



In Search of Better Health

12th KASH Conference

BOOK OF ABSTRACTS

**15th - 18th
FEBRUARY**

SAFARI PARK HOTEL,
NAIROBI (IN PERSON)
& VIRTUAL

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In Search of Better Health

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**African Journal
of Health Sciences**





In Search of Better Health

The 12th KEMRI Annual Scientific & Health (KASH) Conference

**15th - 18th February 2022
SAFARI PARK HOTEL, NAIROBI
(IN PERSON) &
VIRTUAL**

Theme:

*Building a resilient health sector through investments
in data science, research evidence, technology and innovations.*

Organized by:

Kenya Medical Research Institute (KEMRI)

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**MESSAGE FROM
DIRECTOR GENERAL
KEMRI
PROF. SAM KARIUKI**



I take this opportunity to welcome you all to the 12th KEMRI Annual Scientific and Health (KASH) Conference. It is indeed, an exciting moment for KEMRI to host a hybrid Conference of 80 percent physical and 20 percent virtual which is a considerable improvement from last year where we had 100 percent virtual conference.

KASH is a forum that serves to promote health science through dialogue and exchange among scientists, health practitioners, development partners and policy makers with an anticipated 500 participants in attendance. The findings, conclusions and recommendations of this conference will contribute directly to the national discourse managing pandemics, universal Health coverage (UHC) and development.

I am equally happy to report that the theme of the conference is, “Building a resilient health sector through investments in data science, research evidence, technology and innovations.” It is worth noting that we have several other sub themes for the conference that include: Strengthening Health Systems, Mental Health & Other Non-communicable Diseases, Drug Discoveries & Therapeutics, Essential Sexual, Reproductive, Adolescents, Maternal & Child Health, Emerging and Re-emerging Infectious and Parasitic Diseases Prevention, Control and Elimination, Genomics, Diagnostics, Vaccine Development, & Innovations, Climate Change and Zoonoses.

I would also like to take this opportunity to sincerely, thank my colleagues at the KASH Organizing Committee led by the Chair Dr. Cecilia Mbae and her committee members who have worked tirelessly to overcome all the odds and vagrancies posed by COVID-19 pandemic to make this Conference a reality.

I also pay special accolade to the immediate, KASH Conference Chair, Prof. Charles Mbogo who requested to pave way to our new chair after mentoring her and the rest of the team for six years. We celebrate you Prof. Mbogo and thank you for your dedication and service that has seen KASH grow into what it is today.

KEMRI strongly takes cognisance of the Presidential declaration on the four pillars of development in particular, the Universal Health Coverage to which deliberate efforts are being put in place to position it at the top in KEMRI’s flagship in providing not only solutions for diagnosis and management of diseases, but also affordable and available quality health care, including disease surveillance.

It is refreshing to note that at out of the 204 abstracts received, 188 were accepted for presentation with one keynote speaker during the plenary session while six of them were slotted for the plenary talks on different thematic areas which include Mental Health. The conference is also hosting 5 symposia and 25 scientific sessions. I look forward to a robust discussion that will come up with resolutions and I believe solutions that are not just timely, but responsive and result-oriented to our current realities in our health systems.

Finally, allow me to take this opportunity to also, sincerely appreciate the KEMRI Board of Directors, led by our Board Chair, Dr. Daniel M. Mbinda. The Board has not only supported this Conference, but as management, we have continued to benefit from their wisdom, guidance and direction.

It is this support that has nurtured innovation in the Institute that today we celebrate two innovations: the KEMCov PCR-Kit and PlamoCheck mRDT kit that will respectively support diagnostic work against COVID-19 and malaria.

I wish to also sincerely thank all the participants at this Conference, and especially, those who submitted papers for presentation. Without participants, we cannot have a Conference. Most sincere appreciations to all our partners and collaborators who have supported most of this work being presented here today. Finally, to the Government of Kenya through the Ministry of Health who have given us moral and financial support towards making this conference a success.

I trust and believe that we will have a good and successful conference, and I thank you all for your participation and support.

God bless you all.

Prof. Sam Kariuki
Ag. Director General,
KENYA MEDICAL RESEARCH INSTITUTE

MESSAGE FROM KASH CHAIRPERSON, DR. CECILIA MBAE



It is my distinguished honor and privilege to welcome you all to the 12th KEMRI Annual Scientific and Health Conference (KASH) 2022 which is being hosted physically as well as - virtually from February 16 -18, 2022.

Over the last 12 years KASH Conference & Exhibition has continued to provide a premier platform bringing together diverse actors in the health research. The 12th KASH conference's main theme is ***"Building a resilient health sector through investments in data science, research evidence, technology and innovations"*** which is anchored on the following sub-themes: Strengthening Health Systems; Mental Health & Other Non-communicable Diseases; Drug Discoveries & Therapeutics; Essential Sexual, Reproductive, Adolescents, Maternal, & Child Health; Emerging and Re-emerging Infectious and Parasitic Diseases Prevention, Control and Elimination; Genomics, Diagnostics, Vaccine Developments, & Innovations; Climate Change and Zoonotic.

The KASH conference is a strategic event within KEMRI's calendar of activities that brings together researchers, collaborators, both local and international, as well as policy makers and other stakeholders in medical research. This year, we are expecting over 300 participants from various local, regional and international institutions which signifies the importance of this premier scientific event.

The KASH conference continues providing great opportunities for sharing, cross-learning and mentoring of upcoming scientists as well as providing a platform for the discussions of the current health research challenges, exchange of new knowledge that will ultimately shape the future of health research in Kenya and in Africa.

This year's conference features a rich and diverse menu of scientific content, plenary discussions on topical issues in health research, hosted symposia, and exhibitions. I am happy to report that we received a total of 204 abstract submissions, 169 and 19 for oral and poster presentations, respectively. Besides this, there will be diverse opportunities to network with colleagues, form new acquaintances, and forge long-term partnerships from both in-person and the virtual interactive platform.

The conference will have distinguished Keynote and plenary speakers who are world class scientists with deep understanding and wealth of knowledge of not only disease burden, but practical knowledge of appropriate health interventions. The **Opening Keynote Address will be given by Dr. F. George Njoroge on "The Joy of Science: Discovery of Victrelis™, the First HCV Protease Inhibitor to be Approved by Food and Drug Administration (FDA)**. The plenary speakers will be Prof Samuel Kariuki, *"Antimicrobial Resistance, the next pandemic! The evolving AMR Situation in Kenya"*, Dr. Frank Njenga, *"Mental Health and Other Non-communicable Diseases (No Health Without Mental Health)*, Dr. Nelly Mugo *"Single dose HPV vaccine efficacy"*, Prof. Sammy Njenga, *"Current epidemiological status of lymphatic filariasis in Kenya and prospects for its elimination as a public health problem"*, Dr. Sam Aketch, *"Malaria Vaccines: Vaccine Candidates And Evidence Behind WHO Recommendation For Wider Use Of Rts,S/As01 Vaccine"* and Dr. Lucas Nyabero Kimang'a *"Genomics Capacity building and strengthening: Why does it matter for Africa "Kenya"?"*

As the local organizing committee, we are delighted in devoting ourselves to provide leadership, information, and capacity leading to the enhancement of human health, and quality of life through dissemination of research findings, innovations and service delivery.

I encourage all participants to actively engage in the interesting explorations over the next three days and wish you a successful, fruitful, and a memorable conference.

Cecilia Mbae, PhD
Chair, KASH Organizing Committee





PROGRAM AT A GLANCE



OFFICIAL OPENING CEREMONY & LAUNCH OF KEMRI PRODUCTS PROGRAMME FOR THE 12TH KASH CONFERENCE, 15TH, FEBRUARY 2022 AT SAFARI PARK HOTEL

PRECONFERENCE

TIME	ACTIVITY	RESPONSIBILITY
0900 – 0945hrs	Arrival, Registration & Entertainment	Secretariat
0945 – 0955hrs	National and East Africa community Anthem	Band
0955 – 1000hrs	Opening Prayers	Dr. Stephen Wandiga
1000 – 1010hrs	Conference overview by Chairman of KASH Organizing Committee	Dr. Cecilia Mbae
1010 – 1020hrs	Introduction and Welcome Remarks by Director General, KEMRI	Prof. Sam Kariuki
1020 – 1040hrs	Remarks by Chairman of the KEMRI Board of Directors & Introduction of the Board of Directors	Dr. Daniel M. Mbinda
1040 – 1130hrs	Official Opening of the 12 th KASH	Chief Guest
1130 – 1230hrs	Chief Guest Launches: <ul style="list-style-type: none"> • KEMCoV PCR KIT- COVID-19 • PlamoCheck mRDT KIT - Malaria Rapid Kit • ISO 9001:2015 Certification 	Prof. Sam Kariuki
1230 – 1250hrs	Cake Cutting	Prof. Elizabeth Bukusi
1250 – 1300hrs	Vote of Thanks	Dr. Evans Amukoye
1300 – 1315hrs	Photo Session	Corporate Comm.
1315 – 1430hrs	Lunch Break	ALL
Masters of Ceremonies:	Dr. Evans Amukoye	



DAY ONE, WEDNESDAY 16TH FEBRUARY 2022

TIME	OFFICIAL OPENING SESSION & KEYNOTE ADDRESS				
0800-0900hrs	Arrival & Registration				
0900-0910hrs	Prayers				
0910-0920hrs	Welcome Remarks by Director General KEMRI, Prof. Sam Kariuki				
0920-0930hrs	Welcome Remarks by Chair KEMRI Board of Directors, Dr. Daniel M. Mbinda				
0930-0940hrs	Welcome Remarks by KASH Chair, Dr. Cecilia Mbae				
940 - 1010hrs	Opening Keynote Address: Dr. F. George Njoroge; Department of Research, Innovation & Entrepreneurship Kenyatta University Teaching & Referral Hospital Topic: <i>The Joy of Science: Discovery of Victrelis™, the First HCV Protease Inhibitor to be Approved by Food and Drug Administration (FDA)</i>				
Master of Ceremony:	Mr. John Musau				
Session Chair	Dr. Evans Amukoye				
Rapporteur	Dr. Linus Ndegwa				
1010 – 1040hrs	POSTER SESSION AND TEA BREAK				
SCIENTIFIC SESSION 1 – 6 PARALLEL SESSIONS					
1040-1300hrs	1040-1300hrs	1040-1300hrs	1040-1300hrs	1040-1300hrs	1040-1300hrs
Scientific Session 1: AMR 1	Scientific Session 2: Malaria 1	Scientific Session 3: Public Health	Scientific Session 4: Natural Products	Scientific Session 5: Virology 1	Scientific Session 6: NCDs
VENUE: BOGORIA	VENUE: AMBOSELI	VENUE: SAMBURU	VENUE: TSAVO	VENUE: MT. KENYA C	VENUE: MT. KENYA D
Session Chair: Dr. John Mwaniki	Session Chair: Dr. Luna Kamau	Session Chair: Dr. Lydia Kibe	Session Chair: Milka Mwangi	Session Chair: Dr. Limbaso Konongoi	Session Chair: Dr. Rose Bosire
Rapporteur: Susan Kavai	Rapporteur: Koko Mutai	Rapporteur: Mariam Macharia	Rapporteur: Henry Kanyi	Rapporteur: Lilian Mayieka	Rapporteur: Dr. Betty Njoroge
1300-1400HRS: LUNCH BREAK					
SCIENTIFIC SESSION 7 – 11 PARALLEL SESSIONS AND SYMPOSIUM 1					
1400 – 1600hrs	1400 – 1600hrs	1400 – 1600hrs	1400 – 1600hrs	1400 – 1600hrs	1400 – 1600hrs
Scientific Session 7: TB 1	Scientific Session 8: Vector Biology 1	Scientific Session 9: NTDs and One health 1	Scientific Session 10: Health Systems 1	Scientific Session 11: HIV 1	Symposium 1: KNOWLEDGE MANAGEMENT
VENUE: MT. KENYA D	VENUE: AMBOSELI	VENUE: SAMBURU	VENUE: TSAVO	VENUE: MT. KENYA C	VENUE: BOGORIA
Session Chair: Sophie Matu	Session Chair: Prof Charles Mbogo	Session Chair: Milkah Mwangi	Session Chair: James Ngumo	Session Chair: Dr. Serah Gitome	Session Chair: Prof Jennifer Orwa
Rapporteur: Olga Mashedi	Rapporteur: Koko Mutai	Rapporteur: Henry Kanyi	Rapporteur: Sharon Mokuia	Rapporteur: Timothy Kiplagat	Rapporteur: Lilian Mayieka
END OF FIRST DAY					

DAY TWO, THURSDAY 17TH FEBRUARY 2022

TIME	PLENARY TALKS				
0800-0900hrs	Arrival & Registration				
0900- 0920hrs	Plenary 1: Prof. Sam Kariuki: Antimicrobial Resistance, the next pandemic! The evolving AMR Situation in Kenya				
0920 - 0940hrs	Plenary 2: Dr. Frank Njenga: Mental Health and Other Non-communicable Diseases (No Health Without Mental Health)				
0940 -1000hrs	Plenary 3: Prof. Nelly Mugo: Single Dose HPV Vaccine Efficacy				
Session Chair	Dr. Doris Njomo				
Rapporteur	Kelvin Thiong'o				
1000 - 1045hrs	POSTER SESSION AND TEA BREAK				
SCIENTIFIC SESSION 12 – 21 PARALLEL SESSIONS AND SYMPOSIUM 2,3 AND 4					
1045 – 1245hrs	1045 –1245hrs	1045 – 1245hrs	1045 – 245hrs	1045 – 1245hrs	1045 – 1245hrs
Scientific Session 12: Mental Health	Scientific Session 13: Vector Biology 2	Scientific Session 14: NTDs and One health 2	Scientific Session 15: Health Systems 2	Scientific Session 16: MCH 1	Symposium 2: CTMDR
VENUE: MT. KENYA D	VENUE: AMBOSELI	VENUE: SAMBURU	VENUE: TSAVO	VENUE: MT. KENYA C	VENUE: BOGORIA
Session Chair: Dr. Linus Ndegwa Rapporteur: Susan Kavai	Session Chair: Dr. Beatrice Irungu Rapporteur: Koko Mutai	Session Chair: Dr. Erastus Mulinge Rapporteur: Henry Kanyi	Session Chair: James Kariuki Rapporteur: Schiller Buka	Session Chair: Dr. Benson Singa Rapporteur: Bridget Kimani	Session Chair: Dr. Festus Tolo Rapporteur: Dr. Jeremiah Gathirwa Ms. Angela Akide
1300-1400HRS: LUNCH BREAK					



14:00 – 16:00hrs	14:00 – 16:00hrs	14:00 – 16:00hrs	14:00 – 16:00hrs	14:00 – 16:00hrs	14:00 – 16:00hrs
Scientific Session 17: Virology 2 VENUE: MT. KENYA D	Scientific Session 18: Malaria 2 VENUE: MT. KENYA C	Scientific Session 19: TB 2 VENUE: SAMBURU	Scientific Session 20: MCH 2 VENUE: TSAVO	Symposium 3: JICA SATREPS MALARIA PROJECT OSAKA CITY UNIVERSITY (OCU) MOUNT KENYA UNIVERSITY (MKU) KEMRI VENUE: AMBOSELI	Symposium 4: Biotechnology THE ROLE OF GENOMICS IN HEALTH VENUE: BOGORIA
Session Chair: Dr. Samoel Khamadi Rapporteur: Lilian Mayieka	Session Chair: Dr. Joseph Mwangangi Rapporteur: Koko Mutai	Session Chair: Dr. Jane Ong'ang'o Rapporteur: Asiko Ong'aya	Session Chair: Dr. Simon Njoroge Rapporteur: Rosemary Musuva	Session Chair: Prof. Akira Kaneko Rapporteur: Dr. Wataru Kagaya Ms. Susan Kawai	Session Chair: Dr. Damaris Matoke-Muhia Rapporteur: Kelvin Thiong'o

END OF SECOND DAY

DAY THREE, FRIDAY 18TH FEBRUARY 2022

TIME	PLENARY TALKS
0800 - 0900hrs	Arrival & Registration
0900 - 0920hrs	Plenary 4: Prof. Sammy Njenga NTDs: Current epidemiological status of lymphatic filariasis in Kenya and prospects for its elimination as a public health problem
0920 - 0940hrs	Plenary 5: Dr. Sam Aketch: Malaria Vaccines: Vaccine Candidates And Evidence Behind WHO Recommendation For Wider Use Of RTS,S/As01 Vaccine
0940 - 1000hrs	Plenary 6: Dr. Lucas Nyabero Kimang'a: Genomics Capacity building and strengthening: Why does it matter for Africa "Kenya"?
Session Chair	Dr. Vera Manduku
Rapporteur	Susan Kawai

1000 - 1045hrs POSTER SESSION AND TEA BREAK

SCIENTIFIC SESSION 21 – 24 PARALLEL SESSIONS AND SYMPOSIUM 4 AND 5

1045 – 1245hrs	1045 – 1245hrs	1045 – 1245hrs	1045 – 1245hrs	1045 – 1245hrs	1045 – 1245hrs
Scientific Session 21: AMR 2 VENUE: BOGORIA	Scientific Session 22: Health Systems 3 VENUE: MT. KENYA C	Scientific Session 23: Genomics VENUE: MT. KENYA D	Scientific Session 24: TB 3 VENUE: SAMBURU	Scientific Session 25: COVID-19 VENUE: TSAVO	Symposium 5: FOOD ENVIRONMENT RESEARCH IN KENYA VENUE: AMBOSELI



Session Chair: Dr. Lillian Musila	Session Chair: Dr. Joyce Wamicwe	Session Chair: Dr. Limbaso Konongoi	Session Chair: Dr. Peninah Munyua	Session Chair: Dr. John Mwaniki	Session Chair: Prof. Charles Obonyo
Rapporteur: Kelvin Thiong'o	Rapporteur: Stephen Onteri	Rapporteur: Henry Kanyi	Rapporteur: Dr. Erastus Mulinge	Rapporteur: Eric Odoyo	Rapporteur: Rosemary Musuva Bridget Kimani
1300-1400HRS: LUNCH BREAK					
1400-1600hrs	CLOSING SESSION				
	Master Of Ceremony: Prof. Charles Mbogo				
	Sponsors and Exhibitors Session				
	Conference outcomes & resolutions Chief Rapporteur: Dr. Steve Wandiga				
	Awarding Ceremony:				
	Vote of thanks - Dr. Damaris Matoke-Muhia				
	Official Closing remarks KASH Chair: Dr. Cecilia Mbae Ag. Director General & CEO, KEMRI				
END OF THIRD DAY					



KEYNOTE SPEAKER

DR. GEORGE F. NJOROGE

MEMBER OF BOARD OF

DIRECTORS, KEMRI

COMMITTEE CHAIR OF

RESEARCH AND INNOVATION



Dr. Njoroge is a member of Board of Directors at KEMRI and committee chair of Research and Innovation. He is a former Chief Scientific Officer at Kenyatta University Teaching, Referral & Research Hospital and Director of Research, Innovation and Entrepreneurship. Previously, he was a Senior Research Fellow at Eli Lilly and Company and a former a Director in the Department of Medicinal Chemistry at Merck Research Laboratories where he oversaw chemistry program in infectious diseases platform. Through his research leadership at Merck, an anti-HCV viral drug Victrelis™ (also known as Boceprevir or SCH 503034) was discovered – this medicine was approved by FDA on May 13th, 2011 as the first-in-class therapy for Hepatitis C treatment. Dr. Njoroge led his chemistry in the discovery of the second-generation HCV protease inhibitor Nalraprevir® that has completed Phase IIb clinical trials and is currently marketed in Russia as Arlansa. He has also worked extensively in the oncology area, especially in the discovery of therapeutic agents geared towards intervention of signal transduction process in proliferating cells: that work led to discovery of Sarasar®, a farnesyl transferase inhibitor approved for treatment of Progeria –a life threatening disease that cause accelerated aging in kids.

A graduate of University of Nairobi, first class honors, he holds Ph.D. in organic chemistry from Case Western Reserve University, USA

Dr. Njoroge has published extensively in drug discovery and is an author of 134 scientific publications and 104 USA granted patents. Dr. Njoroge was inducted into “Hall of Fame” as the latest Hero of Chemistry by the American Chemical Society (ACS) at a ceremony held in Philadelphia on August 19th 2012. He is a recipient of numerous awards, including Emerald Award for Professional Achievement in Industry and Thomas Alva Edison Patent Award for emerging therapies. Distinguished Alumni Award by Case Western Reserve University among others. Dr. Njoroge was conferred with an Honorary Degree of Pharmaceutical Science by Mount Kenya University in 2014 and Doctor of Science (Honoris Causa) by KCA University in 2021.

Dr. Njoroge is the Founder of Centre of Africa’s Life Sciences (C.O.A.L.S), a premier institution that is being established in Naivasha, Kenya with the primary goal of searching and developing novel medicines in the continent of Africa.

ABSTRACT

THE JOY OF SCIENCE: DISCOVERY OF VICTRELIS™ , THE FIRST HCV PROTEASE INHIBITOR TO BE APPROVED BY FOOD AND DRUG ADMINISTRATION (FDA)

This is an inspiring story by Dr. F. George Njoroge, a Kenyan born scientist based in USA. Dr. Njoroge will take us through the journey that led to discovery of Victrelis, a Hepatitis C virus (HCV) protease inhibitor drug that was discovered by his team in New Jersey, USA and approved by Food and Drug Administration (FDA) on May 13th 2011 for the treatment of the aforementioned indication. HCV affects about 200 million people worldwide and the previous standard of care, interferon-ribavirin was suboptimal. The team undertook a structural based drug discovery effort that led to discovery of this important medicine. The science behind this discovery will be discussed in this presentation and will highlight aspects that made his team to be inducted to the coveted ‘Hall of Fame’ as Heroes of Chemistry by American Chemical Society (ACS).



PLENARY SPEAKERS

PLENARY 1: AMR

PROF. SAM KARIUKI
(BVM, MSC PHARMACOLOGY,
PHD TROPICAL MEDICINE)



Prof. Sam Kariuki obtained his BVM (1989) and MSc (1991) from University of Nairobi, and PhD from the Liverpool School of Tropical Medicine (1997). He is a Chief Research Officer at Kenya Medical Research Institute (KEMRI), and currently the substantive Director, Research and Development and Acting Director General at KEMRI. He is Fellow, African Academy of Sciences, Honorary Faculty, Ohio State University and a Wellcome Sanger Honorary Faculty. He is a visiting Professor of Tropical Microbiology, Nuffield Department of Medicine, University of Oxford, Section Editor, Journal of Medical Microbiology and a member of the American Society for Microbiology. He serves as a member of the World Health Organization Strategic and Technical Advisory Group for Antimicrobial Resistance (STAG-AMR) and previously served as a member of the Advisory Group for Integrated Surveillance of Antimicrobial Resistance (AGISAR).

His research interests are in epidemiology and genomics of enteric bacterial pathogens and antimicrobial resistance, including invasive non-typhoidal salmonellosis (NTS) and typhoid fever, *Vibrio cholerae* and *Escherichia coli*. He has authored 162 papers in peer-reviewed journals and 4 text books on Antimicrobial Resistance and Food Safety. He led the initiative to develop Situation Analysis (Published in January 2011 and updated in May, 2017) and the National Action Plan to combat and control Antimicrobial Resistance. He is also a member of the National Antimicrobial Stewardship Committee overseeing the implementation of the National Action Plan in Kenya.

Abstract

Antimicrobial Resistance, the next pandemic! The evolving AMR Situation in Kenya

Multidrug resistant infections are a major threat to attaining universal healthcare in Kenya with majority of the population unable to afford alternative options available for effective management of infections. Diseases such as typhoid, cholera and invasive nontyphoidal salmonella (NTS) are among the key Enteric infections endemic, especially in displaced populations and among the urban populations living in overcrowded informal settlements. We share data epidemiology of these infections and the growing problem of multidrug resistance (MDR) including emerging resistance to the last line of treatment for these infections. Prevalence rates to commonly available antimicrobials including ampicillin, chloramphenicol cotrimoxazole and tetracycline, now range between 65-80%, while 15-20% of recently studied isolates show reduced susceptibility to fluoroquinolones and emerging resistance to mediated by CTX-M15 gene on a highly mobile genetic element. The high prevalence of resistance to commonly used antimicrobials and to extended spectrum beta-lactams (ESBLs) with reduced susceptibility to fluoroquinolones, calls for enhanced control and management options. From a one-health perspective, we are implementing the National Action Plan to combat and prevent antimicrobial resistance, but these efforts require to be adopted and enhanced at all different levels of healthcare in order to yield meaningful results. In addition, utilization of WHO approved vaccines in the short-to medium term and improvement of water and sanitation in the long term will go a long way in addressing the huge challenge of antimicrobial resistance.



PLENARY 2: MENTAL HEALTH

DR. FRANK NJENGA

PSYCHIATRIST
NAIROBI, KENYA



Frank Njenga graduated at the University of Nairobi in 1975. He obtained the Membership of the Royal College of Psychiatrists in 1980, after training at the Maudsley Hospital in London. He was subsequently elected Fellow of the College. He taught at the University of Nairobi, before venturing into full time private practice in 1983. He was the first full time Psychiatrist in private. Through the media, public lectures as well as talks to professional bodies and schools, he was, for a long time the public face of mental health in Kenya.

Over the years, he has led the campaign against stigma of mental health using among other methods, the mass media. His T.V series, (Frankly Speaking) broke the silence over mental health issues and led Kenyans to embrace the message that mental illness is common and treatable.

He is the author of several books, including a textbook of psychiatry, numerous scientific publications as well as a long running weekly column in the Business Daily.

In public life, he served as Chairman NACADA, and was founder Chairman of AAPAP. (Association of African Psychiatrists and Allied Professions). He is the founder and chair of the Chiromo Group of Hospitals.

Most recently he was the Chairman of the National Taskforce on Mental health and is the Presidential Advisor on mental health in Kenya.

ABSTRACT

MENTAL HEALTH AND OTHER NON-COMMUNICABLE DISEASES (NO HEALTH WITHOUT MENTAL HEALTH)

The recently launched Mental Health Task Force Report (July 2020) is clear testimony to the fact that Kenya is at last fully cognizant of the importance of Mental Health.

The taskforce found, among other things, a high burden of disease, high prevalence of stigma and discrimination, as well as low investment in Mental Health.

Persons with severe mental illness (e.g., Schizophrenia) have a significantly reduced life expectancy (20years). Though suicide is a contributor to this mortality, other significant factors are at play.

The major cause of this increased mortality is the high rate of Cardiovascular, Respiratory and metabolic disorders (e.g., diabetes) found in people with mental disorders. Higher rates of obesity, smoking, and sedentary lifestyles so common in mental health practice are other significant factors. Alcohol and other substance use disorders contribute to this increased mortality.

Depression is two to three times more common in patients with diabetes than in the general population. The rates of depression in patients with cardiovascular disease are high. The rates of cardiovascular in depressed people is high. Patients with cancer have high rates of depression.

The association between Mental Health and other NCD'S is the new frontier of research.

The office of Presidential Advisor on Mental Health is tasked with increasing the visibility and accessibility of mental health in Kenya.



PLENARY 3: SEXUAL REPRODUCTIVE, ADOLESCENT AND CHILD HEALTH (SRACH)

PROF. NELLY RWAMBA MUGO
SENIOR PRINCIPAL CLINICAL
RESEARCH SCIENTIST – KEMRI



Prof. Nelly Mugo is a reproductive health specialist, with over 27 years of clinical experience and 2 decades in clinical research. She is actively engaged in clinical trial research, with a focus on HIV and cervical cancer prevention research. She has worked on HIV and cervical cancer prevention research for over 2 decades. She was an investigator for the Partners PrEP studies, that informed the change in indication for Truvada as HIV pre-exposure prophylaxis. At the Kenyatta National Hospital, she provided clinical services and trained specialists on clinical techniques for the management of cervical intraepithelial lesions for over 12 years. Prof. Mugo has conducted observational HPV studies among sex workers in Kenya, HPV vaccine trials among adolescents and is currently a Principal investigator in a study in Kenya evaluating ‘single dose HPV vaccine’ KENSHE. Prof. Mugo leads a clinical trial unit, PHRD-CCR-KEMRI, in Thika, Kenya. She is a senior principal clinical research scientist at the Center for Clinical Research (CCR), Kenya Medical Research Institute.

ABSTRACT

SINGLE DOSE HPV VACCINE EFFICACY

Background: Human papillomavirus (HPV) is associated with 4.5% of all cancers and high-risk HPV infection causes almost all cervical cancer. Globally, cervical cancer is the 4th most common cause of cancer and cancer deaths among women and is the leading cause of cancer deaths in 42 low-middle -income countries where 90% of invasive cervical cancer deaths occur. The vaccine has been proven to be highly efficacious in prevention of vaccine type HPV infections, yet only 15% of girls are immunized Globally, against the World Health Organization target of 90% to achieve cervical cancer elimination.

Single dose, if efficacious would reduce the cost of vaccine delivery and overcome some of the challenges that undermine HPV vaccine coverage. Globally, there are several studies evaluating the immunogenicity and efficacy of single dose HPV vaccination.

Methods: The Kenya Single Dose HPV efficacy study (KENSHE) is a double blind randomized clinical, conducted at three KEMRI clinical trial clinics, that evaluated the efficacy of a single dose of HPV vaccination in prevention of persistent vaccine type HPV infection. Girls ages 15 to 20 years were randomly assigned to either the nonavalent HPV vaccine, bivalent HPV vaccine and meningococcal vaccine.

Results: The retention was 98% at 18 months of follow-up. Nonavalent vaccine efficacy (VE) was 97.5% (95%CI 81.7-99.7%, $p < 0.0001$), and bivalent VE was 97.5% (95%CI 81.6-99.7%, $p < 0.0001$).

Conclusion: In a randomized trial among young women with HPV exposure, single-dose HPV vaccine was highly efficacious.



PLENARY 4: NTDS

PROF. SAMMY NJENGA SENIOR PRINCIPAL RESEARCH SCIENTIST – KEMRI



Prof. Sammy Njenga is a Senior Principal Research Scientist at the Kenya Medical Research Institute (KEMRI) and former Centre Director of the Eastern and Southern Africa Centre of International Parasite Control (ESACIPAC) in KEMRI. He has PhD in Tropical Health Research from the Liverpool School of Tropical Medicine, United Kingdom. Prof. Njenga is actively involved in conducting research on Neglected Tropical Diseases (NTDs) and has contributed to publishing of more than 100 articles in peer-reviewed scientific journals. He also holds a visiting professor position in the Department of Parasitology at Nagasaki University, Japan.

Prof. Njenga has been providing technical assistance to NTD programmes in several countries in the African region particularly in monitoring and evaluation (M&E). He is a member of the national NTD Expert Committee and the current national chairperson of the Lymphatic Filariasis Technical Advisory Group. He is also a member of the World Health Organization NTD Diagnostics Technical Advisory Group.

Prof. Njenga has been a Principal Investigator (PI) of several lymphatic filariasis research projects, and currently conducting an applied field research to develop an M&E strategy to guide decisions for stopping triple drug mass treatment. Prof. Njenga also does research in schistosomiasis and soil-transmitted helminthiasis. He is the PI of an implementation research on access and adoption of a new child-friendly praziquantel formulation to treat schistosomiasis in preschool-aged children. Since 2020, Prof. Njenga has been the local PI of a project conducting field evaluation of a prototype point-of-care rapid diagnostic test (RDT) for schistosomiasis.

Abstract

Current epidemiological status of lymphatic filariasis in Kenya and prospects for its elimination as a public health problem

Lymphatic filariasis (LF), commonly known as elephantiasis, is mosquito borne parasitic filarial disease belonging to the neglected tropical diseases (NTDs). Earlier research demonstrated that transmission of LF infection can be stopped through preventive chemotherapy. Tremendous progress towards elimination of LF as a public health problem has been made since 1997 when the Fiftieth World Health Assembly encouraged Member States to eliminate the disease as a public health problem. In response, the WHO launched its Global Programme to Eliminate Lymphatic Filariasis (GPELF) in 2000.

In Kenya, LF occurs in the coastal region and prevalence surveys date as early as the 1920s. The National Programme for Elimination of LF (NPELF) was launched in 2002 and has been able to implement preventive chemotherapy through which several rounds of annual mass treatment has been provided to the at risk communities. Results of studies in the coastal area together with programme monitoring and evaluation (M&E) have shown a dramatic decline in the prevalence of the disease. This keynote will 1) provide an overview of the current epidemiological status of LF in Kenya; and 2) explore the prospects of its elimination as a public health problem in the country.



PLENARY 5: MALARIA VACCINE

DR. SAMUEL AKECH
MBChB, MMED (PAEDIATRICS),
DPHIL & PRINCIPAL
INVESTIGATOR AT THE KEMRI/
WELLCOME TRUST PROGRAMME



Sam (MBChB, MMED (Paediatrics), Dphil) is a principal investigator at the KEMRI/Wellcome Trust Programme, Nairobi, a honorary lecturer at the Department of Paediatrics, University of Nairobi, Kenya, and a Visiting Research Fellow, University of Oxford, United Kingdom. He is a consultant paediatrician and clinical epidemiologist with research interest in severe febrile illnesses in children spanning epidemiology, clinical trials, comparative effectiveness research, digital health, quality improvement, and data science. He leads the sentinel surveillance in Kenya for the WHO-led evaluation of RTS, S/AS01 malaria vaccine following its pilot introduction in 2019 in Kenya, Ghana, Malawi. He is involved in teaching and supervision of postgraduate and doctorate students, is a peer reviewer for several medical journals and research funders, is an editorial board member of BMC Medicine, and provides technical consultation to global bodies involved in health such as the World Health Organization (WHO). His Google Scholar Profile can be found at (<https://scholar.google.com/citations?user=NYPYPn4AAAAAJ&hl=en>).

ABSTRACT

MALARIA VACCINES: VACCINE CANDIDATES AND EVIDENCE BEHIND WHO RECOMMENDATION FOR WIDER USE OF RTS,S/AS01 VACCINE

Malaria remains a major cause of illness and deaths; 241 million cases and 627,000 deaths occurred globally in 2020 but most of the burden is concentrated in Africa and predominantly in children. Malaria vaccine has been thought as an additional tool for the control of malaria. RTS,S/AS01 malaria vaccine, developed over 3 decades, was recommended by the World Health Organization (WHO) for broader use as part of routine childhood immunization in October 2021. This session will present the evidence behind the WHO recommendation, summarize other malaria vaccines in development, research priorities for malaria vaccines, and highlight the role of diverse groups, including KEMRI, in the malaria vaccine development.



PLENARY 4: GENOMICS

DR. LUCAS NYABERO KIMANG'A

CEO, PHARMACEUTICAL SOCIETY
OF KENYA (PSK)



Title: **Genomics Capacity building and strengthening: Why does it matter for Africa “Kenya”?**

Dr. Lucas Nyabero Kimanga is a husband to Wambui and both are parents to James, Kerubo, and Tenzin.

Since earning his Doctor of Pharmacy degree from MCPHS University, Dr. Nyabero has worked as a clinical pharmacist, a community pharmacist, and as Faculty in the College of Pharmacy departments of 5 universities. Besides, he is an entrepreneur with a special interest in Personalized Medicine. Trained in pharmacogenetics and pharmacogenomics, he was a pioneer in the use of this technology to guide pharmacologic therapy choices in Arizona. Dr. Nyabero has also been very active in Personalized Medicine circles in the United States and internationally. Personalized Medicine reduces adverse side effects, slows disease progression, reduces incidences of drug therapy related complications, and ultimately leads to better healthcare outcomes and lower healthcare costs.

Dr. Nyabero is an ardent advocate for the advancement of Precision Medicine. He considers a robust NGS platform database to be a vital gateway to Precision Medicine with crucial benefits for Africa. Current health AI algorithms have insufficient Kenyan, and by extension, African data. Expanding the database will have a profound effect on AI technology implementation.

Abstract

Genetics, Genomics, and the potential of these technologies to help with disease, preemption, diagnosis, and therapy are tremendous. It's potential for wellness care and preventive care major too. This can translate to reduces healthcare costs and can play a big role in UHC. The current pace of development and innovation in these fields in America, Europe, and Asia is breathtaking. Africa is not anywhere close to this pace. The algorithms being developed to automate some of these processes are devoid of African data. Surely this is not acceptable. We need to get up and start running and fast!





FULL PROGRAM



DAY 1, WEDNESDAY, 16th FEBRUARY 2022

TIME	DAY 1 OPENING SESSION & KEYNOTE ADDRESS	
0800-0900hrs	Arrival and Registration of Delegates	
0900 – 0915hrs	Conference overview: Chair of KASH Organizing Committee, Dr. Cecilia Mbae	
0935 - 0955hrs	Remarks from Director General KEMRI Prof. Sam Kariuki Remarks from Chair, KEMRI Board of Directors, Dr. Daniel M. Mbinda	
1010 - 1040hrs	Opening Keynote Address: Dr. F. George Njoroge; Department of Research, Innovation & Entrepreneurship Kenyatta University Teaching & Referral Hospital Topic: <i>The Joy of Science: Discovery of Victrelis™, the First HCV Protease Inhibitor to be Approved by Food and Drug Administration (FDA)</i>	
Master of Ceremony:	Mr. John Musau	
Session Chair	Dr. Evans Amukoye	
Rapporteur	Dr. Linus Ndegwa	
1040 – 1115hrs	POSTER SESSION AND TEA BREAK	
1330- 1630hrs	SCIENTIFIC SESSION 1-4, Symposium 1	
Time (EAT) 1115hrs-1300hrs	Abstract No	Scientific Session 1: AMR 1 VENUE: BOGORIA Session Chair: Dr. John Mwaniki Rapporteur: Susan Kawai
	1.	Antimicrobial resistance and virulence characteristics of Klebsiella pneumoniae isolates in Kenya; Angela Muraya
	2.	Prevalence and risk factors for the transmission of H. pylori, E. coli and Klebsiella species among patients presenting with gastritis in Nairobi, Kenya; Sophia Kuve
	3.	Antimicrobial Resistance patterns of Bacterial isolates recovered from UTI patients visiting different healthcare facilities; Susan Kiiru
	4.	Carbapenem resistance in Gram negative bacteria: resistance mechanisms and reduced susceptibility to recently approved drugs; Anne Amulele
	5.	Drug Resistance Mutations Profile Among Infants in Kenya; Sheila Kageha
	6.	Prevalence, Antimicrobial Susceptibility Profiles, and Antimicrobial Resistance Genotypes of Listeria monocytogenes and Gram-Negative Co-isolates from Raw Meats Obtained from Selected Formal and Informal Markets in Nairobi County. Anita Chepkemei
	7.	Comparative Evaluation of ADAGIO and VITEK Automated Antimicrobial Susceptibility Testing Platforms using a collection of Kenyan Clinical Isolates Justin Nyasinga
Time (EAT) 1115hrs-1300hrs	Abstract No	Scientific Session 2: Malaria (1) Venue: AMBOSELI Session Chair: Dr. Luna Kamau Rapporteur: Koko Mutai
	8.	Malaria is a cause of iron deficiency in African children; John Muriuki
	9.	Synergism in Antiplasmodial activities of Epirubicin in combination with Artemether and Lumefantrine; Douglas Ochora



	10.	Plasmodium ovale and Plasmodium falciparum Co-infection is Associated with Symptoms in Malaria Endemic Regions of Western Kenya; Jackline Juma
	11.	Optimization of an antimalarial drug delivery system to infected laboratory reared Anopheles gambiae using sugar baits to target Plasmodium in Mosquitoes; Mollyne Okal
	12.	Amodiaquine pressure selects nonsynonymous mutations in pantothenate kinase, diacylglycerol kinase, and phosphatidylinositol 4 kinase in Plasmodium berghei ANKA; Jean chepngetich
	13.	Capacity to conduct infectious disease surveillance: An investigation of suspected malaria outbreak in the epidemic-prone Nandi County, Kenya; Githinji Geoffrey
	14.	Maintenance of high temporal Plasmodium falciparum genetic diversity in Kilifi, Kenya, despite a reduction in community malaria transmission from 2007 to 2018; Kelvin Muteru
Time (EAT) 1115hrs-1300hrs	Abstract No	Scientific Session 3: Public Health 1 VENUE: SAMBURU Session Chair: Dr. Lydiah Kibe Rapporteur: Mariam Macharia
	15.	Impact of rotavirus vaccination on all-cause and rotavirus-specific gastroenteritis and strain distribution in Kiambu, central Kenya:11-year surveillance; Maurine Mutua
	16.	Mycoflora diversity in stored water from selected households in Nairobi; Olga Mashedi
	17.	Framework for strengthening disease surveillance and response systems: the case of neglected tropical diseases and implications for other endemic and newly emerging diseases; Arthur Ng'etich
	18.	Knowledge, attitudes and Practices of Medical Students on Covid 19 in Burundi; Yves Nsavyimana
	19.	We are in the battlefield and can be hit by stray bullets': Risk Perception for COVID-19 among Health care providers in Kenyatta National Hospital, Nairobi, Kenya; Vallery Ogello
	20.	Communication to improve HPV vaccine coverage in sub-Saharan Africa: a systematic review; Edwin Ochomo
	21.	Scaling up of Polioviruses Surveillance Using Special Strategies of Environmental Surveillance as a Supplementary Strategy for Polio outbreak monitoring in Kenya 2013-2017; Rosemary Nzunza
	22.	Prevalence and types of bacterial contaminants in a tertiary hospital in kenya; Chester Omondi
	23.	Integrity, Use, and Care of Treated Mosquito Nets in Kirinyaga County, Kenya; Mary Sofia
	24.	COVID-19 Vaccine concerns among Healthcare Providers in Kenyatta National Hospital, Nairobi, Kenya: A Qualitative Study; Phelix Okello
	25.	High willingness to pay for PrEP services at retail pharmacies in Kenya; Peter Atandi
	26.	Relationship between Household Air Pollution and Acute Respiratory Infections Among Young Children in Central Kenya; James Mwitari



Time (EAT) 1115hrs-1300hrs	Abstract No	Scientific Session 4: Natural Products VENUE: TSAVO Session Chair: Milka Mwangi Rapporteur: Henry Kanyi
	27.	Screening of antibacterial and anthelmintic potentials of <i>Carica papaya</i> seed oil; Bonface Khajezoanne
	28.	In silico and in vitro response of NCI-60 tumour cell lines to oleanonic acid; Beatrice Irungu
	29.	Pinto beans (<i>Phaseolus vulgaris</i> L.) exhibit potent antiviral activity against human influenza A virus; Phyllis Langat
	30.	Structure based discovery of a quinolinone compound inhibiting nucleoprotein of influenza A virus without selecting for resistant mutants; Juliann N Makau
	31.	The Role of Traditional Medicine in Management of Diabetes Mellitus in Kenya: A Review; Kipkoech Lucia
	32.	Assessment of Phytochemical and Biological Properties of Moringa oleifera Leaves Phytosome on Breast Cancer Cell Lines; Jecinta Wanjiru Ndung'u
	33.	Herbal combination remedy for the management of covid-19 and associated predisposing ailments; Peter Mwitari
	34.	Antibacterial, antioxidant and sun protection potential of selected ethno medicinal plants used for skin infections in Uganda; Peter Sekandi
Time (EAT) 1115hrs-1300hrs	Abstract No	Scientific Session 5: Virology 1 VENUE: MT. KENYA C Session Chair: Dr. Limbaso Konongoi Rapporteur: Lilian Mayieka
	35.	Detection and investigation of vaccine-derived poliovirus circulation by environmental surveillance -A recent case study; Joanne Hassan
	36.	Detection of poliovirus using cell culture in EPI Laboratory, KEMRI from 2018 to 2020; Fiona Alaii
	37.	Neuraminidase inhibition susceptibility of Influenza A virus (IAV) isolates obtained from Kenya, 2008 to 2017; Meshack Wadegu
	38.	Hepatitis C treatment for people who inject drugs in Kenya; Joyce Nyagilo
Time (EAT) 1115hrs-1300hrs	Abstract No	Scientific Session 6: NCDs VENUE: MT. KENYA D Session Chair: Dr. Rose Bosire Rapporteur: Dr. Betty Njoroge
	39.	Characterization of Diabetic Patients at Kericho County Referral Hospital, January-September 2021; Stanley Kemboi
	40.	Characteristics and changes in health-related quality of life of patients treated for esophageal cancer in eldoret; Tabitha Kamau
	41.	An evaluation of current practices in management of diabetic ketoacidosis in a Kenyan academic medical center; Karingo Agnes
	42.	Complementary and Alternative Medicine (CAM) Use among Prostate Cancer Patients at Kenyatta National Hospital, Nairobi, Kenya; Cecilia Kimani
	43.	Baseline Assessment of Cervical Cancer Screening and Treatment Capacity in 25 Counties in Kenya, 2021; David Kariuki
	44.	Assessment of Case Management of Sexual and Gender-based Violence Cases, Uasin Gishu County Hospital, 2018-2020; Jedidah Kiprop



	45.	The Effect of Community-Based Lifestyle Modification Program on risk factors for hypertension Among Adults Living in an Urban Informal Settlement; Beatrice Olack
	46.	The burden of Non-communicable lung diseases in Kenya: Chronic Respiratory Diseases in Nairobi; Hellen Meme
1300-1400hrs: LUNCH BREAK		
SCIENTIFIC SESSION 7-11 AND SYMPOSIUM 1		
Time (EAT) 1400hrs-1600hrs	Abstract No	Scientific Session 7: TB 1 VENUE: MT. KENYA D Session Chair: Sophie Matu Rapporteur: Olga Mashedi
	47.	Characteristics of Extra-pulmonary Tuberculosis Cases in Kitui County, Kenya 2019; Grace Rabut
	48.	Chronic respiratory disease in adult out-patients in three African countries: a cross sectional study; Hellen Meme
	49.	Gaps related to screening and diagnosis of tuberculosis in care cascade in selected health facilities in East Africa countries: A retrospective study; Esther Ngadaya
	50.	Evaluating the significance of actinomycetes infections in tb smear negative and retreatment cases from selected referral facilities, kenya; Frida Njeru
Time (EAT) 1400hrs-1600hrs	Abstract No	Scientific Session 8: Vector Biology 1 VENUE: AMBOSELI Session Chair: Prof Charles Mbogo Rapporteur: Koko Mutai
	51.	Genetic variability of Aedes aegypti populations from Northern Kenya, and their influence on Dengue-2 virus transmission; Edith Chepkorir
	52.	An assessment of the entomological risk of Yellow Fever Virus re-emergence and outbreak in Kenya; Shillah Nasambu
	53.	Insecticide resistance status of indoor and outdoor resting malaria vectors in a highland and lowland site in Western Kenya; Kevin Owuor
	54.	Spatially explicate sampling frames to identify regions of increased mosquito abundance; Brigid Kemei
	55.	Bacterial composition differs between permethrin-susceptible and -resistant Anopheles gambiae s.s. in a site with intense pyrethroid resistance in western Kenya; Diana Omoke
Time (EAT) 1400hrs-1600hrs	Abstract No	Scientific Session 9: NTDs and One health 1 VENUE: SAMBURU Session Chair: Milkah Mwangi Rapporteur: Henry Kanyi
	56.	A comparative study on the quality of life of leprosy patients in Kilifi and Kwale counties in Kenya; Jane Ong'ang'o
	57.	Progress towards rabies elimination in kitui county: 2019-2021; Peris Kung'u
	58.	Molecular epidemiology of cystic echinococcosis in Kenya (2012 – 2021); Erastus Mulinge
	59.	One Health surveillance; Evidence of known and new zoonotic arboviruses circulation in multiple hosts with potential impact to Human; Dorcus Omoga
	60.	Seroprevalence of Human African Trypanosomiasis and Schistosomiasis in Taita Taveta County, Kenya; Joanne Yego



Time (EAT) 1400hrs-1600hrs	Abstract No	Scientific Session 10: Health Systems 1 VENUE: TSAVO Session Chair: James Ngumo Rapporteur: Sharon Mokuu
	61.	Challenges facing blood transfusion services at the eldoret regional blood transfusion centre; Briton Matata
	62.	Evaluation of Enhanced Syndromic Surveillance System for Rift Valley Fever in Kenya, 2021; Nassoro Mwanyalu
	63.	Assessment of Analytical Quality Management Systems at The Bungoma County Referral Hospital Laboratory; Whitney Ondari
	64.	Migori County Multi-Sectoral Action Plan to Improve The Health and Well-Being of Adolescents and Youth: Mid Term Evaluation Results (July 2018-December 2020); Lillian Nyaga
	65.	Implementation considerations for the WHO Essential Diagnostics List with insights from the Essential Medicines List: A scoping review; Moriasi Nyanchoka
	66.	What are the barriers to and provider-developed strategies for early implementation of pharmacy-delivered PrEP services in Kenya? A qualitative study; Peter Atandi
	67.	Navigating emergency but licit procurement during pandemics; Joshua Maina
	68.	How are global health policies transferred to sub-Saharan African countries? A systematic critical review of literature; Walter Odoch
Time (EAT) 1400hrs-1600hrs	Abstract No	Scientific Session 11: HIV 1 VENUE: MT. KENYA C Session Chair: Dr. Serah Gitome Rapporteur: Timothy Kiplagat
	69.	HIV Infection During Pregnancy at Kisumu County Referral Hospital; A Surveillance Evaluation, 2021; Clara Andala
	70.	HIV testing and linkage to care - A case of a mobile diagnostic and counseling service in Mbeya, Tanzania; A quantitative study; Amani Kway
	71.	Proof of principle oral dissolvable strip formulation for pediatric ARV prophylaxis; Sarah Finocchario
	72.	HIV and HCV risk assessment and testing outcomes among sex workers and long distance drivers in Kenya; Alex K Maiyo
	73.	Patterns and causes of suboptimal response to nevirapine based therapy in patients receiving antiretroviral therapy in kisumu and malindi, kenya; Juster Mungiria
	74.	HIV and Viral co-infections: Results from a multicenter study across sites in Kenya; Joseph Mwangi
Time (EAT) 1045 – 1245hrs	Abstract No	Symposium 1: Knowledge Management VENUE: BOGORIA Session Chair: Prof. Jennifer Orwa Rapporteur: Lilian Mayieka



DAY TWO, THURSDAY 17th FEBRUARY 2022

0800-0900hrs	Arrival and Registration of Delegates	
0900-1000hrs	PLENARY TALKS	
0900- 0920hrs	Plenary session 1: Prof. Sam Kariuki- “Antimicrobial Resistance, the next pandemic! The evolving AMR Situation in Kenya”	
0920 - 0940hrs	Plenary 2: Dr. Frank Njenga- “Mental Health and other non-communicable diseases (No health without mental health)”	
0940 -1000hrs	Plenary 3: Dr. Nelly Mugo- “Single dose HPV vaccine efficacy”	
Session Chair: Rapporteur:	Dr. Doris Njomo Kelvin Thiong’o	
1000-1045hrs	BREAK, POSTER SESSION	
1045 – 1245hrs	SCIENTIFIC SESSIONS 12- 21, Symposium 2, 3 and 4	
Time (EAT) 1045 – 1245hrs	Abstract No	Scientific Session 12: Mental Health Venue: MT. KENYA D Chair: Dr. Linus Ndegwa Rapporteur: Susan Kavai
	75.	How postnatal depression impacts on neonatal outcomes: an exploratory study in Kisumu County, western Kenya; Catherine Gribbin
	76.	Characteristics of People living with Mental Illnesses at Mathari Mental Hospital in 2020; Jane Muriuki
	77.	Sources of stress and coping mechanism among maternal health care providers in western Kenya; Joyceline Gaceri
	78.	Prevalence of postpartum depression, mothers’ experiences and barriers and facilitators to seeking postpartum depression care among postpartum mothers attending the postnatal clinic in Jinja Hospital Uganda; Dorothy Akongo
	79.	Social Media Use and Addictive and Depression and Suicide Ideation in Elburgon Ward; Ndirangu Ngunjiri
	80.	Availability of Postpartum Depression care services at Adeoyo Maternity Teaching Hospital and University College Hospital, Ibadan, Nigeria; Dorothy Akongo
	81.	Needs Assessment of the Prevalence and Extent of Sexual Harassment at the Kenya Medical Research Institute (KEMRI); Sarah Okumu
	82.	Socio-cultural perspectives of suicidal behavior at the Coast region of Kenya: an exploratory study; Linnet Onger
Time (EAT) 1045 – 1245hrs	Abstract No	Scientific Session 13: Vector Biology 2 Venue: AMBOSELI Session Chair: Dr. Beatrice Irungu Rapporteur: Koko Mutai
	83.	Survey of yellow fever virus susceptibility across African populations of Aedes aegypti; Victor Okoth
	84.	Mosquito-human contact as a risk factor for dengue and chikungunya virus exposure in major towns along the Northern transport corridor, Kenya; Francis Musili
	85.	Insecticide resistant Anopheles gambiae have enhanced longevity but reduced biting frequency and reproductive fitness; Joyce Kemunto



	86.	Genetic Variation of <i>Aedes aegypti</i> Mosquitoes from Mombasa And Kilifi Counties; Linda Tum
Time (EAT) 1045 – 1245hrs	Abstract No	Scientific Session 14: NTDs and One health (2) VENUE: SAMBURU Session Chair: Dr. Erastus Mulinge Rapporteur: Henry Kanyi
	87.	Unravelling antimicrobial resistance phenotypes and carriage of extended-spectrum β -lactamase genes in <i>Escherichia coli</i> isolated from farmers and their cattle in Kiambu county, Kenya; Dan Waithiru
	88.	Environmental and Household-Based Spatial Risks for Tungiasis in an Endemic Area of Coastal Kenya; Ayako Hyuga
	89.	Prevalence of intestinal parasitic infections in the community of Oloisukut Conservancy, Narok County, Kenya; Zipporah Njeri
	90.	Interleukin-4 responsive dendritic cells are dispensable to host resistance against <i>Leishmania mexicana</i> infection; Bernard Ong'ondo
	91.	Mapping the spread of <i>Procambarus clarkii</i> and their subtle effect on schistosomiasis transmitting snails within Mwea irrigation scheme, Kenya; Geoffrey Murai
	92.	Screening of <i>Wuchereria bancrofti</i> in human blood and mosquitoes in Matayos, Busia County, Kenya Nancy Kinyatta
Time (EAT) 1045 – 1245hrs	Abstract No	Scientific Session 15: Health Systems (2) VENUE: TSAVO Session Chair: James Kariuki Rapporteur: Schiller Buka
	93.	Factors affecting implementation of quality management systems in ISO 15189:2012 accredited laboratories: a survey of staff opinions at Kitale regional public health laboratory; Briton Matata
	94.	Challenges and Lessons Learnt in performing Minimally Invasive Autopsy in under 5 children enrolled in Child Health and Mortality Prevention Surveillance (CHAMPS) in Western, Kenya; Peter Onyango
	95.	An Assessment of the Challenges Facing Blood Transfusion Services at the Bungoma Satellite Blood Transfusion Centre amidst the COVID-19 Pandemic; Brian Nanjendo
	96.	Community Health Volunteers Practices in Advancing Social Accountability in Nairobi County, Kenya; Malkia Abuga
	97.	A Collaboration Approach to Healthcare Service Delivery in Resource Constrained Countries .Case Study: Uganda Martyrs Hospital Lubaga–Uganda; Samuel Walusimbi
	98.	Digital technology alternatives in provision of continued access to health care during the Covid-19 pandemic in Kenya; Samuel Gatherer
	99.	Facilitating timely and equitable healthcare access using blockchain technology; Joe Kabyemela



Time (EAT) 1045 – 1245hrs	Abstract No	Scientific Session 16: MCH 1 VENUE: MT. KENYA C Session Chair: Dr. Benson Singa Rapporteur: Bridget Kimani
	100.	Pregnancy trends and associated factors among Kenyan adolescent girls and young women pre- and post-COVID-19 Lockdown; Dismas Congo
	101.	Diet Diversity of Children with Moderate Acute Malnutrition Living in an Urban Informal Settlement in Nairobi Kenya; Beatrice Olack
	102.	Safety and pharmacokinetics of fosfomycin to treat neonatal sepsis: a randomized clinical trial; Christina Obiero
	103.	Clinical features of bacterial meningitis among hospitalised children in Kenya; Christina Obiero
	104.	Childhood mortality during and after acute illness in Africa and S. Asia: the CHAIN cohort study; James Berkley
	105.	Evaluating practice and guidelines for the care of adolescent scholars living with HIV in Western Kenya; Dama Olungae
	106.	Kangaroo mother care practice during the covid-19 pandemic among postnatal mothers of preterm babies; Beatrice Afande
	107.	Clinical features to distinguish meningitis among young infants at a rural Kenyan hospital; Christina Obiero
Time (EAT) 1045 – 1245hrs	Symposium 2: Herbal medicine in COVID-19 management: Concerns on use and current status of research on therapeutic agents from medicinal plants (CTMDR) VENUE: BOGORIA Session Chair: Dr. Festus Tolo Rapporteur: Dr. Jeremiah Gathirwa	
1300-1400HRS: LUNCH BREAK		
Time (EAT) 14:00 – 16:00hrs	Abstract No	Scientific Session 17: Virology 2 VENUE: MT. KENYA D Session Chair: Dr. Samoel Khamadi Rapporteur: Lilian Mayieka
	108.	Prevalence and demographic characteristics of rotaviruses in children with acute gastroenteritis in kericho county referral hospital; Carlene Sang
	109.	Molecular diversity and evolutionary analysis of human respirovirus 3 strains isolated in Kenya using complete hemagglutinin- neuraminidase (HN) gene; Juliet Mmata
	110.	A laboratory analysis of Acute Flaccid Paralysis (AFP) surveillance in Kenya, 2019 to 2020; Janet Ngugi
	111.	Seroprevalence of rubella, cytomegalovirus and toxoplasma gondii among women attending antenatal clinics in mombasa county; James Gikunda
	112.	Characterization of hepatitis c genotypes circulating among injecting drug users in kilifi county, kenya; Robert Mainga
	113.	Intratypic differentiation of suspected Polioviruses from stool samples in Kenya, 2021; Mercy Onyango
	114.	The Epidemiology of Measles Disease in Kenya in 2021- An overview; Diana Wanjiru
	115.	Epidemiological trends of diarrheal viruses in central kenya before and after rotavirus vaccination; Felix Musyoka



	116.	Diagnosis and Outbreak Investigation of Arboviruses and Viral Hemorrhagic fevers in Kenya and the Region: The KEMRI Viral Hemorrhagic Fever Laboratory Perspective Konogoi Limbaso
Time (EAT) 14:00 – 16:00hrs	Abstract No	Scientific Session 18: Malaria 2 VENUE: AMBOSELI Session Chair: Dr. Joseph Mwangangi Rapporteur: Koko Mutai
	117.	Synergism in Antiplasmodial activities of Epirubicin in combination with Artemether and Lumefantrine; Douglas Ochora
	118.	Artemisinin binds and inhibits the activity of Plasmodium fal-ciparum Dd11, a retroviral aspartyl protease; Noah Onchieku
	119.	Severe Malaria Surveillance System Evaluation in Msambweni Referral Hospital Kwale County, June 2021; Githinji Geoffrey
	120.	Assessment of Kenyan Parasites Response to Currently used Artemisinin combined Therapies using Ex vivo/In vitro susceptibility Assays and Genomic Analysis; Duncan Wakoli
	121.	Quality of diagnosis and treatment of malaria patients in rural hospitals in Kisumu County, Kenya; Wilfred Ouma
	122.	Identification of Plasmodium falciparum Resistance Biomarkers in Primary School Children in Western Kenya; Tonny Nyandwaro
	123.	Ex-vivo Drug Combination Screening using Malaria SYBR Green I Assay; Redemptah Yeda
Time (EAT) 14:00 – 16:00hrs	Abstract No	Scientific Session 19: TB 2 VENUE: SAMBURU Session Chair: Dr. Jane Ong'ang'o Rapporteur: Asiko Ong'aya
	124.	Yield comparison for tb cultures between mycobacterium growth indicator tube (mgit) and lowenstein-jensen (lj) medium; Joseph Nyamweya
	125.	Evaluation of xpert mtb/rif assay in detection of mycobacterium tuberculosis from sputum pellets using a reduced sample reagent in smear negative samples in kisumu county western Kenya; Ruth Sitati
	126.	Challenges of Setting up and Managing a basic TB Immunology Research Laboratory in a resource-limited setting: The KEMRI-Centre for Respiratory Diseases Research Laboratories Experience; Robi Chacha
	127.	Plan do study act (pdsa) cycle quality improvement approach to scale up paediatric tb case finding the case of suna west sub county; Peter Omware
	128.	Drug resistant tuberculosis patterns among presumptive MDR patients from western Kenya, a MoH surveillance program; Albert Okumu
Time (EAT) 14:00 – 16:00hrs	Abstract No	Scientific Session 20: MCH 2 VENUE: TSAVO Session Chair: Dr. Simon Njoroge Rapporteur: Rosemary Musuva
	129.	Low haemoglobin levels are associated with reduced psychomotor and language abilities in young Ugandan children; Agnes Mutua
	130.	Kenyan women's preferences, expectations, and experiences with male partner support during pregnancy in the context of prevention of mother to child transmission services; Brooke Lapke
	131.	Impact of the protecting infants remotely by sms (prisms) on neonatal care in a district hospital; Santorino Data

	132.	Predictors and outcome of cardiac arrest in paediatric patients presenting to emergency medicine department of a tertiary hospital in tanzania; Amne Omar
	133.	The Post-Discharge Risk of Mortality in Children Under Five Years of Age in Western Kenya: A Retrospective Cohort Study; Titus Kwambai
	134.	Post Abortion Care Services at Kitale County Hospital, Transzoia County, Kenya; Selpha Amuko
Time (EAT) 14:00 – 16:00hrs	Abstract No	Scientific Session 21: AMR 2 VENUE: MT. KENYA C Session Chair: Dr. Lilian Musila Rapporteur: Eric Odoyo
	135.	Escherichia coli pathotypes in children under 5 years old with acute diarrhea in an urban informal settlement, Nairobi, Kenya; Moureen Jepleting
	136.	Point prevalence survey on antimicrobial use at kitale county referral hospital; Nancy Koech
	137.	Spectrum and antimicrobial resistance genes in bacterial and fungal pathogens from TB smear-negative and retreatment cases in selected Counties in Kenya; Sally Loronyokie
	138.	Quality Evaluation of Co-trimoxazole Suspensions in Nairobi, Kenya; Lilian Koech
Time (EAT) 1400hrs-1600hrs	Abstract No	Symposium3: JICA SATREPS MALARIA PROJECT VENUE: AMBOSELI Session Chair: Prof. Akira Kaneko Rapporteur: Dr. Wataru Kagaya
Time (EAT) 14:00 – 16:00hrs	Abstract No	Symposium 4: Biotechnology, THE ROLE OF GENOMICS IN HEALTH VENUE: BOGORIA Session Chair: Dr. Damaris Matoke Rapporteur: Kelvin Thiong'o



DAY THREE, FRIDAY 18th FEBRUARY 2022

0830-0900hrs	Arrival and Registration of Delegates	
0900-1000hrs	PLENARY TALKS	
0900 - 0920hrs	Plenary 4: Prof. Sammy Njenga: Current epidemiological status of lymphatic filariasis in Kenya and prospects for its elimination as a public health problem	
0920 - 0940hrs	Plenary 5: Dr. Sam Aketch- “Malaria vaccines: vaccine candidates and evidence behind who recommendation for wider use of RTS, S/as01 vaccine”	
0940 - 1000hrs	Plenary 6: Dr. Lucas Nyabero- “Genomics Capacity building and strengthening: Why does it matter for Africa “Kenya”?”	
Session Chair Rapporteur	Dr. Vera Manduku Susan Kawai	
1000-1045hrs	POSTER SESSION AND TEA BREAK	
1045 – 1245hrs	SCIENTIFIC SESSIONS 21- 24, Symposium	
Time (EAT) 14:00 – 16:00hrs	Abstract No	Scientific Session 21: AMR 2 VENUE: BOGORIA Session Chair: Dr. Lilian Musila Rapporteur: Kelvin Thiong'o
	139.	Escherichia coli pathotypes in children under 5 years old with acute diarrhea in an urban informal settlement, Nairobi, Kenya; Moureen Jepleting
	140.	Point prevalence survey on antimicrobial use at kitale county referral hospital; Nancy Koech
	141.	Spectrum and antimicrobial resistance genes in bacterial and fungal pathogens from TB smear-negative and retreatment cases in selected Counties in Kenya; Sally Loronyokie
	142.	Quality Evaluation of Co-trimoxazole Suspensions in Nairobi, Kenya; Lilian Koech
Time (EAT) 1045 – 1245hrs	Abstract No	SScientific Session 22: Health Systems 3 VENUE: MT. KENYA C Session Chair: Dr. Joyce Wamiewe Rapporteur: Stephen Onteri
	143.	Effect of Organizational Factors on Quality of Care offered at a National Tertiary Referral Hospital in Kenya; Healthcare workers perspectives; Karingo Agnes
	144.	The changing landscape in funding of hiv/aids program; perspectives and experiences of caregivers of pediatric patients at kisii teaching and referral hospital; Mary Mokeira
	145.	The Impact of Strengthening Community Health Services on Malaria Cases That Receive Prompt and Effective Treatment in Migori and Kwale Counties; Athuman Chiguzo
	146.	Changes in technology adaptation: A case of Bungoma County Hospital; Tiner Ouma
	147.	Early lessons from the study “Health and Demographic Surveillance System (HDSS): Developing a sustainable data infrastructure for longitudinal Aopulation-based epidemiological studies in Kwale and Homa Bay counties, Kenya; Kazuchiyo Miyamichi
	148.	Evaluation of the Influenza Surveillance System in Kenya, 2017–2018; Serah Nchoko



	149.	Evaluation of measles surveillance system kenya, 2019-2020; Freshia Waithaka
	150.	A comparative study on strengthened community health services for utilization of malaria control intervention in migori and kwale counties of kenya; Athuman Chiguzo
	151.	A multicenter randomized controlled trial to determine the effect of real-time digital feedback on quality of bag-valve-mask ventilation Santorino Data
Time (EAT) 1045 – 1245hrs	Abstract No	Scientific Session 23: Genomics VENUE: MT. KENYA D Session Chair: Dr. Limbaso Konongoi Rapporteur: Henry Kanyi
	152.	Essential diagnostics: strengthening methods and capacity for evidence-based diagnostic practice for effective national and county programs in Kenya; Eddy Johnson
	153.	β -Thalassemia pathogenic variants in a cohort of children from the East African coast; Johnstone Makale
	154.	Identification and characterization of novel viral pathogens among arthropod vectors using High-Throughput Sequencing: The KEMRI-viral haemorrhagic fever laboratory experience; Solomon Langat
	155.	Evaluation of urine dipstick test reliability in UTI diagnosis; John Ndemi
	156.	Genome-wide Association Study of Vitamin D status in Africans; Reagan Mosei
	157.	Genomic analysis of kenyan influenza b virus matrix and non-structural proteins; a preliminary report; Samwel Symekher
	158.	Whole genome analysis of an African G4P[6] human rotavirus strain identified in a diarrheic child in Kenya: Evidence for porcine-to-human interspecies transmission and reassortment Ernest A Wandera
Time (EAT) 1045 – 1245hrs	Abstract No	Scientific Session 24: TB 3 VENUE: SAMBURU Session Chair: Dr. Peninah Munyua Rapporteur: Dr. Erastus Mulinge
	159.	Reproducibility of ZN smear microscopy results between KEMRI and North-Star Alliance on sputum specimens collected from long-distance truck drivers and commercial sex workers who participated in a TB and HIV prevalence study in Mlolongo, Machakos County; Joseph Kimwomi
	160.	Identification of direct smear negative, GeneXpert negative, LJ negative and MGIT-ZN positive mycobacteria strains isolated from sputum specimens of long distance truck drivers and commercial sex workers enrolled in a prevalence of TB and HIV study in Mlo; Ruth Moraa
	161.	Prevalence of pneumocystis jirovecii in tb smear negative patients and retreatment cases at the coast general hospital; Anne Sein
	162.	Tuberculosis a risk factor for clinically significant chronic respiratory disease in Nairobi, Kenya; Hellen Meme
Time (EAT) 1045 – 1245hrs	Abstract No	Scientific Session 25: COVID-19 VENUE: TSAVO Session Chair: Dr. John Mwaniki Rapporteur: Eric Odoyo

	163.	Developing a Covid Tracking System to improve data management and patient follow up in Kisumu; May Maloba
	164.	Detection of multiple SARS-CoV-2 variants of concern (VOC) in Nairobi, Kenya between March 2021 and July 2021; Silvanos Opanda
	165.	Household genomic epidemiology of SARS-CoV-2 in rural coastal Kenya; Charles Agoti
	166.	Accuracy of the Panbio™ COVID-19 antigen rapid test device for SARS-CoV-2 detection in Kenya, 2021: A multicenter field evaluation; Jack Irungu
	167.	Performance Evaluation of 3 RT-PCR Kits for the Detection of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2); Samwel Symekher
	168.	Knowledge, attitudes and practices regarding Coronavirus Disease-2019: A cross-sectional survey among residents of Busia and Migori Counties, western Kenya; Julius Odera
	169.	Estimate of agreement between two commercial kits for molecular detection of SARS-CoV-2; Janet Majanja
	170.	In-vitro isolation, culture and characterization of SARS-CoV-2 virus in Kenya Abstract; Robinson Irekwa
	171.	Burden of undiagnosed covid-19 in patients admitted at 3 county referral hospitals in western kenya; Benson Singa
	172.	Population' risk perception of COVID-19 infection in Kajiado and Machakos counties; Lilian Nyandieka
	173.	Factors Influencing Willingness to Receive Covid-19 Vaccine in Kisii National Polytechnic Staff Peter Godner
Time (EAT) 1045 – 1245hrs	Abstract No	Symposium 4: Knowledge Management VENUE: BOGORIA Session Chair: Prof. Jennifer Orwa Rapporteur: Lilian Mayieka
Time (EAT) 1045 – 1245hrs	Abstract No	Symposium 5: FOOD ENVIRONMENT RESEARCH IN KENYA Venue: AMBOSELI Session Chair: Prof. Charles Obonyo Rapporteur: Rosemary Musuva
1300-1400HRS: LUNCH BREAK		
1400-1600hrs	Closing Ceremony: Master of Ceremony: Prof. Charles Mbogo	
	Sponsors and Exhibitors Session	
	Conference outcomes & resolutions Chief Rapporteur: Dr. Steve Wandiga	
	Awarding Ceremony	
	Vote of thanks: Dr. Damaris Matoke-Muhia	
	Official Closing remarks: KASH Chair: Dr. Cecilia Mbae Ag. Director General & CEO, KEMRI	



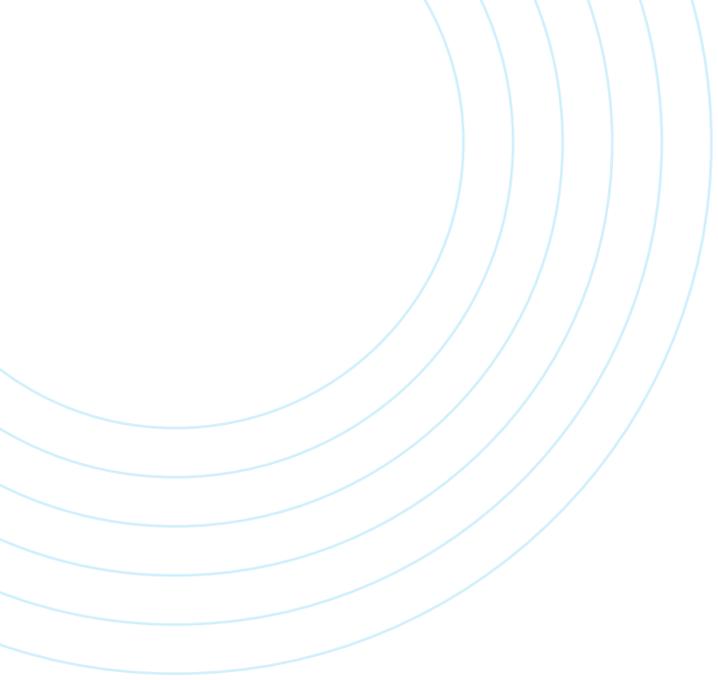
POSTER DISCUSSIONS

SUB THEME	ABSTRACT NO	POSTER TITLE
Strengthening Health Systems	170.	Evaluating the cat system to improve cervical cancer care in Kenya: a mixed methods study; May Maloba
Emerging and Re-emerging Infectious and Parasitic Diseases Prevention, Control and Elimination	171.	Assessing the severity of COVID-19 among patients with latent TB infection in Western Kenya; Joshua Ongalo
Emerging and Re-emerging In-fectious and Parasitic Diseases Prevention, Control and Elimination	172.	Bionomics and ecology of <i>Anopheles merus</i> along the East and Southern Africa Coast; Brian Bartilol
Emerging and Re-emerging In-fectious and Parasitic Diseases Prevention, Control and Elimination	173.	Prevalence of tuberculosis and HIV among long distance truck drivers and commercial sex workers in Mlolongo, Machakos County; Willie Githui
Emerging and Re-emerging In-fectious and Parasitic Diseases Prevention, Control and Elimination	174.	Project management experiences, achievements, and lessons learnt by study site personnel during a study on prevalence of pulmonary tuberculosis and HIV among long distance truck drivers and female sex workers in Mlolongo, Machakos County; Eston Njagi
Emerging and Re-emerging In-fectious and Parasitic Diseases Prevention, Control and Elimination	175.	Neonatal bacteraemia at secondary hospitals in Kenya (NeoBAC); Caroline Tigoi
Emerging and Re-emerging In-fectious and Parasitic Diseases Prevention, Control and Elimination	176.	Demographic factors associated with pathogens detected from influenza like illness in patients attending a nairobi sub-county hospital; Samwel Symekher
Emerging and Re-emerging In-fectious and Parasitic Diseases Prevention, Control and Elimination	177.	Towards a Polio Free Kenya, Performance of AFP surveillance in Kenya 2005-2020; Rosemary Nzunza
Emerging and Re-emerging In-fectious and Parasitic Diseases Prevention, Control and Elimination	178.	Comparative Seroprevalence of Hepatitis B virus among Inmates and Low Risk voluntary Blood Donors in Garissa, Kenya 2021; Vincent Bahati
Emerging and Re-emerging In-fectious and Parasitic Diseases Prevention, Control and Elimination	179.	Impact of rotavirus vaccination on rotavirus gastroenteritis and strain distribution in western Kenya; Mary Wachira
Emerging and Re-emerging In-fectious and Parasitic Diseases Prevention, Control and Elimination	180.	Correlates of condom use at last sexual intercourse among adolescent girls and young women in central and western Kenya; Syovata Kimanthi
Drug Discoveries and Therapeu-tics	181.	In vitro antiviral activity of Cat's claw (<i>Uncaria tomentosa</i>) extract against influenza A virus; Mike Odiwuor
Drug Discoveries and Therapeutics	182.	Circulation of phleboviruses and arboviruses among sandflies from parts of north rift, Kenya; Edith Koskei
Essential Sexual, Reproductive, Adolescents, Maternal, and Child Health	183.	Adverse neonatal outcomes at the maternity ward in Kitale County Hospital, Kenya, April – May 2021; Gabriel Nyang'au



Essential Sexual, Reproductive, Adolescents, Maternal, and Child Health	184.	Assessing COVID-related concerns and their impact on antenatal and delivery care among pregnant women living with HIV in Kenya; Catherine Wexler
Essential Sexual, Reproductive, Adolescents, Maternal, and Child Health	185.	HBV Vaccination and testing dynamics among Key populations in Kenya; Timothy Mwanzia
Essential Sexual, Reproductive, Adolescents, Maternal, and Child Health	186.	Establishment of Tuberculosis Molecular Bacterial Load Assay (TB-MBLA) in Kenya; Asiko Ongaya
Essential Sexual, Reproductive, Adolescents, Maternal, and Child Health	187.	An Epidemiological Analysis of Environmental Surveillance of Polio in Kenya, Jan 2020 –August 2021; Stephen Ochieng
Mental Health and Other Non-communicable Diseases	188.	Integrating quality improvement principles to scale up adult and pediatric tuberculosis active case finding in Arombe dispensary; Omune Everlyn





SCIENTIFIC SESSION

1: AMR 1



Abstract No. 001.

Antimicrobial resistance and virulence characteristics of *Klebsiella pneumoniae* isolates in Kenya

Angela Muraya (JKUAT)*; Lillian Musila (United States Army Med. Res. Directorate-Kenya, Nairobi, Kenya); Cecilia Kyany'a (United States Army Med. Res. Directorate-Kenya, Nairobi, Kenya); Shahiid Kiyaga (Makerere Univ., Kampala, Uganda); Hunter Smith (US Army Med. Res. Directorate-Africa, Kisumu, Kenya); Caleb Kibet (International Center for Insect Physiology and Ecology, Nairobi, Kenya); Melissa Martin (Multidrug-Resistant Organism Repository and Surveillance Network, Silver Spring, MD); Josephine Kimani (Jomo Kenyatta University of Agriculture and Technology)

Background: *Klebsiella pneumoniae* (*K. pneumoniae*) is a globally significant opportunistic pathogen associated with healthcare-acquired and community-acquired infections. This study examined the epidemiology and the distribution of resistance and virulence genes in clinical *K. pneumoniae* strains in Kenya.

Methods: Eighty nine *K. pneumoniae* isolates were collected over six years from five Counties in Kenya and were analyzed using whole genome sequencing and bioinformatics.

Results: Isolates included in this study fell into various categories such as community-acquired (62/89), healthcare-associated infections (21/89), and the hospital environment (6/89). Genetic analysis revealed the presence of bla_{NDM-1} and bla_{OXA-181} carbapenemase genes as well as armA and rmtF genes known to confer pan-aminoglycoside resistance. The most abundant extended-spectrum beta-lactamase genes identified were bla_{CTX-M-15} (36/89), bla_{TEM} (35/89), and bla_{OXA} (18/89). One isolate had a mobile colistin resistance gene (*mcr-8*). Fluoroquinolone resistance-conferring mutations in *gyrA* and *parC* genes were also observed. The most notable virulence factors were those associated with hyper-virulence (*rmpA/A2* and *magA*), yersiniabactin (*ybt*), salmochelin (*iro*), and aerobactin (*iuc* and *iutA*). Thirty-eight distinct sequence types were identified including known global lineages ST14, ST15, ST147, and ST307; and a regional clone ST17 implicated in regional outbreaks. In addition, this study genetically characterized two potential hypervirulent isolates and two community-acquired ST147 high-risk clones that contained carbapenemase genes, yersiniabactin, and other multi-drug resistance genes.

Conclusion: These results demonstrate that the resistome and virulome of Kenyan clinical and hospital environmental *K. pneumoniae* isolates are diverse and that there is a reservoir of high risk-clones capable of spreading resistance and virulence factors which have the potential to cause unmanageable infection outbreaks with high morbidity and mortality.

Abstract No. 002.

Prevalence and risk factors for the transmission of *H. pylori*, *E. coli* and *Klebsiella* species among patients presenting with gastritis in Nairobi, Kenya.

Sophia A Kuve (KEMRI Graduate School)*; John Njeru (KEMRI); Andrew Nyerere Kimang'a (Jomo Kenyatta University of Agriculture and Technology); Susan W Kiiru (KEMRI); Ben Brian Owino (KEMRI Graduate School); Zamith Oginga (MSN Laboratories' investment in research and development (R&D), Mombasa, Kenya.); John Ndemi Maina (Kenya Medical Research Institute); Sharon Sang (Center for Microbiology Research/KEMRI); Dan waithiru (KENYA MEDICAL RESEARCH INSTITUTE); Noel Oduor (Center for Biotechnology Research/KEMRI)

Introduction: In Kenya a high burden of patients presenting with gastrointestinal-related complications is reported, however, limited data exist on the prevalence of infections caused by *H. pylori*, *E. coli*, and *Klebsiella* species.

Methods: A cross-sectional study was conducted between October 2020 and March 2021 to determine carriage of *H. pylori*, *E. coli*, and *Klebsiella*, and identify risk factors associated with *H. pylori* alone. Stool samples were collected from cases, patients presenting with stomach discomfort and heartburn, attending either Mbagathi or Mutuini hospitals, and hailing from Kibera or Dagoretti areas. Subsequently, stool samples were obtained from their close contacts during follow-up visits. Patients across all age groups were recruited upon consenting and assenting. Their socio-demographic profiles were obtained using a structured questionnaire. Stool was obtained and first screened for *H. pylori* using one-step *H. pylori* fecal antigen test strips, cultured on standard enteric bacteriological media then Biochemical testing done for identification of *H. pylori*, *E. coli*, and *Klebsiella*. Assessment of risk factors associated with *H. pylori* infection was done by measuring associations using logistic regression at a significant level $p < 0.05$.

Results: Prevalence of *H. pylori* was 35.7%, *E. coli* 50.6% and *Klebsiella* 19%. A high prevalence of *H. pylori* was among participants from Kibera 58% when compared to those from Mutuini 42%. The differences in infections were statistically significant ($X^2 = 6.0931$; $P = 0.014$). Similarly, an association was found between *H. pylori* and the area the subject resided, ($P = 0.0146$). However, no significant differences were found between *H. pylori* and age, gender, presence of domesticated animals, education, and occupation ($p > 0.05$). A high prevalence of *H. pylori* (62.4%) and *E. coli* (63.3%) was found among close contacts while infection by *Klebsiella* was high in cases (74.6%). There was no statistical association between carriage of *H. pylori* and *E. coli* in cases and close contacts as it was in *Klebsiella* $P = 0.03$. The recovery rate of *H. pylori*, *E. coli*, and *Klebsiella* species was significantly higher in participants from Kibera (58%) than those from Dagoretti (42%) ($P = 0.014$). 25% of the subjects had co-infections of *H. pylori* and *E. coli* while 9% had *H. pylori* and *Klebsiella*. Multi-variable logistic models showed that the site a subject resided was a significant risk factor associated with *H. pylori* infection $OR = 1.8018$, $CI = 1.1262-2.882$, and $P = 0.014$. Other risk factors associated with *H. pylori* infection were the presence of other bacterial species, $P = 0.000$, and smoking or use of hard drugs $P = 0.027$.

Conclusion: *H. pylori*, *E. coli*, and *Klebsiella* species are common in both symptomatic and asymptomatic persons. Laboratory testing and screening of patients for risky social-economic factors can provide a valuable tool to clinicians in the timely detection and treatment of *H. pylori* infections.



Abstract No. 003.

Antimicrobial Resistance patterns of Bacterial isolates recovered from UTI patients visiting different healthcare facilities

Susan W Kiiru (KEMRI)*; John Njeru (KEMRI); John Ndemi Maina (Kenya Medical Research Institute); Japhet Katana (KEMRI); John Kiiru (KEMRI-CMR)

Background: Understanding local antimicrobial resistance patterns is a baseline step for evidence-based empirical antibiotic prescribing. Urinary tract infections (UTIs) are some of the most common infections at the community level. Even though UTIs are easily treated using antibiotics, widespread use of antibiotics without proper susceptibility testing has inevitably led to increased UTI pathogens that are resistant to affordable and available antibiotics. In order to assess the appropriate empirical therapy, this study investigated the resistance patterns of main causative agents of UTI in three metropolitan areas.

Objective: To determine the resistance patterns of bacteria implicated in UTIs among patients seeking treatment in selected healthcare facilities in Kenya.

Methods: In this mixed methods study, 1,898 mid-stream urine were collected from patients who presented with UTI-like symptoms in the following healthcare facilities; KNH, Kiambu hospital, Mbagathi, Makueni, Nanyuki, CMR labs and, Mukuru health centres. Cultures were done on CLED to identify the main uropathogens and ASTs patterns assessed via Kirby Bauer method for the resistance patterns analysis using disc diffusion method.

Results: Out of 1,027 positive urine cultures, Staphylococcus spp and E. coli were the main uropathogens at 24% and 15% respectively. Average resistance profiles for commonly used UTI drugs was as follows; Amoxicillin-clavulanic acid(10%), Cefuroxime(13%), Cefixime(7%), Ciprofloxacin(26%), Nitrofurantoin(9%), Trimethoprim(64%), and Sulfamethoxazole(57%). Additionally, resistance to other broadspectrum antimicrobials such as Ceftriaxone, Ceftazidime and Getamicin was at 11%, 15% and 14% respectively. Cefixime and Amoxicillin Clavulanic Acid were the most effective agents against these isolates while Trimethoprim, sulfamethoxazole and Nalidixic Acid were the most resisted antibiotics.

Conclusion: High resistance rates were reported in Quinolones and Sulfamethoxazole, Trimethoprim which are the commonly used drugs as they are cheap to buy and readily available. Empirical antibiotic selection for UTI should be based on knowledge of the local prevalence of uropathogens and their antibiotic resistance patterns found on the policy briefs and MOH guidelines, because resistance patterns may vary in different regions.

Abstract No. 004.

Carbapenem resistance in Gram negative bacteria: resistance mechanisms and reduced susceptibility to recently approved drugs

Anne Amulele (KEMRI Wellcome Trust Research Programme)*; Alfred Mwanu (KEMRI Wellcome Trust Research Programme); Edwin Machanja (KEMRI Wellcome Trust Research Organization); David Wareham (Queen Mary University of London); James Berkley (KEMRI - Wellcome Trust Research Programme); Claire Gordon (UK Health Security Agency)

Background: In Kenya, there is limited access to carbapenems outside private healthcare and they are typically unavailable at lower level public facilities. At Kilifi County Hospital, carbapenem resistant bacteria have been isolated from patient samples despite the drug being unavailable in the treatment formulary. Here, we describe the clinical characteristics, antimicrobial resistance profile and resistance mechanisms of carbapenem resistant bacteria isolated from patients admitted to the hospital.

Materials/methods: We identified imipenem non-susceptible Enterobacterales, Acinetobacter spp and Pseudomonas aeruginosa isolated from patients admitted from 2005 to 2020. Carbapenem resistance was confirmed in archived isolates by minimum inhibitory concentration with additional susceptibility testing to newer drugs. Carbapenemase activity was detected using the modified carbapenem inactivation method (mCIM) and Triton Hodge test (THT) while the genes were detected by PCR. Whole genome sequencing (WGS) was also performed for selected strains.

Results: We identified 72 imipenem non-susceptible bacteria and confirmed resistance in 61 of these. These were from fifty-four patients, of whom approximately half (31/54) were aged <1yr old. In 33 (61%) individuals, the isolates were hospital acquired. The median duration of hospitalization was 13.5 days (IQR: 4–31) and in-hospital case fatality rate was 33% (18/54). There were 41 Acinetobacter spp (20 A. baumannii), 9 P. aeruginosa, 4 E. coli and 7 K. pneumoniae identified from samples, majority of which were from blood. While there was no resistance to colistin, the strains did show resistance to an expanded panel of newer drugs including cefiderocol, eravacycline, imipenem / relebactam and meropenem / vaborbactam. Carbapenemase activity and genes were detected in 51 isolates; NDM being the commonest gene detected in 10/11 Enterobacterales and 21/41 Acinetobacter. WGS performed on 23 strains, revealed four different variants of NDM (1, 5, 7 and 17) with DIM (MBL) identified in one P. aeruginosa. The strains were of diverse sequence types (STs) and had multiple resistance genes. KPC, IPM, VIM and OXA-24 genes were not detected.

Conclusions: Despite the rare use of carbapenems at our hospital, bacteria resistant to these drugs are present in Kilifi. The diverse STs and resistance genes suggests introduction of multiple strains rather than one successful clone. The presence of resistance to newer agents/inhibitor combinations is concerning and the presence of such strains could compromise the potential usefulness of these drugs.



Abstract No. 005.

Drug Resistance Mutations Profile Among Infants in Kenya

Sheila Kageha (KEMRI)*

Sheila Kageha¹, Xiuqiong Bi³, Quynh T. Nguyen³, Raphael Lihana¹, Dama Olungae¹, Joyceline G. Kinyua¹, Rency J. Lell, Joseph Mwangi¹, Vincent Okoth¹, Matilda Saina⁴, Son T. Chu³, Matilu M. Mwau¹, Elijah M. Songok^{1,2,3} and Hiroshi Ichimura³

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Background: HIV-1 drug resistance-associated mutations (DRMs) are key contributors to antiretroviral therapy (ART) failure. Despite most infants accessing early HIV-1 diagnosis in Kenya, data remains limited on trends of DRMs among them. This study aimed at investigating the trends of DRMs in newly HIV-diagnosed infants between 2014 and 2018

Methods: Dried blood spots (DBS) were collected from infants < 18 months of age through the Kenya Early Infant Diagnosis program in 2014, 2017 and 2018 (n=57, 70, 50, respectively). The DNA was extracted and HIV-1 reverse transcriptase gene was amplified and sequenced for DRMs. Subtyping was done and DRMs checked following the IAS and Stanford HIVDB PROGRAM algorithm. Phylogenetics were done using the neighbor joining method.

Results: DRMs conferring resistance to nucleoside reverse transcriptase inhibitors (NRTI) and non-NRTIs (NNRTI) were respectively found in 22.8% and 57.9% of infants in 2014, 11.4% and 54.3% in 2017, 14.0% and 58.0% in 2018. All infants who had NRTI-DRMs had NNRTI-DRMs. The frequency of DRMs did not differ in the three years, however more NNRTI-DRMs than NRTI-DRMs were found in all years (P<0.001). HIV subtype A was most common in all years (66.7%, 70.0%, 82.0%, P=0.44), followed by subtype D. Y181C was most common in 2014 compared to 2017 and 2018 (28.1%, 7.1%, 4.0%, P=0.0002), whereas K103N was more in 2017 and 2018 than in 2014 (38.6%, 36.0%, 17.5%, P=0.026). The NNRTI-DRMs were associated with mother-to-child HIV transmission prevention (PMTCT) and infant prophylaxis history.

Conclusion: More than half of infants newly diagnosed with HIV harbored NNRTI resistance mutations. This was as a result of possible maternal exposure to ART. Resistance mutation monitoring should be warranted for infants when ART is initiated. Effective PMTCT needs to be strengthened.

Key words: HIV-1; Drug resistance mutation (DRM); antiretroviral therapy (ART)

Abstract No. 006.

Prevalence, Antimicrobial Susceptibility Profiles, and Antimicrobial Resistance Genotypes of *Listeria monocytogenes* and Gram-Negative Co-isolates from Raw Meats Obtained from Selected Formal and Informal Markets in Nairobi County.

ANITA M CHEPKEMEI (KEMRI)*

Background: Meat contamination has been linked to consumer health problems in both developed and developing countries. Among the most important pathogens are *Escherichia coli*, *Klebsiella* spp, and *Listeria monocytogenes*. The present study was conducted to determine the proportions of, *Escherichia coli*, *Klebsiella* spp, and *Listeria monocytogenes* contamination of raw meat (beef, pork, chicken, and goat) collected from retail outlets in Nairobi.

Methods: A total of 270 raw meat samples comprising of 97 raw beef, 85 raw chicken, 34 raw pork, and 54 raw goat were collected from retail outlets. MaCconkey and Hichrome *Listeria monocytogenes* agar were used for selective isolation. *E. coli* and *Klebsiella* spp were identified using colony morphology characteristics, and biochemical tests while *Listeria monocytogenes* were identified using Polymerase chain reaction. Disk diffusion was used to determine the antimicrobial resistance patterns. The isolates showing phenotypic resistance to ampicillin and or 3rd generation cephalosporins, Quinolones, Trimethoprim-sulphamethoxazole, and Carbapenems were screened for the presence of gene determinants using Polymerase chain reaction.

Results: Out of 270 samples of raw meat collected, 185 (66%) had at least one bacterial isolate. Of these, a total of 163 (60%) *Escherichia coli*, 19(7%) *Klebsiella* spp, and *Listeria monocytogenes* 3(1.1%) were recovered. Among *Escherichia coli*, high antibiotic resistance was found to Erythromycin 161(98%) and ampicillin 88(54%) while low resistance was found against imipenem 2(1%). Similarly, high resistance was found among *Klebsiella* Spp to Erythromycin 19 (100%) and ampicillin 12(63%) while low resistance was found to ceftazidime 1(5%), cefotaxime 1(5%), aztreonam 1(5%), and chloramphenicol 1(5%). Only one isolate among the three *Listeria monocytogenes* strains isolated was resistant to Trimethoprim-sulphamethoxazole. No resistance was exhibited to gentamycin by all *Klebsiella* spp and *Escherichia coli* isolates from pork. Forty-one of one hundred and eighty-one (22.7%) of the isolates exhibited multidrug resistance (resistance to three or more classes of antibiotics). 18(69.8%), 9(50%),

and 1(33%) 14(44.9%) isolates respectively carried bla TEM, bla CTX-M, bla OXA, and sul.

Conclusion: This study found considerable contamination of raw meat samples with *Escherichia coli*, *Klebsiella* spp, and *Listeria monocytogenes*, and consumers are at risk of getting foodborne diseases. Furthermore, the presence of multidrug-resistant bacteria in this study could play a role in the dissemination of antimicrobial resistance, thus proper education on meat handling and processing along the food chain is necessary to avoid meat contamination.

Abstract No. 007.

Comparative Evaluation of ADAGIO and VITEK Automated Antimicrobial Susceptibility Testing Platforms using a collection of Kenyan Clinical Isolates

Justin T Nyasinga (Aga Khan University)*; John Njenga (Jomo Kenyatta University of Science and Technology); Mohammed Munshi (University of Nairobi); Gunturu Revathi (Aga Khan University)

Background: Accurate, timely and cost effective determination of antimicrobial susceptibility among clinically relevant bacteria is critical for patient care and antimicrobial stewardship. This study compared two antimicrobial susceptibility testing (AST) platforms: ADAGIO semi-automated AST system (Bio-Rad) and VITEK automated AST platform (Biomérieux) using a heterogeneous collection of clinical bacterial isolates.

Methods: A total of 202 isolates were analyzed. Archived isolates were revived on blood agar culture plates from which pure colonies were used to prepare bacterial suspensions in sterile normal saline. The same suspension was used to inoculate GP/GN AST cards (VITEK) and Mueller Hinton agar plates (ADAGIO) in parallel. Interpretations of minimum inhibitory concentrations (MICs) for VITEK and zone diameters (ADAGIO) were based on the Clinical Laboratory Standards Institute (CLSI) 2019 guidelines. Categorical agreements and Kappa scores of inter-rater reliability were computed. Reagent and consumable cost comparisons were also performed.

Results: A total of 1,568 drug tests (784 drug-pair comparisons) were performed for drugs from seven different classes. Categorical agreements (CA) ranged between 77.9% - 96.5% with an overall CA of 92.7% (727/784) and a major discrepancy rate of 1.9% (15/784). Inter-rater reliability ranged from 0.503 (moderate) to 0.940 (almost perfect). On reagent and consumable costs per isolate after laboratory identification, ADAGIO (USD 2.92) performed better than VITEK (USD 7.50).

Conclusions: The ADAGIO AST platform showed high levels of AST agreement and reduced reagent and consumable costs with VITEK AST for the collection of isolates analyzed. Such studies are important in defining and identifying appropriate technologies for diagnostic bacteriology especially in resource-limited, high infectious disease settings such as Sub-Saharan Africa.





SCIENTIFIC SESSION 2: MALARIA (1)



Abstract No. 008.

Malaria is a cause of iron deficiency in African children

John Muriuki (Kenya Medical Research Institute (KEMRI)-Wellcome Trust Research Programme, Kilifi, Kenya)*; Sarah Atkinson (Department of Paediatrics, University of Oxford, Oxford, UK)

Objective: Malaria and iron deficiency (ID) are common causes of ill health in African children. Observational studies show that the prevalence of iron deficiency increases over the malaria season and decreases when malaria transmission is interrupted. We therefore tested the hypothesis that malaria is causally associated with ID in African children by conducting Mendelian randomization (MR) analyses.

Methods: We used sickle cell trait (HbAS, rs334), a common genetic variant that confers protection against clinical malaria, as an instrument in MR analyses. We assayed markers of iron status and inflammation and genotyped HbAS African children living in malaria-endemic countries in Africa (n=7453). We tested for pleiotropy in malaria-free populations of African Americans and life-long Nairobi residents (n=3818) using no-relevance point sensitivity analyses.

Results: HbAS was associated with a 30% reduction in ID among children living in malaria-endemic countries in Africa, but not among individuals living in malaria-free areas. Genetically predicted malaria risk was associated with an odds ratio of 2.65 for ID per unit increase in log incidence rate of malaria suggesting that an intervention that halves the risk of malaria incidence would reduce the prevalence of ID in African children by 49%. Malaria was associated with increased concentrations of hepcidin, which blocks iron absorption, suggesting that malaria may cause ID by reducing iron absorption.

Conclusion: Our results suggest that malaria may be an important cause of ID in African children. Strategies to treat and prevent malaria should be an integral part of programs to reduce iron deficiency in Africa.

Abstract No. 009.

Synergism in Antiplasmodial activities of Epirubicin in combination with Artemether and Lumefantrine

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Introduction: The rapid emergence of drug-resistant *Plasmodium falciparum* strains warrants the urgent development of new antimalarial drugs. Regrettably, innovation of new drugs is expensive and time-consuming with many candidates failing due to safety reasons. In order to circumvent these challenges, the study determined antiplasmodial activities of combinations of artemether and lumefantrine with epirubicin.

Methodology: This was a follow-up on our previous chemogenomics study that revealed the potency of epirubicin, an anticancer drug, against *P. falciparum* protein targets in-silico. As part of the validation of the observation at the whole-cell level, we tested in vitro activities of the epirubicin against selected field isolates using the SYBR Green I method and again the activities of epirubicin in combination with either artemether or lumefantrine at fixed ratios of 4:1, 3:1, 1:1, 1:2, 1:3 and 1:4 against field isolates ex vivo, parallel to reference clones was established. The half-maximal inhibitory concentration (IC50) was used to determine the mean sum of fifty-percent fractional inhibition concentration (FIC50) that is grouped into synergism (FIC50<1), additivity (FIC50 =1) and antagonism (FIC50>1).

Results: All fixed ratios of lumefantrine or artemether with epirubicin showed synergism against W2 strain of *P. falciparum* with a mean of means sum FIC50s of 0.465 and 0.489, respectively. All fixed ratios of artemether combinations showed synergism when tested against the W2 strain of *P. falciparum* with a mean of means sum FIC50s of 0.489. Lumefantrine combinations against 3D7 strain of *P. falciparum* and field isolates ex vivo showed synergism across all fixed ratios with a mean of means sum FIC50s of 0.1778 and 0.348, respectively. Synergism in the lumefantrine combination against the 3D7 strain was especially observed at a 1:1 fixed ratio with FIC50 of 0.556. Similar synergism was observed across all fixed ratios of artemether combinations against 3D7 strain with a mean of means sum FIC50s of 0.879, except at 1:3 fixed ratio (1.614). A trend of antagonism then additivity and ending with synergism was observed along all fixed ratios when artemether and lumefantrine were each combined with epirubicin against D6 strain.

Conclusion: Most combinations of artemether and lumefantrine with epirubicin showed synergism. This suggests that the use of drug combinations is crucial in overcoming antimalarial drug resistance.

Keywords: Artemether, Combination, Epirubicin, Lumefantrine, Malaria, Synergism



Abstract No. 010.

Plasmodium ovale and Plasmodium falciparum Co-infection is Associated with Symptoms in Malaria Endemic Regions of Western Kenya.

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Background: Plasmodium falciparum (Pf) infections occur sympatrically with Plasmodium ovale curtisi (Poc), Plasmodium ovale wallikeri (Pow) and Plasmodium malariae (Pm). Estimation of prevalence of these species has often been conducted by semi-convenient sampling layouts that screen symptomatic, therefore overlooking these infections in asymptomatic cases. Accurate depiction of the burden of species all among symptomatic and asymptomatic cases is significant in reducing transmission rates. This study assesses the composition of Plasmodium species among symptomatic and asymptomatic cases in Kisumu County.

Methods: Between 2015 and 2016, 435 symptomatic malaria individuals presenting at Kombewa Sub-County hospital with naturally acquired uncomplicated malaria were recruited for a malaria drug resistance surveillance study. Concurrently, 499 asymptomatic individuals within the same area were enrolled in a transmission dynamics study. About 2 mL of blood was drawn from each participant, tested for presence of malaria parasites by 18s rRNA real-time PCR, typed for Plasmodium species composition using the genus specific small subunit ribosomal RNA gene. Association studies between co-infections and symptomatic malaria was also done.

Results: Of 435 symptomatic cases, Pf was the most prevalent, occurring in 96% of the infections, followed by Pow, Poc, and Pm at 28%, 9% and 7% respectively. Co-infections between Pf/Pow were highest in symptomatic, followed by Pf/Pm and Pf/Poc at 21%, 6% and 5%, respectively while Poc/Pow was the least prevalent at 0.2%. In asymptomatic cases Pf, Pm, Pow and Poc were prevalent at 90%, 15%, 11% and 10% respectively. Pf/Pm, Pf/Poc and Pf/Pow co-infections in asymptomatic were observed at 6%, 5%, 2% while, Pm/Poc was the least prevalent at 0.4%. Higher frequency of non-falciparum species in Pow/Pf co-infections among symptomatic than asymptomatic malaria cases was observed ($p < 0.0001$). However higher Pm frequency was observed among asymptomatic than symptomatic cases ($P = 0.419$). Overall species frequency showed stronger association between Pow/Pf co-infections with symptomatic malaria (OR of 10.4, 95% CI range [5.6 – 19.4 and $P < 0.0001$]).

Conclusion: There were more non-Pf single species in asymptomatic than symptomatic suggesting that Pm and Poc single species are less associated with malaria symptoms. Mixed species infections were higher in symptomatic than asymptomatic cases implying that infection with more than one species likely progresses to symptomatic malaria than single species. This study findings argues for consideration of asymptomatic malaria matrices and simulation in estimating malaria burden.

Abstract No. 011.

Optimization of an antimalarial drug delivery system to infected laboratory reared Anopheles gambiae using sugar baits to target Plasmodium in Mosquitoes.

MOLLYNE M OKAL (MOLLYNE OKAL)*

Malaria is a major public health problem which contributes to severe morbidity and mortality worldwide. The current methods of interventions focusing on reducing contact between the human host and mosquitoes using long lasting insecticidal nets (LLINs), mosquito repellents, indoor residual spraying (IRS), complimented with effective treatment using artemisinin based combinations have been useful in bringing down malaria in the past decade. However, their effect on disease burden has plateaued in the past five years, warranting innovation of new strategies to complement the existing efforts. Ongoing studies are exploring use of standard and novel drugs against Plasmodium exo-erythrocytic stages of the parasite within the vector. Innovations of such potential transmission blocking compounds are underway but constrained by lack of appropriate methods of delivery into the vector.

This study involved evaluation of a membrane-feeding platform for assessing the potential of antimalarial drugs and other transmission blocking agents in reducing Plasmodium infection in Anopheles gambiae. Research investigation included determining maximal doses of transmission blocking compounds tolerated by mosquitoes, the effects of the drugs against Plasmodium falciparum infection inside the mosquito and the effect of the drugs on the fecundity and survival of the mosquito. The study utilized an artificial specialized membrane feeding system to deliver gametocytes into laboratory reared mosquitoes alongside known transmission blockers in an effort to validate both delivery of antimalarials primaquine, artemether, lumefantrine and tafenoquine; as well as their transmission blocking capability.

The study objective was to determine tolerable doses of anti-malarial drugs delivered to the mosquitoes, drug's efficacy to plasmodium stages in mosquito vector, and anti-malarial drugs effects on mosquito's fecundity and survival. The maximal doses of artemether, lumefantrine, primaquine and tafenoquine, drugs tolerated by Anopheles gambiae mosquitoes were; 225.45ng/ml, 55.49ng/ml, 11.86ng/ml and 210.69ng/ml respectively. The study presents an important in vitro platform evaluating anti-malarial drug development targeting the Plasmodium stages inside the mosquito vector as a malaria transmission-blocking strategy for malaria control.



Abstract No. 012.

Amodiaquine pressure selects nonsynonymous mutations in pantothenate kinase, diacylglycerol kinase, and phosphatidylinositol 4 kinase in *Plasmodium berghei* ANKA

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The emergence and spread of resistance against artemisinin-based therapies (ACTs) and the progress in genomics technologies have spurred new efforts to identify new drug targets and resistance markers. Protein kinases mediate the action of various antimalarial drugs. However, their link with lumefantrine (LM), piperazine (PQ), and amodiaquine (AQ), long-acting backbone drugs in the ACTs, remains poorly understood. Here, we employed LM, PQ, and AQ-resistant *Plasmodium berghei* parasites, to investigate the association of pantothenate kinase 1 (PANK1), diacylglycerol kinase (DAGK), and phosphatidylinositol 4 kinase (PI4KB), choline kinase (CK), and calcium-dependent protein kinase 1 (CDPK1) with LM, PQ, and AQ resistance. Using in silico bioinformatics tools, we first searched for plausible kinases based on their localization, ligand binding motifs, sequence conservation across the different ortholog parasites, and the predicted mechanism of AQ, LM, and PQ action. We then probed for single nucleotide polymorphisms (SNPs) within the predicted motifs in the selected kinases using PCR amplification and sequencing. Finally, we measured the expression profiles of the kinases by quantifying the mRNA amount using qPCR. We reveal sequence conservation and unique ligand-binding motifs in PANK1, DAGK, PI4KB, CK, and CDPK1 across the different malaria species that infect rodents, humans, monkeys, and chimpanzees. The conservation of the functional domains coupled with amino acid sequence diversity and unique regulatory and functional roles reaffirms malarial protein kinases as attractive drug targets. In silico analysis mapped conserved genomic regions, possible enzyme active sites, and unique ligand binding sites in each of the proteins of CK, PANK1, PI4KB, DAGK, and CDPK1. Sequence analysis of the functional motifs revealed nonsynonymous mutations in PANK1, DAGK, PI4KB but only in the AQ-resistant (AQr) parasites, while CK and CDPK1 remained unaltered across all the resistant parasites. These nonsynonymous mutations are Asn394His in PANK1, K270R, and K292R in DAGK, while PI4KB acquired D1366N, S1367R, Y1394N, and D1423N mutations. Upon quantifying the mRNA transcripts, PANK1 yielded high mRNA amounts in the AQr parasites relative to the wildtype parasites but downregulated in piperazine-resistant (PQr) and lumefantrine-resistant (LMr) parasites. PI4KB was highly expressed in AQr and LMr parasites but downregulated in PQr parasites. Taken together, we demonstrate the association of PANK1, DAGK, PI4KB mutation with AQ resistance in *Plasmodium berghei*. Validation of the impact of the PANK1, DAGK, PI4KB mutations in mediating AQ, LM, and PQ susceptibility in *Plasmodium berghei* is currently ongoing. There is, however, a need to investigate the impact of the mutations on AQ action in the human malaria parasite, *Plasmodium falciparum*.

Abstract No. 013.

Capacity to conduct infectious disease surveillance: An investigation of suspected malaria outbreak in the epidemic-prone Nandi County, Kenya

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Background: Approximately 70% of the Kenyan population is at risk for malaria including 19 million people in highland epidemic prone and seasonal transmission areas. The incidence rate is currently 10.5 per 1000 population. Surveillance data showed a 288% increase in malaria cases between January and May 2021 in Nandi County. We investigate the increased incidence of malaria in Nandi County

Methods: We abstracted demographic and clinical data from the laboratory register in health facilities with high malaria burden. Key informant interviews using a structured questionnaire collected healthcare worker perceptions on malaria interventions and personnel capacity. We calculated means and medians for continuous variables and frequency and proportions for categorical variables. Data quality assessment (DQA) was conducted to evaluate timeliness and completeness, data accuracy, and overall system assessment

Results: We reviewed 19,526 records from 12 health facilities. Females contributed 61% cases (11,862). A majority of cases 21% (4,111), were between age group 15-24 years. Of the 19,498 tested, 2,662 tested positive (test positivity rate, TPR = 13.7%). Microscopy accounted for 39% (1,041) and mRDT 61% (1,620) of tests conducted with some patients being double tested using both tests. Kapsabet County Referral contributed 26%, (5,051) suspected cases, TPR 3.2%, Chemase Health Centre TPR was 33.2%. Of the 78 inpatient cases, median age was 12 years (IQR 29), 5.1% (4) were pregnant, 45 (57.7%) had complications, and 96.1% (75) had received Artesunate. Facilities experienced major mRDTs stock outs in the last 3 months. Approximately 30% (3) of the 10 facilities assessed conducted laboratory IQC programs. Majority of facilities during data quality assurance assessment had data issues with either over- or under reporting in the registers, monthly summaries, or online. Of the 12 facilities assessed 33% (4) facilities had over-reporting of suspected cases in the monthly summary, while 25% (3) facilities over-reported in the online tool. On reporting of confirmed malaria cases, over-reporting was noted in 25% (3) facilities in both the monthly summaries and the online tool. Data completeness was 77% and timeliness 93%

Conclusion: There were data quality issues in health facilities. We recommended regular data review, exposure to key malaria policy documents, support supervision and mentorship on microscopy, and laboratory quality assurance

Keywords: Kenya, malaria, outbreak, data accuracy



Abstract No. 014.

Maintenance of high temporal *Plasmodium falciparum* genetic diversity in Kilifi, Kenya, despite a reduction in community malaria transmission from 2007 to 2018

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Background: High levels of genetic diversity are common characteristics of *Plasmodium falciparum* parasite populations in high malaria transmission regions. Here, we investigate whether a decline in malaria transmission intensity over 12 years in the community in Kilifi, Kenya, resulted in a reduction in *P. falciparum* genetic diversity using merozoite surface protein 2 (*msp2*) as a genetic marker.

Methods: Blood samples from children in the community with asymptomatic infections and first-febrile malaria episodes (< 15 years) were collected between 2007 and 2018 in Kilifi, Kenya. Parasite DNA was extracted and successfully genotyped using allele-specific nested polymerase chain reactions for *msp2* and capillary electrophoresis fragment analysis.

Results: There was a significant temporal reduction in asymptomatic malaria positivity rate based on microscopy from 16.2% to 5.5% (p -value < 0.001), however *msp2* genetic diversity remained high. A high heterozygosity index (H_e) (>0.95) was observed in both asymptomatic infections and febrile malaria over time. About 281 (68.4%) asymptomatic infections were polyclonal (>2 variants per infection) compared to 46 (56%) polyclonal first-febrile infections. There was significant difference in complexity of infection (COI) between asymptomatic 2.4 (95% CI, 2.2 – 2.5) and febrile infections 2.0 (95% CI, 1.7 – 2.3) ($P = 0.016$). Majority of asymptomatic infections (44.5%) carried mixed alleles (i.e. both FC27 and IC/3D7), while FC27 alleles were more frequent (53.3%) among the first-febrile infections.

Conclusion: *P. falciparum* infections in Kilifi are still highly diverse and polyclonal, despite the reduction in malaria transmission in the community.





SCIENTIFIC SESSION

3: PUBLIC HEALTH



Abstract No. 015.

IMPACT OF ROTAVIRUS VACCINATION ON ALL-CAUSE AND ROTAVIRUS-SPECIFIC GASTROENTERITIS AND STRAIN DISTRIBUTION IN KIAMBU, CENTRAL KENYA:11-YEAR SURVEILLANCE

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Background: Rotavirus is the leading cause of severe childhood acute gastroenteritis (AGE) globally. Safe and effective vaccines are considered to be a high-impact and cost-effective public health intervention tool to greatly reduce the burden of AGE. A monovalent rotavirus vaccine was introduced into the National Immunization Program in Kenya in July 2014. The study evaluated the impact of the vaccine on hospitalization for all-cause and rotavirus-specific gastroenteritis and strain distribution in Kiambu, Central Kenya five years following vaccine implementation.

Methods: Data on all-cause and rotavirus-specific AGE and strain distribution were derived from an eleven-year hospital-based surveillance at Kiambu County Referral Hospital (KCH) between 2009 and 2020. Fecal samples were collected from children <5 years presenting with AGE. The samples were screened for group A rotavirus using ELISA and genotyped using multiplex semi-nested RT-PCR and direct Illumina Miseq next-generation sequencing. Trends were compared in all-cause and rotavirus-related AGE and strain distribution between post-vaccine period (February 2019-October 2020) and pre-vaccine baseline period (July 2009-June 2014). Administrative data obtained from KCH and Kiambu Sub-County Health Records Office were used to estimate rotavirus immunization coverage.

Results: Following the vaccine introduction, there was a prevalence of 10.1% (95% CI 9.8%-10.5%) and a monthly median of 24 for all-cause AGE, down from a monthly median of 97 recorded in the pre-vaccine period. This represented a reduction of 75.3% in all-cause AGE. Rotavirus-specific AGE was detected at 12.0% (95% CI: 10.6-13.5%), down from 27.5% (95% CI: 25.5-30.1%) observed in the pre-vaccine period, representing a decline of 53.4% (95% CI: 41.5-70.3%). Reductions in rotavirus hospitalizations were greatest among vaccine-eligible children (<12 months), with the peak shifting to older children post-vaccine introduction. Rotavirus AGE ranged predominantly from moderate to severe among the study population. Coverage with the last dose of rotavirus vaccine was 91% with a 6% drop-out, indicating good access and high utilization of the vaccine in the area. G3P[8] was the most predominant strain in post-vaccine, replacing G1P[8] which predominated in the pre-vaccine period. Additionally, we detected considerable proportions of uncommon strains G3P[6] (4.8%) and G12P[6] (3.5%) in the post-vaccine era.

Conclusion: The data points to a significant decline in all-cause and rotavirus AGE following the vaccine introduction, thus, providing evidence for a significant public health impact of the vaccine in Kiambu, Central Kenya. The change in rotavirus strain dominance following the vaccine introduction underscores the need for continued surveillance to assess whether, over the long term, the observed changes can be attributed to vaccine-induced selective pressure or could diminish the vaccine effectiveness.

Abstract No. 016.

MYCOFLORA DIVERSITY IN STORED WATER FROM SELECTED HOUSEHOLDS IN NAIROBI

Olga Mashedi (KEMRI)*

Introduction: Water is a very vital natural resource for all life on earth as it is used widely. Water plays an important role in the world economy, the uses can be categorized into; commercial use where it is used in hostels, restaurants, offices, and other commercial activities. Fungi are ubiquitous in nature; they produce spores that are small-sized, able to stay airborne for a long duration, and transported over long distances during air dispersal. These are major sources of allergens and airway irritants that are detrimental to health. Biofilms in water distribution systems and storage containers provide favorable habitat for microorganisms as they accumulate better in solid-liquid interfaces that enable them to be embedded in the gelatinous matrix of extracellular polymers excreted by the microorganisms leading to resistance of microbes from environmental stresses. Fungi hydrophobicity and adaptability have enabled them to assemble and colonize different surfaces in domestic settings. The potential health effects caused by fungi in treated water are still not well highlighted and thus the need to carry out this study to investigate the mycoflora isolated from stored water.

Methods: This was a cross-sectional study conducted from 2019-2021, whereby 120 water samples were collected from stored containers in households in Nairobi county Kenya. The fungal strains were plated onto Sabouraud's dextrose agar (SDA), Potato Dextrose Agar, and Czapeck's Agar media with chloramphenicol (0.05mg/ml) (Oxoid, U.K.). The plates were incubated for 7 days at 25°C. Fungal identification was done by direct microscopy and morphological features.

Results: A total of 101 fungal species were isolated from water samples. Yeasts 48(47.5%), *Rhodotorula* 34 (33.6%) accounted for the unicellular fungi. Among Filamentous mycoflora, the most common isolated fungi were *Aspergillus* species 13(12.8%), followed by *Fusarium* spp 4(3.9%) with *Mucor* and *Rhizopus* species accounting for 1(0.9%) respectively. Yeasts species were the most common species isolated from water species and *Aspergillus* species were more frequently isolated filamentous fungi.

Conclusion: Yeasts species were the most common species isolated from water species and the roles they play in biofilm needs to be further investigated.



Abstract No. 017.

Framework for strengthening disease surveillance and response systems: the case of neglected tropical diseases and implications for other endemic and newly emerging diseases

Arthur K.S. Ng'etich (Moi University)*

Background: Efforts to strengthen disease surveillance systems face significant challenges due to a limited focus on diseases targeted for elimination or eradication, particularly preventive chemotherapy neglected tropical diseases (PC-NTDs). At a time when coronavirus disease (COVID-19) has overburdened existing health systems, this has decelerated efforts to control and eliminate both diseases of priority and neglected tropical conditions. The aim of this study was to develop and validate an adoptable framework for improving surveillance and response to PC-NTDs at the sub-national levels.

Methods: Framework development adopted a multi-phased approach. The first phase involved a systematic literature review of surveillance assessment studies conducted in Africa to derive generalized recommendations for reinforcing surveillance system functions. The second phase utilized primary data surveys to identify disease-specific recommendations to improve PC-NTDs surveillance and response. The third phase utilized a Delphi survey to assess stakeholders' consensus on feasible recommendations for improved PC-NTDs surveillance. The fourth phase drew critical lessons from existing health information system and public health surveillance system conceptual frameworks. The four distinct phases that made up the framework development process were undertaken over a three-year period (January, 2018 – December, 2020). The final validated framework was based on resolutions and inputs from concerned stakeholders.

Results: Framework components constituted inputs with the first domain combining surveillance tools, equipment and infrastructure while the second domain combined financial, technical and logistical support. Processes were classified into four sub-domains with activities for strengthening existing surveillance tools, surveillance core, support and attribute functions. The intended results phase comprised of ten distinct outputs with anticipated outcomes categorized into short-term, mid-term and long-term outcomes. Lastly, the overall impact alluded to reduced disease burden, halted disease transmission and reduced costs for implementing treatment interventions.

Conclusion: The framework provides a logical approach for implementing feasible actions to bolster existing surveillance system functions. It pinpoints key elements of the existing surveillance system that require strengthening to inform PC-NTDs targeted control. The context-specific framework necessitates refinement of existing health policies to prioritize improving specific surveillance functions to achieve PC-NTDs elimination. Furthermore, the framework confers an opportunity to improve the overall surveillance system in response to other endemic and newly emerging conditions.

Abstract No. 018.

Knowledge, attitudes and Practices of Medical Students on Covid 19 in Burundi

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Background: COVID-19 first appeared in China in late 2019 and was declared pandemic by the WHO in early 2020. The first cases in Burundi were reported in late March 2020. Our study aimed to find out the basic knowledge, attitudes and practices on Covid-19 of medical students; who've already started their hospital practices likely to encounter patients since they weren't trained before the start of their internship.

Methods: We collected data both on a pre-designed questionnaire (offline questionnaire for medical students from National University of Burundi and University of Ngozi who do their internship in capital city) and an online survey via a Google form (for medical students from Hope Africa University who do internship in rural area). We analyzed socio-demographic data as well as knowledge, attitudes and practices of COVID-19. We used random sampling method. As software, we used Epi-Info for data analysis.

Results: Out of the 3 universities with medical faculties in the whole country; we were able to collect responses from 78 students; 50% were from the University of NGOZI, 46.15% were from the University of Burundi and others from Hope Africa University. Males were represented at 69.23%. Only 34.62% of our respondents claimed to have received training on COVID-19 if not all of them claimed to have learned it from various sources: Social media (70.51%), Google (42.31%), public or electronic poster (20.51%) and online course (5.13%). In general, the majority of students (98.71%) had advanced knowledge on COVID-19 (with ≥ 13 out of 25). 78.21% had full knowledge of the means of propagation; only 21.79% knew more about the risk of complications, 64.10% claimed to follow the preventive practices against Covid19 while almost 41.56% washed hands less than once an hour. In 49.35% of cases, the students stated that they throw away the masks in the garbage after use. Knowledge, attitudes and practices did not depend on the university ($P=0.8719$). A significant majority of students, 87.2%, indicated they were scared of being infected by COVID-19 during internship.

Conclusion: Medical students in Burundi have advanced knowledge regarding COVID-19 but still lack some necessary and useful information to counter the spread of the disease and the risk of complications. Also, self-information takes precedence over training as a source of information. It would be important to learn medical students about Covid-19 and how to prevent themselves before starting their internship, to teach them how to use the PPE (Personal Protective Equipment) and to give them necessary tools which can help to prevent themselves to Covid-19 during the clinical studies or internship.



Abstract No. 019.

'We are in the battlefield and can be hit by stray bullets': Risk Perception for COVID-19 among Health care providers in Kenyatta National Hospital, Nairobi, Kenya

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Background: Globally, health care providers are at high risk for COVID-19 infection. COVID-19 risk perception may influence protective behavior thus influencing risk for COVID-19 infection. We conducted a qualitative study to explore COVID-19 risk perception among health care providers.

Methods: Between April 2021 to June 2021, we interviewed 60 health care providers: 20 frontline providers working in the Infectious Disease Unit (IDU) and 40 healthcare providers working in other departments outside the IDU in Kenyatta National Hospital, who were purposively sampled by cadre. We conducted in-depth interviews remotely by phone using a semi-structured interview guide. We asked health care providers if they felt at risk of COVID-19 in relation to their current duties, units, and work environment. Interviews were audio recorded, transcribed verbatim, and coded using an agreed codebook supported by Dedoose software. We analyzed data using inductive and deductive approaches and identified three key themes: COVID-19 risk perception, risk factors, and comparative risk perception.

Results: Health care providers had a median age of 37 years and included: nurses (30%), medical officers (20%), laboratory technologists (13%) among others. Most health care providers perceived themselves at a high risk for COVID-19 infection with varied risk perception among different cadres. High risk among providers working in the IDU was attributed to poor quality/inadequacy of Personal Protective Equipment (PPEs), close contact with COVID-19 patients, and non-adherence to donning and doffing protocols. Health care providers in non-IDU units largely equated their risk to interacting with colleagues and patients of unknown COVID-19 status and during clinical procedures such as oral examinations. Further, handling patient files, inability to maintain one-meter distance while nursing patients and inadequate PPEs since providers in IDU were given priority were mentioned. On the contrary, some providers (IDU and non-IDU) perceived themselves at a low risk for COVID-19 infection due to perceived adherence to COVID-19 prevention protocols, low risk in the facility compared to the community, and not being in direct contact with patients. Comparing risk perceptions in different departments within the facility, providers considered IDU as low risk.

Conclusion: Health care providers are conscious of their high COVID-19 risk. COVID-19 prevention strategies that target both IDU and non-IDU providers should be explored. Further, implementation and supervision of basic infection prevention and control measures is key.

Abstract No. 020.

Communication to improve HPV vaccine coverage in sub-Saharan Africa: a systematic review

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Background: Cervical cancer is the leading cause of cancer deaths among women globally, with greatest disease burden in low and middle-income countries (LMIC). These LMIC have poor immunization coverage especially for the HPV vaccine. This systematic review explored the communication strategies adopted in various sub-Saharan African countries, the successes, challenges and lessons learnt to enhance immunization of adolescent against human papillomavirus (HPV).

Methods: Our search included both peer reviewed and grey literature on communication strategies to enhance immunization coverage among adolescent girls in sub-Saharan Africa. Two of the reviewers did data extraction and assessment of risk of bias in duplicate. Meta-analysis was done using the random-effects model in outcomes with no variations. For outcomes with substantial variation, the findings were summarized.

Results: We included 22 articles in this review out of the 1314 articles yielded from our search. The communication interventions were used to achieve various outcomes majorly; to educate, make decisions, and communicate. Intervention to facilitate decision making achieved uptake rate of 100%, 95%CI 0.99 to 1.00; 2424 participants followed by intervention to enable communication which achieved 92%, 95CI 0.92 to 0.92; 411708 participants. Communication intervention to inform and educate achieved 90%, 95%CI 0.90 to 0.90; 557062 participants.

Various stakeholders need to be targeted by the interventions; targeting both healthcare workers and community leaders achieved 95%, 95%CI 0.91 to 0.98; 3415 participants while teachers and school boards achieved 92%, 95%CI 0.84 to 1.01; 412138 participants. Targeting policy makers achieved 86%, 95%CI 0.78 to 0.93; 45115 participants.

Communication methods used also need to be varied, use of training achieved an uptake rate of 85%, 95%CI 0.84 to 0.87; 415744 participants, similarly, drama and dance achieved 85%, 95%CI 0.84 to 0.86; 5532 participants. Further, use of information, education and communication materials achieved 82%, 95%CI 0.78 to 0.87; 459868 participants.

The key lessons learnt include the need to share information on the safety and efficacy of the vaccine, use of appropriate language for various settings and age groups targeted, and targeting the hard-to-reach populations.

Conclusion: Vaccine communication is an important component that need to be in cooperated in the planning for vaccine roll out. It must target key stakeholders and must be delivered in an appropriate fashion that suits the target groups.

Keywords: Communication, Human papilloma virus, Vaccination, Sub-Saharan Africa, Adolescents



Abstract No. 021.

Scaling up of Polioviruses Surveillance Using Special Strategies of Environmental Surveillance as a Supplementary Strategy for Polio outbreak monitoring in Kenya 2013-2017

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Background. The gold standard for polio surveillance is the detection and investigation of acute flaccid paralysis (AFP) cases. However, only <1% of individuals develop paralysis following poliovirus infection and more than 99% of these infections are non-paralytic and therefore not detected by acute flaccid paralysis (AFP) surveillance. Environmental surveillance (ES) can detect circulating polioviruses from sewage without relying on clinical presentation. Following the 2013 Horn of Africa (HoA) wild polio virus (WPV) outbreak, Kenya initiated environmental surveillance in October of that year with initial sites in Nairobi County and expanded to other counties in phases. We describe a 5-year scaling up of this strategy of surveillance since inception to 2017.

Methods. In 2013, environmental surveillance sites were validated and established in Nairobi, Kisumu, and Mombasa and Garissa counties. Samples were collected using the grab method and transported to the KEMRI Polio laboratory for concentration and analysis. During the initial 3 years, sample concentrates were sent to Global Specialized laboratory in CDC Atlanta for parallel testing up to 2015 when the laboratory was validated to have full capacity to perform analyses. Polioviruses were isolated from these concentrates following WHO algorithm and intra-typic differentiation was undertaken using real time RT-PCR. Wild poliovirus (WPV) and non-Sabin Like viruses were referred for genomic sequencing targeting the VP1 region of poliovirus genome.

Results. A total of nine sites were established and operationalized in the four main cities from 2013 to 2017. Five hundred and ninety grab samples collected and analyzed over this period. Of these, 1 WPV type 1 was isolated and characterized from Kamukunji site1. Samples collected from other sites yielded either Sabin, non-polio enteroviruses (NPEV), non- enteroviruses (NEV), E24, CVB5 or were negative. Majority of the virus types obtained were NPEV (48.4%), others were PV1 Sabin (11.3%), PV2 Sabin (14.5%), PV3 Sabin (22.2%), NEV (3.2%), E24 (0.14%), CVB5(0.14%). Samples that were negative were 54 (10.6%).

Conclusion. Environmental surveillance of polioviruses in Kenya was sensitive to detect wild poliovirus through targeted site selection. It is therefore a valuable tool to detect silent transmissions and importations from high risk neighboring countries.

Abstract No. 022.

PREVALENCE AND TYPES OF BACTERIAL CONTAMINANTS IN A TERTIARY HOSPITAL IN KENYA

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Background: Hospitals are a source of bacterial infections. Some of the outcomes of Hospital Acquired Infections (HAIs) include prolonged hospital stays, long-term disability, increased resistance of microorganisms to antimicrobials, increased additional costs for the health systems, patients and their families, and preventable deaths. To design infection control programs, facilities need to know the patterns and types of contaminants in various parts of a hospital. We undertook a study to evaluate the prevalence and types of bacterial contaminants on hospital surfaces, equipment and healthcare providers at Migori County Referral Hospital (MCRH).

Methods: This cross-sectional study was done by collecting swabs from selected hospital surfaces, and health workers at MCRH in April, 2020. The swabs were subsequently cultured and bacteria were identified using standard microbiological procedures.

Results: Out of the 62 swabs collected, 38 (61.3%) yielded bacterial growth from which 46 different known pathogenic bacteria were identified. Gram- positives isolates were predominant in 31 swabs (50%) whereas the Gram-negatives were in 7 swabs (11.3%). The highest prevalence of contaminated swabs was noted in the gynaecological ward with 11 out of 14 swabs collected (78%) showing contamination. The paediatrics unit had the highest diversity of pathogenic isolates 17/23 (73.9%). The least contaminated wards were the New-born and Renal units. The wards' surfaces had the highest number of isolates at 27/46 (58.7%) and also showed the highest diversity in the type of species isolated 17/23 (74%) followed by equipment 13/23 (28.3%) and humans at 6/23 (13%). The most prevalent isolates in all wards were Acinetobacter species 19/46 (41.3%) followed by Enterobacter species at 6/46 (13.0%) and Staphylococcus species at 6/46 (13.0 %).

Conclusion: These results indicate high prevalence of bacterial contamination on hospital surfaces which potential causes of hospital acquired infections. There is a need to improve the hospital's infection control program to limit bacterial contamination.

Key Words: Hospital acquired infections, bacteria, contaminated surfaces.



Abstract No. 023.

Integrity, Use, and Care of Treated Mosquito Nets in Kirinyaga County, Kenya

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Background: Vector control is an essential component in prevention and control of malaria in malaria endemic areas. Insecticide treated nets is one of the standard tools recommended for malaria vector control. The objective of the study was to determine physical integrity and insecticidal potency of long-lasting insecticidal nets (LLINs) used in control of malaria vector in Kirinyaga County, Kenya.

Method: The study adopted a cross-sectional household survey that took place between 30th April and 10th May 2018. The study targeted households in an area which had received LLINs during mass net distribution in 2016 from Ministry of Health. A total of 420 households which had received the nets were sampled, using systematic sampling method, where the household heads consented to participate in the study. A semi-structured questionnaire was administered to assess care and use while physical examination was used to determine integrity. Chemical concentration was determined by gas chromatography mass spectroscopy (GC-MS). Data analysis was done using Statistical Package for Social Sciences (SPSS) version 19.

Results: After 18 months of use, 96.9% (95% CI: 95.2–98.6%) of the distributed nets were still available. Regarding net utilization, 94.1% of household heads reported sleeping under an LLIN the previous night. After physical examination, 49.9% (95% CI: 43–52.8%) of the bed nets had at least one hole. The median number of holes of any size was 2 [interquartile range (IQR) 1–4], and most holes were located on the lower part of the nets, [median 3 (IQR 2–5)]. Only 15% of the nets with holes had been repaired. The median concentration for α -cypermethrin was 7.15 mg/m² (IQR 4.25–15.31) and 0.00 mg/g (IQR 0.00–1.99) for permethrin. Based on pHI, Chi-square test varied significantly with the manufacturer ($X(6, N = 389) = 29.14, p = 0.04$). There was no significant difference between nets with different number of washes ($X(2) = 4.55, p = 0.103$). (The nets were from different manufacturers and they were coded A, B and C).

Conclusion: The study focused on the performance of nets under operational conditions in Kirinyaga County by checking integrity, use and care post mass net distribution. After 18 months of field use, more than three-quarters of the nets distributed had survived but integrity had dropped quicker than expected. The slow migration of the insecticide from the sub-surface to the surface could be responsible for the low GCMS results. Standard procedure for field evaluation of surface insecticidal content available to a mosquito after landing on a bed net to rest is recommended.

Abstract No. 024.

COVID-19 Vaccine concerns among Healthcare Providers in Kenyatta National Hospital, Nairobi, Kenya: A Qualitative Study

Phelix O Okello (KEMRI CCR-PHRD Project)*; Vallery Ogello (Partners in Health and Research Development); Nicholas B Thuo (Kenya Medical Research Institute - CCR - PHRD Thika Site); Peter Atandi Mogere (KEMRI - CCR PHRD (THIKA) PROJECT); Paul Mutua (Kenyatta National Hospital); Harrison Mwenda (Kenyatta National Hospital); Linnet Ongeri (Kenya Medical Research Institute); Kenneth Ngure (Jomo Kenyatta University of Agriculture and Technology); John Kinuthia (Kenyatta National Hospital); Nelly R. Mugo (KEMRI)

Background: The evidence of COVID-19 vaccine efficacy for reducing severe effects of COVID-19 infection, including hospitalization and death has been well established. Healthcare providers (HCP) are a trusted and important source of health information to patients and the general population. Understanding HCP COVID-19 vaccine concerns can provide critical insights to optimize success of the vaccine rollout program. We sought to understand health care providers' COVID-19 vaccine concerns in Kenyatta National Hospital.

Methods: From April to July 2021, we interviewed 60 HCP; 20 working in the Infectious Disease Unit (IDU) and 40 working in other departments outside the IDU at Kenyatta National Hospital. The HCP cadres were; 16 nurses, 14 clinicians (11 doctors and 3 clinical officers), 8 laboratory staff, 6 pharmaceutical staff and 16 other non-clinical staff. The HCP were purposively sampled from either within or outside IDU and by department and professional cadre. Interviews were conducted remotely, audio recorded, transcribed and translated verbatim to English. We used inductive and deductive approaches to analyze data and identified four key themes: Vaccine availability, safety concerns, vaccine efficacy and misconceptions.

Results: The HCP had a median age of 37 years (IQR: 32–44). During rollout of the first vaccine dose, most HCP were concerned about the availability of the second vaccine dose and the potential side effects of the vaccine such as blood clots which influenced their motivation to receive the vaccine. Other providers reported hesitancy related to the quick vaccine development and perceived low efficacy of the available vaccine. Additionally, some HCP mentioned herd immunity from recent COVID-19 infections and misconceptions such as the vaccine as a birth control measure as other reasons for not getting COVID-19 vaccine.

Conclusion: Healthcare providers had varying concerns about COVID-19 vaccines which could influence the uptake of vaccination in Kenya. Awareness creation on COVID-19 vaccine safety and efficacy is needed to address concerns and promote vaccine uptake, to prevent the spread of COVID-19.

Keywords: COVID-19 Vaccine, Concerns, Healthcare Providers, Kenya.



Abstract No. 025.

High willingness to pay for PrEP services at retail pharmacies in Kenya

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Background: For models of HIV pre-exposure prophylaxis (PrEP) delivery outside of clinical settings (e.g., retail pharmacies) to be self-sustaining, a fee must be associated with service provision. We collected data on participants' willingness to pay for services associated with pharmacy-based PrEP delivery as part of an ongoing pilot study in Kenya.

Methods: We enrolled pharmacy clients interested in PrEP for HIV prevention at four retail pharmacies in Kisumu and Thika, Kenya. The Ministry of Health supplied PrEP drugs and HIV self-tests free of charge for this pilot and we charged participants a service fee (300 KSH, ~3 USD) for pharmacy-based PrEP initiation, which included counseling, safety assessment, assisted HIV self-testing, and drug dispensing. At enrollment, all participants completed a survey that captured their socio-demographic information, amount spent at a typical pharmacy visit, and future willingness to pay amount per visit for pharmacy-delivered PrEP services. We reported descriptive statistics by age and sex and measured differences using Pearson's chi-squared test.

Results: From December 2020 to February 2021, we enrolled 91 participants in the pilot, of which 57% were females and 45% were <25 years. Participants reported spending a median of 50 KSH (IQR: 0-300 KSH) at a typical pharmacy visit. Almost all participants (97%), were willing to pay for pharmacy-delivered PrEP services and many (43%) were willing to pay more than they were charged (>300 KSH) for these services. There were no significant differences ($p < 0.05$) in willingness to pay for PrEP delivery at pharmacies by age and sex (Fig. 1).

Conclusion: Clients at retail pharmacies in Kenya are willing to pay for pharmacy-delivered PrEP services and many are willing to pay more than what they were charged for these services in the pilot. These findings indicate both a demand for and the potential sustainability of pharmacy-based PrEP delivery models in Kenya and similar settings.

Abstract No. 026.

Relationship between Household Air Pollution and Acute Respiratory Infections Among Young Children in Central Kenya

James Mwitari (Clean Air Africa); Gohole Akaranga Arthur (Environmental Public Health Association of Kenya)*; Lolem Lokolile (Ministry of Health)

Background: Household Air Pollution is perceived to increase the risk of developing acute respiratory infection (ARI), specifically among young children.

Methods: A cohort study involving 430 children (228 exposed to Household Air Pollution and 202 non-exposed to indoor air pollution) was conducted to explore the association of Household Air Pollution upon respiratory infections of children aged less than five years, in Nyeri, central Kenya. Data was collected monthly for twelve months from participants using a questionnaire. Meteorological data on temperature, relative humidity, and rainfall was also collected at the same interval and period. A randomized sample of 60 households was selected in which 24 hours monitoring for particulate matter of less than 10 microns in diameter was carried out.

Results: The overall, mean particulate matter of less than 10 microns in diameter was $68.6 + 90.1 \mu\text{g}/\text{m}^3$ in the exposed households. The mean PM10 level was $100.8 + 95.3 \mu\text{g}/\text{m}^3$ compared to the mean of particulate matter of less than 10 microns in diameter level in the non-exposed household of $4.1 + 4.0 \mu\text{g}/\text{m}^3$ (students t-test 4.88, $p < 0.01$). Children exposed to particulate matter of $> 50 \mu\text{g}/\text{m}^3$ were (10) at times at risk of developing more than five (5) episodes of acute respiratory infections within a year (RR= 10, 95% CI 3.3 to 30). There was also a positive linear correlation between a particulate matter of less than 10 microns in diameter and the development of acute respiratory infection ($R = 0.358$, $p < 0.01$). The rates ratio for acute respiratory infections (ARI) was 1.57(95% CI, 1.19-2.07) and an attributable fraction of 68.6%. The risk of getting ARI during the cold season was 3.6 (RR=3.6, 95% CI 3.1-4.2) compared to the hot season. Exposure to Household Air Pollution, stunting condition of the children were variables identified by the multivariate model as independently associated with ARI.

Conclusion: This study found that the incidence rate for acute respiratory infections was high in the study population, and there was a statistically significant association between Household Air Pollution and acute respiratory infections (RR=1.57, 95% CI, 1.19-2.07). The mean PM10 levels were higher than the standard set by the British Health Panel and European Commission. Besides exposure to indoor air pollution, stunting and time spent in the cooking place were risk factors for acute respiratory infections.

Key Words: Household Air Pollution, Acute Respiratory Infections, Cohort Study, Particulate Matter, Children Under Five Years, Meteorological Parameters





SCIENTIFIC SESSION

4: NATURAL PRODUCTS



Abstract No. 027.

SCREENING OF ANTIBACTERIAL AND ANTHELMINTIC POTENTIALS OF *Carica papaya* SEED OIL

BONFACE KHAJEZO JIVERI (KAIMOSI FRIENDS UNIVERSITY COLLEGE)*

Carica papaya is a short-lived, fast-growing, woody herb which belongs to the family of Caricaceae (Alabi et al., 2012). Papaya contains many biologically active compounds. The increasing prevalence of multi-drug resistant strains of bacteria and the recent appearance of new aggressive strains with reduced susceptibility to antibiotics. This has raised concern and urgency to the search for new infection-fighting strategies. For a long time, plants have been an important source of natural products for human health. The effective way of managing resistant bacteria and helminthes is by use of plant extracts instead of synthetic drugs. The aim of the study was to determine the phytochemicals present in aqueous and ethanolic seeds extracts of Vega F1 and Red royale F1 *Carica papaya* varieties, to determine the antibacterial activity of aqueous and ethanolic seed extracts of Vega F1 and Red Royale F1 *Carica papaya* varieties on *Staphylococcus aureus* and *Salmonella typhi* and to determine the anthelmintic activity of aqueous and ethanolic seed extracts of Vega F1 and Red Royale F1 *Carica papaya* varieties on *Taenia saginata*, *Schistosoma mansoni* and *Ascaris lumbricoides*. A laboratory experiment was laid out in a Completely Randomized Design (CRD) with three replications. Experimental treatments (5) where three levels of *Carica papaya* seed extracts: 25%, 50% and 100% and a synthetic drug chloramphenicol (Standard antibiotic) / Piperazine citrate (10mg/ml) (Standard antihelminthic) were used as standard check and sterile distilled water (0%) as untreated control. The test organisms used were all human pathogenic organisms of clinical origin. They were obtained from Kenya Medical Research Institute, Kisumu County, Kenya. All isolates were subcultured onto nutrient agar. Two *Carica papaya* varieties Vega F1 and Red Royale F1 fruits were bought from Kakamega market from fruit sellers. The aqueous and ethanolic seed extracts of *Carica papaya* varieties Vega F1 and Red Royale F1 will be subjected to routine qualitative chemical analysis to identify the nature of phytochemical constituents present in sample. Information obtained from this study will be useful to inform policy, contribution new information to the big body of knowledge on antimicrobial chemotherapy.

Abstract No. 028.

In silico and in vitro response of NCI-60 tumour cell lines to oleanonic acid

Beatrice Irungu (kemri)*; Fidelis Ndombera (xx)

Background: Compounds derived from plants have played a key role in cancer drug discovery studies serving as a source of several clinically useful anticancer agents. In this study, we report anticancer potential of oleanonic acid (3-oxo-OA) isolated from *Ekebergia capensis* root bark.

Methods: Initially we submitted 3-oxo-OA structure to National Cancer Institute, Developmental Therapeutics Program for unique and privileged drug scaffold evaluation. This was followed by submission of a physical sample that was screened in vitro for anticancer properties at a single dose of 10 μ M against 60 human tumour cell lines. Freely accessible web services SwissADME, CLC-Pred (Cell-Line and Cytotoxicity Predictor) and DIGEP-Pred gene expression were employed to predict drug-like properties, cytotoxicity, and upregulated and downregulated genes.

Results: 3-oxo-OA contains unique and privileged drug-like scaffold. It showed anticancer activity at a single dose of 10 μ M with SK-MEL-5 (hyperpentaploid human skin cancer) being inhibited the most (65.68%). Moreover, it was selective towards leukemia cells with growth inhibition of 57.61% and 50.99% on HL-60(TB) and K-562 respectively. In silico cytotoxicity assessment predicted using CLC-Pred was highest for 8505C, a thyroid gland undifferentiated carcinoma ($P_a=0.518$; $P_i=0.004$) while Protein-tyrosine phosphatase 1B was predicted as a probable target with a confidence value of 0.8013. Previously, 3-oxo-OA was cytotoxic in HEp2 (IC₅₀=1.4 μ M) and 4T1 (IC₅₀=13.3 μ M) cells.

Conclusion: Notably, 3-oxo-OA had good drug-like properties, was selective towards leukemia cells and had growth inhibition of 65.68% on SK-MEL-5 cancer cells suggesting further drug development potential.

Abstract No. 029.

Pinto beans (*Phaseolus vulgaris* L.) exhibit potent antiviral activity against human influenza A virus

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Introduction: Diet rich in plant-derived foods is known to offer a protective effect on human health. The identification of bioactive dietary constituents is important for the discovery of new drugs and novel approaches for disease management. Seasonal influenza causes significant deaths every year worldwide with most of the deaths occurring in poor countries. Although antiviral drugs and vaccines are available, the virus changes quickly often making them ineffective. These drugs and vaccines are also not affordable for people in poor countries. Therefore, overcoming drug resistance and the discovery of a cheap and accessible treatment option for influenza is an urgent public health need. In this study, we investigated the antiviral effects of a common legume, pinto beans, against human influenza virus using cell-based assays

Methods: One gram of the powdered pinto beans was mixed with 10mL of 80% ethanol and shook overnight at room temperature. The extract was dried and reconstituted to 20mg/mL and used for the determination of toxicity and antiviral activity using crystal violet assay. MDCK cells in 96-well tissue culture plates were treated with serial dilutions of extracts in minimum essential medium. Influenza virus solution of 100 TCID₅₀ was added per well for the antiviral activity assay. Plaque formation assay was used to elucidate the possible mechanism of action by performing different virus and/or cell treatments.



Results: Bean extract concentrations of up to 100 µg/mL did not show cytotoxicity. The extract potently suppressed the replication of various strains of influenza A virus including an oseltamivir-resistant clinical isolate of 2009 pandemic flu. Treating cells with extract prior to virus infection and incubating virus with extract before infecting to cells did not suppress plaque formation. However, when extract and virus were simultaneously added to cells plaque formation was inhibited by 69%, suggesting that the extract interferes with the early stages of virus infection. Also, treatment of cells with extract after virus infection resulted in 73% reduction in plaque formation indicating the inhibition of virus replication processes occurring after infection. Combination of the extract with oseltamivir shifted the 50% inhibitory activity of oseltamivir against a resistant strain from >100 µg/mL to 0.62 µg/mL in the presence of 3.13 µg/mL of the extract.

Conclusion: Pinto bean extract exhibits potent activity against oseltamivir-resistant influenza virus. It inhibited the early stages of virus infection and demonstrated a synergistic effect when combined with oseltamivir. This study demonstrates the possible future application of a cost-effective and widely accessible food for influenza management and for combating drug resistance.

Abstract No. 030.

Structure based discovery of a quinolinone compound inhibiting nucleoprotein of influenza A virus without selecting for resistant mutants

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Background: Influenza A virus infections are associated with significant morbidity and mortality across the globe. The emergence of resistance to available anti-influenza drugs heightens the need for the development of antivirals with novel mechanisms of action. The influenza A virus nucleoprotein (NP) is highly conserved and the main component of the viral ribonucleoprotein complex (vRNP); where via NP-NP interactions it forms oligomers that coat viral RNA. The formation of a functional vRNP is indispensable for virus replication. In our recent work, we aimed at finding small molecule compounds that could inhibit vRNP formation by interfering with NP-NP interactions.

Methods: A custom chemical library consisting of drug-like compounds was screened using DEGIMA supercomputer and Nagasaki University Docking Engine software to select potential inhibitors of NP-NP interactions which were tested for biological activity in a cell-based assay. Biologically active compounds were further analyzed for their mode of action using biochemical experiments.

Results: We found a compound designated NUD-1 (a 4-hydroxyquinolinone derivative) that effectively inhibited the replication of various influenza A virus strains including a drug resistant clinical isolate of 2009 H1N1 pandemic within a 50% inhibitory concentration range of 1.8 – 2.1 µM. Analysis of binding between NP and NUD-1 using surface plasmon resonance assay and fragment molecular orbital calculations revealed that the compound binds to NP and inhibit NP-NP interactions. NUD-1 also inhibited the formation of vRNP-like structures in vitro and suppressed viral transcription and protein synthesis. Moreover, serial passage of clinical isolate of 2009 H1N1 pandemic showed that oseltamivir selected for resistant variants after 5 passages but NUD-1 did not select for resistant variants after 9 passages.

Conclusion: Collectively, our data demonstrate that NUD-1 is a potential lead compound for the development of a novel anti-influenza drug. Structural modifications are ongoing to optimize NUD-1 for in vivo studies

Abstract No. 031.

The Role of Traditional Medicine in Management of Diabetes Mellitus in Kenya: A Review

Kipkoech K Lucia (KEMRI)*; Guantai Eric (University of Nairobi); Abuga Kennedy (University of Nairobi)

Background: The global diabetes burden continue to increase alongside its chronic complications which are responsible for morbidity, disability and mortality. It causes around 4 million deaths yearly. This figure is likely to be driven higher by the COVID-19 pandemic which is causing severe illness and sometimes death in people with pre-existing medical conditions such as diabetes. In Kenya, diabetes prevalence is estimated at 2.4% of the population. Poor glycaemic control, lack of cure, side effects and other factors has caused many diabetic patients to seek alternative treatments. It is estimated that close to 50% of diabetic patients use some form of Complementary/ alternative medicine, plant-based therapies being the most popular. This review examines the role of traditional medicines in management of diabetes mellitus in Kenya.

Methods: A systematic literature review was conducted using key words such as 'Kenya antidiabetics' and 'Kenya hypoglycaemic' combined with other terms like 'therapies', 'herbs' or 'plants' in scientific databases including PubMed, Elsevier, ScienceDirect, the Wiley Online Library and Google Scholar from inception to January 05th 2022. Publications were assessed to identify literature focusing on documentation and scientific investigation of traditional therapies used for management of diabetes in Kenya. Only peer reviewed publications were included. **Results:** A total of 28 publications were included in evidence data synthesis. Only 5 papers were diabetes therapies documentation studies that were undertaken in the former lower Eastern Province, Embu and Mbeere Districts, Nyeri, Narok, Baringo and Nyamira Counties. Over 120 medicinal plants, foods and spices have been documented for use in management of diabetes mellitus though not all are native to the local flora. Approximately 30% have been scientifically evaluated for their antidiabetic properties and efficacy while 23.8% have been screened for presence



of trace elements involved in diabetes pathogenesis and therapy. Ten percent have undergone general phytochemical screening to determine presence of secondary metabolites responsible for antidiabetic activity while phytochemical compound have been isolated from one plant only.

Conclusion: This review provides scholarly evidence supporting the role of natural products in management of diabetes in Kenya. However, there is limited scientific evidence of in-depth investigation of antidiabetic properties of locally documented therapies have been carried out in the Country. In addition, there are few documentation studies reported. Hence, there is urgent need for research prioritisation and resource allocation in order to bridge this gap. Documentation studies are vital to indigenous knowledge preservation while high-quality pharmacological and phytochemical analysis of the documented traditional medicines is important in establishment of efficacy and possible identification of novel bioactive natural products.

Abstract No. 032.

Assessment of Phytochemical and Biological Properties of Moringa oleifera Leaves Phytosome on Breast Cancer Cell Lines

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Background: The active plant molecules have been relocated increasingly for managing breast cancer traditionally. However, phytoconstituents such as polyphenols have high polarity and possess a large molecular size thus cannot be absorbed by simple diffusion to target cells by passive diffusion. The polyphenols also possess a poor lipid miscibility and this results to poor bioavailability and decreased efficacy. 'Phytosome' plays a very important role of improving bioavailability, prolong the retention time and also facilitate absorption of the polyphenols.

Methods: Phytosome being a novel formulation system loaded with polyphenols and phosphatidylcholine complex was prepared by a nanoprecipitation technique combined with solvent evaporation method with an aim of developing a drug delivery system. The gallic acid was used as a standard and the total phenolic content expressed as mg/g gallic acid equivalents (GAE). The zeta-potential, average particle size, encapsulation efficiency, polydispersity index, solubility and residual drug-loading content was used to evaluate the Moringa oleifera polyphenols-loaded phytosomes. Additionally, Fourier transform infrared spectroscopy was also evaluated to demonstrate the integrity of the polyphenols-loaded phytosomes. Cytotoxicity and the anti-proliferative activity of M. oleifera nanophytosome complex against normal Vero cell lines and 4T1 (Breast) cancer cell lines were assessed by the MTT cell viability assay.

Results: Gallic Acid Equivalent standard curve equation was $Y = 0.0061x + 0.0396$ with R^2 value = 0.9991. Electrophoretic light scattering described a dispersion with an average particle size of 250.1000 ± 0.2300 nm, polydispersity index of 0.2160 ± 0.0550 to 0.8700 ± 0.1170 , and a zeta-potential value of -45.4000 ± 1.4000 mV. The stability tests for In vitro, demonstrated that the average particle size had no evident change at different storage conditions of $+4^\circ\text{C}$, -20°C , -80°C and at room temperature of 25°C . The 50% cytotoxic concentration value of normal Vero cell lines for nanophytosome was 98.4400 ± 1.4350 µg/ml and 212.9000 ± 1.3000 µg/ml for M.oleifera polyphenols. The half maximal inhibitory concentration (IC50) for co-encapsulated nanophytosome was 7.7300 µg/ml and for the free polyphenols of M. oleifera was 39.8400 µg/ml on 4T1 cancer cell lines.

Conclusion: In vitro cytotoxicity assays using VERO cell lines, indicated that the polyphenol-loaded phytosomes had remarkable cytotoxicity. The In vitro anti-proliferative effect revealed inhibitory effect on 4T1 cancer cell lines growth. These findings indicates that the M. oleifera polyphenol-loaded phytosomes had better effects of prolonging retention time and promoting absorption than the free polyphenols. This shows that it can be used as a sustained delivery system for bioactive compounds with poor lipid immiscibility. Additionally, it can offer an effective and promising formulation for drug delivery for breast cancer therapy.

Abstract No. 033.

HERBAL COMBINATION REMEDY FOR THE MANAGEMENT OF COVID-19 AND ASSOCIATED PREDISPOSING AILMENTS

Peter G Mwitari (KEMRI)*; Mercy Jepkorir (KEMRI/JKUAT); Elizabeth Kigondu (KEMRI); Edwin Murungi (Kisii University); Ruth Nyangacha (KEMRI)

Background: The novel SARS-CoV-2 coronavirus identified in 2019 is the causative agent of the COVID-19 disease, a global pandemic. COVID-19 has not only devastated people's health and relationships but their livelihoods as well. Indeed, it has become a threat to the world economy. Globally, as of January 2022, over 300 million people have been infected resulting in over 5.4 million deaths. Kenya has reported over 306,000 cases and at least 5,411 deaths as at 6 January 2022. Although several vaccines and two drugs are currently approved for the management of COVID-19, optimal management of the disease is still elusive and therefore additional therapeutic alternatives are urgently required. Natural products offer a viable approach for the development of novel COVID-19 remedies not just in and for resource poor settings but on a global scale.

Methods: In the current study, medicinal plants with previously reported antioxidant, anti-inflammatory, immunomodulatory, antiviral, antibacterial, antioxidant and antiproliferative activities were processed and formulated, safety profile evaluated through microbial contamination and cytotoxicity analyses using In vitro methods, and anecdotal data on effectiveness in COVID-19 treatment collected (n>30). Structures of the constituent compounds present in the herbal combination remedy were elucidated spectroscopically. In silico molecular docking was undertaken to decipher the binding affinities of the constituent compounds onto selected putative targets.



Results: A combination of extracts of key medicinal plants/herbs targeting COVID-19 and associated predisposing ailments showed a cytotoxicity value of CC50 573.462 $\mu\text{g/ml}$ and zero microbial contamination. Anecdotal data collected so far has revealed effectiveness of the combination herbal remedy in the treatment of COVID-19. Several constituent compounds exhibited strong binding affinities with docking scores < 8.5 kcal/mol.

Conclusion: Anecdotal evidence ($n > 30$) has revealed the effectiveness of the combination herbal remedy for the treatment of COVID-19. Additionally, preliminary in vitro analysis has shown that the remedy is safe.

Abstract No. 034.

ANTIBACTERIAL, ANTIOXIDANT AND SUN PROTECTION POTENTIAL OF SELECTED ETHNO MEDICINAL PLANTS USED FOR SKIN INFECTIONS IN UGANDA

Peter Sekandi (Makerere University)*; Jane Namukobe (Makerere University)

Rural populations in Uganda rely heavily on medicinal plants for the treatment of bacterial skin infections. However, the efficacy of these medicinal plants for their pharmacological action is not known. The study aimed at evaluating the antibacterial, antioxidant, and sun protection potential of *Spermacoce princeae*, *Psorospermum febrifugum*, *Plectranthus caespitosus*, and *Erlangea tomentosa* extracts. The plant samples were collected from different parts of Uganda after identification and authentication by a taxonomist from Makerere University. The samples were air-dried at room temperature for 28 days and ground into fine powder, sealed in air-tight polythene bags and stored in a cool dry place. The plant samples were extracted by maceration sequentially using hexane, dichloromethane, ethyl acetate, methanol, and distilled water. The antibacterial activity of each extract was carried out using an agar well diffusion assay against *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Escherichia coli*, *Klebsiella pneumoniae*, *Streptococcus pyogenes*, and *Salmonella typhi*. The antioxidant activity of each extract was carried out using a 1,1-diphenyl-2-picryl-hydrazyl (DPPH) radical scavenging assay. The sun protection factor was determined using Shimadzu UV-VIS double beam spectrophotometer between 290 to 320 nm. The plant extracts showed good antibacterial activity against the tested bacterial strains with minimum inhibitory concentration (MIC) ranging between 3.12 to 12.5 mg/ml. The aqueous and methanol extracts of *S. princeae* showed potential antioxidant properties ($IC_{50} = 59.82$ and 61.20 $\mu\text{g/ml}$ respectively). The organic and aqueous extracts of *P. caespitosus* showed high levels of protection against Ultraviolet light with sun protection potential values ranging between 30.67 and 37.84. This work supports the potential of these medicinal plants in managing bacterial skin infections

Keywords: Antibacterial, Antioxidant, Toxicity, Sun protection, Medicinal plants, Skin infections





SCIENTIFIC SESSION

5: VIROLOGY 1



Abstract No. 035.

Detection and investigation of vaccine-derived poliovirus circulation by environmental surveillance -A recent case study

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Background: The Polio Endgame Strategy 2019-2023, which includes tackling circulating vaccine derived polioviruses, has been developed. However, more effective and efficient surveillance activities should be conducted as more Vaccine-derived polioviruses (VDPVs). Environmental surveillance is recommended as a supplementary tool to augment standard surveillance for acute flaccid paralysis (AFP) and can be used for risk mitigation to monitor excretion, potential circulation, and loss of attenuation of the OPV.

Methods: On the 10th of august 2021 a scheduled collection and shipment was done in Jomvu site. It was received on the 11th of August 2021. Concentration was done followed by isolation using L20B and RD cell lines. The flasks that tested positive in L20B were subjected to intratypic differentiation on the 7th October and shipped to CDC for sequencing on the 13th October. We describe outcome of laboratory results as well as investigations undertaken following confirmation of a VDVP. In the latter, we undertook descriptive investigation, records review, and active-case-search as well as household survey, during household survey, care givers were interviewed on the vaccination status of their children; knowledge, attitude, and practices on polio prevention; sanitation and hygiene practices, and health-seeking behaviors.

Results: Sequence results were received on the 4th November 2021. The intratypic differentiation results showed the poliovirus as serotype 2. Upon sequencing the virus was classified as a VDPV. The VDPV2 sequence result showed that it has 7 nucleotide differences (nt diff) from Sabin 2 in VP1 region and was not genetically linked to any previously sequenced VDPVs. During field investigations, we visited 1027 households, 1222 children under 5 years of age; constituting 641 (62.4%) female and 386 (37.5%) males. The proportion of children with 3 or more doses of OPV by card was 69% and 31% by recall. IPV coverage by card was 69% and 31% by recall. In 29 out of 30 households' guardians/caregivers had had knowledge on polio vaccination campaign/ vaccines but not polio disease. Two (2) missed cases of AFP were found in the facilities visited

Conclusion: Although the VDVP isolated from the Mombasa's Jomvu site, could not be classified according to the GPEI classification guidelines, there is need to strengthen routine immunization because the VDVP was a recent divergent virus from Sabin, and shows there are immunity gaps that encourage this genetic drift. This is especially crucial since Jomvu sub county has had sub-optimal routine immunization for the past 3 years' routine immunization and a sub-optimal VPD surveillance performance. Social mapping should be done to determine the source of VDPV within community in order to stop transmission through adequate vaccine coverage.

Abstract No. 036.

Detection of poliovirus using cell culture in EPI Laboratory, KEMRI from 2018 to 2020

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Background: Polioviruses grow readily in a wide range of continuous human and primate cell lines. Stool specimens suspected of containing polioviruses are inoculated into L20B cells, a mouse cell line genetically engineered to express the human poliovirus receptor; and RD cells that are derived from a human rhabdomyosarcoma may produce a cytopathic effect (CPE) if polioviruses or non polio enteroviruses are present.

Methods: We inoculated L20B and RD cell lines seed in 16mmx125mm culture tubes, with 0.2 ml of stool specimen extract and incubated in the sloped (5°) position at 36°C. Tubes were examined daily using an inverted microscope for the appearance of CPE against control tubes containing only cell monolayer. We read tubes for a maximum of 10 days, and scored CPE on a scale of 1+ to 4+) to indicate the percentage of cells infected; 1+ being up to 25% CPE; 2+ up to 50%; 3+ up to 75% and 4+ up to 100% CPE. Tubes showing +3 CPE were frozen at -20°C for a secondary passage. Blind passages were undertaken for negative CPE tubes after the fifth day. RD positive cultures that were negative in L20B cells were re-passaged in L20B cells and examined for five days to exclude the possibility polioviruses in cultures. We referred positive cultures in L20B cells for confirmatory intratypic differentiation (ITD) molecular assays using real time PCR.

Results: Between 2018 to 2020, we received and processed 15,127 samples. Of these 3.2% were positive in L20B cell cultures while 11.6% were positive with RD cultures. On molecular characterization of the L20B positive cultures, 98% yielded a poliovirus (Sabin or non Sabin-like) while 2% yielded non entero virus.

Conclusion: Cell culture is the gold standard for preliminary identification of suspected poliovirus. We demonstrated the importance of using the WHO poliovirus isolation algorithm of using two different cell lines for detection of polioviruses. However, the technique's major challenges which include contamination of cultures and non specific cell degeneration may pose problems in poliovirus; Implementation of a direct testing method using PCR may overcome these challenges.



Abstract No. 037.

Neuraminidase inhibition susceptibility of Influenza A virus (IAV) isolates obtained from Kenya, 2008 to 2017

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Background: Neuraminidase inhibitors (NAIs) have become the main antiviral agents useful in mitigation of IAV infections. Resistance to NAIs both due to drug pressure and transmission of variants has been cited in certain geographical regions. Data on neuraminidase inhibition (NAI) susceptibility profile of influenza A isolates circulating within the Eastern African region remains scanty.

Objective: Here we characterized the NAI susceptibility of the 2008-2017 influenza A strains circulating in Kenya, by profiling known molecular markers in neuraminidase (NA) protein.

Method: Global neuraminidase (NA) and hemagglutinin (HA) sequences were selected from Gene bank for inclusion in the alignments together with local IAV sequences prior to phylogenetic reconstruction using the Bayesian method of tree inference.

Results: During the study period 2008 to 2017 molecular analyses involving- 75HA and 84NA IAV H1N1pdm09; 100HA and 79NA IAV H3N2; 26HA and 33NA seasonal IAV H1N1-genetic fragments was carried out to investigate their susceptibility to oseltamivir. Majority of the seasonal influenza A/H1N1 strains obtained in the 2008-2009 season possessed H275Y marker of Oseltamivir drug resistance. All the 2009 H1N1 IAV strains and majority of the 2008 H1N1 IAV strains belonged to the Northern European lineage (clade 2B. II) bearing the dual signature H275Y and D354G substitutions in the neuraminidase sequence.

All the A/H1N1pdm09 strains obtained from Kenya from 2009-2017 were cluster 2 viruses possessing the main substitution S203T. None of the IAV H1N1pdm09 strains obtained from Kenya from 2009 to 2017 indicated presence of H275Y substitution associated with oseltamivir drug resistance. Additional substitutions, I223K and S247N were not detected.

The IAV H3N2, HA phylogeny indicated that the 2012-2013 strains were Brisbane/10/2007-like possessing S144N substitution. Most of the 2016 IAV H3N2 Kenyan strains belonged to Perth/16/2009 clades defined by S/N144K substitution where as the 2017 virus strains possessed 144S mutation instead. All the Kenyan IAV H3N2 strains analyzed lacked R292K, Q136K, D151V and N294S substitutions.

Conclusion: Most of the seasonal influenza A/H1N1 strains, 2008-2009 season obtained from Kenya possessed H275Y marker and were predominantly oseltamivir resistant. The IAV H1N1pdm09 and IAV H3N2 strains obtained from Kenya in the study period have remained susceptible to oseltamivir and zanamivir. The NAIs were appropriate for prophylaxis against influenza A/H3N2 and influenza A (pH1N1) virus strains. Active surveillance of NAI-molecular markers of resistance is recommended in order to monitor emergence of dangerous resistant strains and inform epidemic/pandemic preparedness and drug use policy.

Abstract No. 038.

Hepatitis C treatment for people who inject drugs in Kenya.

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Authors: Joyce Boke, Aliza Monroe-Wise, Helgar Musyoki, Mercy Nyakowa, John D. Scott, Sara Masyuko, Carey Farquhar, Joshua Herbeck, Brandon L. Guthrie

Background: Despite high risk of hepatitis C virus (HCV), people who inject drugs (PWID) in sub-Saharan Africa have limited access to direct acting antiviral (DAA) treatment and there is little research on treatment modalities to overcome logistical and financial barriers. We investigated the feasibility and outcomes of treatment offered through methadone clinics and needle and syringe program (NSP) centers in Kenya.

Methods: This is an observational cohort study. Working with Kenya's National AIDS and STI Control Programme (NAS COP), we enrolled individuals with active HCV infection confirmed by HCV RNA detection from methadone and NSP sites in Nairobi, Mombasa, and Kilifi counties. Liver function and hepatitis B virus (HBV) status were assessed at baseline. Those eligible were offered ledipasvir/sofosbuvir treatment provided by NAS COP through directly observed therapy (DOT). Participants completed a follow-up visit 12 weeks after completing treatment to measure sustained viral response (SVR-12).

Results: To date, 155 participants have been screened for treatment with predominant genotypes 1a (40%) and 4a (60%). Of those screened, 3 (2%) were ineligible due to contraindications. Of 152 eligible participants, 136 have been successfully initiated on treatment, of whom 46 (34%) were also living with HIV, 15 are pending treatment, and 1 declined treatment. Median age was 38 years (interquartile range: 32-43), 116 (85%) were male, 86 (63%) were taking methadone, and 46 (34%) were also living with HIV. Eight (5%) were HBV surface antigen positive, all of whom were started on HBV treatment (n=2) or already being treated through HIV treatment (n=6). To date, 107 (79%) have completed treatment, 12 (9%) are still being treated, 2 (1%) died before completing treatment, and 15 (11%) stopped treatment due to barriers to daily DOT, among whom 5 (35%) were on methadone compared to 10 (65%) from NSP sites. Of the 107 who completed treatment 95 (89%) achieved SVR-12. Programmatic challenges include availability and reliability of lab assays, participants' hesitation to undergo treatment, and financial concerns related to DOT.

Conclusion: Despite some challenges, an HCV treatment program among PWID in Kenya has resulted in a high proportion of patients who have started and completed treatment. Potential solutions to challenges include ensuring the availability of laboratory tests and prioritizing treatment through methadone centers.

Keywords: hepatitis C; people who inject drugs; treatment





SCIENTIFIC SESSION

6: NCDS



Abstract No. 039.

Characterization of Diabetic Patients at Kericho County Referral Hospital, January-September 2021

STANLEY KEMBOI (MINISTRY OF HEALTH)*

Background: Diabetes is a chronic metabolic condition characterized by elevated blood sugar due to lack of insulin or the presence of insulin resistance. Globally, non-communicable diseases (NCDs) remain a public health threat to people and the health systems. Over 80% of NCD related deaths occur in low and middle-income countries. Diabetes mellitus (DM) is one of the NCDs commonly managed at health facilities. In 2021, IDF reported approximately 537 million persons were newly diagnosed with diabetes and cases were to rise twice by 2030. In Kenya, NCDs account for 27% of the total deaths and over 50% of total hospital admissions. In 2015, a diabetes household survey among persons aged 18-69 years found prevalence was 2.4%.

Methods: We carried out a records review to clinically characterize patients who sought diabetic care at Kericho County Referral Hospital. We reviewed diabetic outpatient register (MOH 222) records. Any entry aged ≥ 15 years with a diagnosis of diabetes at Kericho County referral hospital in 2021 was eligible for abstraction. A standardized abstraction tool was used to conduct a data quality audit. Demographic and clinical variables were collected. Abstracted data was entered, cleaned and analysed using Microsoft Excel. Proportions were calculated for categorical variables and means and medians for continuous variables. No patient identifying information was recorded.

Results: A total of 300 diabetic-case records were abstracted. Females were one hundred and ninety two (64%) and mean 49(SD \pm 15) years. Type II DM were two hundred and fifty (83%). One hundred and fifty five (52%) had micro vascular complications and fifty (17%) had a high diabetic foot risk. The median HbA1c was 9%.

Conclusion: Diabetic complications have often been associated with poor glycaemia control. A comprehensive diabetes intervention that integrates personalized care based on individual contexts could potentially improve glycaemia control.

Abstract No. 040.

CHARACTERISTICS AND CHANGES IN HEALTH-RELATED QUALITY OF LIFE OF PATIENTS TREATED FOR ESOPHAGEAL CANCER IN ELDORET

Tabitha Kamau (Moi University); Tabitha N Kamau (Alexandria Cancer Center and Palliative Care Hospital)*; Diana Menya (Moi University); Naftali Busakhala (Moi University); Eva M Ombiro (Moi University)

Background: Globally, esophageal cancer (EC) is among the leading cancers in the world. EC increased from 572,034 new cases and 508,585 deaths in 2018 to 604,100 new cases and 544 076 deaths in 2020. In Kenya, it was ranked the 3rd most frequent cancer in both sexes with 4380 cases and the leading cause of all cancer deaths with 4351 deaths in 2018. According to Eldoret cancer registry data, 2017, there were 139 EC cases. Evaluating outcomes of cancer therapy has primarily focused on effectiveness in terms of survival, the side effects of treatment, and treatment related mortality. However, in the past decade health-related quality of life (HRQoL) has been recognized as an important outcome measure of therapy for EC. Therefore the aim of this study was to determine the demographic and clinical characteristics of patients treated for EC in Eldoret; to determine the change in health-related quality of life of patients treated for EC and to estimate survival probability of patients treated for EC in Eldoret.

Methods: This was a longitudinal study in which we interviewed EC patients twice; during enrollment and 3 months post treatment in the oncology clinic at MTRH, Equira Health Kenya and Alexandria Cancer Center and Palliative Care Hospital (ACCPCH) between March-August 2020. Consecutive sampling method was used to enroll study participants until a sample size of 59 was achieved. Patients' characteristic data was analyzed using descriptive statistics (frequencies and percentages); change in HRQoL was calculated using analysis of variance (ANOVA) test while survival probabilities were estimated using Kaplan Meier method.

Results: Of the total 59 patients treated for EC in Eldoret that were eligible, 67% were males, 37% (of the total) were between 61-70 years with a mean age of 57.5 years, the majority were married (69.5% of the total) and most of them had squamous cell carcinoma (83.1% of the total). From baseline to 3-months post treatment, patients with EC treated with a combination of chemotherapy plus surgery had a positive change in their quality of life ($P= 0.04$) while those treated with radiotherapy alone had a negative change i.e., radiotherapy significantly impaired health-related quality of life 3-months post treatment, $P=0.0092$. The overall survival probability from enrollment (baseline interview) to 3-months post treatment was 0.56. Higher baseline functional assessment of cancer therapy-esophagus (FACT-E) was independently associated with longer probability of survival with hazard ratios of 3.26 (1.38, 7.69).

Conclusion: The majority of the patients treated for EC in Eldoret were males, the peak age group was 61-70 years, the majority were married and most of them had SCC. A combined treatment therapy of chemotherapy plus surgery was significantly associated with a positive change in HRQoL from baseline to 3-months post treatment and just about half of the participants survived three months post treatment



Abstract No. 041.

An evaluation of current practices in management of diabetic ketoacidosis in a Kenyan academic medical center.

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Background: For over 30 years, guideline-based management of hyperglycemic complications such as diabetic ketoacidosis (DKA) and hyperglycemic hyperosmolar non-ketotic states (HHNK) has been accepted as standard of care (SOC). The importance of management of hyperglycemic complications is increasing in developing countries as the burden of non-communicable metabolic disease such as obesity, diabetes mellitus, and hypertension increases in African countries. Guideline-based management of DKA and HHNK has been shown to reduce complications and adverse outcomes, length of stay, cost, and mortality. The Emergency Medicine Kenya Foundation (EMKF) publishes such guidelines, however, the degree to which they are followed varies. We hypothesized that there may be limited adherence to the guidelines even in major academic centers, which may result in suboptimal outcomes for patients and health systems and conducted an audit of guideline adherence to establish the need for quality improvement initiatives.

Methods: We conducted a health record review over a five-month period in 2018 for patients presenting to Kenyatta National Hospital Accident and Emergency Department (Nairobi, Kenya) with diagnoses of DKA, HHNK, or hyperglycemia. Actual management was compared to EMKF guidelines to determine alignment of management to standard of care. Data analyzed included diagnostic measures such as appropriateness and timeliness of laboratory assays, and treatment aspects including appropriateness and timeliness of fluids, insulin, electrolyte correction, and repeat laboratory assays. Descriptive statistics were used to characterize adherence to standard of care.

Results: 26 patients met inclusion criteria. 77.3% (goal 100%) received intravenous crystalloid at the time of triage, and 22.7% (goal 0%) received intramuscular or intravenous insulin without a documented potassium level or electrocardiogram. Investigations ordered varied (all with goal 100%), with 84.6% of patients receiving a full hemogram and urine, electrolyte, and creatinine study. 69.2% of patients received a blood gas analysis, 53.8% received a urinalysis, and 23.1% received serial glucose measurements. 100% of patients, following triage and treatment, received intravenous crystalloid, and 62.9% received intravenous insulin without specification as to bolus or infusion. Charts often lacked sufficient information to assess the appropriateness of interventions.

Conclusion: Given the availability and acceptance of guidelines for hyperglycemic emergencies, this audit demonstrates the need for improvement in management and documentation of patients with DKA and HHNK. We will begin quality improvement initiatives in 2021 to train staff in management of hyperglycemic emergencies, which we hypothesize will improve staff knowledge, guideline adherence, and clinical outcomes.

Abstract No. 042.

Complementary and Alternative Medicine (CAM) Use among Prostate Cancer Patients at Kenyatta National Hospital, Nairobi, Kenya

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Introduction: Cancer has become a huge burden in Kenya and is among the highest killer disease globally. Prostate cancer (PCa) is currently one of the most diagnosed cancers in men in Kenya. There are reports that complementary and alternative medicine (CAM) use is common in cancer patients. However, the extent of CAM use in prostate cancer patients in Kenya is largely unknown.

Aim of study: To establish if prostate cancer patients at Kenyatta National Hospital (KNH), use CAM, establish the socio-demographic characteristics of patients in the oncology clinic, establish the types and patterns of CAM use and the reasons and factors that may contribute to CAM use.

Methodology: A descriptive cross-sectional study was conducted from June to December 2019. A structured questionnaire on factors associated with use of CAM, and participants' socio-demographic profile was used. All consenting prostate cancer patients who met the inclusion criteria were interviewed as they presented to the oncology clinic of KNH. Quantitative data analysis was carried out using the 'R' Statistical Product and Service Solutions.

Results: Eighty six male respondents were interviewed. 31.4% reported to have used CAM at one time or another in the course of treatment. Age distribution was 56 to 93 years (mean 71.6). In terms of disease progression, 75.6% were at stage 4. 67.5% were actively receiving chemotherapy, radiotherapy or both while the rest were attending review clinics post treatment or pre-surgical operation. The use of CAM was not affected by the age, gender, marital status, level of education and level of income. Most frequently used CAM was special diet (vegetables and fruits) and herbal medicine at 19.8% and 16.8% respectively. Next in frequency was faith healing at 10.5%. The reasons for use of CAM were varied with a majority (79.2%) citing that they used CAM with the hope to alleviate their condition and for symptomatic relief. 12.2% stated that they wanted to take control of their treatment. Those who were using CAM for pain relief were 8.4%. Among the CAM users, 91.7% were satisfied with CAM use and would recommend to other PCa patients. Notably, 75% of the CAM users had not disclosed the use of CAM to their conventional healthcare providers.



Conclusion: The prevalence of CAM use among prostate cancer patients in KNH was moderate (<32%). The most common type of CAM in use is special non-animal protein diet and locally sourced herbal products. The level of satisfaction from CAM intervention among its users was high. The CAM users do not disclose to their conventional health providers as they feel it is not important and/or the conventional healthcare providers do not ask.

Recommendations: CAM use among cancer patients at KNH is lower than what have been documented in other parts of the world. However, there is need for health education among the prostate cancer patients and their health care providers to enhance tapping of any beneficial aspects of CAM.

Abstract No. 043.

Baseline Assessment of Cervical Cancer Screening and Treatment Capacity in 25 Counties in Kenya, 2021

David M Kariuki (Field Epidemiology and Laboratory Training Program)*; Valerian Mwenda (National Cancer Control Program); Joan Paula Bor (National Cancer Control Program); Mary Nyangasi (National Cancer Control Program)

Background: Cervical cancer is the second leading cause of cancer incidence and the leading cause of cancer deaths in Kenya. Kenya is implementing the Global Strategy to Accelerate the Elimination of Cervical Cancer as a public health problem through the scale-up of Human Papilloma Virus (HPV) vaccination and the 'screen and treat' approach. A baseline assessment was conducted in the initial scale-up phase to assess the status of cervical cancer screening and treatment services in 25 counties selected based on HIV burden, lack of support from partners, and based on the training needs assessment conducted by the National Cancer Control Program.

Methods: The survey was carried from February to November 2021. Data collectors were recruited from healthcare providers in each sub-county. High-volume health facilities offering cervical cancer services were purposively selected in the selected counties. An online survey tool was used to collect data from the selected health facilities. Facilities with incomplete data were not included in this assessment. The main variables were availability of services, health products and commodities, screening guidelines, data tools, and treatment equipment. Descriptive statistics were calculated for selected key variables.

Results: Of 3,129 facilities surveyed, 1,660 (53.1%) offered cervical cancer screening, while 266 (8.8%) offered treatment services for precancer lesions. Visual inspection with acetic acid (VIA) was used in 96.3% of the facilities as the screening modality, while HPV testing was available in 35 (2.1%) facilities. For treatment of precancerous lesions, 132 (8%) facilities performed cryotherapy while 30 (1.8%) performed thermal ablation. Pathology services were offered in 22 (0.7%) facilities. The median cost of histopathology was KES 1,500 [IQR; 700-2,500], and costs were borne by the patient in 17 (78%) facilities. Only 2,834 (11.7%) of the facilities' healthcare workers were trained in cervical cancer screening and treatment, out of which 1,977 (69.8%) were retained in their facilities' cervical cancer screening and treatment service areas. Facilities with adequate space for cervical cancer screening were 2,601 (83.1%). Of these facilities, 1,062 (40.8%) had an appropriate light source.

Conclusion: Training, workforce retention, commodities, and diagnostic services are major gaps in the cervical cancer screening and treatment program in Kenya. To meet the 2030 elimination targets both the national and county governments ought to prioritise cervical cancer screening and diagnosis through adequate financial allocation and effective monitoring and evaluation. Integration with other services would lower the cost and be more sustainable.

Keywords: Cervical Cancer, Cancer Screening, Kenya

Abstract No. 044.

Assessment of Case Management of Sexual and Gender-based Violence Cases, Uasin Gishu County Hospital, 2018-2020

Jedidah W Kiprop (Uasin Gishu)*; Maryanne Gachari (KFELTP)

Introduction: Globally, 30% women experience physical and/or sexual violence. In Kenya, in 2014, 45% and 14% of women aged 15–49 years experienced physical violence and sexual violence respectively. During the COVID-19 pandemic, there was a reported increase in cases of sexual and gender violence. We sought to characterize cases attending the sexual and gender based violence (SGBV) clinic in Uasin Gishu County.

Methods: We conducted a cross sectional retrospective study design by review of the SGBV clinic records in Uasin Gishu County Hospital in 2020. The case definition was any record of defilement, sodomy, rape, attempted rape or physical assault. We abstracted data into a Microsoft Excel tool and collected information on demographics, residence, laboratory tests and treatment. Descriptive analysis was done using measures of central tendency for continuous variables and frequencies and proportions for categorical variables.

Results: We collected data on 300 cases. The median age was 24 years (IQR=16) and females were 252(84%). Those who were classified as orphaned and vulnerable were 24(8%) and 7(2.3%) were disabled. Cases aged 21-30 years were 98(33%) and those who were married were 105 (35%). Cases from Moiben were 83 (27.9%), Turbo 67,(22.5%), Kapseret 58(19.5%), Ainabkoi 52,(17.4%), Kesses 22, (7.4%), Soy 16(5.4%). Cases who were tested for HIV were 114(38.3%) and 3 (2.6%) were HIV positive. Cases given post exposure HIV prophylaxis were 62 (60%). Fifty- five(18.3%) were tested for pregnancy and 47 (85.4%) given emergency contraceptives. Hepatitis testing and vaccination was not offered.

Conclusion: Majority of cases are married women residing in low income and slum dwellings. Services were limited to HIV and pregnancy testing and prophylaxis. There is need to increase HIV post exposure prophylaxis, introduce hepatitis testing and vaccination and conduct community sensitization targeting women in low income dwellings.

Key Words: Gender- based violence, domestic violence, sexual offenses, child abuse



Abstract No. 045.

The Effect of Community-Based Lifestyle Modification Program on risk factors for hypertension Among Adults Living in an Urban Informal Settlement

BEATRICE OLACK (KEMRI)*

Background: Hypertension is a known risk factor for cardiovascular diseases. Despite the burden of hypertension decreasing in the developed world, in developing countries like Kenya this burden is on the increase. Lifestyle modification that include eating healthy diets, reduced salt intake, increased physical activity and reduced stress levels are fundamental to prevention and control of hypertension. We aimed to establish the effect of community-based lifestyle modification intervention delivered by community health workers for middle-aged and older adults in an urban limited community on blood pressure and its associated risk factors.

Methods: Quasi-experimental study conducted at community level: One village allocated to the intervention the other allocated to usual care.

Intervention: Participants in the intervention village participated in a 6-month lifestyle modification programme. The programme entailed weekly lifestyle modification sessions conducted by trained community health volunteers (CHVs). The key components of the intervention were creating awareness on the risk factors associated with hypertension, motivating the participants to engage in healthy eating optimal diet based on Dietary Approaches to Stop Hypertension (DASH) increased physical activity, identifying perceived stress and coping strategies. Participants in the comparison village received standard care which included education pamphlet distributed at the health facilities with documented lifestyle changes recommended for reducing blood pressure.

Outcomes and measures: Change in Systolic Blood Pressure (SBP) and other risk factors for hypertension six months after intervention. Data were analysed using the linear mixed effect model.

Results: Out of 352 assessed for availability 319 (90.6%) were available to participate. The linear mixed effect model results for SBP indicate that the groups differed significantly with respect to change in mean SBP from baseline to 3 months ($\beta = -3.94$, $p < 0.001$) and 6 months ($\beta = -3.78$, $p = 0.001$). Systolic Blood Pressure decreased progressively over time in the intervention group compared to the control group. Significant differences for Perceived Stress Score were observed between the intervention arms ($\beta = -2.49$, $p = 0.002$). Dietary components indicate that as much as there were reductions (increases) in the intake of energy, total fat, carbohydrates, proteins and sodium (dietary fibre) post-intervention, these differences were only significant for sodium. Cross-group comparison indicated that compared to the control group, there was a significant reduction in sodium intake from visit1 to visit3 ($p = 0.038$)

Conclusion: Lifestyle modification had a beneficial effect on Systolic Blood Pressure and other risk factors for hypertension.

Key words :Hypertension,blood pressure,lifestyle modification,risk factors,informal settlement.

Abstract No. 046.

The burden of Non-communicable lung diseases in Kenya: Chronic Respiratory Diseases in Nairobi

Hellen Meme (KEMRI)*

Hellen Meme, Sophie Matu, Evans Amukoye, Richard Kiplimo, Barbara Miheso, Margret Karugu Fred Orina, Lindsay Zurba

Introduction: Chronic Respiratory Diseases (CRDs) affect more than 1 billion people globally. Asthma, and Chronic Obstructive Pulmonary Disease (COPD) are the most prevalent. The greatest burden of CRDs occurs in Low Middle Income countries LMICs) with almost 90% of COPD and 80% of asthma deaths occurring in LMICs. There is paucity of epidemiological data on the burden of COPD in developing countries including Kenya.

Objective: To Measure the burden of CRDs and associated risk factors in Nairobi, Kenya **Methods:** Multistage random sampling was used in recruitment of participants for the study. The households were randomly selected by Kenya National Bureau of statistics (KNBS). A questionnaire on demographics and assessment of risk factors was administered followed by pre and post spirometry testing for eligible participants.

Results: Of the 2728 participants enrolled, 61 % (1666) were females; 34% were aged 40yrs and above. Of these 10% (296) had an abnormal spirometry function (restrictive 6%; obstructive 3% low FEV1 1%). Of these 52% were in the age group 18- 39 while the remainder 40 and above whereby females comprised 66% and 61% respectively the highest proportions. Age (aOR 1.8 (CI:[1.4-2.3])) past history of TB (OR 2.9 (CI: [1.8-4.5])) and reported asthma (OR 4.2 (CI 2.8-6.1) were significantly associated to the abnormal lung function.

Conclusion: Of all the lung function abnormalities in Nairobi, restrictive is the commonest. Age, past history of TB and reported asthma were significantly associated with an abnormal lung function.





SCIENTIFIC SESSION

7: TB 1



Abstract No. 047.

Characteristics of Extra-pulmonary Tuberculosis Cases in Kitui County, Kenya 2019

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Introduction: Extra-pulmonary Tuberculosis (EPTB) accounted for 16% of the 7.1 million incident Tuberculosis cases reported in 2019. Mortality in patients with EPTB is double that of patients with pulmonary tuberculosis. There was no recent assessment of EPTB cases in Kitui County. We sought to describe the sociodemographic and clinical characteristics of EPTB cases in Kitui County in 2019.

Methods: We conducted a cross-sectional study. Secondary data from the tuberculosis online reporting database called TIBU was used. A case was defined as any patient with tuberculosis outside the lung parenchyma in Kitui County from January to December 2019. We analyzed sociodemographic, clinical, and outcome data. Microsoft Excel software was used to calculate measures of central tendency and dispersion for continuous variables while proportions and frequencies and percentages for categorical variables.

Results: We analyzed a total of 381 cases, of these 244 (64%) were male. The median age was 33 (IQR= 24-48) years and the age group 25–34-year-old had 100 (26.2%) cases. HIV positivity was 120 (31.5%), 148 (46.7 %) had a body mass index (BMI) less than 18.5 and 357 (93.7 %) cases had no prior history of TB treatment. Abnormal chest X-ray findings were reported in 231(60.6%) cases and 3(0.8%) cases had mycobacterium tuberculosis detected by Gene-Xpert and no diagnosis was made by smears. Pleural effusion was reported in 217(57%) cases and 59 (15.5%) lymph node tuberculosis. Therapeutic feeds were given in 76(19.9%) cases. Patients who completed treatment were 332 (87.1%) and 32 (8.4%) of patients died while on treatment.

Conclusion: About half of EPTB Cases were male and under-weight. We recommend nutritional health promotion messages and adherence to nutrition guidelines in cases diagnosed with EPTB.

Keywords- Humans, Male, Mycobacterium tuberculosis, Cross-Sectional Studies, Body Mass Index, Sanitation, Kenya, X-Rays Tuberculosis, Pulmonary Lymph Node Tuberculosis, Pleural Effusion, Nutrition Policy, HIV Infections, Health Promotion.

Abstract No. 048.

Chronic respiratory disease in adult out-patients in three African countries: a cross sectional study.

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Kevin Mortimer MD, PhD⁸, Graham Devereux MD, PhD⁸, On behalf of the lung health in Africa across the life course collaboration.

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Background: The greatest burden of chronic respiratory disease is in low- and middle-income countries with recent population-based studies reporting substantial levels of obstructive and restrictive lung function. This study aimed to characterize the common chronic respiratory diseases encountered in hospital out-patient clinics in three African countries.

Methods: A cross-sectional study of consecutive adult non TB patients with chronic respiratory symptoms (>8 weeks) attending hospital outpatient departments in Ethiopia, Kenya and Sudan. Patients were assessed by respiratory questionnaire, spirometry and chest radiography. The diagnoses of the reviewing clinicians were ascertained.

Result: 519 patients (209 Kenya, 170 Ethiopia, 140 Sudan) participated, mean (SD) age 45.2 (16.2) years, 53% women, 83% never smoked. Reviewing clinicians considered that 36% (95% confidence interval 32-40%) of patients had asthma, 25% (21-29%) chronic bronchitis, 8% (6-11%) COPD, 5% (4-8%) bronchiectasis and 4% (3-6%) post-TB lung disease. Spirometry consistent with COPD was present in 35% (30-39%). Restriction was evident in 38% (33-43%). There was evidence of sub-optimal diagnosis of asthma and COPD.

Conclusion: In Ethiopia, Kenya and Sudan, asthma, COPD and chronic bronchitis account for majority of diagnoses in non-TB patients with chronic respiratory symptoms. The suboptimal diagnosis of these conditions will require the widespread use of spirometry.

Key Words: chronic respiratory symptoms, spirometry, COPD, asthma, Africa, Ethiopia, Kenya, Sudan, hospital clinics



Abstract No. 049.

Gaps related to screening and diagnosis of tuberculosis in care cascade in selected health facilities in East Africa countries: A retrospective study.

ESTHER S NGADAYA (NATIONAL INSTITUTE FOR MEDICAL RESEARCH)*

Introduction: East Africa countries (Tanzania, Kenya, and Uganda) are among tuberculosis high burdened countries globally. As we race to accelerate progress towards a world free of tuberculosis by 2035, gaps related to screening and diagnosis in the cascade care need to be addressed.

Methods: We conducted a three-year (2015-2017) retrospective study using routine program data in 21 health facilities from East Africa). Data abstraction were done at tuberculosis clinics, outpatient departments (OPD), human immunodeficiency virus (HIV) and diabetic clinics, and then complemented with structured interviews with healthcare providers to identify possible gaps in implementing integration, screening, and diagnosis of tuberculosis. Data were analyzed using STATA™ Version 14.1.

Results: We extracted information of 49,454 presumptive TB patients who were registered in the 21 facilities between January 2015 and December 2017. A total of 9,565 tuberculosis cases were notified; 46.5% (4,450) were bacteriologically confirmed and 31.5% (3,013) were HIV-infected. Prevalence of tuberculosis among presumptive pulmonary tuberculosis cases was 17.4%. The outcomes observed were as follows: 79.8% (7,646) cured or completed treatment, 6.6% (634) died, 13.3% (1,270) lost to follow-up or undocumented and 0.4% (34) treatment failure. In all countries, tuberculosis screening was largely integrated at OPD and HIV clinics only. High patient load, weak laboratory specimen referral system, shortage of trained personnel, and frequent interruption of laboratory supplies were the major cited challenges in screening and diagnosis of tuberculosis.

Conclusion: Screening and diagnostic activities were frequently affected by the scarcity of human and financial resources. Tuberculosis screening was mainly integrated at OPD and antiretroviral therapy (ART) clinics, with less emphasis on the other health facility clinics. Closing gaps related to TB case finding and diagnosis in developing countries requires sustainable investment for both human and financial resources and strengthen the integration of TB activities within the health system.

Abstract No. 050.

EVALUATING THE SIGNIFICANCE OF ACTINOMYCETES INFECTIONS IN TB SMEAR NEGATIVE AND RETREATMENT CASES FROM SELECTED REFERRAL FACILITIES, KENYA.

FRIDA M NJERU (KEMRI)*; CHRISTINE BII (KEMRI); PERPETUAL NDUNGU (JKUAT)

Background: Actinomycetes are opportunistic pathogens causing infections in patients with immunosuppressive conditions. Pulmonary infections are common though cutaneous diseases also occur. In most cases respiratory infections caused by Actinomycetes display symptoms that mimic tuberculosis, hence they can easily be misdiagnosed as TB leading to delayed or inappropriate treatment. Therefore, this study aimed at evaluating the significance of Actinomycetes infections in TB smear negative and retreatment patients from selected referral facilities in Kenya.

Methods: This was a cross-sectional laboratory based study where purposive sampling method was used. The samples were collected from 4 sites ie; Moi Teaching and Referral Hospital, Jaramogi Oginga Odinga Teaching and Referral Hospital, Coast Provincial General Hospital and Mbagathi Hospital. Sputum samples (385) from consented TB smear negative and retreatment patients were collected and screened for Actinomycetes. This was done via phenotypic and genotypic characterization. Phenotypic characterization involved; gram staining, culturing and biochemical testing. Confirmatory identification was done by molecular methods (PCR and Sequencing) where DNA was extracted and amplified using primers that target 16S rRNA gene.

Results: Out of the collected samples, 52 (13.5%) were identified as Actinomycetes using the phenotypic methods. The 16S rRNA gene was successfully amplified in 32 (8.3%) of the isolates. Sequencing was done and Phylogenetic analysis confirmed that nine (2.3%) were members of Actinomycetes of which eight were members of the genus *Streptomyces* while one was a *Nocardopsis* species.

Conclusion: There is significant Actinomycetes infections in TB smear negative and retreatment patients with a prevalence of 13.5%. Retreatment cases had more actinomycetes infections than new cases; JOOTRH had highest cases while CPGH had the least. Most of the isolates were found to be from the genus *Streptomyces*. Therefore, it is important to investigate suspected pulmonary pathologies for potential Actinomycetes infection for proper diagnosis and interventions





SCIENTIFIC SESSION

8: VECTOR BIOLOGY

1



Abstract No. 051.

Genetic variability of *Aedes aegypti* populations from Northern Kenya, and their influence on Dengue-2 virus transmission

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Background: Dengue, an *Aedes*-borne viral disease has re-emerged as a major public health problem in recent times, in Kenya and horn of Africa. However, how the spread of the disease is modulated by locally adapted subpopulations of the key vector, *Aedes aegypti* is not well defined. This study compared the genetic diversity of *Ae. aegypti* and assessed how the competence of the vector in transmitting dengue-2 is related to the geographic distribution of the domestic and forest forms in West Pokot and Turkana counties in northern Kenya.

Objective: To determine the genetic variability of *Aedes aegypti* populations from Northern Kenya, and their influence on Dengue-2 virus transmission

Methods: Mosquitoes were collected from peridomestic areas at the selected sites using standardized adult and larval collection tools. Mitochondrial sequence data was analysed to assess the genetic variability of *Ae. aegypti* populations after DNA amplification of the barcode region of the Cytochrome Oxidase subunit 1 (COI) gene. Vector competence experiments were also performed to determine the susceptibility of *Ae. aegypti* for dengue 2 virus, by exposing the mosquitoes to an infectious blood meal for 1 hour, then later incubated and tested for infection.

Results: Neighbor joining phylogeny based on COI gene sequences revealed the presence of two lineages. One contained all samples from Turkana (n=31) and a proportion from West Pokot (n=26) which clustered with published sylvatic *Ae. aegypti formosus*. The second lineage had samples exclusively from West Pokot (n=33) and clustered with the domestic form of *Ae. aegypti*. *Ae. aegypti* population from West Pokot were more susceptible to dengue-2 virus compared to the mosquito population from Turkana County (13.6% and 4.6% respectively), although there was no disseminated infection in either population.

Conclusion: The data suggest differential distribution of mitochondrial lineages of *Ae. aegypti* populations found in West Pokot and Turkana counties, which could explain differences in susceptibilities between populations of the species to dengue-2 virus.

Abstract No. 052.

An assessment of the entomological risk of Yellow Fever Virus re-emergence and outbreak in Kenya.

Shillah Nasambu Simiyu (ICIPE)*; David Tchouassi (ICIPE); Rosemary Sang (ICIPE and KEMRI); Henri Tonnang (ICIPE); Armanda Bastos (University of Pretoria)

Background: Kenya experienced its last Yellow Fever (YF) outbreak in 1992. In spite of this, it is still classified by the WHO as being at risk of YF transmission. It is also potentially at risk of YF re-emergence given the recent recurrent YF outbreaks in the neighboring countries of Uganda, South Sudan, and Ethiopia with the possibility of cross-border spillover either through infected non-human primates, humans, or mosquitoes. Furthermore, Kenya possesses the same ecological features that enable YFV transmission as its neighboring countries and has a large immunologically naïve population.

Objective: To characterize the presence and abundance of known and potential YFV vectors in selected high-risk areas in Kenya, to understand the entomological risk factors of YF re-emergence.

Methods: Cross-sectional mosquito sampling was conducted in Nguruman (Kajiado county) and Kerio Valley (Baringo county) during the long rains season (February to June) of 2021. Diurnal and nocturnal adult host-seeking mosquitoes were trapped using BG-Sentinel and CDC light traps respectively. Mosquito immatures (larvae and pupae) were collected from outdoor artificial and natural water-holding containers using ladles, aspirators, and Pasteur pipettes, and reared to the adult stage under optimum insectary conditions. All mosquitoes were morphologically identified on a cold plate, under a dissecting microscope, using standard taxonomic keys.

Results: 3,865 mosquitoes belonging to 37 different mosquito species were collected in Nguruman: 601 (15.5%) by BG sentinel traps, 2406 (62.3%) by CDC light traps, and 858 (22.2%) as immatures. 75.8% of the mosquitoes collected were female. The most abundant species were *Cx.univittatus* (35.5%), *Ae.aegypti* (27.9%), *Cx.vansomereni* (9.5%) and *An.funestus* (6.5%). In addition to *Ae.aegypti*, other important YFV vectors that were collected included *Ae.metallicus* (2.7%), *Ae.simpsoni* (2.5%), *Ae.furcifer* (1.9%) and *Ae.vittatus* (0.4%). YFV vectors accounted for 37.9% of Nguruman's mosquito collection. In addition, a total of 1973 mosquitoes, belonging to 30 different mosquito species were collected in Kerio valley: 1110 (56%) by BG sentinel traps, 533 (27%) by CDC light traps, and 330 (17%) as immatures. 70% of the collection were female. The YF vectors, *Ae.aegypti*, *Ae.simpsoni*, and *Ae.vittatus* emerged as the most abundant mosquito species in the area with abundances of 42.3%, 16.6%, and 7.6% respectively. *Ae.africanus* which was implicated in Kenya's last outbreak only accounted for 0.10% of the collection, while *Ae.metallicus*, yet another important YF vector accounted for only 0.15% of the collection. YFV vectors accounted for more than 75% of the mosquito species composition in Kerio Valley.

Conclusion and Recommendations: Nguruman and Kerio Valley may be at a moderate-to-high risk of YF re-emergence based on their abundance of YFV vectors. Therefore, there is a need to intensify surveillance and vector control strategies in these areas.



Abstract No. 053.

Insecticide resistance status of indoor and outdoor resting malaria vectors in a highland and lowland site in Western Kenya

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Background: LLINs and IRS are powerful tools for malaria vector control in sub-Saharan Africa. The success of these interventions is reliant the ability to inhibit indoor feeding and resting of malaria mosquitoes. This study sought to understand the interaction of insecticide resistance with indoor and outdoor resting behavior of malaria vectors in Western Kenya.

Methods: The status of insecticide resistance between indoor and outdoor resting Anopheles mosquitoes collected from Kisian (Kisumu) and Kimaeti (Bungoma) was compared. The level and intensity of resistance was measured using WHO-tube and CDC-bottle bioassays, respectively. The PBO synergist was used to determine if metabolic activity explained the resistance observed. The mutations at the voltage-gated sodium channel gene and Ace 1 gene were characterized using PCR methods. Microplate assays were used to measure levels of detoxification enzymes if present.

Results: A total of 1094 samples were identified within *Anopheles gambiae* s.l. and 289 within *An. funestus* s.l. In Kisian, the dominant species was *An. arabiensis* 75.2% while in Kimaeti collections the dominant species was *An. gambiae* s.s 96.5%. The *An. funestus* s.l samples analysed were all *An. funestus* s.s from both sites. Pyrethroid resistance of *An.gambiae* s.l F1 was observed in all sites. Lower mortality was observed with deltamethrin for the F1 of indoor resting mosquitoes compared to outdoor resting ones ($P=0.044$). The intensity assays showed moderate-intensity resistance to deltamethrin in the F1 of mosquitoes collected from indoors and outdoors in both study sites. In Kisian, the frequency of *vgsc-L1014S* and *vgsc-L1014F* mutation was 0.14 and 0.19 respectively in indoor resting malaria mosquitoes while those of the outdoor resting mosquitoes were 0.12 and 0.12 respectively. The ace 1 mutation was present in higher frequency in the F1 of mosquitoes resting indoors (0.23) compared to those of mosquitoes resting outdoors (0.12). In Kimaeti, the frequencies of *vgsc-L1014S* and *vgsc-L1014F* were 0.75 and 0.05 respectively in the F1 of mosquitoes collected indoors whereas those of outdoor resting ones were 0.67 and 0.03 respectively. The ace 1 G119S mutation was present in F1 of mosquitoes from Kimaeti resting indoors (0.05) whereas it was absent in those resting outdoors. Monoxygenase activity was elevated by 1.83 folds in Kisian and by 1.33 folds in Kimaeti for mosquitoes resting indoors than those resting outdoors respectively.

Conclusion: The study recorded high phenotypic, metabolic and genotypic insecticide resistance in indoor resting populations of malaria vectors compared to their outdoor resting counterparts. The indication of moderate resistance intensity for the indoor resting mosquitoes could have an operational impact on the efficacy of the existing pyrethroid based vector control. The use of synergists in LLINs may be a better alternative for widespread use in these regions recording high insecticide resistance.

Abstract No. 054.

Spatially explicate sampling frames to identify regions of increased mosquito abundance

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Background: Control of vector borne diseases(VBDs) must be coupled with efficient and informative vector surveillance to among other reasons, measure the impact of intervention, inform on different traits of the local vector populations including species diversity, abundance and insecticide resistance status. This study reports on the practical application and outcome of a community-based field evaluation of a recently proposed vector surveillance model, which uses existing entomological and environmental data to generate sampling locations across the geographic area which can be sampled to give a representative estimate of entomological indices.

Methods: Study was conducted in Kilifi county to look at different sampling stages. Here,30 sampling points were selected and a maximum of 4 houses sampled within a 5km radius of each point. A volunteer, preferably a member of one of the households was selected and trained to assemble and operate a CDC light trap according to the Standard Operating procedures,and given all the requirements for collection. Each household was sampled once every 2 weeks for two months.

Results: Total of 3621 samples were collected out of which 72.08% were *Culex*. *Anopheles* species included *An. funestus* (68.11%), *An. gambiae* (13.52%), *An. coustani* (9.58%), and *An. protoriensis*, *An. squamosus*, *An. moucheti* , *An. maculipalpis* ,all were less than 1% of collected samples.

Conclusion: The environmental stratification coupled with the lattice and close pair design established a clear relationship with the two primary vector species and the proximity to water. While this is not an unexpected finding the ability to isolate this relationship with freshwater bodies, the ability to quantify this relationship does clarify the picture and we believe provide clear actionable data that could be utilized by a vector control program going forward.



Abstract No. 055.

Bacterial composition differs between permethrin-susceptible and -resistant *Anopheles gambiae* s.s. in a site with intense pyrethroid resistance in western Kenya

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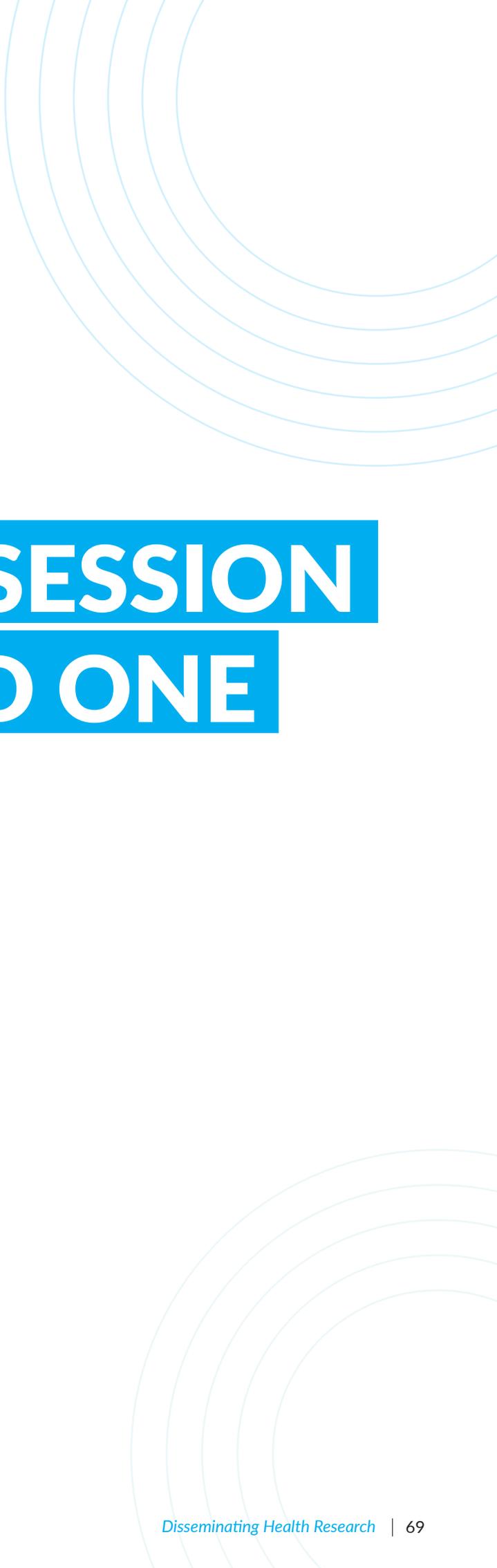
Background: Insecticide resistance poses a growing challenge to malaria vector control. Following evidence of associations between the mosquito microbiota and insecticide resistance, we characterized the microbial composition of malaria vectors in relation to their insecticide resistance profiles, in different locations with high and low levels of pyrethroid resistance. Here, we report findings from our study on *Anopheles gambiae* s.s. in Turukuyi village, Bungoma County, where high levels of pyrethroid resistance were detected.

Materials and Methods: F1 non-blood fed female *An. gambiae* s.s. that were obtained from wild-caught mosquitoes were exposed to five times (107.5µg/ml) the discriminating dose of permethrin using the CDC bottle bioassay. The microbiota of mosquitoes that were alive (resistant, n=50) or dead (susceptible, n=50) following the bioassay were characterized using high throughput sequencing targeting the universal bacterial and archaeal 16S rRNA gene.

Results: There were significant differences in bacterial composition between resistant and susceptible individuals (PERMANOVA, $F=2.33$, $P=0.001$), with *Sphingobacterium* and *Streptococcus*—both comprising pyrethroid-degrading species, and the radiotolerant *Rubrobacter*, being over three folds ($P<0.05$) more abundant in resistant compared to susceptible mosquitoes. This first report of association between the microbiota and pyrethroid resistance in *An. gambiae* s.s. corroborates results of previous studies conducted on *Anopheles albimanus* from Peru and Guatemala.

Conclusion: Our findings, which show significant differences in bacterial composition between permethrin resistant and susceptible individuals, provide a basis for studying the role of mosquito microbiota in insecticide resistance, and potentially identifying novel microbial markers of insecticide resistance in mosquito populations.





SCIENTIFIC SESSION

9: NTDS AND ONE

HEALTH 1



Abstract No. 056.

A comparative study on the quality of life of leprosy patients in Kilifi and Kwale counties in Kenya

Jane R Ong'ang'o Kenya Medical Research Institute*

Background: Kenya at present is at the post elimination phase of leprosy having achieved a prevalence of <1 case per 10,000 persons in 1989. In 2019 Kenya notified 163 leprosy patients and the highest notifications were in Kilifi and Kwale counties. About a quarter (26%) of the notified leprosy patients had grade 2 disability at the time of diagnosis, this being the most severe form of disability may indicate late diagnosis. This study aimed at assessing the quality of life of leprosy patients in order to provide guidance for policies and programs intended to enhance the health and wellbeing of leprosy patients.

Methods: This was a case control study conducted in Kilifi and Kwale Counties. For every leprosy index patient enrolled, two controls were identified within the same village to match the case. The World Health Organisation (WHOQOL-BREF) tool was used to measure quality of life. A total of 98 leprosy patients and 167 controls were evaluated for quality of life.

Results: On perception of quality of life, leprosy patients had significantly lower mean transformed scores 39 (SD 25) versus 49 (SD 25) $p = <0.0001$ compared to controls. Similarly index cases had lower health satisfaction scores of 42 (SD 26) compared to controls 61 (SD 27) $p = <0.001$. Overall leprosy patients had statistically significant poorer scores on physical health, psychological health, social relationships and environmental QoL domains. Differences were most remarkable in the psychological domain, with mean transformed score of 53 (SD 20) versus 68 (SD 16) $p = <0.0001$ for controls. The overall quality of life model revealed that leprosy patients who were found to have either diabetes or hypertension enjoyed a better overall quality of life with OR of 10.98 and 1.22 respectively with p -value <0.00001 . Patients with tuberculosis and HIV presented the poorest quality of life with ORs of 0.49 and 0.14 respectively.

Conclusion: The quality of life of the leprosy patients was significantly lower than that of the community controls in all the domains. Governments and communities need to prioritize rehabilitation measures such as provision of artificial limbs, cataract surgery, and social protection disbursements to help leprosy victims improve their quality of life.

Key words: Quality of Life (QoL), Leprosy patients

Abstract No. 057.

PROGRESS TOWARDS RABIES ELIMINATION IN KITUI COUNTY: 2019-2021

Peris N Kung'u (Global Implementation Solutions)*

Introduction: Rabies is a viral zoonosis that affects all mammals and is transmitted through contact with infected saliva from animal bites, with dogs accounting for 98% of all human cases. Rabies can be eradicated through control of the disease in dogs achieved through dog population control and mass rabies dog vaccination. This study resulted from the death of a suspected human rabies case in Kitui West sub-county. The objective was to describe characteristics of animal bite incidences and rabies dog vaccination coverage in the sub-county.

Materials and Methods: We conducted a retrospective records review (January 2019 to September 2021) of animal bites from selected health facilities (HFs) in Kitui West. We then conducted a descriptive analysis, with the variables including patient's demographics, location, part of body bitten, dog ownership and PEP uptake. We also calculated animal bite incidences using the bites reported in DHIS2 and sub-county population. We further obtained data from the veterinary department on the dogs vaccinated within the same period.

Results: A total of 340 animal bite cases were extracted from 17 HFs: thirteen public, four private. Those aged ≤ 15 years were 138 (41%) (Range 1-95), with 176 (52%) being males. An average of 10 animal bites per month (SD 5.2) from the records, with an incidence of 42 bites/100,000 persons per month from DHIS2. Twenty-two (6%) records stated body part bitten while 127(37%) stated dog ownership, only two record stated that the bites were unprovoked. While eighty-three (24%) victims received the first PEP dose, only fourteen (4%) received the five doses.

Median vaccinations figure of 15 dogs per month (range 7-1031) were recorded in the veterinary department, with 1535 (76%) taking place in 2019 (March, April) and 2021 (April).

Conclusion: Proper patients' documentation, scheduled mass dog vaccinations, and timely provision and completion of PEP to bite victims is key in human rabies elimination.

Abstract No. 058.

Molecular epidemiology of cystic echinococcosis in Kenya (2012 – 2021)

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Molecular epidemiology of cystic echinococcosis in Kenya (2012 – 2021)

Background: Cystic echinococcosis (CE) is a neglected zoonotic disease caused by the larval stage of the dog tapeworm *Echinococcus granulosus sensu lato* (s. l.). This study aimed to determine the prevalence and distribution of CE in humans and



livestock and Echinococcus infection in dogs and wild carnivores in Kenya. The study also sought to establish the role of dogs and wild carnivores in linking both domestic and sylvatic cycles of Echinococcus.

Methods: This study was carried out in 12 CE endemic counties. The presence of CE in humans was determined by ultrasound sonography and examination of livestock carcasses in selected abattoirs. The presence CE in drowned wildebeest was determined following postmortem. Dog faecal samples were collected from the environment and from six National Parks and Game reserves for wild carnivores. Genotyping of Echinococcus was performed by nested polymerase chain reaction-restriction fragment length polymorphism and sequencing of NADH dehydrogenase subunit 1 gene.

Results: The prevalence of CE ranged from 0.2 – 1.7% in humans, 4.3 – 56.4% in cattle, 1.7 – 15.5% in goats, 1.7 – 24.4% in sheep, 15.9 – 72.8% in camels and was 5.7% in donkeys and 0.8% in wildebeest. The prevalence of Echinococcus infection in dogs ranged from 0.3% in Meru county to 9.2% in Turkana county and was 4.6% (overall) in wild carnivores. *E. granulosus sensu stricto* (s. s.) and *E. canadensis* (G6/7) were the most frequent taxa in humans, livestock and dogs. Donkeys were frequently infected with *E. equinus* and *E. granulosus* s. s. while in wild carnivores *E. felidis* was common and *E. granulosus* s. s. rare. Meru and Isiolo were identified as the main foci of *E. ortleppi* in livestock. *E. felidis* eggs were detected in dogs. *E. granulosus* omo genotype was only found in cattle in Laikipia.

Conclusions: This study confirmed that Turkana, Narok and Kajiado counties are still the major CE endemic areas in Kenya. This study demonstrates that dogs and wild carnivores play a role in linking the domestic and sylvatic cycles of Echinococcus.

Abstract No. 059.

One Health surveillance; Evidence of known and new zoonotic arboviruses circulation in multiple hosts with potential impact to Human.

Dorcus Omoga (icipe)*; Rosemary Sang (KEMRI); Marietjie Venter (University of Pretoria); David Tchouassi (icipe)

Background: Arboviruses (arthropod-borne virus) cause serious diseases with epidemic potential in humans and animals ranging from mild febrile illnesses to haemorrhagic and/or encephalitic fevers as well as cause death. Therefore, Arboviruses are of great public health, social, and economic importance worldwide. These viruses are diverse and include zoonotic viruses like Crimean Congo Haemorrhagic Fever Virus (CCHFV), Rift Valley Fever virus (RVFV), and West Nile Virus (WNV) among others. In many African countries including Kenya, the impact of these viruses is undetermined due to paucity of active surveillance, poor disease reporting systems, and lack of appropriate diagnosis leading to more than 90% of cases being undiagnosed or misdiagnosed and therefore treated as other common endemic diseases like malaria in humans and Rift Valley fever in livestock. As a result, the possibility of these viruses circulating unnoticed causing unresolved disease and/or outbreaks both in humans and animals cannot be underestimated.

Methods: In this study, we carried out a One Health laboratory-based cross-sectional survey in Baringo and Kajiado Counties in Kenya involving humans, livestock, and peridomestic rodents to understand the circulation and transmission of arboviruses. Sampling was done at varied times, after the rainy seasons when vector activity is presumably high then algorithms of virological methods including molecular-based, serology and virus culture applied to screen the samples for various arboviruses.

Results: Our findings confirm circulation of known zoonotic arboviruses including tick-borne CCHFV and mosquito-borne Ngari virus (NRIV) in unusual hosts, rodents, and livestock respectively.

Conclusions: NRIV has previously been isolated from mosquitoes and humans in Kenya and the role of livestock in its circulation needs to be investigated. Additionally, a new mosquito-borne Orbivirus previously not known in Kenya was isolated from cattle for the first time. The study creates awareness of known and unknown arboviruses actively circulating in diverse hosts. This study highlights the need for sustained routine surveillance and differential diagnosis in both healthcare facilities and veterinary diagnostic centres to enhance detection, acts as early warning and combat zoonotic diseases emergence and outbreaks.

Abstract No. 060.

Seroprevalence of Human African Trypanosomiasis and Schistosomiasis in Taita Taveta County, Kenya

Joanne J Yego (Kenya Medical Research Institute)*

Title: Seroprevalence of Human African Trypanosomiasis and Schistosomiasis in Taita Taveta County, Kenya

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Background: Neglected tropical diseases (NTDs) are a threat to many livelihoods of the poor impoverished populations in Africa, Middle East and Asian countries. Currently, the World Health Organization (WHO) is working with different partners towards the elimination of these diseases. The Kenyan NTD unit has initiated programs aimed at the elimination of selected NTDs through Mass Drug Administration (MDA), continued monitoring and evaluation of impact and surveillance. This study sought to identify occurrence of selected NTDs within residents of Taita Taveta County, Kenya.



Methods: This was a cross-sectional study where data was collected using the Android Open Data Kit. The households engaged in the study were randomly selected using the satellite imagery system and all available household members sampled by taking a blood sample using a Dried Blood Spot. Disease specific antibody detection was done using the simultaneous bead-based assay for multiple detection of diseases.

Results: A total of 303 participants were enrolled into the study and blood samples collected. Of these, a total of (51/303) 16.8% participants were exposed to Human African Trypanosomiasis (HAT), while 9.9% (30/303) to schistosomiasis. Of the 30 exposed to schistosomiasis, 19/303 (6.3%) were exposed to *S. mansoni* and 11/303 (3.6%) to *S. haematobium*. HAT exposure ranged from 0.3% (1/303), 4% (12/303), 6.3% (19/303), and 6.3% (19/303) for GM6, FCaBP (flagella calcium binding protein), 64-kDa and 65-kDa invariant surface glycoproteins (ISGs) antigens respectively. Age distribution of NTD exposure showed a higher exposure rate in the elderly than in children. The simultaneous bead-based platform was effective in detection of exposure to specific diseases causing the different NTDs in participants.

Conclusion: The simultaneous bead-based assay is an effective tool in serological surveillance of NTDs exposure in populations.





SCIENTIFIC SESSION

10: HEALTH SYSTEMS

1



Abstract No. 061.

Challenges Facing Blood Transfusion Services at The Eldoret Regional Blood Transfusion Centre

Briton Matata Kavulavu (Moi University School of Medicine)*; Whitney Ondari Kumotia (Moi University School of Medicine); Brian B Nanjendo (Moi university); Norrah Muendo (Moi University School of Medicine)

Background: There is a need for a well-organized system with sufficient equipment and trained staff to meet the blood demand in Western Kenya. Besides processing blood for use among the hospitals in Uasin Gishu County, the Eldoret Regional Blood Transfusion Centre (ERBTC) also performs the role of screening blood from its satellite centres including Nandi, West Pokot, Kitale, Bungoma, Lodwar, Ziwa, and Elgeyo Marakwet. This research aimed at studying the problem of blood deficiency in Kenyan blood transfusion centres by considering the ERBTC's challenges regarding human resource, financing, equipment, and reagent deficits; demand and supply mismatches; and blood wastages and discards.

Methodology: We used a cross-sectional descriptive design in which self-administered questionnaires were administered to all ERBTC staff to gather information on the challenges of staffing, financing, equipment, and reagent deficits. Researchers also analyzed donor records to gather information on the prevalence of demand versus supply mismatches, blood discards and wastages, and the reasons for these. Data was analyzed descriptively using Microsoft Excel 2019.

Results: The analysis included 16 staff, 230 donors, and 9612 units of requested blood. The study noted that the ERBTC was understaffed, and faced challenges of limited funding, few equipment, and irregular reagent supply. The blood bank only managed to supply 4740 units of blood against a demand of 9612 units, thus a 50.69% deficit. A discard rate of 7.83% was also noted against 0% system wastages.

Conclusion: The study concluded that the main challenges facing the ERBTC were understaffing, insufficient funding, limited equipment for preparing components and screening for Transfusion Transmitted Infections (TTIs), frequent reagent outages, excessive demand of blood products against limited supply, and blood discards secondary to insufficient volumes and TTIs. The study recommended hiring of sufficient staff, increased funding, acquisition of adequate equipment, regular supply of needed reagents, and education of the public on the need for blood donation. Improved supply of necessary resources such as equipment, reagents, and staff will promote better performance while education of the public on the need for blood donation will reduce the frequency of blood deficits

Abstract No. 062.

Evaluation of Enhanced Syndromic Surveillance System for Rift Valley Fever in Kenya, 2021

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Introduction: Rift Valley fever (RVF) is a mosquito borne viral zoonosis that primarily affects animals. Most of RVF outbreaks have first been recognized in the humans. By February 2021, RVF was reported in counties that were not implementing Enhanced Syndromic Surveillance (ESS) system. We sought to evaluate ESS system in Kenya, 2021.

Method: We reviewed reports from Zoonotic Disease Unit (ZDU) for the ESS system for the period between 2020 and 2021. Data were retrieved from M/S Excel tool, laboratory results and Outbreak investigation reports. We used Updated CDC Guideline for Evaluating the System. System attributes evaluated included; Representative, sensitivity, timeliness and data quality. Descriptive analysis was conducted using M/S Excel.

Results: Of the 22 mapped high risk counties for RVF in the country, 7(31.8%) implemented ESS for six(6) weeks. Epi Week1 had a reporting rate of 67%(374/560), with 3.2%(12/374) of the reports not complete. Kilifi county reported highest environmental risk factors, where flooding was at 24.42%(261/1069) while increased mosquito population was 22.2%(409/1840). Of the RVF associated syndromes reported, Mortalities in young livestock was highest in Sheep, Goat, Camel and Cattle at 2.6%(856/33137), 2.7%(1204/44048), 0.9%(76/8892) and 0.7%(172/22693) respectively. Increase in human illness in households was reported in six counties at 13.5%(376/2769). For outbreaks detected in both humans and animals in the country, 1(one) in January and 4(three) in November/December, ESS detected 31.8%(1/5) outbreaks in Kajiado county in Epi week2 among livestock. Of 102 samples collected, Antibody detection (PPR) test confirmed 32%(33/102) positive for RVF with sheep at 27%(13/48) and goats at 37%(20/54). Laboratory results turnaround time was 17 days.

Conclusion: Early detection of RVF outbreaks in animals before spill over to humans by the ESS system. To improve reporting rates, data quality, reduce results turnaround time and roll out of ESS in all high risk counties throughout the year.

Abstract No. 063.

Assessment of Analytical Quality Management Systems at The Bungoma County Referral Hospital Laboratory

Whitney Ondari Kumotia (Moi University School of Medicine)*; Briton Matata Kavulavu (Moi University School of Medicine)

Background: With automation of laboratory analyses becoming the new order, there is a need for laboratory staff to supervise results more carefully to ensure accuracy, reliability, timeliness, and reproducibility. Such is always ensured by implementing a quality management system and promoting laboratory test results' usability for patient care. This study assessed Bungoma County Referral Hospital Laboratory (BCRHL). Precisely, the study assessed the quality control methods put in place at BCRHL, the knowledge of the staff on the use and maintenance of laboratory analyzers, and challenges facing the laboratory quality management at BCRHL.



Method: The research was undertaken as a mixed-method cross-sectional study targeting all laboratory staff and managers at the BCRHL. A checklist was used to assess the documentation of quality control measures in place to check quality documents and charts. Knowledge on the use and maintenance of laboratory analyzers was studied by administering a structured questionnaire to all staff, while the challenges hindering quality management procedures were checked by interviewing the laboratory managers.

Results: The laboratory maintained standard operating procedure (SOP) files which were regularly updated. Lot-to-lot verification and Levey-Jennings charts were well maintained, and Westgard rules were followed. However, temperature charts for refrigerators and the room and some equipment maintenance charts were lacking in some departments. Nonetheless, external quality assurance procedures were properly undertaken and documented, except for some lack of daily control records. Generally, all staff were knowledgeable on the maintenance and use of laboratory analyzers. Asked about the challenges limiting quality management at BCRHL, the managers cited inadequate finances, machines, and staff.

Conclusion: Whereas BCRHL had trained its staff on maintenance and use of laboratory analyzers and installed measures to ensure quality, failure to maintain accurate charts, in addition to inadequate finances, machines, and staff, hindered laboratory quality. Hence, there was a need for refresher training on holistic quality management, improved resource supply, and close supervision of quality control activities.

Abstract No. 064.

Migori County Multi-Sectoral Action Plan to Improve The Health and Well-Being of Adolescents and Youth: Mid Term Evaluation Results (July 2018-December 2020)

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Introduction: The County Government of Migori developed a five year Multi-Sectoral Action Plan to Improve the Health and Well-being of Adolescents and Youth (AY) in 2018. The action plan is meant to provide strategic guidance for the county's response to the needs of AY and its implementation begun in July 2018. Upon implementing for a period of two and a half years, and in collaboration with various stakeholders, a midterm evaluation was conducted. The purpose of the evaluation was to assess progress made towards achieving the intended results in the six priority areas of the action plan; Adolescent pregnancy, HIV/AIDS, sexual and Gender Based Violence (SGBV), Advocacy, Governance and Coordination, Monitoring and Evaluation

Methodology: The review period was from July 2018 to December 2020. A mixed methods approach with qualitative and quantitative data collection and analysis was adopted. Qualitative data was collected through Focus Group Discussions and Key Informant Interviews while other data were obtained from desk reviews, Kenya Health Information Software (KHIS 2), departmental registries and the action Plan M&E tracking & monitoring tool (kobotool). Comparative analysis of the indicators was done against the baseline findings. Data was presented using graphics and maps while qualitative information was presented in descriptive format.

Results: Adolescent pregnancies reduced from 37% in 2016 to 20.8% in December 2020. Reporting of adolescent pregnancies in schools improved from 361 cases in 2018 to 850 in 2020, of which 65% from both periods were from primary schools. The school drop-out reduced from 238 in 2018 to 134 in 2020, and 85% of the girls re-admitted back to school. Contraceptive uptake for 10-19 years improved from 16.9% to 20.1% while for ages of 20-24 years was 26.4% to 30.9%. HIV positivity increased from 0.9% in 2018 to 1.6% in 2020 which is attributed to targeted testing strategies. SGBV reporting increased from 91 cases to 667 in 2020 and 46 cases were successfully prosecuted. Department of gender showed reduction in defilement cases from 95 in 2018 to 7 in 2020, while child marriages reduced from 43 in 2018 to 34 in 2020. Probation department reported 104 young people successfully rehabilitated during with 17 of them attached to local artisans for skills development. Department of youth affairs enrolled 4159 on Life Skills Training and 3956 on business skills while county resource allocation increased from 16 million in 2018/2019 to 16.7 million in 2020/2021

Conclusion: The demands of AY are beyond health, this process demonstrates the importance of multi-sectoral collaboration in improving their health and wellbeing. The approach provides a joint monitoring and learning, thus providing an effective and efficient scale up of best practices in the next phase of implementation.

Abstract No. 065.

Implementation considerations for the WHO Essential Diagnostics List with insights from the Essential Medicines List: A scoping review

Moriassi Nyanhoka (Centre for Global Health Research, Kenya Medical Research Institute)*; Mercy Mulaku (Centre for Global Health Research, Kenya Medical Research Institute); Bruce Nyagol (Centre for Global Health Research, Kenya Medical Research Institute); Eddy Johnson Owino (Center for Global Health Research, Kenya Medical Research Institute); Simon Kariuki (KEMRI); Eleanor Ochodo (Centre for Global Health Research, Kenya Medical Research Institute)

Background: Effective implementation of the World Health Organization (WHO) Essential In Vitro Diagnostic List (EDL) is vital to ensure better access to diagnostics and universal health care and improved health outcomes. To inform and guide the implementation of National EDLs, this scoping review mapped literature on implementing the WHO essential lists in African nations.



Methods: We searched eight electronic databases, including Ovid MEDLINE, Embase, CINAHL, Web of Science, African Index Medicus, Cochrane Central Register of Controlled Trials, SCOPUS, and Health System Evidence. We included studies that evaluated barriers and facilitators to implementing the WHO EDL and essential medicines list (EML), mainly in Africa. Study selection and data extraction were conducted by independent reviewers, with disagreements resolved through discussion or by a senior reviewer. We used the Supporting the Use of Research Evidence (SURE) checklist for identifying barriers and enablers to health systems to extract themes from the included studies. We used thematic content analysis to synthesize the findings. The study used the Mixed Method Appraisal Tool (MMAT) version 2018 to assess the quality of included studies.

Results: In total, 176 studies reporting on EDL and EML were included after screening 3,813 articles titles and abstracts and 1,545 potentially relevant full-text papers. The majority (81%) of EDL studies used quantitative methods, and 19% used the mixed methods approach combining quantitative and qualitative approaches. The most frequently reported health systems barrier themes facing the EDL and EML implementation were limited accessibility of care, financial and human resources, information systems, facilities, and procurement and distribution systems. Barriers unique to EDL included accessibility of care, financial resources, human resources, education system, information system, facilities, and procurement and distribution systems. The health system facilitators that face both the EML and EDL included good accessibility of care, the adequate capacity of facilities, procurement, and distribution systems. Most included studies (56%) were of high quality.

Conclusions: Though the EDL was introduced to improve access to essential diagnostics, barriers facing the implementation of the newly introduced EDL are mainly about health system access limitations and are similar to those facing the more established EML. More process and impact evaluations are needed to unpack ways of increasing the EDLs impact in different African settings.

Abstract No. 066.

What are the barriers to and provider-developed strategies for early implementation of pharmacy-delivered PrEP services in Kenya? A qualitative study

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Background: In Kenya, individuals at risk for HIV acquisition currently obtain oral pre-exposure prophylaxis (PrEP) from health facilities where barriers to access remain, including long wait times and HIV-associated stigma. Retail pharmacies are often the first point-of-care for many individuals and outnumber HIV clinics in Kenya and other low-and-middle-income countries. As part of an ongoing pilot study testing the first model of pharmacy-delivered PrEP in Kenya, we identified early implementation barriers and provider-developed strategies to enhance implementation.

Methods: At four retail pharmacies in Kisumu and Thika, Kenya, trained pharmacy providers initiated and continued clients at risk of HIV acquisition on PrEP. Pharmacy providers used a prescribing checklist to assess PrEP eligibility, and clinicians provided remote oversight. Every week, research assistants stationed at the pharmacies completed an observation report. Two qualitative researchers analyzed the reports from the first six months of implementation using inductive content analysis informed by pharmacy provider input. We used the socioecological model to organize multilevel barriers to and provider-developed strategies for implementing pharmacy-delivered PrEP

Results: From November 2020 to May 2021, pharmacy providers initiated 211 clients on PrEP (~45% of those screened, 211/472), and research assistants completed 74 weekly reports (~18/pharmacy). We identified organizational-, interpersonal-, and individual-level barriers to pharmacy-delivered PrEP services. Organizational barriers included high costs to clients, missed client follow-up visits, competing provider priorities, and high provider turnover. Interpersonal barriers included client hesitancy to discuss sexual behavior and providers' lack of clear PrEP communication or advocacy. Individual barriers included clients' fear of PrEP stigma and concerns of PrEP safety. Provider-developed strategies included flexible scheduling of PrEP initiation and follow-up visits, phone calls to remind clients of upcoming visits, a self-screening option to assess for HIV risk, and assurance of client privacy and confidentiality through counseling and education.

Implications for D&I research: Pharmacy-delivered PrEP may potentially expand the reach of HIV prevention services for individuals at risk. Our study provides insight into early implementation barriers and provider-developed strategies to improve PrEP delivery at retail pharmacies in Kenya. Future research will triangulate data from client interviews, refine strategies, understand their underlying mechanisms, and evaluate the feasibility and effectiveness of pharmacy-delivered PrEP services in Kenya.

Abstract No. 067.

Navigating emergency but licit procurement during pandemics.

Joshua W Maina (East African Science and Technology Commission(EASTEKO).)*

During a plenary discussion at 13TH East Africa Procurement Forum held in Kigali in April 2021 and further upon a desk review of current Procurement Laws and Regulations of Kenya, Uganda, Tanzania, Rwanda, Burundi and those of other African Countries, it emerged that in the midst of Covid-19 pandemic, No Governments have enacted comprehensive policies, laws, regulations and procedures to handle emergency procurement. However, the above Tanzania's Law and Regulations has made a good attempt. The situation is same in Regional Integration organizations. Procurement Regulations and Manuals of Eastern and Southern Regional organizations: EAC, AU, COMESA and IGAD provide little or no policy, rules or procedure for this. This has



resulted in cases of corruption, uncontrolled waste of public funds through duplicative and ineffective procurements. Example: <http://www.parliament.go.ke/search/node?keys=report+on+kemsa>; <https://www.dailymaverick.co.za/opinionista/2021-01-28-corruption-perceptions-index-covid-19-ppe-procurement-scandals-cement-south-africas-global-ranking-below-50/> and <https://www.dailymail.co.uk/news/article-8959889/The-18bn-coronavirus-PPE-fiasco.html>.

Regional Governments and Organizations, should consider the following reforms: Direct procurement; Request for Quotations regardless of procurement value; No absolute deadline for response; Retrospective approvals; None-exact and simplified evaluation criteria; Most technically acceptable offer when none is responsive; Order from second lowest evaluated bidder; Allow alternative bids; Awarding higher priced offer if more technically advantageous; Split orders; Commence procure procedure before receipt of funds; Accelerate reviews/awards/due diligence/contracting; Waive shortlisting procedure and three quotations requirement; Backward planning; Create and empower a multi-agency emergency task force; No middlemen and Agents and use Manufacturers of Original Equipment; Delegate procurement Authority; Allow brand names; Waive Standardization; Ignore missing documents; Conduct due-diligence; Consortium/collaborative innovation & buying strategies; Agile/Buffer stock; Suspend, vary and re-negotiate terms and conditions of contracts, including redefining “force majeure and frustration” ; Embrace re-built Cognitive driven data Analytics.

Key words: emergency, risks, value for money, accountability, results.

Abstract No. 068.

How are global health policies transferred to sub-Saharan African countries? A systematic critical review of literature

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Background: Most sub-Saharan African countries adopt global health policies. However, mechanisms with which policy transfers occur have largely been studied amongst developed countries and much less in low- and middle- income countries. The current review sought to contribute to literature in this area by exploring how health policy agendas have been transferred from global to national level in sub-Saharan Africa. This is particularly important in the SDGs era as there are many policy prepositions by global actors to be transferred to national levels for example the WHO policy principles of health financing reforms that advance UHC.

Methods: We conducted a critical review of literature following Arksey and O’Malley framework for conducting reviews. We searched EBSCOhost, ProQuest, PubMed, Scopus, Web of Science and google scholar for articles. We combined the concepts and synonyms of “policy transfer” with those of “sub-Saharan Africa” using Boolean operators in searching databases. Data was analyzed thematically, and results presented narratively.

Results: Nine articles satisfied our eligibility criteria. The predominant policy transfer mechanism in the health sector in sub-Saharan Africa is voluntarism. There are cases of coercion, however even in the face of coercion there is usually some level of negotiation. Agency, context and nature of the issue are key influencers in policy transfers. The transfer is likely to be smooth if it is mainly technical and changes are within the confines of a given disease programmatic area. Policies with potential implications on bureaucratic and political status quo are more challenging to transfer.

Conclusion: Policy transfer, irrespective of the mechanism, requires local alignment and appreciation of context by the principal agents, availability of financial resources, a coordination platform and good working relations amongst stakeholders. Potential effect of the policy on the bureaucratic structure and political status are also important during the policy transfer process.





SCIENTIFIC SESSION

11: HIV 1



Abstract No. 069.

HIV Infection During Pregnancy at Kisumu County Referral Hospital; A Surveillance Evaluation, 2021

Clara M Andala (Field Epidemiology and Laboratory Training Program)*; Fredrick Odhiambo (Field Epidemiology and Laboratory Training Program); Maurice O Owiny (Kenya FELTP); Dickens Onyango (Kisumu County Department of Health)

Background: HIV surveillance system in Kenya captures individuals' data on testing and linkage to provide evidence-based data used to guide program interventions. Approximately 34 % of mother-to-child transmission will be among women with incident infection after the first test, making retesting later in pregnancy a vital step.

Methods: The system was evaluated using the CDC guidelines to determine its usefulness in providing data on HIV retesting during pregnancy. We collected data through interviews and reviewed hospital records. We assessed the system's attributes using the Likert scale and analysed antenatal care records from January 2018 to December 2020. We interpreted the system attributes as very poor to excellent and ranked them as Excellent (>90%), Good (80%-90%), Average (60%-80%), Poor (40%-60%), and very poor (<40%).

Results: We found the system to be useful (96.7%). The overall performance was good (83.1%). Representativeness (91.7%) and simplicity (95%) were excellent, acceptability (86.7%) was good; stability (66.7%) and flexibility (61.7%) were average, while data quality was poor (60%). Records eligible for analysis were 985; mean age 26 (interquartile range, IQR: 15–30) years ; mean pregnancy gestational age at first visit was 22 weeks. Of these records, 142 (14.4%) were known positive. Of the 843 (85.6%) tested for HIV, 69 (8.2%) tested positive. Only 71% of the positive got enrolled into care. Women aged 20-24 years contributed 24 (35%) of the positive cases. Only 591 (60%) of the initial records, revisited the facility at third trimester. Mean gestational age was 32 weeks. Known positives were 152 (25.7%). Only 196 (44.6%) were retested despite 439 (74.2%) being eligible for retesting.

Conclusion: The system provided patient-level data on HIV testing among pregnant women. However, there was minimal data on retesting. We concluded that the system was meeting its objective of providing HIV testing trends, incidence, and magnitude among pregnant women. The system can provide data on HIV retesting, per the guidelines. We recommend routine supervision with integrated data quality assessment, capacity building of healthcare workers on the proper use of tools, and feedback to improve data quality. Paired with knowledgeable and motivated staff, the system can provide insights into the HIV epidemic among pregnant women.

Keywords: Pregnancy, HIV testing, Data Quality, Antenatal care

Abstract No. 070.

HIV testing and linkage to care - A case of a mobile diagnostic and counseling service in Mbeya, Tanzania; A quantitative study

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Background: HIV-care programmes are faced with multiple challenges in getting newly diagnosed People Living with HIV (PLHIV) linked to care despite of massive investment in HIV prevention, treatment and care. This study assessed the performance of mobile HIV Testing and Counseling (mHTC) services in provision of HIV-testing and linkage to care of newly diagnosed PLHIV from Key and Vulnerable Populations (KVPs).

Methods: A retrospective review of the records of 25,248 clients was extracted from mHTC Services database from October-2016 to September-2018. Data were entered into Microsoft Access database and then imported for analysis into Stata software version 15.

Results: Of 25,248 clients, 13,056 (51.17%) were in 25-45 years age group, 13,997 (55.4%) were males, 15,273 (60.5%) were married and 15,687 (62.1%) had primary level of education. The median age of clients was 31 (IQR: 23-42) years. Out of the clients tested 800 (3.17%) were PLHIV. Positivity was high among females 450 (4%), age group 25-45 years 538 (4.12%), divorced 202 (7.41%) and clients with primary level of education 504 (3.21%). An association between HIV-status and gender, age group, relationship-status and level of education was observed (P<0001). Out of the 800 PLHIV, 418 (52.25%) were successful linked to care. Among PLHIV, 5/6 (83.33%) children below 15 years old, 238/450 (52.89%) females and 39/64 (60.94%) widows were successful linked to care. In multivariable log binomial regression model age of the clients was associated with successful linkage to care.

Conclusion: The mHTC was able to reach KVP clients in rural setting with limited health care infrastructure. Overall linkage for both sexes was 52.25% below the recommended UNAIDS 90-90-90 target. Raising the need to address challenges associated with linkage and specific care for KVPs as a subset of the general population.

Integrating comprehensive health services to mHTC may be possible, however further research is required to improve linkage and retention to HIV-care of KVP clients.



Abstract No. 071.

Proof of principle oral dissolvable strip formulation for pediatric ARV prophylaxis

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Background: Current formulations of pediatric HIV prophylaxis pose barriers to administration and adherence due to regimen complexity, reliance on liquid formulations, and conspicuous administration in Kenya and other settings with HIV high stigma. Oral dissolvable strips (ODS) are alternative formulations that can simplify administration for infants and have generated interest for other pediatric formulations.

Methods: We conducted a preclinical pilot study to formulate and evaluate a single mucoadhesive and rapidly dissolving ODS for pediatric HIV prophylaxis containing 60 mg zidovudine (AZT) and 10mg nevirapine (NVP); the prophylactic regimen for infants >12 weeks of age in Kenya. For strip formulation, AZT was encapsulated for taste masking; NVP – with a more neutral flavor – was not. ODS were evaluated on the following key properties: AZT encapsulation, active ingredient degradation at 72-hours (40°C, 80% humidity) and after 6 months (20°C, 30% humidity), taste, and dissolution. A three-stage in vitro bioavailability study mimicked the varied pH environments of the oral administration pathway (oral cavity [pH 6.8], stomach [pH 2], intestine [pH 6.5]) to quantify active pharmaceutical ingredients (API) released from the ODS compared with non-formulated bulk drug powder.

Results: ODS characteristics met or exceeded targeted criteria for encapsulation of AZT (72%), degradation during AZT encapsulation (none detected), degradation of the final strip over six months (none detected), and ODS dissolution time (<30 seconds). Taste needs to be formally evaluated, but investigators indicated that taste was mild and not bitter. The values of API released at the intestinal stage were 97.5% (±4.4%) of AZT and 107.6% (±4.6%) of NVP.

Conclusion: These preliminary in vitro bioavailability data indicate non-inferiority of ODS (AZT + NVP) compared to bulk drug standards, indicating proof of principle that formulation of ODS for pediatric dual ARV prophylactic is feasible. These formulations have the potential to mitigate many of the barriers to pediatric ARV adherence. Planned next steps include to optimize ODS formulation for commercialization and to advance testing to include more robust in vitro release methods for quality control and in vivo proof of principle studies to establish bioequivalence for the developed ODS. More extensive testing under Zone IV(c) conditions (hot and humid) will be included in the next phase of development. An ongoing qualitative R21 exploratory study will engage end users in Kenya (mothers/caretakers, providers, and children living with HIV) to inform the development of ODS and preferred packaging/dispensing options. This parallel effort of patient informed design will serve to further enhance the ultimate impact of better regimen adherence because of this innovative pharmaceutical product.

Abstract No. 072.

HIV and HCV risk assessment and testing outcomes among sex workers and long distance drivers in Kenya

Alex K Maiyo (KEMRI); Joseph Mwangi (KEMRI)*; Rency Lel (KEMRI); Vincent Okoth (KEMRI); Nancy Lagat (KEMRI); Lucy Kanyara (KEMRI); Raphael Lihana (KEMRI); Samuel Khamadi (KEMRI)

Background: The prevalence of HIV is highest in Africa, with Kenya considered among the seven high burden countries globally. Both HIV and HCV shared common risk factors and mode of transmission. The burden of HIV and HCV is concentrated in sub-Saharan Africa where 25.7 million people are living with HIV and 10.2 million people are chronically infected with hepatitis C (HCV). Key populations (KPs) are special groups of people with increased risk for acquiring these infections and for their onward transmission. Assessment, surveillance and monitoring of HIV and HCV is important in order to initiate appropriate interventions among the high risk groups

Objective: We report on the preliminary outcomes of an ongoing study among sex workers and long distance truck drivers. The aim of this study is to determine risks and testing access and outcomes for HIV and HCV in a high-risk population.

Methods: Convenient sampling was used to recruit 700 participants for this cross sectional study. We carried out HIV and HCV test among sex workers and long distance truck drivers along the Northern transport corridor in Kenya. Interviews to assess the risk and testing exposure was conducted by trained research assistants using a structured questionnaire within the hotspot areas. Testing for HIV and HCV was conducted in the field using RDTs and results provided on site. Further testing was carried out at HIV research division laboratories at KEMRI Nairobi. Data obtained was analyzed to generate a report shared with study partners implementing programs within the study sites.

Results: In this study, 62% [447] of study participants were female while 38% [273] were male. Risk assessment indicated that 23% of the participants had had 2-4 sexual partners in the last year; 17% [5-10], 20% [11-20], 10% [21-50] and 4% [> 50] sexual partners respectively. Notably, 4% [28] of participants had never been tested for HIV prior to this study. Those who had ever tested for HCV were 2% [15/720]. For 25% [n=180] of participants, their last HIV test was taken over a year ago while 56% [402] and 15% [110] had had their taken a test in the last 3 and > 1 month respectively. For the 2% [15] ever tested for HCV 33% [5] had taken the test over a year ago. HIV Prevalence was at 7.3% [50] and HCV 1.3 % [8].

Conclusion: Prevalence of HIV and HCV in this population was slightly higher than that of general population [7.3% & 1.3%]. Based on the number of sexual partner and testing uptake the risk of exposure to HIV and HCV could be high. Testing for HCV is very low indicating unavailability or inaccessibility of this test for this population. Addressing gaps in testing and risk drivers are among the interventions that could reduce risk to HIV and HCV. Continued surveillance of these infection is recommended especially in this high risk population group.



Abstract No. 073.

PATTERNS AND CAUSES OF SUBOPTIMAL RESPONSE TO NEVIRAPINE BASED THERAPY IN PATIENTS RECEIVING ANTIRETROVIRAL THERAPY IN KISUMU AND MALINDI, KENYA

Juster Mungiria (Chuka University)*; Lucy Gitonga (Chuka University); Moses Mahungu (Chuka University); John Njeru (KEMRI); Musa Ngayo (KEMRI)

Background: Scaling of antiretroviral treatment (ART) has significantly reduced deaths and morbidity for HIV patients. Kenya's standard ART regimen is restricted to limited combination options with Nevirapine (NVP) being particularly widely prescribed component of highly active antiretroviral therapy (HAART). Nevirapine is used with other ART drugs to maximize viral suppression, due to its affordability and availability in generic fixed drug combinations. In addition, host pharmacoeconomic and pharmacogenetic factors are also associated with suboptimal clinical levels jeopardizing treatment successes of Nevirapine. Although some studies have suggested that plasma NVP concentrations may affect virologic outcome, therapeutic drug level measurements are usually excluded from ART management of patients in many countries. This study sought to determine the patterns and causes of suboptimal response to NVP based first line therapy in patients receiving ART in western and coastal Kenya.

Methods: In this case-control study, blood samples were collected from consenting 114 cases and 263 control participants receiving first line ART regimen from Kisumu (n = 272) and Malindi (n = 105). Social demographic questionnaire was administered to gather data on ART adherence, health care and access, HIV testing and sexual behaviour and nutritional status. The NVP was extracted using an in-house liquid-liquid extraction method and quantified using Liquid Chromatography Tandem Mass Spectrometry. The cytochrome 2B6 (CYP2B6) c.516 G>T and c.983T>C genotypes were determined by rt-PCR.

Results: Out of the 377 recruited participants (30.2%) were experiencing virologic failures. The average age of the participants evaluated was 41.6 years. The steady state NVP concentration varied widely among patients ranging from 4ng/mL to 44207ng/mL with control group having higher levels than the cases. There were 25.5% participants with nevirapine plasma concentration levels <3100 ng/mL while 74.5% had NVP concentration levels >3100ng/mL. Gender (p=0.047), education (p=0.026) and region (p=0.016) were the only sociodemographic variables that were associated with NVP plasma concentrations. None of the nutritional variable evaluated were associated with NVP plasma concentration (p>0.05). CYP2B6 516TT participants had significantly higher mean plasma concentrations of 6753.5 ng/mL compared to the other genotypes (p<0.001). Heterozygous mutant (983TC) participants had higher mean plasma levels when compared to other genotypes. However, the differences were not significant (p=0.256). **Conclusion:** Routine evaluation of plasma concentrations of NVP and other ART drugs considering virologic load, male gender, education level, region of origin and CYP 2B6516 G>T genotypes are key to ensuring optimal ART treatment outcomes in Kenya. These findings will guide policy formulation on treatment strategies leading to optimal responses to ART which might influence current dose recommendation of HAART.

Abstract No. 074.

HIV and Viral co-infections: Results from a multicenter study across sites in Kenya

Joseph Mwangi (KEMRI)*

Joseph Mwangi¹, Ziporah Nganga², Muasya Timothy¹, Olungae Dama¹, Kinyua Joyceline¹, Rency Lell¹, Alex Maiyo, Raphael Lwembe and Joseph Muriuki

Background: HIV co-infection with certain viral infections affect the natural history of HIV infection and vice-versa. Both Hepatitis C virus (HCV) and hepatitis B virus (HBV) co-infections result with higher risk for both progression to AIDS and progression to end stage liver disease. Despite the huge public health burden of disease due to these infections majority of people co-infected, remain undiagnosed and unaware of their infection. This is a major barrier to scale-up of access to prevention, care and treatment. HBV and/or HCV co-infection with HIV varies significantly across geographical regions, risk groups and type of exposure involved. Prompted by the emerging trends in hepatitis and HIV co-infections, countries are currently developing guidelines to position their strategies for prevention, diagnosis, care and treatment of hepatitis B, hepatitis C and HIV co-infections. The framework for action to achieve targets of reduction in viral hepatitis in the African region includes integration of hepatitis testing into health policies and systems especially among priority populations such as HIV positive individuals. In obtaining information for focused action, the prevalence of hepatitis coinfection is therefore essential. In this study, we aimed to determine sero-prevalence of HBV, HCV as co-infection among a population of HIV infected.

Materials and Methods: This multicenter study involved participants from comprehensive care clinics. Upon consent, blood samples were collected from participants and analyzed serologically for HIV, HBV and HCV. An algorithm that combined rapid diagnostic Kits was used to screen for HIV, HBV and HCV following manufacturer's instructions.

Results: Seroprevalence of HBV was 29% while that of HCV was 14%. Most of the participants (71%) had co-infections. The frequency of HBV and HCV combinations was at 9%. There was significant relationship between study sites and co-infection status (p=0.001).

Conclusions: Prevalence of HBV, HCV and Co-infections was high in this population. With the results reported in this study, it is necessary to screen for HBV and HCV among the HIV infected in order to identify co-infections and initiate early interventions. Continuous surveillance distribution of HBV, HCV is crucial for development of interventions and policy direction.



SYMPOSIUM 1: KNOWLEDGE MANAGEMENT

Title : **The Space and Role for Evidence use in Health Sector Policy Making and Routine Decision-Making Processes.**

Introduction

The health sector policy making and decision-making environment is constantly characterized by multiple activities and processes. These may include problem identification, agenda setting, policy formulation, policy implementation and policy evaluation. Though often identified as distinct stages, however in the “real world” environments, these processes often happen concurrently with multiple overlaps and interactions with each other. In addition, the health sector context/environment within which these policy/decisions making process occur is characterized by multiple stakeholders, actors and agents, who often have diverse interests (sometimes conflicting) on the different policy issues and process being navigated around within the health sector.

In the recent past, there has been a growing appreciation by policymakers and other actors in the health policy making environment to use and apply “evidence” in guiding actions taken in the policy making and decision-making processes. However, even with this growing appreciation, the application of evidence in policy decision making has not always been an easy process. This has been the case for multiple reasons. First, the multiplicity of roles and activities in the policy environment (including creation of knowledge, persuasion of different actors, technical choices, implementation and evaluations of decisions) means that “evidence” is used and applied in multiple varied ways in these policy making environments. Second, all these multiple roles and activities in the health policy environment require that different types of evidence is needed and used in different forms and format, even within the same policy issue. Thirdly, in the “real world” health sector policy making and decision making, “evidence” has to constantly compete with other factors that influence these environments including, but not limited to stakeholder interests, costs or financial implication of policy choices, organizational cultures, values, cultures and habits of policy makers.

This proposed symposium seeks to explore and build the understanding of the application of different types and forms of evidence in the various processes and activities that take place in the health policy making and routine decision-making environments. Building this understanding will in turn create stakeholder awareness on the role and space for the application of evidence; and in turn serve to improve the application and consideration of evidence in the health sector policy making and routine decision making processes.





SCIENTIFIC SESSION

12: MENTAL HEALTH



Abstract No. 075.

How postnatal depression impacts on neonatal outcomes: an exploratory study in Kisumu County, western Kenya

Catherine E Gribbin (Liverpool School of Tropical Medicine)*; Florence Achieng (Kenya Medical Research Institute); Alloys O K'Oloo (KEMRI-CGHR); Hellen Barsosio (Liverpool School of Tropical Medicine (LSTM)); Edith Kwobah (Moi Teaching and Referral Hospital); Simon Kariuki (KEMRI); Helen M Nabwera (Liverpool School of Tropical Medicine (LSTM))

Background: Postnatal depression (PND) is the most common complication of childbearing and can reduce a mother's ability to care for herself and her infant. Previous Kenyan studies have found that PND negatively impacts infant growth, health, and development although studies are limited to Nairobi and no previous studies have explored the effects of PND in the neonatal period. This study aimed to generate preliminary data exploring the impact of PND on neonatal outcomes and to understand the most challenging aspects of maternal caregiving to shape targeted interventions for supporting these mothers and their infants.

Methods: This was a mixed methods study of mothers and their neonates ≤ 72 hours post-delivery, recruited from postnatal wards and clinics across five health facilities in Kisumu County. The Edinburgh Postnatal Depression Scale (EPDS) was used to screen and identify mothers with features suggestive of PND ($EPDS \geq 12$). Cross-sectional surveys were done at baseline and 2 weeks to describe the frequency of PND, infant health and growth characteristics and a sub-sample of 27 mothers were invited for semi-structured interviews to further explore how PND affects maternal caregiving practices. Quantitative data was analysed using descriptive statistics and chi-square tests were applied to assess the similarities between the two groups of mothers. Framework analysis was used to identify and analyse emerging themes from the interviews in an iterative process alongside qualitative data collection.

Results: 150 mother-infant pairs were recruited at baseline, 56 (37%) of whom had an EPDS score ≥ 12 . At baseline we found that mothers with features of PND practised exclusive breastfeeding less frequently (76.9% vs 90.9% $p=0.6$) and a smaller proportion of their infants gained weight at 2 weeks (23.1% vs 36.4% $p=0.75$). Key caregiving challenges included feeding difficulties, mother's diminished capacity to perform normal daily activities for example due to poor physical health, and poor healthcare experiences. However, the key stressors for mothers were financial insecurity and lack of social support. Mothers described the positive impact of support from friends and relatives on their mood and caregiving abilities in the context of inadequate support from healthcare professionals in the postnatal period.

Conclusion: Adverse growth and feeding outcomes appear to already be apparent in the first 2 weeks of life among infants of mothers with features of PND highlighting the importance of early screening and linking of at-risk mothers into appropriate support services. Community support structures including community health workers and peer support groups and routine maternal and child health clinics could provide effective platforms for early PND screening and intervention that should incorporate strategies to increase maternal self-efficacy to both prevent and mitigate against the impact of PND on the mother's mood and caregiving ability.

Abstract No. 076.

Characteristics of People living with Mental Illnesses at Mathari Mental Hospital in 2020

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Background: Mental Health is a key determinant of health and socio-economic development. Every one out of four persons who seek healthcare in Kenya has a mental health condition. The COVID-19 Pandemic has reportedly worsened this burden, yet despite this, there was no recent assessment of cases seen in Mathari National Teaching and Referral Hospital. This study sought to describe the persons living with mental illness seen at the facility.

Methods: We reviewed records from the out patients register (MOH 204 B) and used an MS Excel based tool to extract data on socio demographic and clinical characteristics of persons living with mental illness from January to December 2020 at Mathari National Teaching and Referral Hospital. We performed data quality audit (DQA) using a standardized DQA tool. Data was analyzed using MS-Excel. We calculated measures of central tendency and measures of dispersion for the continuous variables and frequencies and proportions for categorical variables.

Results: We analyzed 300 records. Mean age was 33 ± 13 sd with age 20-29 years contributing 123 (41%) cases. Males were 204 (68%). Unemployed cases were 105 (35%), and never married 181 (61%). Those whose reported highest level of education was a secondary certificate were 113 (39%) and 95 (33%) had completed tertiary education. Substance Use Disorder (SUD) was reported among 92 (33%) of cases. Hospitalized cases were 22 (7%), while 277 (92%) were managed as outpatient cases. The Data Quality Audit had a weighted average of 97%.

Conclusion: Almost half of persons living with mental illness are aged 20-29 years and Substance Use Disorder was the commonest diagnosis. We recommend health promotion amongst Adolescents and Young Populations on the dangers of substance abuse.

Key Words: Mental Illness, Substance Use Disorder, COVID -19, Kenya



Abstract No. 077.

SOURCES OF STRESS AND COPING MECHANISM AMONG MATERNAL HEALTH CARE PROVIDERS IN WESTERN KENYA

Joyceline Gaceri Kinyua (Kenya Medical Research Institute)*; Linnet Ongeru (Kenya Medical Research Institute); Monica Getahun (University of California, San Francisco); Beryl Akinyi (Global Programs for Research and Training); Edwina Ndhine (Global Programs for Research and Training); Patience A. Afulani (University of California, San Francisco)

Background: The dynamic and complex nature of care provision predisposes healthcare workers to stress, including physical, emotional, or psychological fatigue due to individual/interpersonal or organizational factor. Yet, despite the well-documented benefit of mental health support in addressing stress, many providers, especially in low-resource settings in Sub-Saharan Africa, continue to have an unmet mental health support need. There is an urgent need to better understand both the source as well as coping strategies among providers, in order to inform strategies to address their mental health.

Methods: In-depth Interviews were conducted with n=32 providers across medium and large facilities in Migori county in Western Kenya from June-Sept, 2019. Semi-structured guides probed about instances of stress, sources, and coping strategies. A team of two researchers, trained in qualitative methods, collected the data and partook in the collaborative analyses process. Codes were developed prior based on interview guides, and iteratively refined based on emergent data. Codes were applied by a team of five researchers in Dedoose and then queried. We used socioecological (SE) framework to organize rich data on the experiences of and coping mechanisms related to stress among providers of maternal care. Our findings highlight the multiple levels of influence from policy (health system level), institutional (facility level), interpersonal (among providers and patients) to intrapersonal levels (at the individual provider level).

Results: We identified six distinct themes related to sources of stress: high workload, staff shortage and turnover, lack of work resources, inadequate rewards or incentives, attitude and behavior of supervisors, colleagues, patients, and difficult cases or poor outcomes among patients. Many of these themes influenced providers at one or more levels of the SE framework. Most recurring themes for coping mechanisms were categorized in three themes with different sub theme codes; dealing with stress by oneself, reaching out to others and seeking help from higher power.

Conclusion: Findings underscore the need to address various issues at the organizational, interpersonal and individual levels. Strategies are needed to support staff retention, provide adequate resources and incentives for providers and ultimately improve patient outcomes. Further, the challenges underscore the need for mental health support to enhance personal coping strategies. Future interventions should leverage the coping strategies identified.

Abstract No. 078.

Prevalence of postpartum depression, mothers' experiences and barriers and facilitators to seeking postpartum depression care among postpartum mothers attending the postnatal clinic in Jinja Hospital Uganda.

Dorothy Akongo (Makerere University)*; Sarah Effertz (San Diego State University); Juliana Namutundu (Makerere University); Violet Gwokyalya (Makerere University)

Background: Postpartum depression (PPD) is a major depression episode associated with child birth and common within 4-6 weeks after child birth. Globally, postpartum depression affects approximately 900000 women annually with only about 6% of women with PPD seeking psychological help. Over 70 per 300 women in Uganda suffer from postpartum depression. Despite the availability of PPD services in Jinja regional referral hospital, the uptake is still low. Designing appropriate interventions for PPD and mitigating its negative effects required establishing the burden and barriers and facilitators to accessing postpartum depression health care among those affected.

Methodology: A facility based cross-sectional study was conducted at Jinja Regional Referral Hospital using a mixed methods approach. The prevalence of postpartum depression was measured using Edinburgh postnatal depression scale (EPDS) based on the presence of depressive symptoms. The data was captured using kobo collect tool and analysed using STATA. The mothers' experiences were collected using In-depth interviews while the barriers and facilitators were collected using focus group discussions and key informants interviews. All interviews were audio taped, transcribed verbatim and analyzed using thematic analysis.

Results: A total of 377 mothers who were within six months postpartum were screened for depressive symptoms at the postnatal clinic from July to August 2020 and 16.2% (61) had depression symptoms. The mothers with PPD experienced hopelessness and lack of confidentiality. The study found that the barriers and facilitators to seeking formal care were; stigmatization among others while psychological support facilitated seeking for care.

Conclusion: The prevalence of postpartum depression in this study is high meaning 70 per 300mothers in Uganda suffer from postpartum depression. These mothers with postpartum depression undergo unfavorable experiences. As a result they fail to access PPD health care due stigmatization. However a few uptake PPD health care with the help of some psychosocial support.



Abstract No. 079.

Social Media Use and Addictive and Depression and Suicide Ideation in Elburgon Ward

Ndirangu Ngunjiri (University of Nairobi)*

Background Addictive behavior to social network sites is considered an alarming phenomenon where other psychopathological problems can be manifested in the Elburgon ward. Which is the leading cause of death, but detecting those at risk is challenging. Interest in the potential for both detrimental and supportive influences of social media use on suicidal behavior has been increasing; however, the relationship remains unclear. The purpose of the study is to analyze the relationship between the use and the addictive behavior of social media and the use of mobile devices, depression, and suicidal ideation.

Methods The questionnaires were applied to a sample of 374 residents between 9 years to 60 years old where 58.6% were men and 41.4% were women, with an average age of 20.01 years (SD = 1.84)

Results These findings suggest that excessive use of social media be linked to negative depression characteristics and possibly lead to suicidal ideation. The 36.1% of the sample reported having at least one idea concerning suicide in the last two weeks. No studies were investigating the relationship between social media use and suicide.

Recommendations We propose an explanatory model that was adjusted appropriately and explained the addictive behavior with the frequency of mobile phone use, daily hours, depression, and suicidal ideation, the last one in a negative direction. These results contribute to a better understanding of addictive behavior toward social media concerning depression and suicidal ideation. A deeper investigation is recommended to create preventive and intervention programs for healthy social media usage.

Conclusions Unlike excessive use, addictive behavior is associated with negative psychological characteristics. However, addictive behavior can also be considered a protective factor against suicidal ideation when relating to depression. social media platforms develop, more understanding of the specific risks and mechanisms associated with different types of social media activity, by different Elburgon populations will be essential to understand risk and pave the way for specific interventions.

Keywords: social media; addictive behavior; excessive use; depression; suicidal ideation; mobile Phone

Abstract No. 080.

Availability of Postpartum Depression care services at Adeoyo Maternity Teaching Hospital and University College Hospital, Ibadan, Nigeria

Dorothy Akongo (Makerere University)*; Sarah Effertz (San Diego State University)

Background: Postpartum depression (PPD) is a common and often under looked mental health problem. Validated standard PPD screening tools exist but with low use in most health facilities leaving greater number of PPD cases undetected and untreated. In low income countries like Nigeria PPD services are in place but with low detection and treatment. The study explored the available PPD care services in Adeoyo maternity teaching hospital.

Methods: In June 2019, we conducted qualitative study with 13 key informants who included resident doctors and senior registrars at Adeoyo maternity teaching hospital/ University teaching hospital (UCH). The interview explored the themes on the screening process, availability of standard tool, PPD services offered and treatment utilization.

Results: Most of the key informants indicated the availability of the screening tool at the mental health unit though, the routine screening process doesn't involve PPD screening. However, few health care providers assess the functionality of the mothers. Standard screening tools are not available at postnatal clinic and they only offer referral services with little or no follow up.

Conclusion: PPD a serious and overlooked mental health problem with impacts on mother and child. Despite the available validated Standard screening tools, little effort is put on screening leaving out a greater number of PPD cases undetected and untreated. However few medical practitioners assess for functionality which is close to PPD though most mothers found with signs of PPD Shan treatment with little or no follow up.

Key Words: Postpartum depression, Mental health, Screening tools, Postpartum mothers

Abstract No. 081.

Needs Assessment of the Prevalence and Extent of Sexual Harassment at the Kenya Medical Research Institute (KEMRI)

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Background: Sexual harassment and sexual misconduct have both been recognized as public health and human rights issues by the World Health Organization (WHO). This type of harassment or misconduct may take the form of verbal or non-verbal behaviour ranging from repeated, unreciprocated requests for dates, intrusive notes/emails, phone calls, touching and cornering, gross sexual imposition and physical sexual assault. Sexual harassment can have serious adverse consequences for an employee and their institution, and can negatively impact productivity. The rate of occurrence of sexual harassment at KEMRI is unknown, and currently policies to address sexual harassment and create reporting mechanisms are in process. To support enactment of appropriate robust structures, it was imperative to investigate knowledge on and the nature and extent of sexual harassment at KEMRI.



Objective: The needs assessment was part of a project seeking to establish and finalize mechanisms for creating awareness and reporting of sexual harassment in KEMRI. The project's overall goals include supporting the finalizing and implementation of the policies including, raising awareness on sexual harassment through training.

Methods: Data was collected using both quantitative (survey) and qualitative (interviews) methods. The work climate survey targeted individuals working at KEMRI and was distributed online via the corporate affairs office. The survey was also sent to various program heads, the graduate school and hand copies printed out for support staff. Key informant interviews were carried out with senior management and board members. The interview was semi-structured, with questions centred on the participants' perspectives.

Results: There was a total of 102 survey responses and 8 key informant interviews. From the survey responses, more than half of staff (66%) have never attended any sexual harassment training or have information on where they could report a complaint; 40% indicated they had experienced sexual harassment in the KEMRI workplace. More women than men would not be comfortable reporting, or confident that KEMRI management would take appropriate action. Respondents reported that they believed sexual harassment has an impact on work performance. Other needs that staff reported the institute could address included adding ramps around buildings, spaces for lactating mothers, better structural working conditions and information and access to counsellors who would handle sexual harassment complaints and other staff welfare concerns. All interview participants indicated that awareness and prevention of sexual harassment was beneficial and cited that there was a lack of proper mechanisms to address this at KEMRI. Their recommendations included effective communication and implementation of policies, increase gender representation at top level management, regular training and sensitization at the centre level.

Conclusion: Staff have experienced incidences of sexual harassment at KEMRI, although there is lack of formal reports/rates of these complaints. Increasing awareness of what sexual harassment is and where to report if it occurs can reduce these incidences and create a safer working environment for staff.

Way forward: The project will continue to support the implementation of the policies once approved. This will include dissemination of the policy, implementation of the proposed structures and in addition support training to raise awareness to enhance a sexual harassment free work environment for KEMRI staff

Abstract No. 082.

Socio-cultural perspectives of suicidal behavior at the Coast region of Kenya: an exploratory study.

Linnet Onger (Kenya Medical Research Institute)*; Miriam Nyawira (KEMRI); Symon Kariuki (KEMRI - Wellcome Trust Research Programme); Cyrus Theuri (KEMRI); Mary Bitta (KEMRI- Wellcome Trust Research Programme); Brenda Penninx (Vrije University); Charles Newton (KEMRI - Wellcome Trust Research Programme); Joeri Tjiddink (Vrije University)

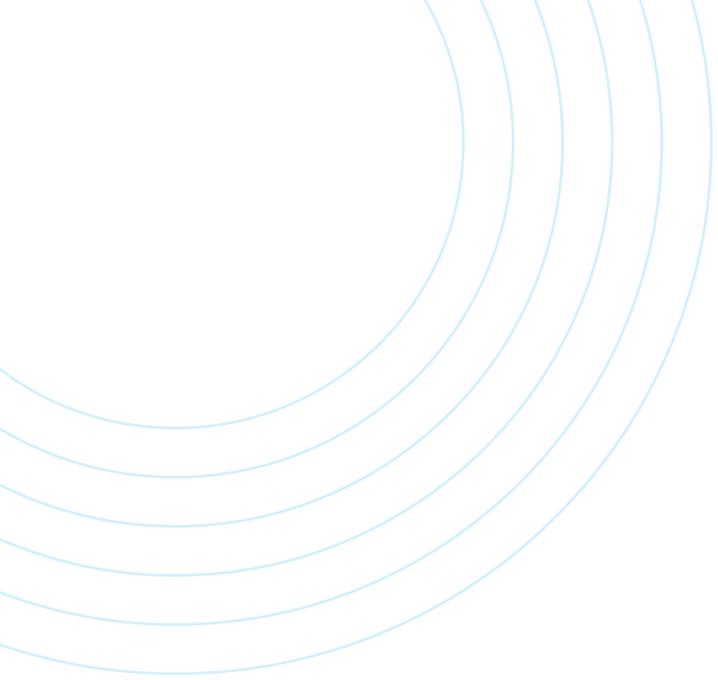
Background: To design and implement effective suicide prevention interventions, a socio-cultural understanding of the population's attitudes to suicide is imperative. Suicide incidence is high in Kenya, including the coastal region, where culture and religion are diverse. Further, suicide remains illegal in Kenya despite ongoing efforts to decriminalize it. While survey data exists confirming high incidence of suicide in the coastal region, no exploratory qualitative study has been conducted in the region to understand the cultural perspectives for these high rates. This study reports perceived socio-cultural factors that may influence suicidality in coastal Kenya.

Methods: We purposively sampled key informants such as administrative leaders, community leaders, health care workers, persons with history of attempted suicide and bereaved family members. In-depth interviews were used to collect data on socio-cultural perspectives of suicide. Thematic analysis was used to identify key themes using both inductive and deductive processes.

Results: Four key themes were identified from the inductive content analysis of 25 in-depth interviews as being important for understanding cultural perspectives related to suicidality: (i) the stigma of suicidal behavior, with suicidal victims perceived as weak or crazy, and suicidal act as evil and illegal; (ii) the attribution of supernatural causality to suicide for example due to sorcery or inherited curses; (iii) the convoluted pathway to care, specifically, delayed access to biomedical care and preference for informal healers; and (iv) gender and age differences influencing suicide motivation, method of suicide and care seeking behavior for suicidality.

Conclusion: This study provides an in depth understanding of cultural factors attributed to suicide in this rural community that may engender stigma, discrimination, and poor access to mental health care in this community. We recommend the study results be used to inform the design of a quantitative study in order to provide additional baseline information.





SCIENTIFIC SESSION

13: VECTOR BIOLOGY

2



Abstract No. 083.

Survey of yellow fever virus susceptibility across African populations of *Aedes aegypti*

Victor Okoth Anyango (Kenya Medical Research Institute)*; Fabien Aubry (Pasteur Institute); Noah Rose (Princeton University); Carolyn McBride (Princeton University); Joel Lutomiah (KEMRI); Louis Lambrechts (Pasteur Institute)

Survey of yellow fever virus susceptibility across African populations of *Aedes aegypti*

Abstract Background: Despite the availability of a safe and effective vaccine, yellow fever virus (YFV) still causes approximately 200,000 human cases and 30,000 deaths annually, mostly in Africa. YFV is an arthropod-borne enzootic virus, which is maintained in a sylvatic cycle between canopy-dwelling mosquitoes and non-human primates. Occasionally, the virus finds its way to the human population through bridge vectors that bite human beings living around or visiting forested areas. Eventually the virus is transported to urban centers via these infected people when they migrate to these areas. Urban outbreaks of YF are typically mediated by, *Aedes aegypti*. In the past three decades, there has been a surge in outbreaks of YF in Africa. Despite this surge, the epidemiology of YF is not fully understood, particularly in East Africa where YF outbreaks are unpredictable. A remarkable feature of human YF outbreaks in East Africa is that they do not involve the traditional urban transmission cycle. Unlike West Africa, where urban outbreaks are typically mediated by *Ae. aegypti*, urban cycles in East Africa are often associated with sylvatic mosquito species such as *Ae. africanus*, *Ae. keniensis*, and *Ae. simpsoni*, despite the presence of *Ae. aegypti* in the region.

Methods: In an attempt to find a possible explanation for this phenomenon, a panel of eight laboratory colonies of *Ae. aegypti* representative of the wild *Ae. aegypti* populations along a West-East transect of the African species distribution were gathered and orally challenged with three doses of two strains of YFV (YFV_Uganda (YFV_UG): East African genotype; and YFV_Senegal (YFV_SEN): West African genotype).

Results: Overall, all the mosquito populations were susceptible to the two strains of YFV. However, the degree of susceptibility varied from one population to another. Out of 452 mosquitos infected with the YFV_UG strain, only 15 were susceptible. Kedougou (KED) and Awka (AWK) populations were not infected at any dose. At 4.75 log₁₀ FFU/mL 8% of ENT (Entebbe) were infected. At 6.15 log₁₀ FFU/mL, ENT, KWA (Kwale) and KAK (Kakamega) were infected (4% KAK to 12.5% KWA). At 7.17 log₁₀ FFU/mL, NGO (N’Goye) KUM (Khumasi), ENT, KAK, KWA and RAB (Rabai) were infected (4% KWA to 13% ENT). Interestingly, 74/ 489 mosquitoes were susceptible with YFV_Senegal. At 4.75 log₁₀ FFU/mL: NGO, ENT, KAK and RAB were infected (5.2% NGO to 12% ENT). At 6.15. log₁₀ FFU/MI: NGOs, KED, KUM, and RAB were infected (4.1% KUM to 30% RAB). For the dose 7.17 log₁₀ FFU/mL: NGO and KED, KUM, ENT KAK and RAB (4.3% KAK to 33% NGO). The proportion of mosquitoes infected with YFV_Senegal was generally higher than with YFV_Uganda.

Conclusion: YFV genotype and the proportion of domestic ancestry among African populations of *Ae. aegypti* may help to explain the lack of *Ae. aegypti*-mediated YFV outbreaks in East Africa.

Abstract No. 084.

Mosquito-human contact as a risk factor for dengue and chikungunya virus exposure in major towns along the Northern transport corridor, Kenya.

Francis M Musili (KEMRI)*

Francis Mulwa¹, Edith Chepkorir¹, James Mutisya¹, Betty Chelangat¹, Rosemary Sang¹, Joel Lutomiah¹

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Background: Kenya experiences frequent outbreaks of dengue and chikungunya virus in coastal and northern eastern parts of the country. This has been linked to increased urbanization and the colonization of *Aedes aegypti*, the primary vector for the diseases. The frequency with which humans are bitten by mosquitoes is a critical determinant of vector-borne virus transmission risk. *Aedes aegypti* affinity for human blood varies among different geographic populations; hence the need to determine in which vector population displays enhanced anthropophilic behavior as an indicator of risk of disease transmission to human population. Using the human landing collection (HLC) method, this field study examined the abundance of adult *Ae. aegypti* by measuring its tendency to be attracted to humans in cities and major towns along the Mombasa to Malaba Railway line (Meter Gauge railway line).

Methods: The study used a systematic sampling approach to directly measure attractiveness of *Ae. aegypti* to human odor in sites in Mombasa, Kilifi, Nakuru, Uasin Gishu, Busia and Kisumu counties. Volunteers who met the criteria for selection were consented, enrolled and trained on HLC method. The mosquitoes were collected at the six counties between 2019 and 2021 for six days. The volunteers worked for six hours per day during each visit following a standardized protocol. Mosquito collections began at 9.00 am to 12.00p.m and from 2.00 p.m. to 5.00 p.m. Human biting index (HBI) was calculated as the number of mosquitoes landing on one volunteer for a blood meal per hour.

Results: A total of 8625 mosquitoes were collected and identified to species. *Aedes aegypti* (n=51190; 60%) was the most abundant, and others (n=3,435; 40%). Mombasa had the highest number of *Ae. aegypti* (n=2216; 43%) followed by Kilifi (n=1598; 31%). The HBI expressed as bites per man per hour (b/m/h) was highest in Mombasa at 3 b/m/h followed by Kilifi (2 b/m/h), Malaba (2 b/m/h) and Kisumu (1 b/m/h), Eldoret and Nakuru had the lowest HBI levels ranging from 0 to 0.5 b/m/h. *Aedes vitatus*, another major vector of chikungunya, had 2 b/m/h person/hour in Mombasa.

Conclusion: *Aedes aegypti* is the most common human-biting species in all cities, followed by *Ae. vitatus*. Due to the abundance of competent vectors with a high proclivity to bite humans, the risk of exposure to chikungunya and dengue virus is highest in Mombasa city followed by Kilifi, and lowest in Nakuru and Eldoret. More resources efforts in controlling vectors should be targeted in Mombasa in order to minimize the risk of transmission.

Keywords: *Aedes aegypti*, human biting rate, abundance, mosquito species

Abstract No. 085.

Insecticide resistant *Anopheles gambiae* have enhanced longevity but reduced biting frequency and reproductive fitness.

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Background: Widespread insecticide resistance in African malaria vectors raises concerns over the potential to compromise malaria vector control interventions. Understanding the evolution of resistance mechanisms, and whether the selective disadvantages are large enough to be useful in resistance management or designing suitable control strategies is crucial. This study assessed whether insecticide resistance to pyrethroids has an effect on the gonotrophic cycle and reproductive potential of malaria vector *Anopheles gambiae*.

Methods: Comparative tests were performed with a pyrethroid resistant and susceptible colonies of *Anopheles gambiae* colonized from the same geographical area, and the reference Kisumu strain was used as a control. Adult females aged 2 days old were given a blood meal and kept separately for individual egg laying. The number of days taken to lay eggs post blood feeding was recorded to determine the length of gonotrophic cycle. To measure adult longevity and reproduction potential, newly emerged males and females of equal numbers were aspirated into a cage and females allowed to blood feed daily. The number of eggs laid and the surviving mosquitoes were recorded daily to determine fecundity, net reproduction rate, intrinsic growth rate and adult longevity.

Results: Overall, the resistant females had a significantly longer (1.8 days) gonotrophic cycle than susceptible females ($F_{2, 13} = 9.836$, $P < 0.01$). The proportion of resistant females that laid eggs was lower 31.30% (94/300) compared to 54% (162/300) in the susceptible colony and 65.7% (197/300) in the Kisumu strain. The mean number of eggs laid per female was significantly lower in the resistant colony (88.02 ± 20) compared to the susceptible colony (104.9 ± 28.8) and the Kisumu strain (97.6 ± 34.8). The adult longevity was significantly higher for resistant (39.7 ± 1.6 days) compared to susceptible (29.9 ± 1.7 days) and the Kisumu strain was (29.6 ± 1.1 days) ($F_{2,8} = 45.05$, $P < 0.0001$). Resistant colony exhibited a lower fecundity (4.3 eggs/females/day) and net reproductive rate (2.6 offsprings/female/generation) compared to the susceptible colony (8.6 eggs/female/day; 4.7 off springs/female/generation respectively) and Kisumu strain (9.7 eggs/female/day; 4.1 off springs/female/generation respectively).

Conclusion: The study suggests high fitness cost on reproductive parameters of pyrethroid resistant mosquitoes particularly on the duration of gonotrophic cycle, fecundity and net reproductive rate. These fitness costs are likely associated with maintaining both target site and metabolic mechanisms of resistance to pyrethroids. Despite these costs, the resistant mosquitoes had a longer longevity. The results of this study are critical to determining the extent to which insecticide resistance interacts with mosquito reproduction potential and should provide key information in the design of more targeted insecticide resistance management strategies.

Abstract No. 086.

Genetic Variation of *Aedes aegypti* Mosquitoes from Mombasa And Kilifi Counties

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Background: Dengue (DENV), chikungunya (CHIKV) and zika (ZIKV) are mosquito-borne viruses of public health concern globally. These viruses are responsible for the most aggressive re-emerging diseases in form of outbreaks globally, resulting in morbidity with significant clinical symptoms. In Kenya, the first dengue and chikungunya outbreaks occurred in 1982 and 2004-2005 respectively in the coastal region, while ZIKV antibodies have been detected in northwestern Kenya. These viruses are principally transmitted by *Aedes aegypti* and *Ae. albopictus* mosquitoes in Africa and Asia respectively. *Ae. aegypti* occurs in two forms: *Ae. aegypti aegypti* and *Ae. aegypti formosus*, which interbreed resulting into hybrids/ admixtures with varying vectorial capacities. Therefore, this study aimed to determine the genetic diversity of *Ae. aegypti* mosquito populations from Mombasa and Kilifi Counties and their vector competence for CHIKV and ZIKV.

Methods: *Ae. aegypti* mosquitoes were collected as adults and eggs, in a cross-sectional study, from Mombasa and Mariakani in Kilifi county and transported to the VHF lab at KEMRI. Genetic diversity of the two *Ae. aegypti* populations was determined by extracting DNA using QIAGEN Kit. PCR was conducted using appropriate published CO1 primers. The PCR products were cleaned using an EXO-CIP clean up kit and sequencing commercially outsourced from Macrogen, UK. The sequences were trimmed using CHROMAS and the consensus sequence obtained were then imported to MEGA to determine ancestral relation and differences.

Results: Our study has shown that of the mosquitoes collected from Kilifi county, 95% were *Ae. aegypti formosus* and 5% were *Ae. aegypti aegypti*. Of those collected from Mombasa County, 71.93% were *Ae. aegypti formosus* while 28.07 % were *Ae. aegypti aegypti*. The maximum likelihood tree showed genetic variation of the mosquitoes from the two Counties.

Conclusion: This data demonstrates the geographical distribution and variations in the genetic structure of *Ae. aegypti*, the principal vector of DENV, CHIKV and ZIKV between Mombasa and Kilifi counties. While *Ae. aegypti formosus* is dominant in Kilifi County, *Ae. aegypti aegypti* is dominant in Mombasa.





SCIENTIFIC SESSION
14: NTDS AND ONE
HEALTH 2



Abstract No. 087.

Unravelling antimicrobial resistance phenotypes and carriage of extended-spectrum β -lactamase genes in *Escherichia coli* isolated from farmers and their cattle in Kiambu county, Kenya

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Introduction: The use of antibiotics for prophylaxis and growth enhancement in livestock farming is on the increase globally. This practice has led to the emergence and spread of antimicrobial-resistant bacterial strains in livestock. However, only limited research has been done to establish the role of cattle farming in spreading antimicrobial resistance. The current study sought to establish the carriage of multi-drug resistance and extended-spectrum beta-lactamase (ESBL) genes in *Escherichia coli* strains from farmers and their cattle and cattle slurry in the immediate environment within Kiambu County.

Methodology: Stool, rectal swabs, and slurry samples were obtained from selected farmers, their cattle, and immediate environment, respectively, and cultured for *E. coli*. Isolation and antimicrobial susceptibility tests were then performed. Phenotypic tests, Polymerase Chain Reaction, and sequencing were done to determine the carriage of ESBL genes and the molecular diversity of the strains. Results: A total of 286 (81%) *Escherichia coli* isolates were recovered from the 352 samples analysed. Isolation of *E. coli* was common in the non-human samples; 163 (57%) compared to human samples, 123 (43%). Antibiotic resistance profiling showed 114 (40%) isolates were resistant to ≥ 3 antimicrobial classes and were considered multidrug-resistant (MDR). Among MDR *E. coli* strains, 40 (14%) were resistant to 3 different antimicrobial classes, while 71 (25%) were resistant to between 4 and 7 antibiotic classes. Only 3 (1%) strains were resistant to 8 antimicrobial categories. A significant difference was found between the carriage of the MDR phenotype and isolates from human and non-human sources. In addition, there was no homogeneity in antimicrobial resistance profiles in these isolates. Extended-spectrum β -lactamase resistance was found in 18 isolates (14 from humans, 2 from cattle, and 2 from the environment). Both the blaCTX-M and blaTEM genes were detected in 10 and 15 strains, respectively. Sequence analysis showed that the isolates carried the blaTEM-116 (n = 7), blaTEM-1 (n = 5) and blaCTX-M (n = 8) genes. Co-carriage of resistance genes was recorded in 10 *E. coli* strains, with CTX-M/TEM-116 (7/10) being the most common phenotype. Genotyping MDR isolates using (GTG)₅ PCR demonstrated that the isolates were not clonal; therefore, co-resistance may be associated with mobile genetic elements.

Conclusion: These data show a snapshot of the diverse resistance genes present in the *E. coli* population reservoir in dairy farms, which points to the need for more effective, targeted public health policies and infection control/prevention measures.

Abstract No. 088.

Environmental and Household-Based Spatial Risks for Tungiasis in an Endemic Area of Coastal Kenya

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Background: Tungiasis is a cutaneous parasitosis caused by an embedded female sand flea, *Tunga* spp. Tungiasis primarily afflicts people in resource-poor communities, but even in areas with similar risk profiles, the distribution of cases can be spatially heterogeneous. This study assesses household and remotely sensed environmental factors that contribute to the geographic distribution of tungiasis cases in a remote rural area along the Kenyan Coast.

Methods: The Kwale Health and Demographic Surveillance System collects public health data for ~10,000 households near the Southern Kenyan Coast. Data on household tungiasis case status, demographic and socioeconomic information, and geographic locations were recorded during regular survey activities, mainly during 2011. Data were joined with other spatial data sources using latitude/longitude coordinates. Generalized additive models were used to predict and visualize spatial risks (odds ratios) for tungiasis, both in an unadjusted model and multivariate analyses, including household-level ecological, demographic, and socioeconomic factors.

Results: The household-level prevalence of tungiasis was 3.4% (272/7925). There was a 1.1% (461/41,135) prevalence of infection among all participants. A significant spatial variability was observed in the unadjusted model (p-value < 0.001). The number of children per household (OR: 1.4, 95%CI: 1.3-1.5), earthen floor (OR: 3.1, 95%CI: 1.3-7.6), organic roof (OR: 1.8, 95%CI: 1.1-2.9), elevation (OR: 1.2, per 10 m, 95%CI: 1.1-1.3), aluminum content in the soil (OR: 1.1, per 10 mg/kg, 95%CI: 1.02-1.1), and distance to the nearest animal reserve (OR: 0.6, per km, 95%CI: 0.5-0.7) attenuated the odds ratios and partially explained the spatial variation of tungiasis.

Conclusion: Spatial heterogeneity in tungiasis risk remained even after a factor adjustment. This suggests that there are possible unmeasured factors associated with the complex ecology of sand fleas that may contribute to the disease's uneven distribution.



Abstract No. 089.

Prevalence of intestinal parasitic infections in the community of Oloisukut Conservancy, Narok County, Kenya

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Background: Globally, close to 1.4 billion people suffer from soil-transmitted helminth infections with disease burden estimated at 5.3 million Disability Adjusted Life Years. Mass drug administration (MDA) remains the World Health Organization recommended strategy for control. The Kenya government in 2012 initiated a national school-based deworming program (NSBD) among school children living in high-risk environments. This program however, faces the challenge of re-infections with the factors leading to this being poorly understood. Furthermore, the program neglects non-school age children and adults who may serve as potential reservoirs of infections within the community. This study determined prevalence of intestinal parasitic infections following MDA to the community living in Oloisukut Conservancy.

Method: Four hundred and eleven fecal samples from 92 families were collected and examined microscopically following Kato-Katz and formal ether concentration techniques. All family members aged ≥ 2 years were sampled.

Results: A total of 411 faecal samples were collected and examined microscopically by Kato-Katz and formal-ether concentration techniques. By Kato-Katz 135/411 (32.8%) faecal samples had at least one helminth infection, the most common being *Trichuris trichiura* 126 (30.7%), *Ascaris lumbricoides* 18 (4.4%), hookworm 8 (1.9%), *Taenia* species 2 (0.5%) and *Hymenolepis nana* 1 (0.2%). The formal-ether concentration method demonstrated 226/392 (57.7%) samples with at least one intestinal parasite. The prevalent intestinal protozoa were *Entamoeba histolytica*/*E. dispar*/*E. moshkovskii* 109/392 (27.8%), *Giardia lamblia* 20/392 (5.1%), and non-pathogenic protozoa were *Entamoeba coli* 82/392 (20.9%), *Iodamoeba butschlii* 27/392 (6.9%) and *Chilomastix mesnili* 4/392 (1.0%). The prevalent helminths were *T. trichiura* 111/392 (28.3%), *A. lumbricoides* 20/392 (5.1%), hookworm 5/392 (1.3%), *H. nana* 4/392 (1.0%), *Taenia* spp. 1/392 (0.3%) and *Strongyloides stercoralis* 1/392 (0.3%).

Conclusion: The presence of *Taenia* spp. confirms zoonosis within this community. The high prevalence of intestinal protozoan infections suggests poor sanitary measures and personal hygiene conditions. This together with the high prevalence of helminth infections among populations not targeted by MDA program proposes a greater focus on intervention, and the need to include the entire community in the elimination program as well as management of intestinal protozoan infections.

Abstract No. 090.

Interleukin-4 responsive dendritic cells are dispensable to host resistance against *Leishmania mexicana* infection.

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IL-4 and IL-13 cytokines have been associated with a non-healing phenotype in murine leishmaniasis in *L. mexicana* -infected BALB/c mice as demonstrated in IL-4^{-/-}, IL-13^{-/-} and IL-4R α ^{-/-} mice studies. However, it is unclear from the studies which cell-type mediates protection to *L. mexicana*. Previous studies have ruled out a role for IL-4-mediated protection on CD4⁺ T cells during *L. mexicana* infections. A candidate for this role may be non-lymphocyte cells, particularly Dendritic cells (DCs), as was previously shown in *L. major* infections, where IL-4 production drives dendritic cell-IL-12 production thereby mediating a type 1 immune response. However, it is unclear if this IL-4-instruction of type 1 immunity also occurs in CL caused by *L. Mexicana*, since the outcome of cutaneous leishmaniasis often depends on the infecting *Leishmania* species. Thus, BALB/c mice with cell-specific deletion of the IL-4R α on CD11c⁺ DCs (CD11c^{cre}IL-4R α ^{-/lox}) were infected with *L. mexicana* promastigotes in the footpad and the clinical phenotype, humoral and cellular immune responses were investigated, compared to the littermate control, IL-4R α ^{-/lox} mice.

Our results show that CL disease progression in BALB/c mice is independent of IL-4R α signaling on DCs as CD11c^{cre}IL-4R α ^{-/lox} mice had similar footpad lesion progression, parasite loads, humoral responses (IgE, IgG1, IgG 2a/b), and IFN- γ cytokine secretion in comparison to littermate controls. Despite this comparable phenotype, surprisingly, IL-4 production in CD11c^{cre}IL-4R α ^{-/lox} mice was significantly increased with an increasing trend of IL-13 when compared to littermate controls. Moreover, the absence of IL-4R α signaling did not significantly alter the frequency of CD4 and CD8 lymphocytes nor their activation, or memory phenotype compared to littermate controls. However, these populations were significantly increased in CD11c^{cre}IL-4R α ^{-/lox} mice due to greater total cell infiltration into the lymph node. A similar trend was observed for B cells. Similarly, the recruitment of myeloid populations (macrophages, DCs, and neutrophils) into LN was comparable to littermate IL-4R α ^{-/lox} mice.

We investigated the IL-4-DC instruction using BMDCs that we generated from CD11c^{cre}IL-4R α ^{-/lox} and IL-4R α ^{-/lox} mice. BMDCs stimulated with LPS or *L. mexicana* promastigotes in presence of IL-4 had unchanged ability in the production of IL-12p70 and IL-10 cytokines between the two groups. Notably, IL-4 stimulation did not affect the maturation nor activation of BMDCs during *L. mexicana* infection. Consequently, the loss of IL-4R α signaling on DCs did not affect their effector functions regarding the production of nitrite and arginine derived metabolite (urea). Together, this study suggests that IL-4 R α signaling on DCs is not key in the regulation of immune-mediated protection in mice against *L. mexicana* infection.

Key words: Mice, *Leishmania mexicana*, IL-4R α , IL-4



Abstract No. 091.

Mapping the spread of *Procambarus clarkii* and their subtle effect on schistosomiasis transmitting snails within Mwea irrigation scheme, Kenya

Geoffrey Murai Maina (Kemri)*; Eric Lelo (KEMRI)

Background: Schistosomiasis is a water-based chronic parasitic disease caused by trematode worms of the genus *Schistosoma*. Considered as a neglected tropical disease by the World Health Organization (WHO), schistosomiasis affects more than 250 million people worldwide with an estimated global burden of 1.4 million disability-adjusted life years (DALYs) in 2017. Several strategies have been employed to control the transmission of the disease. Some of the methods in use include mollusciciding and Praziquantel, the first line drug of choice is used during mass drug administration. Here, we explored the possibility of scaling up a molluscivorous decapod, *Procambarus clarkii*, which by design or default has found its way in the vast Mwea irrigation scheme, to control schistosomiasis transmitting snails.

Methods: The study was a cross sectional survey which involved an initial baseline survey of all canals and streams within Mwea division of Kirinyaga county. Long hand held snail scoops were used to sample snails along the littoral zones of river/canal banks. Snails collected were placed in 24 well-cultured and exposed in light for 1 hour to stimulate cercarial emergence. Conventional crayfish traps were used to catch the crustaceans which were then introduced in habitats without and low density areas. Abiotic and biotic parameters were recorded. Snail abundance and infection rates were compared with Fisher's exact test or chi-squared test and differences were considered significant when $P < 0.05$.

Results: Overall, 2703 schistosome transmitting snails were detected in the 6 sampled sites in Mwea in August 2017 before the introduction of crayfish. The dominant species were *Biomphalaria* spp and *Bulinus* spp which constituted of 93% of the total number of snails caught. In the 6 study sites significant differences in snail abundance was observed. After introduction of crayfish the prevalence of snails decreased significantly ($p=0.001$) throughout the study period particularly in Nice and Mianya.

Conclusion: Our findings motivate additional research on the importance of integrating locals in biological control efforts for sustainability when funding comes to an end. Local communities would also play key roles in conservation biological control which involves manipulation of the environment to enhance the survival, fecundity, longevity and behavior of natural enemies to increase their effectiveness. Habitat management can reduce vector abundance by top-down effects operating via enhancing of their third trophic level (natural enemies), vectors may also be suppressed by bottom up effects operating via the first trophic level (flora, as seen at Nice habitat) of diverse habitats. Lastly, crayfish, though undisputed, snail predator faces challenges from farm agrochemicals, which should be prudently applied to realize full control potential of this predator.

Abstract No. 092.

Title: Screening of *Wuchereria bancrofti* in human blood and mosquitoes in Matayos, Busia County, Kenya

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Introduction: Lymphatic filariasis (LF) is a parasitic disease caused by *Wuchereria* and *Brugia* species transmitted mosquitoes. It is the second cause of long lasting disability world-wide. In Kenya, mapping of the disease was done in 1998-1999, only Coastal region was considered endemic with 2.5 million people at risk of infections. All control efforts have been directed and scaled up in coastal regions though unpublished reports have shown Lake Victoria regions could be affected. This study therefore aimed at screening *W. bancrofti* in vectors and in humans in Matayos, Busia County, to shade light on the speculations that filarial worms are in circulation in this county.

Methodology: Matayos South and Busibwabo wards were selected for the study where cases of filarial-like lymphedemas had previously been reported. The study was both case and cross sectional based. Blood samples and mosquitoes were collected. Antigenemia and filarial DNA prevalence were determined. Different mosquito species have exhibited different vector competence potential. A tenth of the collected mosquitoes were dissected and the rest pooled according to species and area of collection. SPSS version 23 was used for data analysis employing descriptive statistics.

Results: 262 participants were recruited from 23 Clinical Units with age ranging from 4-88 years old. Majority (73.3%) of the participants were asymptomatic, 14.1% had swollen legs, 5.3% painful limbs and 3.8% represented scrotal swellings. Most patients had lived with the disease for over 10 years. Antigenemia prevalence was 35.5% and DNA testing by PCR was at 8.0%. 1305 mosquitoes collected belonged to *Anopheles* (63.75%), *Culex* (33.2%), *Aedes* (1.9%) and *Coquilletidia* (1.15%) genera. None of dissected mosquitoes had filarial larvae. Out of 78 pools obtained, 2 pools were positive for filarial DNA representing 0.15% positivity rate.

Conclusions & Recommendations; The antigenemia and PCR prevalence obtained showed that there is evidence of transmission in the area. The infected mosquitoes indicate an active transmission. The chronic clinical signs are evidence that filarial infections have been in circulation in Matayos region for over 20 years. Further screening, MDA, Morbidity management is required and mosquito control needs to be enhanced.





SCIENTIFIC SESSION

15: HEALTH SYSTEMS

2



Abstract No. 093.

FACTORS AFFECTING IMPLEMENTATION OF QUALITY MANAGEMENT SYSTEMS IN ISO 15189:2012 ACCREDITED LABORATORIES: A SURVEY OF STAFF OPINIONS AT KITALE REGIONAL PUBLIC HEALTH LABORATORY

Briton Matata Kavulavu (Moi University School of Medicine)*

Background: Despite the documented importance of diagnostic testing and the need to strengthen laboratory testing systems, the strengthening of laboratory services in Africa continues to be wanting, secondary to limited resources, poor training of staff, poor management, information management challenges, and weak reagent and equipment supply chain systems. The study aimed to determine the factors affecting the implementation of quality management systems (IQMS) at the Kitale Regional Public Health Laboratory (KRPHL) while focusing on the effect of Adequacy of Resources (AoR), Human Resource Development Programs (HRDP), Top Management Skills (TMS), and Information Management Systems (IMS) on IQMS .

Methodology: The study utilized a quantitative cross-sectional descriptive survey design targeting all technologists and scientists working at KRPHL. Data were collected using a 5-point Likert scale questionnaire, analyzed by descriptive and inferential statistics using SPSS, and presented in frequency tables.

Results: Although KRPHL was well resourced (3.64/5), AoR was not a statistically significant predictor of IQMS ($p>0.05$). Financial limitation was the most outstanding challenge. While HRDPs were effectively implemented (4.15/5), HRDP was not a statistically significant predictor of IQMS ($p>0.05$). A need for refresher training was noted (4.55/5). The management excelled at supervising IQMS (4.05/5), but TMS was not a statistically significant predictor of IQMS ($p>0.05$). The KRPHL scored well in IMS infrastructure, networking, and laboratory automation (3.64/5), but IMS was a statistically significant predictor of IQMS ($p<0.05$). Customer complaints and underperformance in some areas of EQA were also noted.

Conclusion: The study concluded that among the variables of AoR, HRDP, TMS, and IMS, IMS was the only statistically significant predictor of IQMS at KRPHL. However, financial limitations, the need for refresher training of staff, customer complaints, and occasional low performance in some areas of External Quality Assurance was notable. The study recommended that the County Government of Trans Nzoia, hospital management, and other stakeholders need work together to ensure sufficiency of finances, implementation of refresher training, and continued improvement of IMS.

Abstract No. 094.

Challenges and Lessons Learnt in performing Minimally Invasive Autopsy in under 5 children enrolled in Child Health and Mortality Prevention Surveillance (CHAMPS) in Western, Kenya

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Introduction: Despite reductions over the past two decades, childhood mortality remains high, particularly in low-income settings in sub-Saharan Africa and South Asia. In lower- and middle-income countries, individuals often die without having been seen by qualified medical personnel and are frequently buried or cremated before a full evaluation of the cause of death can be made. Here we present notification & enrolment data metrics, challenges and lessons learnt performing MITs in CHAMPS.

Methods: The Child Health and Mortality Prevention Study (CHAMPS) in Western Kenya is conducting minimally invasive tissue sampling (MITS) procedures in deceased children under the age of five. MITS procedures are faster, minimally disfiguring, and less resource intensive than full postmortem autopsy. All stillbirths, neonatal and under-5 child deaths in the community and health facilities are reported to the surveillance team by various community members and hospital staff. The family was contacted for consent and provided a brief description of the child's death through verbal autopsy. MITS procedures were subsequently conducted at the mortuary, and clinical data abstraction was conducted from all available medical records.

Results: From September 2007 to December 2020, we received 1002 death notifications; 425 (42.4%) reported by hospital staff, 407 (40.6%) by community health workers and the remaining 17.0% by community, mortuary staff, family members and demographic surveillance system staff. In total, 758 were eligible to be enrolled in CHAMPS either for MITs or non-MITs procedures. Six hundred and fifteen were eligible for MITs, of whom 507 (82.4%) consented for the procedure, 500 (98.6%) MITs were conducted. MITS on community eligible deaths increased from 29.4% in October 2017 to a high of 58% in March 2020 (pre-COVID period). Of all MITs conducted, 97 (19.0%) were children 12-60 months, 118 (24.0%) infants 27 days to <12months, 142 (28.0%) neonates and 143 (29.0%) stillbirths. Four hundred and sixteen (%) cases have had their cause of death successfully determined with 367 (88%) results shared back with the family. Some of the challenges experienced include 1) frequent strikes affecting notifications, 2) beliefs and traditions 3) rumors, myths and misconceptions 4) concerns from some families on why the project only comes in at time of death. Conclusion

CHAMPS program has reported high MITs acceptability, even among community deaths, backed by a robust community death notification system, continuous community engagement, and participation in health intervention programs. We recommend Continuous community engagement to help mitigate some of the challenges.



Abstract No. 095.

An Assessment of the Challenges Facing Blood Transfusion Services at the Bungoma Satellite Blood Transfusion Centre amidst the COVID-19 Pandemic

Brian B Nanjendo (Moi university)*; Briton Matata Kavulavu (Moi University School of Medicine)

Background: Kenya's blood transfusion system continues to be plagued with demand and supply imbalances, in addition to limitations in trained staff, equipment and reagents, and finances. Thus, the system has consistently been unable to meet the country's demand for blood. This research studied demand and supply mismatches, limitations in human resources, financing, equipment, and reagent deficits, and the effects of the COVID-19 pandemic on blood supply at the Bungoma Satellite Blood Transfusion Centre (BSBTC).

Methods: The study used a cross-sectional descriptive design in which we analyzed archived records to gather information on the prevalence of demand versus supply mismatches for the month of June 2021. We also administered questionnaires to all 8 staff at the BSBTC to gather information on the challenges of staffing, financing, equipment, and reagent deficits as well as the challenges posed by the COVID-19 pandemic. The data were analyzed by descriptive statistics using Microsoft Excel 2019.

Results: The analysis included 218 units of requested blood and 8 staff members. The study noted that the blood bank managed to supply only 121 units of blood against a demand of 218 units, thus a 44.5% deficit. Also, staff reported that the BSBTC was understaffed according to 75% of the respondents and faced challenges of inadequate funding according to 62.5% of the respondents, and that there was insufficient equipment and reagents according to 75% of the respondents. 50% of the staff also reported that the COVID-19 pandemic led to the decrease in the number of blood donors.

Conclusion: The study concluded that there was excessive demand against limited supply, in addition to limitations in terms of staffing, finances, equipment, and reagents limited the effectiveness of the BSBTC. The COVID-19 pandemic caused a further decline in blood donors. Hence, the study recommended hiring of adequate staff, increased funding, acquisition of equipment and reagents, and education of the public on the need for blood donation.

Abstract No. 096.

Community Health Volunteers Practices in Advancing Social Accountability in Nairobi County, Kenya.

Malkia M Abuga (Kenya Methodist University)*; Wanja Tenambergen (Kenya Methodist University); Kezia Njoroge (Kenya Methodist University)

Background: Community Health Volunteers' (CHV) position in the health system can enable them to serve as community mouthpieces to fight against inequities and advocate for community rights and needs to government structures. However, questions on how they practice this role particularly how they present community concerns to the health system and vice versa are not adequately answered. Social accountability refers to strategies in which citizens voice their opinions on the quality of services or the performance of service providers who are then asked to respond to citizens and account for their actions and decisions. The aim of this study was to assess CHVs practices that advance social accountability.

Methodology: The study adopted a non-equivalent quasi-experimental design. It was conducted in two sub-counties selected purposively due to the low support from non-governmental organizations. The target population was 180 CHVs. The CHVs were sampled using stratified sampling. Data was collected using an interviewer-administered questionnaire and Focus group discussion.

Results: The mean age of the CHVs was 44 years (S.D 10.3). Baseline results illustrated that 86 (47.8%) of CHVs always, 85 (47.2%) sometimes and 9 (5%) rarely sensitized the community on their health rights and entitlement. To enable the community express their concerns, 89 (49.4%) of the CHVs always encouraged the community to speak up, while 88 (48.9%) sometimes and 3 (1.7%) rarely ($p=0.027$). Complaints and compliments were documented by 76 (42.2%) always, 58 (32.2%) rarely and 46 (25.6) sometimes ($p=0.049$). On reporting community concerns to the appropriate actor for action, 95 (52.8%) always, 78 (43.3 %) sometimes and 15 (8.3 %) rarely ($p=0.005$). Follow-up of concerns to ensure they are resolved was reported by 88 (48.9%) of CHVs to always, 77 (42.8%) sometimes and 15 (8.3%) rarely ($P<.001$). On providing feedback to clients on the concerns raised, 101 (56%) of the CHVs acknowledged to always, 60 (33 %) sometimes and 19 (11%) rarely.

Conclusion: There was sub-optimal implementation of social accountability practices by CHVs. The results were used in the co-creation of social accountability interventions that would strengthen these practices. In the future, we hope to report the experiences and results of the intervention.

Abstract No. 097.

A Collaboration Approach to Healthcare Service Delivery in Resource Constrained Countries .Case Study: Uganda Martyrs Hospital Lubaga-Uganda

Samuel Walusimbi (Ministry of East African Community Affairs)*

Background and Purpose: The application of an Information system that could provide a seamless flow of patient information and medical guidelines is highly desirable in the practice of Evidence Based Medicine (EBM). This will enable medical workers to collaborate, innovate together, and exploit operational synergies. Conversely, the systems in Resource- Constrained Healthcare Facilities (RCHF) are inadequate and this hinders collaboration and information sharing for decision making. As a result, the



valid information which can vividly provide a precise and concise status of a patient under care in real time is not always at hand. As a result, this brings about a mismatch between actual and assumed information flows in clinical workflows which ultimately deters quality healthcare service delivery. When referrals are done within a facility or from other facilities for instance, medical workers have to start from scratch a process that brings about missed handoffs, repetitive tests, mistaken identity, wrong medication, patient-length-of-stay, and ultimately death.

Method: Uganda Martyrs Hospital Lubaga was investigated as a case study. The study focused on mission, vision, goals, clinical business processes, patient information, ICT infrastructure, challenges that hinder collaboration among medical workers and the opportunities they offer for improvement. Through a qualitative strategy, data was collected using interviews and focus groups; observation, documentary reviews and professionally selected internet resources.

Results: Findings showed that current systems focus more on monitoring and evaluation, surveillance of chronic diseases and data capture; less is done towards optimising collaboration. The study further found out that the informants believe that information systems play an important role in the provision of patient information and medical knowledge.

Conclusion: There is a need to develop a collaborative mobile tool that would connect medical workers and enable them to work and innovate together. This study therefore aimed at developing a mobile tool that will improve collaboration and sharing of the most up-to-date, solid and reliable information among medical workers at any point of care.

Abstract No. 098.

Digital technology alternatives in provision of continued access to health care during the Covid-19 pandemic in Kenya.

Samuel K Gathere (KEMRI)*; Evans K Kiptanui (KEMRI)

Digital technology alternatives in the provision of continued access to health care during the Covid-19 pandemic in Kenya.

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Introduction. During the Covid-19 pandemic period, healthcare experienced unprecedented effects that negatively affected patients. Most health facilities attended to emergencies only. Patients had to resort to alternative channels of seeking healthcare. Our study sought to establish the knowledge, attitude, and practice as well as barriers to the utilization of digital alternatives to access care.

Methodology. We adopted a mixed-methods design focusing on both quantitative and qualitative data collection in four counties in Kenya. Kruskal-Wallis test was used to test if there is any significant difference between the use and frequency of using telehealth services before and during the pandemic.

Results. Out of 406 respondents Male to female ratio (1:0.8). Of these 406 respondents, 73 (18%), 85 (21%), 91 (22%), and 67 (16%) have heard of telemedicine, telehealth, mhealth, and ehealth respectively. 194 (48%) have ever consulted using phone calls, 72 (18%) using SMS/text messaging, and 19 (5%) using a video call. Interestingly, the majority 72% preferred to use video call to telephone(28%) for consultation and 42% would be okay with accessing a specialist remotely from a nearby health facility. 23% would prefer free telemedicine services but between 42% would be willing to pay a fee of Kes 100-500 per consultation. There was no significant difference between the use of SMS/text messaging ($p=0.438$), phone call ($p=0.434$), and video call ($p=0.493$) before and during the pandemic period.

Conclusion. There is a need for more awareness on digital health to increase the uptake and reduce patient stress and anxiety in case of future challenges in accessing health care.

Abstract No. 099.

Facilitating timely and equitable healthcare access using blockchain technology

Joe Kabyemela (East Cheshire NHS Trust)*

Introduction: The 8 millennium development goals (MDG) agreed upon by all 191 UN members at the turn of the 21st century have not been achieved. The delivery of Universal Health Coverage (UHC) is at the core of all the goals. Most developing countries are far from achieving UHC. Resources are limited and the challenges in achieving these lofty goals are immense. It is imperative therefore that innovative approaches are actively sought, explored, and adopted if we are to achieve this basic human right and the wider MDG. One such technological tool is the rapidly maturing blockchain technology.

Methods: We review the literature and evidence of the deployment of Distributed Ledger Technology (blockchain) technology in various industries including healthcare. In this, we have followed PRISMA guidelines and accessed 4 databases (PubMed, Embase, Scopus and ScienceDirect). We also searched Google Scholar. 93 articles were accessed and 44 of these utilised. We review how blockchain works, the feasibility of universal deployment, how it secures health records, its facilitation of eHealth and telemedicine, smart contracts functionality and other security advantages of blockchain over cloud-based data centres. We also look at the limitations of the legacy electronic health records platforms.



Discussion: For most developing countries, delivery of UHC remains a distant dream. Poverty, poor planning, low budgetary prioritisation, a severe and chronic shortage of healthcare workers, poor communication infrastructure, and fraud are just some of the challenges.

Telemedicine and eHealth capabilities remain viable avenues to overcome some of these challenges. So far, projects in these have remained small with little impact. The emergence of blockchain technology coupled with widely accessible mobile telephony have transformed the landscape. These developments mean UHC is, for the first time, a realistic and achievable ambition.

Conclusion: Despite prevailing limitations and challenges, blockchain technology holds the potential to transform healthcare via the facilitation of reliable and instantly accessible individual health records within the budgetary and technological capabilities of developing countries. This is a paradigm shift where individuals take control of their health records thus freeing each person from being beholden to a particular healthcare provider. Through curbing fraud, the technology should also reduce healthcare costs. Other benefits include the enabling of efficient acquisition of reliable health data for healthcare planners and researchers. The technology could be transformative.

Recommendation: African scholars and relevant authorities should take steps to study the application of the technology already in use elsewhere and undertake own proof of concept research. This is with the purpose of transforming care quality, enhance efficiency, and reaching the under-served through blockchain-enabled telemedicine.





SCIENTIFIC SESSION

16: MCH 1



Abstract No. 100.

Pregnancy trends and associated factors among Kenyan adolescent girls and young women pre- and post-COVID-19 Lockdown

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Objective. The COVID-19 pandemic has had a negative impact on health

systems and health outcomes globally, with increasing emergent evidence of differential gender implications. The combination of school closure and the disruptions to sexual and reproductive health services has uniquely impacted adolescent girls' and young women. We evaluated incident pregnancy trends and outcomes in a large cohort of Kenyan adolescent girls and young women, pre-and post-government lockdown during the COVID-19 pandemic.

Methods: The primary study enrolled sexually-active girls and young women aged 15-20 years from Thika, Kisumu, and Nairobi in a blinded, prospective randomized study of a single dose HPV vaccination. Pregnancy testing was performed at enrollment, followed by every 3 months, data was collected using Dfexplore by the KEN SHE study team. Pregnancy incidence trends were determined among this cohort, pre-and post- COVID-19 lockdown, pregnancy outcomes (delivery, spontaneous or induced abortion, ongoing, or undetermined), and post-abortion and postpartum contraceptive uptake were assessed. Kaplan-Meier (K-M) survival estimates of incidence rates were used to estimate the cumulative probability of pregnancy until the end of the study period, while Cox regression was used to investigate factors associated with pregnancy incidence.

Results: Of the 2,223 participants included in the analysis, the median age was 18.6 IQR(17.6 – 20.3), and 53% of them were from Kisumu, 35% from Thika, and 13% from Nairobi. 95% percent of the participants were single at the time of enrollment, with more than half (65%) reporting incomplete secondary school education. Most (82%) reported having a primary sexual partner. Pregnancy incidence peaked at 2.27 (95% CI 1.84 – 2.81)/100-person years of observation (PYO) during the first quarter of 2020, a period coinciding with first COVID-19 lockdown imposed by the government. At post-covid-19 lockdown, girls had 60% increased risk of being pregnant compared to pre-covid-19 lockdown (HR=1.60, 95% CI 1.25 – 2.05). Condom use at last sex was associated with 75% risk reduction of pregnancy (HR=0.25, 95% CI 0.16 – 0.41). Among 514 pregnancies at all sites, 127 (25%) ended in abortion, of which 66 (52%) were recorded as induced abortions. Live births and ongoing pregnancies accounted for 36.4% and 37% of pregnancies, respectively.

Conclusion: The period of time corresponding to COVID-19 lockdown in Kenya was associated a significant increase in pregnancy incidence rate in this cohort of girls and young women, though incidence differed by site and level of movement restrictions. One in four pregnancies ended in abortion, suggesting a high rate of undesired pregnancy. These findings give us insight into the gendered impact of the COVID 19

Abstract No. 101.

Diet Diversity of Children with Moderate Acute Malnutrition Living in an Urban Informal Settlement in Nairobi Kenya.

BEATRICE OLACK (KEMRI)*

Background: Moderate acute malnutrition (MAM) is a major global public health burden in developing countries including Kenya. Children suffering MAM not only need supplementary food but also need diversified diets that supply varied nutrients to help sustain recovery and prevent relapses. Diet Diversity Scores (DDS) is well described among healthy children; however, there is limited data for the same among malnourished children. Establishing gaps in diversity of diets is a step towards informed directions in early interventions to prevent malnutrition. We describe the diet diversity scores and nutritional status of children treated for MAM in an urban informal settlement in Nairobi Kenya.

Methods: We used data from a randomized control trial (RCT) that sought to determine the effect of an enhanced food supplement in children with MAM. Mothers of enrolled children received dietary counselling promoting use of local foods that enhance diet diversity. The nutritionists delivered active counselling to the mothers every fortnight over a period of 12 weeks. Dietary data was collected using the 24 hr recall pre and post the intervention. Child Diet Diversity Score using a 7-food group measure was adopted from the World Health Organization index for infant and young child feeding. A score of ≥ 4 is considered adequate diet diversity while a score < 4 indicates inadequate diet diversity. Data was analysed using Stata version 13.0. Changes in DDS and nutritional status pre and post intervention were assessed using student's t-test.

Results: Total 80 children 29 (36.3%) male and 51(63.7%) female with MAM were enrolled into the study. Data on 24 hr dietary recall was available for 76 (95%) and 64 (80%) children pre and post intervention. The food groups predominantly consumed were grains, root and tubers 75(98%) Vitamin A rich fruits and vegetables 63 (82.9 %) and dairy products 40 (52.6%). Twelve weeks post the intervention as compared to baseline , there were significant increases in Diet Diversity Scores (3.63 to 4.13, $p < 0.05$), consumption of grains, root and tubers, (27.6% to 48.4%, $p < 0.05$), flesh foods (44.7 to 45.3%, $p < 0.01$) and eggs (7.9% to 20.3%, $p < 0.03$). Mean Middle Upper Arm Circumference (MUAC) increased significantly from 12.1 cm to 12.9 cm, $p < 0.01$.

Conclusion: The intervention improved Diet Diversity Scores and nutritional status of children suffering from MAM to acceptable levels.



Abstract No. 102.

Safety and pharmacokinetics of fosfomycin to treat neonatal sepsis: a randomized clinical trial

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Background: Increasing antimicrobial resistance means new treatment options are urgently needed for neonatal sepsis. Fosfomycin is a 'critically-important' antibiotic with divergent intravenous (IV) dosing recommendations and no published oral dosing regimens in neonates. IV fosfomycin presents a significant sodium load and oral fosfomycin preparations contain a large amount of fructose, but limited safety data exists. We assessed the safety and pharmacokinetics (PK) of IV followed by oral fosfomycin in neonates with clinical sepsis.

Methods: We conducted an open-label randomized controlled trial among 120 neonates aged ≤ 28 d and weighing >1500 g treated with standard-of-care (SOC) antibiotics (ampicillin and gentamicin) at the Kilifi County Hospital (KCH) between March 2018-February 2019. We randomly assigned half of the participants to receive additional IV followed by oral fosfomycin at 100mg/kg twice daily (BID) for up to 7 days (SOC-F). We evaluated safety for 28 days and fosfomycin PK.

Results: Sixty-one SOC-F and 59 SOC neonates aged 0-23 days were enrolled. We observed 35 adverse events (AEs) among 25 SOC-F and 50 AEs among 34 SOC participants during 1,560 and 1,565 infant-days observation respectively (incidence rate difference -0.95 events/100 infant-days [95%CI -2.1 to 0.20]). Four SOC-F and 3 SOC participants died. There was no evidence of impact of fosfomycin on serum sodium or gastrointestinal side-effects. PK modelling suggests 150mg/kg IV BID for pharmacodynamic target attainment, reduced to 100mg/kg BID if age <7 days or weighing <1500 g.

Conclusion: Fosfomycin offers potential as a safe antibiotic with a simple dosing schedule for neonatal sepsis in hospital settings.

Abstract No. 103.

Clinical features of bacterial meningitis among hospitalised children in Kenya

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Background: Diagnosing bacterial meningitis is essential to optimize the type and duration of antimicrobial therapy to limit mortality and sequelae. In sub-Saharan Africa, many public hospitals lack laboratory capacity, relying on clinical features to empirically treat or not treat meningitis. We investigated whether clinical features identified prior to introduction of conjugate vaccines still discriminate meningitis in children.

Methods: We conducted a retrospective cohort study to validate KCH-2002 signs: bulging fontanel, neck stiffness, cyanosis, seizures outside the febrile convulsion age range, focal seizures, impaired consciousness, or fever without malaria parasitaemia; and Integrated Management of Childhood Illness signs: neck stiffness, lethargy, impaired consciousness or seizures, in discriminating bacterial meningitis. Children aged ≥ 60 days hospitalised between 2012-2016 at Kilifi County Hospital (KCH) were included. Meningitis was defined as positive cerebrospinal fluid (CSF) culture, microscopy, antigen test, leukocytes $\geq 50/\mu\text{L}$ or CSF:blood glucose ratio <0.1 .

Results: Among 12,837 admissions, 98 (0.8%) had meningitis. Presence of KCH-2002 signs had sensitivity 86% (95%CI: 77-92) and specificity 38% (95%CI: 37-38). Exclusion of 'fever without malaria parasitaemia' reduced sensitivity to 58% (95%CI: 48-68) and increased specificity to 80% (95%CI: 79-80). IMCI signs had sensitivity 80% (95%CI: 70-87) and specificity 62% (95%CI: 61-63).

Conclusions: A lower prevalence of bacterial meningitis and less typical signs than in 2002 meant lower performance of KCH-2002 signs. Clinicians and policymakers should be aware of the number of lumbar punctures or empirical treatments needed for each meningitis case. Establishing basic capacity for CSF analysis is essential to exclude meningitis in children with potential signs.

Abstract No. 104.

Childhood mortality during and after acute illness in Africa and S. Asia: the CHAIN cohort study

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Background: Mortality during acute illness among children in low- and middle-income settings remains unacceptably high and there is increasing recognition of the importance of post-discharge mortality. A more comprehensive understanding of the incidence, timing and contributions of proximal and underlying exposures underlying mortality among acutely ill children is needed to develop interventions and improve guidelines.

Methods: We enrolled a cohort of acutely ill children stratified by anthropometry aged 2-23 months admitted to nine hospitals in sub-Saharan Africa and South Asia. We assisted sites to comply with guidelines. Co-primary outcomes were mortality within 30-days from admission and post-discharge mortality within 180-days from discharge. A priori exposure domains, including demographics, clinical and anthropometric characteristics at admission and discharge, and child-, caregiver- and household-level characteristics, were examined in regression and structural equation survival models (SEM).

Findings: Of 3101 participants (median age 11 months), 1218 were severely wasted/kwashiorkor, 763 moderately wasted and 1120 were not wasted. Of 350 deaths, 182 (52%) occurred during index admission, 234 (67%) within 30-days of admission and 168 (48%) within 180-days post-discharge. Ninety (54%) post-discharge deaths occurred at home. The proportion of children who died post-discharge was relatively preserved across nutritional strata. Large high and low risk groups could be disaggregated for both early and post-discharge mortality. Structural equation models identified direct pathways to mortality and multiple socioeconomic, clinical and nutritional domains acting indirectly through anthropometric status.

Interpretation: Among diverse sites in Africa and South Asia, almost half of mortality occurs post-discharge. Despite being highly predictable, these deaths are not addressed in current guidelines. A fundamental shift to a risk-based approach to inpatient and post-discharge management is needed to further reduce childhood mortality and clinical trials of these approaches with outcomes of mortality, readmission and cost are warranted.

Abstract No. 105.

Evaluating practice and guidelines for the care of adolescent scholars living with HIV in Western Kenya

Dama Olungae (KEMRI)*; Vincent OKOTH (KENYA MEDICAL RESEARCH INSTITUTE); Raphael Lihana (KEMRI); Rency Lel (KEMRI); Joseph Mwangi (KEMRI); Sheila Kageha (KEMRI); Joyceline Kinyua (KEMRI)

Introduction: Adolescents have specific needs and experience structural barriers to healthcare engagement. This study explores the experiences and perceptions of secondary school and hospital caregivers for young people living with HIV/AIDS in boarding and day schools. The aim of the study was to evaluate challenges encountered by this age group from a care givers viewpoint, in accordance to the guidelines of the Kenya Education sector Policy on HIV/AIDS.

Methods: Three schools were selected by stratified random sampling method, based on location and population. Additionally the youth friendly clinic at the County Referral Hospital was included. We conducted n=10 interviews with school administrators, teachers and counsellors as well as health service providers in Kisumu County, Kenya between July and December 2019. Key informant guides were used to gain perspective on the impact of HIV/AIDS education sector policy and barriers faced by school going adolescents from the view of their school caregivers and health providers. A team of five researchers, trained in qualitative methods, collected the data and were involved in the analyses process. Codes were developed prior as per the interview guides and refined after the interviews. Transcribed interviews were entered into Dedoose software for qualitative analysis. Deductive and inductive thematic analysis was undertaken to understand the challenges, perceptions and quality of care related to HIV/AIDS in adolescent scholars.

Results: We identified 5 thematic areas that impact on the HIV education sector policy. These were; Policy implementation gaps, Referral mechanisms, Adherence, Disclosure, Psychological support, as well as stigma and discrimination. From the responses, we identified one additional thematic area of concern that is, financial support for schools and students as stakeholder feedback.

Conclusions: Adolescents are a unique population and their needs are ever evolving, the education sector policy on HIV/AIDS is due for review with strategic innovative interventions that are more adolescent-center focused for improved well-being of this population. Stakeholder experience feedback is crucial in the formulation, implementation and continuous improvement of existing policies for better interventions and health outcomes.

Abstract No. 106.

KANGAROO MOTHER CARE PRACTICE DURING THE COVID-19 PANDEMIC AMONG POSTNATAL MOTHERS OF PRETERM BABIES

Beatrice Afande Mukhola (University of Nairobi)*

Background: Kangaroo mother care (KMC) is a sound intervention for the care of premature infants. It entails the preterm infant being placed on continuous skin-to-skin contact. However, evidence indicates that country-level adoption and implementation of KMC, across the globe, remained sub-optimal. COVID-19 pandemic is a rapidly evolving situation and its effects on utilization of essential maternal and child health care services across the globe remained unclear. The study sought to assess the practice of kangaroo mother care during the COVID-19 pandemic among postnatal mothers of preterm babies.

Methods: This was a cross sectional mixed-methods study conducted at Kenyatta National Hospital's Newborn Unit. The study populations were postnatal mothers of preterm babies admitted in the unit and nurses at the unit. The study sample size consisted of 91 postnatal mothers' selected using systematic sampling method and 30 nurses working selected using census method. A researcher-administered pretested questionnaire and an interview guide were used as data collection instruments. The quantitative



data generated from the closed-ended questions was analyzed using descriptive statistics with Statistical Package for Social Science (SPSS, version 24) and presented as percentages and frequencies. The qualitative data generated from the interviews was analyzed thematically using content analysis.

Results: Of the 62 mothers that practiced KMC, most (80.6%) were practicing intermittent form of KMC while 24.4% did not practice KMC. Most (85.4%) of the mothers and all (100%) of the nurses were in support of KMC practice during the prevailing COVID-19 pandemic on account of its significant benefits to the infants. However, 86.6% of the mothers perceived COVID-19 pandemic as a serious threat to their babies in the context of KMC practice. Further, fear of contracting COVID-19 - 85.4%; fear of the baby contracting COVID-19 - 85.3%; inadequate KMC rooms/spaces - 100%; lack of KMC appropriate clothing - 74.4% and lack of/inadequate support from family - 62.2% were the leading factors impeding the mothers' practice of KMC during the ongoing COVID-19 pandemic. They reported need for more KMC rooms; provision of KMC appropriate clothing; strict application of COVID-19 prevention guidelines and need for greater support of KMC practice from the family were the suggestions given for enhancing the mothers' KMC practice.

Conclusion: Mothers of preterm babies at the unit had a positive perception towards practice of KMC during the COVID-19 pandemic, though they considered COVID-19 pandemic as a serious threat to their babies in the context of KMC practice. There is urgent need for social support both from the institution and family to motivate and enable the mothers to practice KMC as per the set guidelines. Recommendation: The unit managers need to reinforce continued practice of KMC by postnatal mothers despite the challenges occasioned by the pandemic.

Abstract No. 107.

Clinical features to distinguish meningitis among young infants at a rural Kenyan hospital

Christina Obiero (KEMRI - Wellcome Trust Research Programme)*; Neema Mturi (KEMRI WTRP, Kilifi); Salim Mwarumba (KEMRI WTRP, Kilifi); Moses M Ngari (KEMRI Wellcome Trust Research Programme); Charles Newton (KEMRI - Wellcome Trust Research Programme); Michael Boele van Hensbroek (University of Amsterdam); James Berkley (KEMRI - Wellcome Trust Research Programme)

Background: Detection of meningitis is essential to optimise the duration and choice of antimicrobial agents to limit mortality and sequelae. In low and middle-income countries most health facilities lack laboratory capacity and rely on clinical features to empirically treat meningitis. We conducted a diagnostic validation study to investigate the performance of clinical features (fever, convulsions, irritability, bulging fontanel and temperature $\geq 39^{\circ}\text{C}$) and WHO-recommended signs (drowsiness, lethargy, unconsciousness, convulsions, bulging fontanel, irritability or a high-pitched cry) in discriminating meningitis in young infants.

Methods: We conducted a retrospective cohort study of infants aged <60 days hospitalised at the Kilifi County Hospital (KCH) between 2012-2016. Definite meningitis was defined as positive cerebrospinal fluid (CSF) culture, microscopy or antigen test, or leucocytes $\geq 50/\mu\text{L}$.

Results: Of 4809 infants aged <60 days included, 81 (1.7%) had definite meningitis. WHO-recommended signs had sensitivity 58% (95%CI: 47-69) and specificity 57% (95%CI: 56-59) for definite meningitis. Addition of history of fever improved sensitivity to 89% (95%CI: 80-95) but reduced specificity to 26% (95%CI: 25-27). Presence of ≥ 1 of 5 previously identified signs had sensitivity 79% (95%CI: 69-87) and specificity 51% (95%CI: 50-53).

Conclusion: Despite a lower prevalence of definite meningitis, the performance of previously identified signs at admission in predicting meningitis was unchanged. Presence of history of fever improves the sensitivity of WHO-recommended signs but loses specificity. Careful evaluation, repeated assessment and capacity for lumbar puncture and CSF microscopy to exclude meningitis in most young infants with potential signs are essential to management in this age group.



**SYMPOSIUM 2:
HERBAL MEDICINE
IN COVID-19
MANAGEMENT:
CONCERNS ON
USE AND CURRENT
STATUS OF RESEARCH
ON THERAPEUTIC
AGENTS FROM
MEDICINAL PLANTS**



SYMPOSIUM 2: Herbal medicine in COVID-19 management: Concerns on use and current status of research on therapeutic agents from medicinal plants

The role of Traditional/Herbal Medicine in primary health care in Kenya can never be over emphasized, especially due to its wide use and availability. Inadequate provision of conventional health care, more so during this period of COVID-19 pandemic, rejuvenates use. Therefore, an effective health agenda for the region, especially in view of the Kenyan Vision 2030 and the government's big four agenda encompassing Universal Health Coverage (UHC), can never be adequately achieved by orthodox medicine alone unless complemented with Traditional/Herbal medicine. Kenya has a wealth of biodiversity in medicinal plants and our ancestors had a way of co-existing with this valuable resource without necessarily destroying it, harnessing it for use as medicine, food and timber. Presently, and most unfortunately, most of it is being lost with knowledge of medicinal values eroding. This is despite the fact that advent of emerging and re-emerging new diseases and the difficulties being experienced in drug resistance, researchers still depends on this natural resource as a major raw material for identification of new management therapies. The Centre for Traditional Medicine and Drug Research (CTMDR) of the Kenya Medical Research Institute (KEMRI) is a major player in this field and serves as reference point for government on issues herbal/traditional medicine. The Centre is currently carrying out evaluation of selected medicinal plants repurposed for COVID-19 management and advising on use of herbal medicine for VCOVID-19 management.

Names of presenters and titles of presentations

1. Dr. Festus M. TOLO – Zedupex and herbal combinations research for COVID-19 management.
2. Dr. Peter G. Mwitari – On going study on identification of herbal remedies for COVID-19 management
3. Dr. Beatrice Irungu- New approaches of research on medicinal plants for drug discovery.
4. Dr. Jack Githai –Registered Herbal Practitioner on role of herbalists in COVID-19 management
5. MoH- Presentation on the Governments position on herbal medicines as alternative therapies in COVID-19 management
6. Student presentations on herbal medicine research in KEMRI and Collaborating institutions.

SYMPOSIUM 3: JICA SATREPS MALARIA PROJECT

In 1955 the WHO launched the Global Malaria Eradication Program (GMEP) to interrupt malaria transmission in all endemic areas except Africa. Heavily reliant on vector control through indoor residual spraying, the campaign achieved limited success and was ultimately abandoned in 1969. Some of the factors contributing to the failure of the campaign included insecticide and antimalarial resistance, the vertical approach that lacked local community input, and the lack of program flexibility to adapt to local epidemiology. Withdrawal of strong support for malaria control in the ensuing decades led to a resurgence of malaria, and many countries were encouraged to pursue control and case management instead of elimination.

At the start of the 21st century, interest and commitment to eradicate malaria globally were renewed together with introduction of novel tools and global supports under SDGs and MDGs. However, still tropical Africa is considered by many as the last obstacle to global malaria eradication. Despite two decades of intensified effort, malaria remains a major infectious disease prevalent in many parts of tropical Africa. How can we maximize the efficacy of currently available malaria control tools? What kind of novel tools and strategies are needed to move from control stage to elimination stage? To answer these questions, we launched interdisciplinary studies in the Lake Victoria basin of western Kenya with aim of developing an integrated strategy for malaria elimination in highly endemic areas, under the scheme of the Science and Technology Research Partnership for Sustainable Development (SATREPS) project granted by JICA and AMED. In this session our recent outcomes approaches there will be discussed.

Names of presenters and titles of presentations

Akira Kaneko, Jesse Gitaka: the overview of the SATREPS Kenya malaria project

Emi Honda: Impacts of indoor residual spray on malaria prevalence in the Lake Victoria basin

Wataru Kagaya: A randomized control trial of novel vector control tool, ceiling net

Tomoya Matsumoto: Behaviour economics intervention towards freedom from malaria

Protus Omondi: Mixed *Plasmodium falciparum* infections and disease outcomes in the Lake Victoria region, Western Kenya

Takatsugu Okai: Detection of *P. falciparum* histidine rich protein2/3 deletion parasites around Lake Victoria region, Kenya

Ashley Osborne: Characterizing the genomic variation and population dynamics of *Plasmodium falciparum* malaria parasites

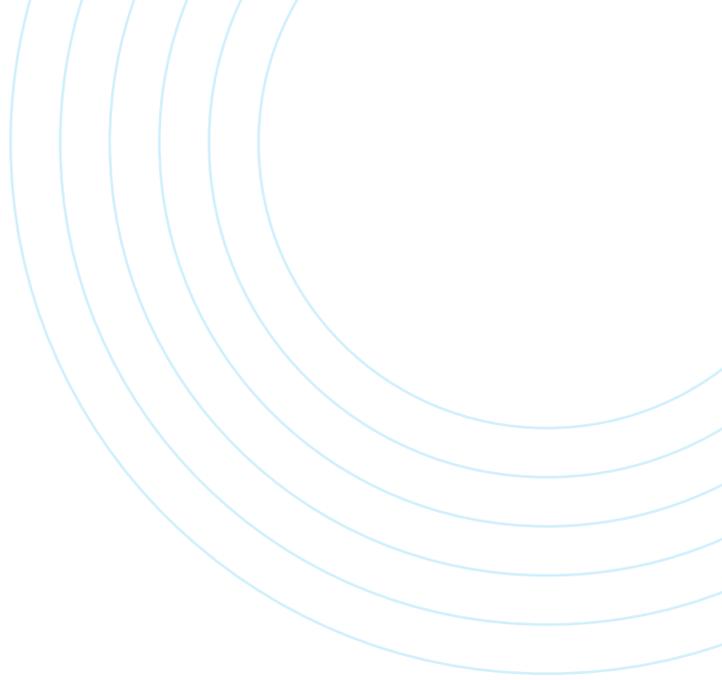
Kenji Hirayama: Characterization of glucose-6-dehydrogenase deficiency in the Lake Victoria basin

Brian Musyoka: Characterization of the genetic variation present in CYP3A4 in population living around the L. Victoria region, Western Kenya

Bernard Kanoi: Identification of key targets of protective immunity against *falciparum* malaria in children

Mtakai Ngara: The role of T lymphocytes in defining distinct malaria outcomes in an endemic region using population and single-cell gene expression analysis





SCIENTIFIC SESSION

17: VIROLOGY 2



Abstract No. 108.

PREVALENCE AND DEMOGRAPHIC CHARACTERISTICS OF ROTAVIRUSES IN CHILDREN WITH ACUTE GASTROENTERITIS IN KERICHO COUNTY REFERRAL HOSPITAL

Carlene C Sang (KEMRI); BETH K NYAMANGA (KEMRI/ UNIVERSITY OF KABIANGA)*

Authors: Beth K. Nyamanga, Janeth Kombich, Raphael Lihana, James Nyangao, Carlene Sang

Background: Rotavirus infections are the chief source of acute gastroenteritis in infants aged under 5 years worldwide. Internationally gastroenteritis infections caused by rotavirus lead to more than 600,000 deaths among infants under 5 years of age. This is due to severe dehydration, electrolyte and acid-base disturbances. Approximately, more than 80% of mortalities due to rotavirus happen in countries that have limited resources especially in Sub-Saharan Africa and Southern Asia. The incorporation of the rotavirus vaccine in most national immunization programs has prevented more than 28,000 deaths among children younger than 5 years old, particularly in sub-Saharan Africa. In Kenya, rotavirus vaccines were introduced in July 2014 as part of the national immunization program.

Objective: This study aimed at determining the prevalence and demographic characteristics of infants under the age of five years exhibiting rotavirus related gastroenteritis post vaccine introduction in Kericho County.

Methods: This was a hospital based cross sectional survey based at Kericho County Referral Hospital. Consecutive sampling was employed to recruit the study participants. One hundred and ninety one (191) stool samples were collected from children with diarrhea/ loose watery stool. Their demographic characteristics were recorded during sampling and vaccination status confirmed. Samples were analyzed for rotavirus using a commercial Enzyme linked immunosorbent assay (ELISA) kit.

Results: The prevalence of rotavirus was 12 % (23/191). The highest rate of infection was detected among children aged 30-36 months old. Rotavirus infections were not detected in infants 8 weeks and 16 weeks post vaccination. Instead they occurred in older age groups. Boys had a higher infection rate than girls at 61% and 39% respectively.

Conclusion: This study reports an overall reduction in rotavirus infections suggesting a positive impact of rotavirus vaccinations in Kenya. The study emphasizes the need for continued research on the impact of the Rotarix Vaccine and circulating rotavirus genotypes in Kenya

Abstract No. 109.

Molecular diversity and evolutionary analysis of human respirovirus 3 strains isolated in Kenya using complete hemagglutinin- neuraminidase (HN) gene

Juliet E Mmata (KEMRI)*; Wallace Bulimo (KEMRI); Silvanos M Opanda (KEMRI); Samwel Symekher (KEMRI); Fred Wamunyokoli (JKUAT)

Human respirovirus 3 (HRV3) is a leading etiology of lower respiratory tract infections in young children and ranks only second to the human respiratory syncytial virus (HRSV). Despite the public health importance of HRV3, there is limited information about the genetic characteristics and diversity of these viruses in Kenya. To begin to address this gap, we analyzed 35 complete hemagglutinin-neuraminidase (HN) sequences of HRV3 strains isolated in Kenya between 2010 and 2013. Viral RNA was extracted from the isolates, and the entire HN gene amplified by RT-PCR followed by nucleotide sequencing. Phylogenetic analyses of the sequences revealed that all the Kenyan isolates grouped into genetic Cluster C;

sub-clusters C1a, C2, and C3a. The majority (54%) of isolates belonged to sub-cluster C3a, followed by C2 (43%) and C1a (2.9%). Sequence analysis revealed high identities between the Kenyan isolates and the HRV3 prototype strain both at the amino acid (96.5–97.9%) and nucleotide (94.3–95.6%) levels. No amino acid variations affecting the catalytic/active sites of the HN glycoprotein were observed among the Kenyan isolates. Selection pressure analyses showed that the HN glycoprotein was evolving under positive selection. Evolutionary analyses revealed that the mean TMRCA for the HN sequence dataset was 1942

HPD: 1928–1957), while the mean evolutionary rate was 4.65×10^{-4} nucleotide substitutions/site/year (95% HPD: 2.99×10^{-4} to 6.35×10^{-4}). Overall, our results demonstrate the co-circulation of strains of cluster C HRV3 variants in Kenya during the study period. This is the first study to describe the genetic and molecular evolutionary aspects of HRV3 in Kenya using the complete HN gene

Abstract No. 110.

A laboratory analysis of Acute Flaccid Paralysis (AFP) surveillance in Kenya, 2019 to 2020

Janet Ngugi (kemri); Joanne H Hassan (kemri)*; Agnes Chepkurui (kemri); Rosemary Nzunza (kemri); Stephen Ochieng Ombija (Kenya Medical Research Institute); Evans Komen (Kemri); Benlick Mwangi (Kemri); Mercy A Onyango (KEMRI); Shadrack Mr. Barmasai (Kenya Medical Research Institute); DIANA WANJIRU WANJIKU (KEMRI); James Nyangao (kemri); Janet Wanjiru (kemri); Fiona Aluoch Alaii (KEMRI); Sheila Mbaabu (Kemri); Paul Muchai (Kemri); Peter Maritim (kemri); Moses Orina (kemri); Mary Njuguna (kemri); Samoel Khamadi (kemri); Robert Mainga (kemri); Jennifer Njomo (kemri); Peter Borus (WHO)

Background: Global eradication of poliomyelitis was initiated in 1988, targeting 3 serotypes of wild poliovirus; type 1, 2, and 3. Kenya reported the last case of indigenous wild type poliovirus (WPV) in 1984 but the country had importations of WPV1 in



2006, 2009, and 2013/2014. The country has also reported outbreaks of circulating vaccine-derived poliovirus type 2 (cVDPV2) and occurrence of other VDPVs, the last of which was detected in 2021. The laboratory network detects poliovirus through testing of cases of acute flaccid paralysis (AFP), and provides critical virologic evidence about where poliovirus is circulating and guides supplementary vaccination and other response activities including enhanced surveillance aimed at interrupting transmission. This study summarizes Kenya's polio surveillance performance between 2019 and 2020 using WHO recommended polio surveillance standards.

Methods: Retrospective Laboratory data analysis was conducted using Kenyan AFP surveillance case-based database between 2019 and 2020. Analyses were carried out using Epi-Info statistical software (version 7).

Results: Kenya reported 7341 cases of AFP between 2019 and 2020. The cases of non-polio enteroviruses (NPEV) were 957 (13%), samples that tested negative for poliovirus or enterovirus were 8853 (84%), while those positive for poliovirus were 286 (3%). Seven thousand two hundred and fifty-seven (99.1%) samples were received in good condition, 67(0.9%) in bad condition, including breaking reverse cold chain, storage in leaking containers or desiccation.

Conclusions: The KEMRI Polio Laboratory has performed up to Global Polio Laboratory Network (GPLN) standards by surpassing the annual target of 150 samples the minimum requirement for WHO accreditation, attained non-polio enterovirus isolation rate of over 10% as well as other accuracy and timeliness indicators. More crucial, the laboratory augmented surveillance and response efforts by detecting circulation of VDVPs within the country, including of cases from Somalia detected in the refugee camps.

Abstract No. 111.

SEROPREVALENCE OF RUBELLA, CYTOMEGALOVIRUS AND TOXOPLASMA GONDII AMONG WOMEN ATTENDING ANTENATAL CLINICS IN MOMBASA COUNTY.

James JG Gikunda (KENYA MEDICAL RESEARCH INSTITUTE)*; vincent Ruttoh (KEMRI); Robert Mainga (KEMRI)

Authors: James Gikunda, Vincent Ruttoh, Robert Mainga

Background: Maternal Cytomegalovirus (CMV) is the leading cause for congenital infection with a permanent hearing, vision loss and neurological impairment. Maternal sexual behavior and contact with infected young children are the known source of infection. Equally, Rubella infection is a common cause of exanthematous disease predominantly of childhood and its importance for public health relates to the teratogenic effects in pregnant women. Infections caused by rubella and CMV can lead to serious complications in pregnancy. The time at which infection occurs during gestation can influence the outcome. The earlier in gestation the maternal infection occurs, the more severe is the damage to the fetus. Maternal infection during the first 8 weeks after the last menstrual period results in nearly all fetuses becoming infected and most of them develop congenital defects. Toxoplasmosis is a disease that results from infection with the *Toxoplasma gondii* parasite, one of the world's most common parasites. Infection usually occurs by eating undercooked contaminated meat, exposure from infected cat feces, or mother-to-child transmission during pregnancy. There is paucity of data on the epidemiology of CMV, Rubella and *T. gondii* among expectant mothers in Mombasa.

Objectives: To determine the prevalence and co-infections of *T. gondii*, Rubella and Cytomegalovirus among women attending antenatal clinics in Mombasa County.

Methods: Using a cross-sectional study design, 220 expectant women were enrolled between March 2014 and February 2016. A blood sample (4mL) was collected from each participant and sera prepared. Serum samples were tested for *T. gondii* IgG and IgM antibodies, cytomegalovirus [CMV] [IgG/IgM] and rubella [IgG/IgM] by indirect Enzyme linked immunosorbent Assay. Structured questionnaires were administered to capture maternal sociodemographic characteristics, obstetric history and risk factors associated with the diseases.

Results: The mean age of the study participants was 29.43±5.312 years while gestational age was 30.21±4.376 weeks. Serum IgG positive for *T. gondii* were (37.2%), CMV (92%), and rubella (2.7%). Serum IgM was only positive for CMV (22.3%). Though, there was an association between previous abortions (34.8%), intrauterine death (9.6%), premature labor (7.5%), microcephaly (3.4%), other congenital diseases (0.8%) and low birth weight (2.1%) with current IgG positivity for TORC infections, the results were statistically significant ($p=0.047$). There were two cases (2/18) of *T. gondii* and cytomegalovirus coinfection.

Conclusion: This study reports high burden of *T. gondii* and cytomegalovirus, with low prevalence of rubella virus among expectant women in Mombasa County. Co-infections with *T. gondii* and CMV was not statistically significant.

Abstract No. 112.

CHARACTERIZATION OF HEPATITIS C GENOTYPES CIRCULATING AMONG INJECTING DRUG USERS IN KILIFI COUNTY, KENYA

Robert Mainga (KEMRI)*

Robert Mainga, Raphael Lihana, Eddy Odari, Peter Borus, Allan Ole Kwalla, and Charles Mwandawiro.

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Introduction: Hepatitis C virus is a major global health problem estimated to infect over 170 million people globally with the most common route of infection being injecting drug use (IDUs). Treatment for HCV is genotype specific although drugs are expensive.

Objective of the Study: This study aimed to determine HCV prevalence, circulating genotypes and link the data to socio-demographic characteristics of IDUs in Kilifi County.



Methods: A cross-sectional survey was conducted among 127 IDUs in Kilifi County. Serology tests were done followed by RT-PCR, RNA amplification. Sequencing of genetic material was done and socio-demographic data was collected using questionnaires.

Results: The most prevalent genotype was genotype 4a accounting for 87% with genotype 1a accounting for 13%. Tout/drivers/bodaboda group of IDUs had the highest HCV infection 12(21.8%, OR=1) compared with other occupations. Percentage OR for HCV infection were 1.3 (95% CI: 0.4-4.3) for beach boys, 0.8 (95% CI: 0.2-3.1) for fishermen and 0.9 (95% CI: 0.3-2.6) for other occupations. Lower primary had 13 (20.0%) infection compared with upper primary 6 (16.7%), secondary and tertiary education 9 (34.6%). Percentage ORs were 1.0 for lower primary, 0.8 (95% CI: 0.3-2.3) upper primary, 2.1 (95% CI: 0.8-5.8) for secondary and tertiary education. A total of 28 samples were positive establishing a sero-prevalence of 22.1%.

Discussion: Prevalence of HCV infection among IDUs in Kilifi County is raising as harm reduction strategies is going on. This study recommends continuous molecular surveillance of HCV genotypes among IDUs to prevent infection to the general population.

Key words: Characterization of Hepatitis C Virus among IDUs in Kilifi County, Kenya.

Abstract No. 113.

Intratyptic differentiation of suspected Polioviruses from stool samples in Kenya, 2021

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Background: Great improvements have been made in Polio eradication since the inception of the program in 1988. Kenya has not reported any case of wild poliovirus (WPV) since 2014. There are three individual and immunologically-distinct wild poliovirus serotypes: type 1, type 2 and type 3. The World Health Organization (WHO) recommends all children be fully vaccinated against all polio serotypes. The schedule for the Oral Polio Vaccine (OPV) regimen is at 6, 10 and 14 weeks of age with an extra dose administered at birth and supplementary immunization activities (SIA) targeting children aged less than five years.

Methods: The aim of the study was to analyze the number and status of children whose stool samples were collected, analysed and found to contain suspected polioviruses. The isolates underwent intratyptic differentiation (ITD) to determine the poliovirus serotype. Retrospective secondary data analysis was conducted using Kenyan Acute Flaccid Paralysis (AFP) surveillance case-based database for 2021. Data analyses were carried out using Epi-Info statistical software (version 7).

Results: A total of 1602 stool specimens collected from suspected AFP case patients and their contacts were analysed. Out of these, 22 isolates were obtained from culture; seventeen (17) were from AFP cases and five (5) from community children. Children of aged 5 years and below accounted for 100% of the cases, with (59%) being between 0-12 months. Of these; 15 (68%) isolates were from males, and 7 (32%) isolates were from females. Sixteen (73%) had received three or more doses of OPV while 6 (27%) had no vaccination history according to their case investigation forms.

Intratyptic differentiation identified the isolates as; 18 were Sabin-like 2, 1 was Sabin-like 3 and 3 were a mixture of Sabin-like 1 and 3. The Sabin-like 2 isolates were from Nairobi (2), Kitui (2), Wajir (2), Kilifi (1), Tana River (2), Garissa (5) and Mandera (2) counties. The Sabin-like 3 was from Garissa County. For the Sabin-like 1 and 3 mixture, one was from Garissa and the other two from West Pokot County.

Conclusion: No wildtype polioviruses and circulating vaccine derived polioviruses (cVDPVs) were reported in Kenya in 2021 although a cVDPV2 was isolated from sewage samples collected during environmental surveillance of polioviruses. The high frequency of Sabin-like viruses may be partly attributed to the supplementary immunization activity (SIA) that was conducted in the months of May and July 2021 as well as routine immunization given to children under the age of 5 years. OPV-vaccinated children also shed the vaccine viruses in their stool and in settings where hygiene is poor, those viruses can spread to unvaccinated children, immunizing them too.

Abstract No. 114.

The Epidemiology of Measles Disease in Kenya in 2021- An overview

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Background: Measles is a disease earmarked by all WHO Regions for elimination as it is a leading cause of death in children. It is a paramyxovirus that causes fever, malaise, cough, coryza, conjunctivitis, and maculopapular rash on its patients. In sever cases, it causes pneumonia, encephalitis, and death. Case based surveillance for measles is implemented in Kenya integrated with Acute Flaccid Paralysis (AFP) surveillance. In 2011, the African Region WHO adopted a measles elimination goal to be achieved by 2020, which included coverage, incidence and surveillance performance targets which remain relevant in the post-2020 period. We reviewed measles Lab-based surveillance data in Kenya for the year 2021.

Methodology: The aim of this study was to review Measles distribution in Kenya in 2021. Measles cases reported and confirmed by serology in the measles case-based surveillance system in 2021 from January to November were analyzed. Data for this review



were analyzed using EpiInfo 2000 Version 3.3.5.

Results: Of the 998 suspected measles cases received in the KEMRI measles laboratory, 99(9.9%) were confirmed measles, 37 (3.7%) were confirmed rubella, 68 (6.9%) were indeterminate and 793 (79.4%) were non-measles, non-rubella cases and 1 sample was rejected. Confirmed measles cases were from 26 counties out of 47 in Kenya with notable high cases from Pokot with 15 (15.1%) and Garissa with 13(13.1%). The rest of the 71 cases were distributed in the remaining 24 counties. Children 15 years and below accounted for 94.1% of the patients confirmed with Measles.

Conclusion: From the above results, a total of 99 confirmed measles cases were identified in 26 out of 47 counties in Kenya. Of the 26 counties, Garissa and Pokot County had a notable amount of positive measles cases. Improving vaccination coverage, timely emergency immunization campaign response and strengthening case-based surveillance is important to reduce morbidity of measles in Kenya. Further analysis are important to determine the non-measles and non-rubella cases are. This will help answer the question of whether there are other viruses or pathogens causing measles-like morbidity in the Kenyan population.

Abstract No. 115.

EPIDEMIOLOGICAL TRENDS OF DIARRHEAL VIRUSES IN CENTRAL KENYA BEFORE AND AFTER ROTAVIRUS VACCINATION

Felix fmm MUSYOKA (KEMRI)*; Maurine M Mutua (Nagasaki University-KEMRI); Mary Wacira (Nagasaki Kemri); Betty Kathomi Muriithi (NUITM-KEMRI); Cyrus Kathiiko (Nagasaki University); Satoshi Komoto (Nagasaki University); Samoel Khamadi (Kemri); Joseph Njau (kemri); Satoshi Kaneko (Nagasaki University); Yoshio Ichinose (Nagasaki University); Shingo Inoue (Nagasaki University); Kouichi Morita (Nagasaki University); Ernest A Wandera (Kenya Medical Research Institute-Nagasaki University)

Background: Rotavirus vaccine was introduced into Kenya's National Immunization Program in July 2014. With the expected decline of rotavirus disease after vaccine implementation, monitoring for other diarrheal viruses will be important to assess changes in their relative burden in order to implement appropriate public health measures. Therefore, the objective of this study was to determine the disease burden and molecular epidemiology of norovirus, adenovirus 40/41, and astrovirus among children in Central Kenya before and after rotavirus vaccine implementation.

Methods: A total of 410 fecal samples collected from children <5 years of age presenting with acute gastroenteritis at Kiambu County Referral Hospital in Central Kenya before and after the rotavirus vaccine introduction were examined for the presence and molecular characteristics of norovirus and astrovirus by and multiplex RT-PCR and adenovirus 40/41 by conventional singleplex PCR as described previously.

Results: Post-vaccine prevalence of norovirus, astrovirus and adenovirus 40/41 was 5.9%, 2.4% and 6.3%, respectively compared with 5.4%, 2.0%, and 17.6%, respectively reported in the pre-vaccine period. This translates to a 9.3% and 25.1% increase and 64.2% decrease in norovirus, astrovirus, and adenovirus 40/41 prevalence, respectively, following rotavirus vaccine implementation. Additionally, the proportion of gastroenteritis cases due to these viruses among vaccine-eligible children (<12 months) decreased substantially, with the most detections among children aged 12-35 months (that is, norovirus-41.8%; astrovirus-80% and adenovirus 40/41-38.5%). Cumulatively, the three viruses were detected in larger proportions among the male children than their female counterparts in both pre-vaccine (male- 28.4%; female- 20%) and post-vaccine (male- 16.8%; female- 12.2%). Norovirus GII was the dominant genogroup with a prevalence of 75%, followed by GI at 25% in both pre and post-vaccine periods.

Conclusion: Rotavirus vaccine introduction into the routine immunization program in Kenya has resulted in a notable decline in adenovirus 40/41 prevalence and a slight increase in norovirus and astrovirus. We recommend continued surveillance of enteric viruses causing diarrhoea in other regions in Kenya to monitor their trend in order to guide public health intervention measures.

Abstract No. 116.

Diagnosis and Outbreak Investigation of Arboviruses and Viral Hemorrhagic fevers in Kenya and the Region: The KEMRI Viral Hemorrhagic Fever Laboratory Perspective

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Background: Since responding to an outbreak of Yellow Fever in Kenya in 1992, the viral hemorrhagic fever (VHF) and arbovirus laboratory at the Kenya Medical Research Institute (KEMRI) continues to expand its capacity and is in the forefront in the diagnosis, outbreak investigation, response and arbovirus surveillance activities locally and regionally. It is a National arbovirus outbreak response laboratory, a partner of Global Outbreak Alert and Response Network (GOARN) and is mandated by the Kenya Ministry of Public Health to respond to arbovirus/VHF outbreaks.

Methods: Samples from suspect human cases are collected and sent to the laboratory in cold chain with accompanying clinical information. The immunoglobulin M enzyme linked immunosorbent assay (IgM ELISA), RT- PCR, cell culture and sequencing are utilized to detect presence of IgM antibodies against of a panel of arbovirus/VHF agents and for pathogen identification and characterization. Entomological investigations concurrently undertaken in areas with reported human cases. Results are relayed to the Kenya ministry of Health for clinical management and response activities and to comply with the International Health



Regulations. In addition, all laboratory personnel are trained in aspects of biosafety/biosecurity in relation to their duties and samples are appropriately archived and secured in a new ultramodern sample management and repository facility in KEMRI.

Results: The laboratory has responded to multiple outbreaks both locally and regionally (Locally - Marburg 1980, Dengue 1982,2011- date, Yellow Fever 1992/93,2016, Rift Valley Fever 1979/2006/07,2014,2019-date, Crimean Congo hemorrhagic Fever 2000, Chikungunya 2004,2006,2016-date. Regionally – Yellow Fever South Sudan 2003, Ebola S. Sudan 2004, Kenya:2014-2016, Chikungunya in Comoros, Re Union 2004, Dengue Eritrea 2010, Dengue Somalia 2010). Entomological surveillance has detected numerous viruses including: West Nile, Bunyamwera, Pongola, Usutu, Ngari, dengue, Chikungunya, Ndumu, Usutu and Sindbis. In addition, from March 2020 - date, the VHF lab has tested over 30,000 Covid- 19 suspect samples and results reported to the Kenya MOH for patient care and public health intervention purposes.

Conclusion: The KEMRI VHF laboratory continues to be a critical facility in the country and region in providing timely diagnosis and collection of early warning data for multiple public health threats. This information is useful in keeping the country prepared and responsive to the various health threats posed by infectious diseases. There is however a constant for homegrown solutions and partnerships to invest in capacity building, technology and encourage laboratory networks in making the country and region a safer place.





SCIENTIFIC SESSION

18: MALARIA 2



Abstract No. 117.

Synergism in Antiplasmodial activities of Epirubicin in combination with Artemether and Lumefantrine

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Introduction: The rapid emergence of drug-resistant *Plasmodium falciparum* strains warrants the urgent development of new antimalarial drugs. Regrettably, innovation of new drugs is expensive and time-consuming with many candidates failing due to safety reasons. In order to circumvent these challenges, the study determined antiplasmodial activities of combinations of artemether and lumefantrine with epirubicin.

Methodology: This was a follow-up on our previous chemogenomics study that revealed the potency of epirubicin, an anticancer drug, against *P. falciparum* protein targets in-silico. As part of the validation of the observation at the whole-cell level, we tested in vitro activities of the epirubicin against selected field isolates using the SYBR Green I method and again the activities of epirubicin in combination with either artemether or lumefantrine at fixed ratios of 4:1, 3:1, 1:1, 1:2, 1:3 and 1:4 against field isolates ex vivo, parallel to reference clones was established. The half-maximal inhibitory concentration (IC₅₀) was used to determine the mean sum of fifty-percent fractional inhibition concentration (FIC₅₀) that is grouped into synergism (FIC₅₀<1), additivity (FIC₅₀ =1) and antagonism (FIC₅₀>1).

Results: All fixed ratios of lumefantrine or artemether with epirubicin showed synergism against W2 strain of *P. falciparum* with a mean of means sum FIC₅₀s of 0.465 and 0.489, respectively. All fixed ratios of artemether combinations showed synergism when tested against the W2 strain of *P. falciparum* with a mean of means sum FIC₅₀s of 0.489. Lumefantrine combinations against 3D7 strain of *P. falciparum* and field isolates ex vivo showed synergism across all fixed ratios with a mean of means sum FIC₅₀s of 0.1778 and 0.348, respectively. Synergism in the lumefantrine combination against the 3D7 strain was especially observed at a 1:1 fixed ratio with FIC₅₀ of 0.556. Similar synergism was observed across all fixed ratios of artemether combinations against 3D7 strain with a mean of means sum FIC₅₀s of 0.879, except at 1:3 fixed ratio (1.614). A trend of antagonism then additivity and ending with synergism was observed along all fixed ratios when artemether and lumefantrine were each combined with epirubicin against D6 strain.

Conclusion: Most combinations of artemether and lumefantrine with epirubicin showed synergism. This suggests that the use of drug combinations is crucial in overcoming antimalarial drug resistance.

Keywords: Artemether, Combination, Epirubicin, Lumefantrine, Malaria, Synergism

Abstract No. 118.

Artemisinin binds and inhibits the activity of Plasmodium fal-ciparum Ddi1, a retroviral aspartyl protease

Noah M Onchieku (KEMRI)*; Daniel Kiboi (JKUAT); Pawan Malhotra (ICGEB)

Background: Reduced sensitivity of the human malaria parasite, *Plasmodium falciparum*, to Artemisinin and its derivatives (ARTs) threatens the global efforts towards eliminating malaria. ARTs have been shown to cause ubiquitous cellular and genetic insults, which results in the activation of the unfolded protein response (UPR) pathways. The UPR restores protein homeostasis, which otherwise would be toxic to cellular survival. Here, we interrogated the role of DNA-damage inducible protein 1 (PfDdi1), a unique proteasome-interacting retropepsin in mediating the actions of the ARTs.

Methods: We expressed and purified PfDdi1 gene (PF3D7_1409300) in Rosetta (DE3) cells, and then raised antibodies in mice and rabbits. Since PfDdi1 possesses a retroviral-like protease (RVP) domain, we assessed the pepsin/cathepsin D, retropepsin or proteasome activity of the purified PfDdi1 using the Bz-RGFFP-MNA, DABCYL-Gaba-SQNYPIVQ-EDANS or Suc-LLVY-AMC substrates, respectively. We then assessed the impact of ART on protein ubiquitination and on the activity of the PfDdi1 enzyme. In addition, we employed in situ DNA fragmentation (TUNEL) assay to assess ART-specific DNA damage in the *P. falciparum* parasites. Besides, we carried out binding and computational analysis to delineate the interaction between PfDdi1 and ART. We also used yeast functional complementation studies to analyze whether PfDdi1 is a true ortholog of ScDdi1 and assess the susceptibility of the Ddi1 deficient cells to the ARTs

Results and Conclusion: We demonstrated that PfDdi1 is an active proteasome reprotopepsin that cleaves ubiquitinated substrates. We showed that artemisinin enhances polyubiquitination of parasite proteins and inhibits the activity of PfDdi1 in digesting ubiquitinated proteins. In addition, the parasites' exposure to artemisinin induces DNA fragmentation and increases recruitment of the PfDdi1 protein into the nucleus. Besides, using yeast complementation studies, we showed that whereas ScDdi1 is dispensable in yeast, ScDdi1 deficient *S. cerevisiae* cells display more susceptibility to artemisinin pressure. The expression of PfDdi1 restores the functions in the corresponding Ddi1-knock out yeast cells. Our work thus gives insights into the role of the PfDdi1 in mediating the actions of ARTs and validates it as a vulnerable protein that could be the basis for the development of new chemotherapies against the *P. falciparum* malaria.



Abstract No. 119.

Severe Malaria Surveillance System Evaluation in Msambweni Referral Hospital Kwale County, June 2021

Githinji Geoffrey (MOH KENYA - FELTP)*; Maurice O Owiny (Kenya FELTP); Elvis Oyugi (DNMP -MOH KENYA); Elizabeth Chomba (MOH KENYA - KWALE COUNTY)

Background: Malaria surveillance requires systems that can accurately and reliably track disease burden and intervention efforts. Between January and June 2020, confirmed malaria cases per 1000 population increased from 3.3 to 5.7, in the Coastal malaria endemic region. We evaluated Kwale county's malaria surveillance system

Methods: We evaluated system attributes (simplicity, acceptability, flexibility, timeliness, representativeness, sensitivity, data quality and stability) using the United States CDC updated guidelines on evaluation of a public health surveillance system, 2001. We abstracted demographics and clinical data from the inpatient register between January and December 2020. We interviewed key informants at service delivery points to assess attitudes, perceptions and gaps. Descriptive statistics were calculated

Results: A total of 219 patient records were reviewed; the median age was 4 years [IQR 6] with those aged under 5 years contributing 125 (57.07%), those with fever were 181 (32%). The median length of stay was 4 days [IQR 4]. Of the 98 (44.7%) referrals from peripheral facilities, 47 (48%) received artesunate pre-referral treatment. Anaemia (79.4%) was the most common complication recorded for the abstracted records. The system had a simple and easy to apply case definition with all eight of the key informants reporting ease of use of the case definition in management of patients and reporting tools data capture, with minimal organizations involved in case reporting and minimum time spent on data handling. Acceptability was demonstrated by facility reporting rate of 80% and six out of the eight informants reporting willingness of the responsible personnel to take up their assigned roles at all levels of reporting despite human resource constraints. All key informants agreed reports generated were representative and all relevant variables were available to conduct facility level analysis. Data quality of the monthly reports was 75% in recent facility Data Quality Assessment conducted in the facility by the Division of National Malaria Programme on support supervision visits in April 2021. Lack of sensitization on the new updated standard reporting tools, MCH source registers not capturing significant malaria data and lack of regular sensitizations and refresher trainings on updated guidelines and key policies were some of the challenges highlighted by the informants

Conclusion: A majority of the patients were aged below 5 years, mostly presented with fever and anemia. The surveillance system was useful, simple, and representative. We recommended supportive supervision

Keywords: Malaria, Surveillance, System attributes, Data Quality

Abstract No. 120.

Assessment of Kenyan Parasites Response to Currently used Artemisinin combined Therapies using Ex vivo/In vitro susceptibility Assays and Genomic Analysis

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Background: Artemether-lumefantrine (Coartem®) is the recommended first-line drug while dihydroartemisinin-piperazine (Duo-cotecxin®) is an alternative first-line antimalarial regimen in Kenya. Recent reports of resistance to artemisinin in Uganda and Rwanda warrants intensified surveillance of susceptibility of natural infection to currently used antimalarials in Kenya, in line with WHO policy for early detection of changes in response to drugs.

Methods: Blood samples collected between 2008 and 2021 from individuals with naturally acquired *P. falciparum* infections presenting with uncomplicated malaria were tested for susceptibility to a panel of antimalarial drugs as well as ex vivo susceptibility to piperazine, using piperazine survival assays (PSA). Drugs tested using the malaria SYBR Green I method include piperazine, dihydroartemisinin, lumefantrine, artemether and chloroquine. Each isolate was also characterized for polymorphisms in putative drug resistance genes namely; Pfert, Pfmdr1, Pfpm2, Pfpm3, Pfdhfr, Pfdhps, Pfxo, and Pfk13 affecting response to current antimalarials using real-time PCR (qPCR) and Agena MassARRAY platform. Associations between phenotype and genotype were also determined.

Results: Piperazine susceptibility increased gradually during the study from a median IC50 of 16.8 ng/ml, n=58 (IQR 10.8-23.1 ng/ml) in 2008 to 8.4 ng/ml, n=69 (IQR 6.4-21.3 ng/mL) in 2021, (P<0.05). The median ex vivo piperazine survival rate (IQR) was 0% (0-11.02%), n=40, at 95% CI though some isolates had a PSA survival rate of >10%, consistent with the range of piperazine resistance parasites. Analyses of these isolates did not detect polymorphisms in piperazine resistance markers. Lumefantrine median IC50s rose significantly between 2008 at 11.0 ng/mL, n=54 (IQR 2.7-26.9 ng/mL) and 2021 at 30.55 ng/mL, n=51 (IQR 3.2-47.7 ng/mL), (p<0.05). In reciprocity, steady significant incline in chloroquine susceptibility was observed during the study from a median IC50 of 7.9 ng/mL, n=36 (IQR 3.9-15.8 ng/ml) in 2008 to 4.6 ng/ml, n=62 (IQR 3.1-8.2 ng/ml) in 2021, (P<0.05). The proportion of piperazine resistant markers; Pfpm2/3 and Pfmdr1 mutants did not vary significantly between clinical isolates collected from different time points and sentinel sites. A significant association was observed between PPQ IC50 and Pfert K76T (p=0.0007), Pfdhps A437G (p=0.0167), and A613S (p=0.0043) genotypes respectively.

Conclusion: These findings depict that circulating Kenyan field isolates are sensitive to currently used ACTs. However, continuous monitoring of response to frontline drugs using in-vitro/ex-vivo susceptibility and genomic assays for early detection of resistance is recommended.



Abstract No. 121.

Quality of diagnosis and treatment of malaria patients in rural hospitals in Kisumu County, Kenya

Wilfred Ouma Otambo (PhD scholar)*

Introduction: Accurate, dependable, and affordable malaria diagnosis, followed by effective treatment at health facilities, is critical for effective malaria management and control. Malaria misdiagnosis at health-care facilities, on the other hand, is becoming a growing concern, potentially leading to mistreatment of the disease. As Kenya strives for malaria eradication, it is critical to examine routine practices used in the diagnosis and treatment of malaria cases in health facilities. The current study sought to investigate discrepancies in malaria diagnosis and treatment in rural communities in Kisumu County, Kenya.

Method: A cross-sectional study was conducted in three hospitals in Kisumu County, Kenya: two public hospitals and one private hospital. Between November-2019–March-2020, two groups of study participants were enrolled. Febrile patients with malaria symptoms had finger-prick blood smears taken for analysis. The reading accuracy of microscopy was compared between hospital laboratory technicians and independent microscopy and PCR. These patients' antimalarial treatment regimens were documented, and blood smears from patients diagnosed with a rapid diagnostic test (RDT) and presumptively treated with antimalarial and antibiotics were re-examined for malaria parasites.

Results: A total of 1,117 febrile cases agreed to take part in the study, with 936 being evaluated for slide positivity rates and malarial treatment. RDT diagnosis was used for 126 people, and clinicians prescribed presumptive treatment for 55 of them. Of the 936 febrile cases examined for clinical treatment, malaria slide positivity rate was 27.5%. Hospitalization level was higher in the private hospital among the slide positive patients at 40.8% (29/71) ($P < 0.0001$). Antimalarial treatment was more common in public hospitals (14.6% vs. 3.7% in private hospitals) among malaria negative patients. Approximately 8.8% malaria positive did not receive antimalarial treatment. Treatment with coartem was most common among those aged 5-14 years, accounting for 75.9% (88/116). The hospital microscopy sensitivity was 38.3% and specificity was 91.2% when RT-PCR was used as the standard. The level of agreement between RT-PCR and hospital microscopy was low ($Kappa = 0.26$, $P = 0.001$). Misdiagnosis was found in 19.9% (77/387) of the 1131 febrile cases examined for slide reading accuracy. The level of agreement in malaria diagnosis between health facilities RDT (48.4%) and independent microscopy (41.3%) was moderate ($Kappa = 0.633$; $P = 0.000$). Of the 55 people who were presumptively treated, 25% were slide positive and 74.5% were slide negative.

Conclusion: The highlighted discrepancies between clinical malaria diagnosis and treatment carried out at these health facilities in comparison to the Ministry of Health guidelines highlight the urgent need for the government to strengthen capacity for clinicians and laboratory technicians to improve accurate malaria diagnosis

Abstract No. 122.

Identification of Plasmodium falciparum Resistance Biomarkers in Primary School Children in Western Kenya

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Background: Malaria continues to cause unacceptably high levels of disease and death, as reported in successive editions of the World malaria report. According to the UNICEF MALARIA report 2021, there were an estimated 229 million cases and 409 000 deaths globally in 2019. Long-term monitoring of parasite sensitivity to previously withdrawn anti-malarial drugs, such as chloroquine, can provide useful surveillance information if these drugs target similar resistance markers to current or candidate ACT partner drugs.

Material and Methods: The study was conducted on sample of pupils from Alupe primary school archived primary who tested positive for Plasmodium falciparum using a gold standard microscopy.

Prevalence

Positive samples from dried blood spot were identified by PCR

Percentage prevalence = $\text{frequency}/(\text{Total number of samples}) \times 100$

Detection of Plasmodium falciparum

DNA extracted was Dried Blood Spots using MightyPrep reagent stored -30oC .

Direct PCR

PCR targeting Pfprt gene was performed on the following conditions: 98oC for 2 minutes to inactivate the blocking antibody, 40 cycles, denaturation at 98oC for 10 seconds, annealing at 60oC for 15 seconds, extension at 68oC for 1 minute and 42 seconds max 1.7kb (CT) (1min/1kbp), 4oC for 2 minutes.

Agarose Gel Electrophoresis

Samples were run in 2.0% agarose S using 6x loading dye and 100bp GelLadder marker at 100V for 35 minutes and stained with 2x Gel Red™ for one hour on a shaker. Amplification of chloroquine resistance transporter genes (Pfprt) Malaria positive samples with Plasmodium falciparum were subjected to second nested PCR. Initial denaturation at 95°C for 3 minutes, 35 cycles for both Pfprt forward and reverse primers 95°C for 30 seconds, annealing at 58°C seconds and 72°C for 60 seconds and final extension at 72°C for 15 minutes .PCR products were run on 2.0% agarose gel for 35 minutes at 100 V and stained with 2x GelRed for 1 hour and visualized. All positive samples were excised from the gel and purified using QIAquickR gel extraction kit.



Pfprt gene Sequence Analysis

PCR products containing the amplified PCR gene were sequenced using Sanger sequencing for both forward and reverse primer. Samples sequences were trimmed on a chromas tool and analysed using Bioedit tool to determine similarities. Multiple sequence alignment was done both the sequences and the reference gene using ClustalW and a dot plot chart was done to show the nucleotides bases mutations. Amino Acides changes were determined followed by BLAST tool (<https://blast.ncbi.nlm.nih.gov>).

Results: Plasmodium falciparum chloroquine resistance transporter gene analysis 11 samples turned positive on 26-well agarose with a target band size 1638bp.

Conclusion: New mutations reported at codon F81L, F72Y, Q48H, Q51E, Y52 and I53L.

Conclusion: A majority of the patients were aged below 5 years, mostly presented with fever and anemia. The surveillance system was useful, simple, and representative. We recommended supportive supervision

Keywords: Malaria, Surveillance, System attributes, Data Quality

e government to strengthen capacity for clinicians and laboratory technicians to improve accurate malaria diagnosis

Abstract No. 123.

Ex-vivo Drug Combination Screening using Malaria SYBR Green I Assay

Redemptah A Yeda (usamru-k-KEMRI)*

Background: Emergence of artemisinin resistance in Uganda is the basis for intensified screening of resistance to artemisinin based combination and ex-vivo screening is robust, faster and reliable. This study aimed to determine antiplasmodial activity of ACT drug combinations against fresh field isolates ex-vivo alongside P. falciparum strains. Methodology: Artemether and lumefantrine, dihydroartemisinin and piperaquine, amodiaquine and artesunate were prepared in combinations at fixed drug A-drug B dose ratios of 4:1, 3:1, 1:1, 1:2, 1:3 and 1:4 and screened against field isolates obtained from individuals with uncomplicated malaria. The assays were done using a fluorescence-based SYBR Green I assay alongside cultured D6, 3D7 and W2 P. falciparum strains. Fifty percent inhibitory concentration (IC50s) was calculated for individual drug combinations which were used to determine the mean sum of fifty-percent fractional inhibition concentration (FIC50). The FIC50s are grouped into synergism (FIC50<1), additivity (FIC50 =1) and antagonism (FIC50>1). Results: Most artemether-lumefantrine combinations showed antagonism when tested against field isolates ex vivo and strains of P. falciparum. Synergism was observed in all fixed ratios of dihydroartemisinin-piperaquine against D6 P. falciparum strain apart from 1:1 fixed ratio. Similarly, Synergism was also observed when amodiaquine was combined with artesunate and tested against W2, 3D7 and D6 strains of P. falciparum at 1:3 and 1:4 fixed ratios with mean of mean sum FIC50 values of less than 0.7. Conclusion: Use of drug combination continue to play a key role in the reduction of the occurrence of malaria parasite resistance. Keywords: Combination, ex vivo, Malaria, Plasmodium falciparum, Synergism





SCIENTIFIC SESSION

19: TB 2



Abstract No. 124.

YIELD COMPARISON FOR TB CULTURES BETWEEN MYCOBACTERIUM GROWTH INDICATOR TUBE (MGIT) AND LOWENSTEIN-JENSEN (LJ) MEDIUM

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Background: Tuberculosis (TB) is caused by a bacteria (*Mycobacterium tuberculosis*) that most often affects the lungs. Tuberculosis is curable and preventable. People infected with TB bacteria have a 5–10% lifetime risk of falling ill with TB. Those with compromised immune systems, such as people living with HIV, malnutrition or diabetes, or people using tobacco, have a higher risk of falling ill. The BACTEC MGIT 960 system still remains the golden standard for the recovery of MTBC in clinical specimens other than blood.

Objective: To compare Mycobacterium Growth Indicator Tube (MGIT) with Lowenstein-Jensen (LJ) medium with regard to Mycobacterium tuberculosis yield and cost-effectiveness if both have the same yield especially from a resource-limited setting.

Methods: A total of 186 samples were decontaminated using 4% NaOH, Na Citrate and N-acetyl-L-cysteine (NALC), Centrifuged at 3000RCF for 15 minutes, decanted and the pellet was suspended in 2 ml of sterile phosphate buffer (pH 6.8). 0.5 ml of the suspended pellets was inoculated on MGIT tubes and 0.3ml on LJ medium for a period of 42 and 63 days.

Results: 25 out of 186 samples were analysed after coming out as MGIT positive suspects, of which results were compared with that of LJ and the following observations made. From MGIT, 14 were MTBC, 7 were MOTT, 1 contaminated while 3 were negatives, whereas on LJ, 9 were MTBC, 3 were contaminated, and 13 were negatives.

Conclusion: Our results show that MGIT liquid culture system outperformed LJ solid culture in terms of yield. We therefore recommend that MGIT liquid culture should be used as a first-line culture method, to reduce costs in resource-limited settings; however more research should be done to establish the possible causes of the loss for better patient management.

Abstract No. 125.

EVALUATION OF XPRT MTB/RIF ASSAY IN DETECTION OF MYCOBACTERIUM TUBERCULOSIS FROM SPUTUM PELLETS USING A REDUCED SAMPLE REAGENT IN SMEAR NEGATIVE SAMPLES IN KISUMU COUNTY WESTERN KENYA

Ruth Sitati (KEMRI-CGHR)*; Laureen Nyongesa (KEMRI-CGHR); Albert Okumu (KEMRI-CGHR); Joseph Orure (KEMRI-CGHR); Cecelia Dete (KEMRI_CGHR); Christine Ogollah (KEMRI-CGHR); Patrice Madata (KEMRI-CGHR); Steve O Wandiga (KEMRI)

Introduction: Approximately 10 million incident cases of Tuberculosis (TB) are reported annually. The emergence of multidrug-resistant tuberculosis (MDR-TB) is widely considered a major threat to global TB control. Diagnosis by culture on solid and liquid systems is available only in laboratories with high level of biosafety and highly qualified and experienced staff. TB culture has a high turnaround time that hinders timely decisions on patient management. The Xpert MTB/RIF is a PCR-based diagnostic test that detects *Mycobacterium tuberculosis* and rifampin (RIF) resistance within two hours. Xpert MTB/RIF was approved by the WHO for use in high-burden TB countries such as Kenya. However, evaluations have demonstrated low sensitivity in smear-negative samples. We sought to determine whether using a lower ratio of sample reagent (SR) to sputum pellets (2:1 compared with the currently recommended 3:1 ratio) would improve Xpert detection of *M. tuberculosis* in sputum pellets from smear negative patients in Kisumu County in western Kenya.

Method; This was a laboratory-based cross sectional study where 154 pellet samples collected from patients from Jaramogi Oginga Odira Teaching and Referral Hospital as part of TB observational study for individuals treated for TB and sent to KEMRI/CDC TB laboratory were used. The samples were decontaminated using NALC sodium hydroxide and pellets stored in -80oC freezer. Xpert MTB/RIF test procedure involved mixing sample pellet with SR at different ratios (2:1 and 3:1), two milliliters of the mixture was placed into the Xpert MTB/RIF cartridge, and the cartridge inserted into the Xpert MTB/RIF instrument, where fully automated PCR was completed to detect both *M. tuberculosis* and Rifampin resistance.

Results; According to this study, sensitivity and Specificity of Ratio 2:1 SR was 72.1% and 79.3% respectively while the Negative and Positive Predictive Value was 88.0% and 57.4% respectively. Results from this study showed moderate agreement between the two dilutions with Cohen kappa value of 0.476 at $p < 0.001$. Sputum appearance, tenacious samples were significantly associated with performance of 2:1 sample dilution with Fishers exact test ($p = 0.053$).

Conclusion; There was increased detection of MTB in ratio 2:1 reagent to processed pellet in smear negative samples and should be adapted in populations with high smear negative TB rates.



Abstract No. 126.

Challenges of Setting up and Managing a basic TB Immunology Research Laboratory in a resource-limited setting: The KEMRI-Centre for Respiratory Diseases Research Laboratories Experience

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Background: TB immunology research has made major contributions to understanding the complex interactions between M. tuberculosis and host immunity hence informing the rational design of better TB vaccines and therapeutics. The ability to isolate and culture PBMCs, isolate and stain cytokines, perform whole blood stimulation assays and perform ELISA makes this area of research more desirable to most research laboratories. While this situation is desirable, the novice usually faces the daunting task of setting up and maintaining a tuberculosis immunology laboratory, often without access to local expertise.

Objectives: The aim is to provide guidance on ways to overcome many challenges to smooth operation, encountered in resource-limited areas.

Methods: This article originates from the experience gained by the author in the establishment of a basic tuberculosis immunology research laboratory at the KEMRI-Centre for Respiratory Diseases Research Laboratories.

Results: The CRDR Centre managed to put up elements that could be applied to a basic immunology research laboratory, such as robust standard operating procedures, key laboratory equipment, laboratory analytical plans, organization, and personnel. The laboratory became operational in July 2020.

Conclusions: In the methodology, suggestions, and comments that arose from our experience in establishing the laboratory can be used as a guide to other researchers from poor resource settings on the fundamental issues to be addressed while establishing a basic TB immunology laboratory and enhancing the development of quality systems that support medical research conducted to ensure the research data are reliable and can be easily reconstructed in other research settings.

Keywords: Tuberculosis, Immunology, Research Laboratory

Abstract No. 127.

PLAN DO STUDY ACT (PDSA) CYCLE QUALITY IMPROVEMENT APPROACH TO SCALE UP PAEDIATRIC TB CASE FINDING THE CASE OF SUNA WEST SUB COUNTY

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Back ground: Suna west is a sub county in migori county which from the first quarter in 2020 began experiencing a drop in pediatric TB case finding upto 2.2% in the last quarter against an expected national target of 10-15%.

PLAN

The sub county health management identified this problem and started a QI project. The following root causes were identified using a fish bone i.e. late diagnosis, clinician knowledge gap on pediatric TB case finding, Inadequate assessment of contacts of bacteriologically confirmed TB cases and Inadequate access to commodities e.g. x-rays, NG tubes

Objective: To improve pediatric TB case finding from 4.1% to 10% through use of the PDSA cycle in Suna West Sub County, Migori County

Methodology: This is a mixed method study design with a retrospective review of records from the online TB platform (TIBU) comparing data in the year 2020 before interventions and 2021 after interventions.

Strategies employed (activity planning) DO

1. Facility staff training on integrated TB management and pediatric TB (7)
2. CME on pediatric TB case finding, contact management for HCW (NO, CO& Lab)
2. OJT and mentorship on pediatric TB
3. Training CHVs on contact management
4. Support for chest x-ray by komesha TB

RESULTS: in 2020 in the first quarter out of the 61 cases diagnosed 6(9.8%) were pediatrics, in quarter two out of the 57 TB cases 2(3.5%) were paediatric, in quarter three out of the 59 TB cases no (0%) paediatric was diagnosed and quarter four of the 45 TB cases only 1 (2.2%) were pediatrics. The total paediatric achievement in 2020 was 4.1%

in 2021 in the first quarter at the beginning of interventions out of the 56 cases diagnosed 3(5.3%) were pediatrics, in quarter two out of the 48 cases 6(12.5%) were paediatric, in quarter three out of the 52 cases 10(19.2%) were paediatric and quarter four currently of the 45 TB cases 9(20%) were pediatrics. Overall paediatric TB cases diagnosed were 28 (14%) of the total 200 cases diagnosed yield from contact tracing 2.5% (25% paediatric TB contribution)

Conclusion: The study made it evident that through the PDSA cycle (quality improvement approach) facilities and Sub Counties can be able to improve their performance especially TB indicators such as pediatric TB case finding.

RECOMMENDATION(ACT)

The National TB program and Counties should adopt the CQI strategy as a way of improving TB indicators' performance for facilities with unsatisfactory performance. This should be achieved through the introduction of policies/guidelines that incorporate PDSA cycle (quality improvement) in the implementation of TB activities especially active case finding(ACF)



Drug resistant tuberculosis patterns among presumptive MDR patients from western Kenya, a MoH surveillance program

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Introduction/Background: Tuberculosis (TB) is the highest single cause of death worldwide from an infectious disease and continues to be a major public health problem. The World Health Organization (WHO) estimates that 10.4 million people contracted TB in 2016 of which 4 million of these cases were undiagnosed. About 480,000 were estimated to be cases with TB that is resistant to at least Isoniazid (INH) and Rifampicin (RIF), with or without resistance to other first-line drugs multidrug resistance tuberculosis (MDR-TB) cases. In a resource-constrained setting, delays in MDR-TB diagnosis lead to delays in therapy initiation or completion due to lack of laboratory infrastructures. Systematic surveillance and tracking of drug-resistant TB helps in understanding the overall burden of the disease and can inform research and practice in diagnosis, treatment, and infection control.

Objective: To determine drug resistance patterns among presumptive multidrug patients from health facilities in Western Kenya.

Methodology: Sputum samples were collected from peripheral health facilities in the counties and transported to KEMRI TB laboratory for processing using national TB program diagnostic algorithm, GeneXpert Polymerase chain reaction (PCR), both 1st and 2nd Line probe assay (LPA) liquid culture, Fluorescent microscopy and mycobacteria tuberculosis complex (MTBC) identification and phenotypic drug susceptibility tests as appropriate.

Results: A total of 394 samples from DRTB presumptive patients from 12/47(25.5%) counties were processed between March and December of 2020. The HIV infected were 121/394 (30.7%) and 85/394 (21.6%) for both males and females, respectively. A total of 12/394(3.0%) MDR cases were identified from 5/47(10.6%) counties, comprising of 10/12(83.3%) males of whom 4/10 (40%) were HIV infected as well as all the 2 females. A total of 12/394 (3.0%), 9/12 (75%) males, of whom 4/9(44.4%) HIV infected, while 3/12 (25%) females of whom 2/3(66.7%) were HIV infected were Mono RIF resistant and 35/394(8.8%), of whom 30/35(85.7%) males with 14/30(46.6%) HIV infected and 5/35(14.2%) females of whom 3/5(60%) had INH mono resistance respectively.

Conclusion: For prompt and effective drug resistant tuberculosis (DRTB) diagnosis in the country decentralizing tuberculosis through genotypic and/or phenotypic techniques is very essential leading to prompt care and patient management.





SCIENTIFIC SESSION

20: MCH 2



Abstract No. 129.

Low haemoglobin levels are associated with reduced psychomotor and language abilities in young Ugandan children.

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Background: Anaemia and iron deficiency (ID) are highly prevalent in pregnant mothers and young children. The global prevalence of maternal anaemia during pregnancy is 38% and 36% in East Africa. Approximately 60% of pre-school children are anaemic and 52% are estimated to have ID in Africa. Children living in Sub-Saharan Africa are vulnerable to developmental delay, particularly in the critical first five years due to various adverse exposures including disease and nutritional deficiencies. Anaemia and ID are implicated in abnormal brain function. However, available evidence on the association between anaemia, ID and developmental outcomes in Sub-Saharan Africa is limited.

Methods: We used data from the Entebbe Mother and Baby Study prospective birth cohort in Uganda to examine the effect of maternal haemoglobin (Hb) levels during pregnancy, child Hb and iron status on developmental outcomes at 15 months (n=937) and five years (n=530). Hb levels in children were measured in annual blood samples and iron status was assessed at two years. Developmental outcomes were assessed at 15 months and 5 years using locally adapted measures. At 15 months the developmental outcomes were executive function, psychomotor, social cognition and language while at five years they included verbal and non-verbal IQ, executive function and motor ability. We used univariable and multivariable linear regression analyses to assess associations between maternal and child Hb, iron status and developmental outcomes. We conducted subgroup analyses to explore the effects of different forms of anaemia at 12 months.

Results: About 39.8%, 17% and 0.9% of mothers had mild (Hb<11 g/dL), moderate (Hb<10 g/dL) and severe (Hb<7 g/dL) anaemia respectively during pregnancy. The prevalence of mild, moderate and severe anaemia in children at one year of age was 76.4%, 46.9% and 3.9% respectively and decreased to 13.6%, 4.4% and 0.6% respectively at five years of age. About 47.1% of children had at least one episode of moderate anaemia during one to five years of follow-up while at two years, almost a third of children had ID and 18.6% had iron deficiency anaemia.

Lower maternal Hb and child Hb levels at one year were associated with Lower psychomotor and language scores at 15 months, but we found no evidence that anaemia or ID was associated with cognitive and motor outcomes at five years. In adjusted subgroup analyses microcytic anaemia was associated with low psychomotor scores while nutritional anaemia was associated with low psychomotor and language scores.

Conclusion: Maternal and child anaemia and were highly prevalent in this study population and were associated with poor psychomotor development at 15 months. This study emphasizes the importance of managing anaemia in pregnancy and infancy and highlights the need for further studies on the effects of anaemia and iron deficiency in African children.

Abstract No. 130.

Kenyan women's preferences, expectations, and experiences with male partner support during pregnancy in the context of prevention of mother to child transmission services

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Background: Antenatal (ANC) and Prevention of Mother-to-child Transmission (PMTCT) care are important in limiting HIV maternal-to-child transmission. While male partner participation in PMTCT care has been shown to influence maternal and child outcomes and many studies have thus sought to increase male partner attendance at PMTCT, few studies have evaluated the female preferences and experiences with male partner engagement. The purpose of this study was to assess how women's preferences for male partner support throughout PMTCT of HIV services compares to their actual experiences with male partner support.

Methods: This was a prospective quantitative analysis nested within a larger cluster randomized control trial at 12 government hospitals to evaluate the effect of the HITS system on complete PMTCT retention. All participants were surveyed at PMTCT enrollment, delivery, and 6 months postpartum. Variables in the survey included in this analysis include demographics, a 4-point Likert scale that assessed preferences for male partner support and experiences of partner support. We used descriptive statistics and proportions to summarize data.

Results: Data from 1,173 women were evaluated. Of these, 1,007 (85.8%) reported a current relationship, 1,023 (87.4%) disclosed their HIV status to at least one person, 761 (65.0%) disclosed to their male partner, and 851 (73.2%) lived with their current male partner. Among women with partners, the following were indicated as somewhat or very important to them: partner attendance at ANC appts (65.5%), provision of monetary support (87.9%), provision of advice (84.6%), partner help with household responsibilities (58.5%), reminders to take medication (77.8%), and partner encouragement (89.8%). Among the 734 women who completed delivery surveys, 26.5% of women's partners attended any ANC appts. Women were supported often or sometimes in the following ways: monetary means (77.3%), advice (62.9%), medication reminders (57.4%), help with household responsibilities (39.3%), and encouragement (70.3%).



Discussion: Preferences for male partner support varied among women and included not only partner attendance at appointments but also components of emotional, informational, and financial support, highlighting the need to individually assess female's preferences for male partner support before engaging partners. Despite desires for various types of support, there is a gap between female preference and experiences. This study will be useful in guiding the development of interventions to engage appropriate male partner support during PMTCT utilization by taking into consideration the women's own desires. Future analyses will look at how preferences for male partner support in later phases of PMTCT (i.e. delivery, postpartum), how preferences align with actual experiences of male partner support, and how these factors impact retention.

Abstract No. 131.

IMPACT OF THE PROTECTING INFANTS REMOTELY BY SMS (PRISMS) ON NEONATAL CARE IN A DISTRICT HOSPITAL

Santorino Data (Mbarara University of Science and Technology)*; Mary Asimwe (Kagadi Hospital); Martin Mukama (CAMTech Uganda); Rosette Birungi (Clinton Health Access Initiative); Joy Batusa (Clinton Health Access Initiative)

Introduction: The Protecting Infants Remotely by SMS (PRISMS) is a neonatal care decision support tool that uses routine assessment findings to provide instant clinical management suggestions. PRISMS consists of an assessment form, feeds calculator, and growth rate calculator at the front end and an analytical server at the back end. We aimed to describe newborn characteristics and the effects of PRISMS deployment on neonatal care in Kagadi Hospital.

Methods: Four frontline health workers in Helping Babies Breathe, Essential Care for Every Baby and Essential Care for Small Babies and in PRISMS use. PRISMS was deployed in Kagadi Hospital during which case scenarios were utilized to familiarise clinical staff to PRISMS followed by real time use in clinical ward rounds. Three mentorship visits 4-6 months apart were conducted during which mentors participated in newborn care using the PRISMS technology in the morning and a Quality improvement meeting in the afternoon. A paired t test was used to compare in-facility neonatal mortality in months before and during PRISMS use.

Results: We report analysis of data collected over 10 months (October 2020 - July 2021). A total of 3418 neonates were assessed 3507 times with the PRISMS technology. Babies in the Neonatal Intensive Care Unit (NICU) were 56.4% (1929/3418) of all babies in the database and contributed 56.3% (1976/3507) of all assessments.

The incidence of hypothermia (axillary temp < 36.5°C) in neonates assessed in maternity was 27.5%, with 91.2% of hypothermic babies having a temperature of < 35.5°C. The incidence of hypothermia among NICU neonates was 42.3% with 20.8% of hypothermic babies with temperatures of < 35.5°C. The incidence of inability to feed was 1.2% (19/1531) in maternity and 64.5% (1275/1929) among babies in NICU. A prolonged capillary refill time (> 3 seconds) was present in 0.1% and 9.9% of maternity and NICU assessments respectively. Chest indrawing was present among 0.4% (6/1531) and 11.6% (229/1976) of assessments in maternity and NICU respectively.

Mean in-facility neonatal mortality in NICU was 8 (95% CI: 3.1 - 12.9) pre intervention and 3.4 (95% CI: 2.3 - 4.5) in the PRISMS use period, p = 0.0459.

Conclusion: A combination of newborn care training, mentorship and PRISMS deployments reduced and sustained lower in-facility neonatal mortality over 10 months in a district hospital.

Abstract No. 132.

PREDICTORS AND OUTCOME OF CARDIAC ARREST IN PAEDIATRIC PATIENTS PRESENTING TO EMERGENCY MEDICINE DEPARTMENT OF A TERTIARY HOSPITAL IN TANZANIA.

Amne Omar Yussuf (Muhimbili National Hospital)*

Background: Cardiac arrest is the cessation of blood circulation caused by absent cardiac mechanical activity. The survival of children who suffered cardiac arrest is poor. This study aimed to determine the predictors and outcome of cardiac arrest in paediatric patients presenting to an emergency department of a tertiary hospital in Tanzania.

Methodology: Prospective cohort study of paediatric patients >1 month to <14 years presenting to Emergency Department of Muhimbili at National Hospital (EMD-MNH) in Tanzania from September 2019 to January 2020 and triaged as Emergency and Priority. We enrolled consecutive patients during study periods where Patients' demographic and clinical presentation, emergency interventions and outcome were recorded. Logistic regression analysis was performed to identify the predictors of cardiac arrest.

Results: We enrolled 481 patients, 294 (61.1%) were males and median age was 2 years [IQR 1-5 years]. Among studied patients, 38 (7.9%) developed cardiac arrest in the EMD, of whom 32 (84.2%) were ≤5 years. Referral patients who had cardiac arrest at EMD were 32 (84.2%) were over-represented among those who had an arrest. Majority 33 (86.8%) of those who developed cardiac arrest, died. Compromised circulation on primary survey (OR 5.9 (95% CI 2.1-16.6), bradycardia for age on arrival (OR 20.0 (CI 1.6-249.3), hyperkalemia (OR 8.2 (95% CI 1.4-47.7), elevated lactate levels >2mmol/L (OR 5.2 (95% CI 1.4-19.7), oxygen therapy requirement (OR 5.9 (95% CI 1.3-26.1) and intubation (OR 4.8 (95% CI 1.3-17.6) were independent predictors of cardiac arrest.

Conclusion: One in a hundred paediatric patients who presents to EMD develop cardiac arrest at EMD and their mortality after cardiac arrest is high. Those who arrested were more likely to presents with signs of hypoxia, shock and acidosis, which suggest they were later stage in their illness. Outcome can be improved by strengthening the pre-referral care and providing timely critical management to prevent cardiac arrest.

Keywords: Predictors and outcome of cardiac arrest, Emergency Department, Tanzania.



Abstract No. 133.

The Post-Discharge Risk of Mortality in Children Under Five Years of Age in Western Kenya: A Retrospective Cohort Study

Titus K Kwambai (CDC)*

Introduction: Limited evidence suggests that children in sub-Saharan Africa hospitalised with all-cause severe anaemia or acute malnutrition are at high risk of dying in the first few months post-discharge. We aimed to determine the risk and determinants of post-discharge mortality among hospitalised children aged <5 years in an area with high malaria transmission in western Kenya.

Methods: We conducted a retrospective cohort analysis among recently discharged children <5 years of age using mortality data from a Health and Demographic Surveillance System that included household and paediatric in-hospital surveillance. Cox regression was used to compare post-discharge mortality by health conditions.

Results: Between 2008 and 2013, overall in-hospital mortality was 2.8% (101/3,639). Mortality by six months post-discharge (primary outcome) was 6.2% (159/2,556) and highest in children with severe acute malnutrition (SAM) (21.6%), followed by severe anaemia (15.5%), severe pneumonia (5.6%), 'other diagnoses' (5.6%), and severe malaria (0.7%). Six-month post-discharge mortality in children hospitalised with SAM (HR=3.95, 2.60-6.00, p<0.001) or severe anaemia (HR=2.55, 1.74-3.71, p<0.001) was significantly higher than in children without these health conditions and significantly lower in children with severe malaria (HR=0.33, 0.21-0.53, p<0.001). The odds of dying by six months post-discharge was higher than during the in-hospital period for all health conditions.

Interpretatio: The first six months post-discharge is a high-risk period for mortality among children admitted with severe anaemia and SAM in western Kenya. Post-discharge treatment and follow-up guidelines are needed to reduce mortality and morbidity.

Abstract No. 134.

Post Abortion Care Services at Kitale County Hospital, Transzoia County, Kenya

Selpha O Amuko (health - transzoia)*; Gabriel K. Nyang'au (Department of Health, Trans Nzoia County Government); sammy masibo (Department of Health, Transzoia)

Background: Post Abortion Care (PAC) includes the emergency treatment of complications as a result of abortion, counseling, referral to other reproductive health services and provision of family planning. Worldwide, abortion complications are among the major reasons why women seek emergency obstetric care. Unsafe abortion is still a leading cause of maternal death in most sub-Saharan African countries. In Kenya, nearly 465,000 induced abortions occur each year.

Methods: A retrospective descriptive study by reviewing data from the county hospital PAC register and drug stock cards at the hospital pharmacy for the period January – December 2020 was conducted. Information on age, gestation, presenting complication, type of family planning method and source of information for PAC services was collected using MS Excel® data collecting tool. Descriptive analysis was done using proportions for categorical variables and measures of central tendency for continuous variables.

Results: Data from a total of 333 women of reproductive age seeking post-abortion care services was reviewed. Of all the women who attended the clinic, only 27.3% sought elective abortion services with women aged 11-19 years being the majority (15.6%). Women aged 20-28 years were the majority (33.9% of 333) presenting with incomplete abortion. Most abortions occurred at 6-8 weeks gestation in all age groups. Some women, 79 of the total did not access post abortion family planning.

Conclusion: Most women presented with incomplete abortion at 6-8 weeks gestation hence need for more investigation on the causes of abortion. Adolescents were the majority who sought elective abortion services. The unmet FP need predisposes young women to unwanted pregnancy hence need for abortion services. The county government needs to identify and implement more strategies that will upscale FP uptake among young women.

Key words Abortion, post abortion care, post abortion family planning, elective abortion





SYMPOSIUM 3: JICA SATREPS MALARIA PROJECT





SYMPOSIUM 4: BIOTECHNOLOGY



THE ROLE OF GENOMICS IN HEALTH

Recently there has been upsurge of communicable and non-communicable diseases leading to high morbidity and mortality globally. Effective and efficient management of these disease is important. Therefore, there is an urgent need for robust innovative tools and technologies that can be used for prevention and management. Genomics, the study of genes, is making it possible to predict, diagnose, and treat diseases.

During the current COVID-19 pandemic, genomics has emerged as a key resource from case screening, disease surveillance to understanding SARS-CoV-2 variants. Additionally, the role of genomics in forensics cannot be downplayed, forensic databases such as human ancestry and origin has led to the development of health solutions especially with regard to mitochondrial diseases.

This symposium therefore seeks to provide a platform for discussion on the role genomic tools play in disease identification, management, and the development of health solutions. It also seeks to elucidate the opportunities, weaknesses, and threats in genomic research in Kenya.

Expected Outcomes:

1. The role of genomics in disease detection
2. Insight on the serology of SARS-CoV-2 in Kenya
3. An understanding on the transmission dynamics of SARS CoV-2 from a genomic perspective
4. Role of genomics in forensics

Symposium Programme

Chair: Dr. Damaris Matoke-Muhia **Co-Chair:** Dr. Lucas Nyabero **Rapporteur:** Kelvin Thiong'o

Date: 17th February 2022

Time	Topic	Presenter
2:30 -2:45PM	Opening remarks and BRP overview	Dr. Damaris Matoke-Muhia
2:45 -3:00 PM	Genomics for Bio-surveillance and Pathogen Discovery	Dr. John Waitumbi
3:00 -3:15 PM	SARS-CoV-2 genomics and transmission in Kenya	Dr. George Githinji
3:15 -3:30 PM	SARS-CoV-2 Serology in Health care workers in Kenya	Dr. Antony Etang
3:30 -3:45 PM	Forensic DNA data bases in the era of genomics	Ms. Eva Aluvaala
3:45 -4:20 PM	Panel discussion/question & answer	Dr. Bernhards Ogutu
4:20 -4:30 PM	Wrap up Dr. Luna Kamau	





SCIENTIFIC SESSION

21: AMR 2



Abstract No. 135.

Escherichia coli pathotypes in children under 5 years old with acute diarrhea in an urban informal settlement, Nairobi, Kenya

Moureen Jepleting (Washington state university)*

Background: Diarrhea is a leading cause of morbidity and mortality in children under the age of 5 years. Among the bacterial agents that cause diarrhea in children, diarrheagenic *Escherichia coli* (DEC) accounts for 30-40% of diarrheal cases in children in developing countries. Unlike other enteric bacteria which can be easily detected in the laboratory by conventional culture methods, pathotypes of diarrheagenic *Escherichia coli* can be detected by either traditional serotyping or by more advance molecular techniques. Molecular methods have more discriminatory power unlike the phenotypic methods, however they are rarely available for routine testing in resource limited settings resulting in occasional reports on incidences of DEC. This study aimed to determine the pathotypes and antimicrobial susceptibility profile of diarrheagenic *E. coli* (DEC) isolates from children below 5 years presenting with diarrhea in three clinics in an urban informal settlement in Kenya.

Methods: We conducted a laboratory based cross-sectional study on archived presumptive *E. coli* isolates obtained from children below 5 years of age presenting with diarrhea in three outpatient clinics in Mukuru, Nairobi between January 2017 to August 2018. Simple random sampling technique was used for isolates selection. *E. coli* identification and antimicrobial susceptibility testing was done on VITEK-2 System. Pathotyping of DEC was performed using singleplex Polymerase Chain Reaction (PCR). Data was analyzed using IBM SPSS.

Results: Out of the 382 bacterial isolates, 175 were confirmed as *E. coli*. DEC pathotypes were identified in (27%, 48/175) of the isolates. The predominant pathotype detected was Enteroaggregative *E. coli* (71%, 34/48), followed by Enterohemorrhagic *E. coli* (19%, 9/48) and Enteropathogenic *E. coli* (10%, 5/48) common in children between the age group of 1 and 2 years (32.6%) compared to other age groups. Overall, the DEC isolates were resistant to Ampicillin (83%), ampicillin-sulbactam (66%) and trimethoprim-sulphamethoxazole (88%) but 100% susceptible to amikacin, Tigecycline, Ertapenem, Meropenem and Imipenem. Intermediacy of 65% was also observed in Cefazolin. Low resistance of DEC to Gentamicin (15%), Ceftriaxone (8%), Ciprofloxacin(25%) and Cefepime (6%) was also recorded.

Conclusion: This study reports predominance of EAEC among children below five years of age in Mukuru and overall resistance to first line antibiotics; Penicillin and Sulfonamide. High intermediacy of DEC to Cefazolin suggests the possibility of acquiring resistance to this antibiotic. Resistance to Cefepime (4th generation cephalosporin) was also a major factor and this points out to the potential public health threat by *E. coli*. Therefore, there is need to build capacity for testing in laboratories located in Mukuru informal settlement as this will help in proper diagnosis and treatment of DEC related childhood diarrhea. This will also further support AMR surveillance in Kenya.

Abstract No. 136.

POINT PREVALENCE SURVEY ON ANTIMICROBIAL USE AT KITALE COUNTY REFERRAL HOSPITAL

Nancy Koech (Transzoia County-MOH)*; Preston Otieno (Transzoia County)

Background: The misuse of antimicrobials is a great driver of antimicrobial resistance. Antimicrobial resistance (AMR) is a growing public health treat today. Promoting rational use of antimicrobial agents through the antimicrobial stewardship program is crucial in curbing the increase in resistance. The study sought to determine the prevalence of antimicrobial use and hospital acquired infections and to identify key quality improvement indicators.

Methodology: The study was conducted at Kitale County Hospital (KCH), Trans-nzoia County. It was a descriptive cross sectional point prevalence survey. Universal sampling method was used; all the patients on antimicrobials in all the inpatient wards were sampled. Patients admitted for same day procedures and those prescribed for antimicrobials after 8 am on the day of the study were excluded.

A standardized antimicrobial PPS tool adopted from the British Society of Antimicrobial Chemotherapy (BSAC) was used for data collection. Data was collected in August by trained pharmacists and pharmacist interns. Data was entered into an Epi-info form and analyzed using STATA software. The findings of the study are being disseminated to various departments for action and quality improvement.

Results: Of the 219 inpatients during the study, 51.14% were on at least one antimicrobial. 423 antimicrobials were prescribed during the current admission. Majority of these patients on antimicrobials were from the pediatric and female medical ward (20.9%). The female medical ward had the highest (77.4%) prevalence of antimicrobial use. The surgical, medical and pediatric wards had a prevalence of >50% of antimicrobial use. Approximately 60% of the patients were on at least two antimicrobials while 18.9% were on up to four antimicrobials. Ceftriaxone and metronidazole were the most commonly used antimicrobial (33.01% and 17.48%). The most common route of administration was parenteral route accounting for 74.76%. Community acquired infections were common (56.3%) while the hospital acquired infections were at 7.77%. Very few patients were put on antibiotics for surgical prophylaxis; with antibiotics being given post-surgery. Hospital acquired infections (HAI) were common in the gynecology and maternity wards (>30%). The utilization of the laboratory for microbiology testing was low. 33.7% of the antimicrobials prescribed in the hospital were irrational. Maternity ward had highest percentage of irrational prescribing of antimicrobials. Majority of the prescriptions were incomplete (73.79%).

Conclusion: The prevalence of antimicrobial use was above the WHO reference value of 30% or less. Irrational prescribing of antimicrobials, incomplete prescriptions and use of antimicrobials without due regard to various guidelines including the AWARE classification are among the key drivers of AMR. And in addition, empirical prescribing lowers the utilization of the microbiology culture and sensitivity testing.



Abstract No. 137.

Spectrum and antimicrobial resistance genes in bacterial and fungal pathogens from TB smear-negative and retreatment cases in selected Counties in Kenya.

Sally N Loronyokie (KEMRI)*; Abdi Mohamed (KEMRI); Benear Obanda (KEMRI); Njeri Kariuki (KEMRI); Richard R.K Korir (KEMRI); Christine Bii (KEMRI)

Background: Pulmonary tuberculosis is a significant predisposition to fungal colonization and secondary bacterial infection. The long-term exposure to antibiotics during TB treatment selects for antimicrobial resistance.

Objectives: To determine bacterial, fungal pathogens and drug resistance in TB smear-negative and retreatment cases.

Methods: Sputum from consented smear-negative and retreatment TB patients were subjected to bacterial and fungal investigations using CLSI standard protocols; microscopy, bacterial/fungal culture, antimicrobial susceptibility and PCR targeting for TEM, SHV, INT, OXA and CTX-M genes.

Results: Participants (350) were enrolled; median age was 38 years (IQR: 18-78), of whom 62% (217) were males and 38% (133) females. Seventy bacteria were isolated as follows: *Escherichiacoli* (18.2%), *Klebsiellapneumoniae*. (32.5%), *Pseudomonas aeruginosa*. (24.7%), *Proteus spp.* (10.4%), *Citrobacter spp.* (2.6%) and *Stenotrophomonasmaltophilia* (1.3%). Multiple pathogens were detected in 25 patients exhibiting different antimicrobial susceptibility profiles. Resistance to antimicrobial drugs were; Ampicillin 73%, Chloramphenicol 41%, Sulfamethoxazole-Trimethoprim 61%, Ciprofloxacin 21%, Gentamicin 34%, Azithromycin 57%, Tetracycline 43%, Ceftazidime 22%, Cefotaxime 36%, Ceftriaxone 31%, Cefepime 29%, Aztreonam 32%, Imipenem 2.6%, Amoxicillin-Clavulanic acid 17%, Piperacillin-Tazobactam 0%. *Pseudomonas aeruginosa* exhibited a higher resistance to Ciprofloxacin (88.71%) and Gentamycin (54.79%), *Klebsiella pneumoniae* and *E.coli* isolates presented equal resistance of 59.53%, 48.19% and 30% to Amoxicillin-Clavulanic acid, Ciprofloxacin and Gentamycin respectively. Among the pathogens tested. 28.6%, 58.4%, 13.3%, 6.5% were positive for CTX-M, TEM, SHV and INT genes, respectively.

Fungal culture yielded 73/350 (20.9%) for fungi with; *Aspergillus fumigatus* (52.0%), *A. niger* (32.0%), *A. terreus*, *A. flavus*, *A. candidus*, and *A. clavatus* (4.0%) each. *Penicillium spp.* was (10.4%), *Scedosporium spp.* (10.2%) and *Rhizopus spp.* (6.1%). *Candida albicans* 18 (34.6%) *C. glabrata* 5 (9.6%), *Cryptococcus spp.* (5.8%) and 13 (25%) other yeasts.

Discussion and conclusion: Drug resistant *Pseudomonas aeruginosa*, *E. coli*, *Klebsiella pneumoniae*, *Proteus mirabilis* and co-infection with fungi could complicate TB diagnosis and management. Investigation and antimicrobial monitoring of non-TB pathogens prior to, during, and post-TB is recommended before retreatment.

Abstract No. 138.

Quality Evaluation of Co-trimoxazole Suspensions in Nairobi, Kenya.

Lilian Koech (KEMRI)*

Background: Medication non-adherence is often cited as a driver of antimicrobial resistance in clinical practice. Poor-quality medicines impede the efforts of patients who take medicines correctly, creating similar sub-therapeutic results and potentially resulting in treatment failure. Co-trimoxazole, a fixed-dose combination of sulfamethoxazole and trimethoprim, is a broad-spectrum antibacterial agent for treating bacterial diseases and is also used as a prophylaxis drug for opportunistic infections in human immunodeficiency virus (HIV)-infected individuals. Increased reports of bacterial resistance in the acquired immunodeficiency syndrome (AIDS) era have extensively been attributed to the widespread use of co-trimoxazole prophylaxis against opportunistic infections in HIV/AIDS patients. This study, therefore, evaluated the quality of selected co-trimoxazole oral suspension marketed in Nairobi County, Kenya.

Methods: A total of 106 samples were collected, characterized into 15 brands, and evaluated for active pharmaceutical ingredient content (API) and pH following United States Pharmacopeia (USP). Assay for API potency was conducted using High-Performance Liquid Chromatography, and results were compared with pharmacopoeia references. Visual examination of the medicines packaging and confirmation of retention status of the brands with Pharmacy and Poisons Board retention register was carried out.

Results: The majority of the samples were of local origin (86.7%). On October 23, 2019, the retention status of six of the fifteen brands documented was not listed in the Pharmacy and Poisons Board retention register. Of the 106 samples analyzed, 70.6% and 86.8% complied with USP specifications for pH and API, respectively, while 84.0% adhered to packaging and labelling requirements.

Conclusion: This study demonstrated that the majority of co-trimoxazole suspensions tested were compliant with USP requirements. Additionally, it has provided evidence of poor quality co-trimoxazole medicines that could compromise the treatment of infectious diseases in patients contributing to bacterial resistance. These results emphasize the need for regular quality assurance tests to ensure only quality medicines are in the Kenyan market.





SCIENTIFIC SESSION

22: HEALTH SYSTEMS

3



Abstract No. 139.

Effect of Organizational Factors on Quality of Care offered at a National Tertiary Referral Hospital in Kenya; Healthcare workers perspectives

Karingo Agnes Karume (Kenyatta National Hospital)*; **Pirirei Sankei** (Kenyatta National Hospital); **Lydia Okutoyi** (Kenyatta National Hospital); **John Kinuthia** (Kenyatta National Hospital)

Background: Quality and safety is the link to improved health, responsiveness, social and financial risk protection and improved efficiency according to the WHO health systems block. In order for providers to perceive that they are providing quality care the organizational structures and processes involved need to be aligned to support optimum care provision.

Methods: The study sought to determine health care workers perspectives on effect of organizational factors on quality of care offered. Physical work environment, communication and coordination of care and leadership and management support were assessed based on the Donabedian Quality model. A cross-sectional survey with stratified random sampling of nurses and doctors was conducted of whom 400 took part. Data was collected using self-administered questionnaires and descriptive and inferential analysis of the data done.

Results: Of the respondents 62% were nurses while 38% were doctors. There was a positive moderate relationship between physical work environment ($r = 0.389$, $p < 0.001$), communication coordination ($r = 0.351$, $p < 0.001$), leadership and management support ($r = 0.430$, $p < 0.001$) and perception of quality of care. On physical work environment 46% agreed to have the necessary equipment needed to do their job optimally, 49% that their work area is visually appealing, 66% that their work area is clean and hygienically safe but only 32% agreed that they were able to take a break and restful places provided for this. On communication and care-coordination 45% agreed to getting timely specialized patient reviews, 77% were able to engage often in multidisciplinary discussions, 68% had a clear standard way of handing over patients and 56% used technology for communication. On leadership and management support 80% agreed that their roles were clear, 53% of the respondents felt that they were able to express their concerns freely, 41% were able to bring to the forefront a medical error without fear of victimization but only 22% felt appreciated for good work. The care offered was considered to be of the highest quality by 66% of the participants and overall perception index was at 66.1%.

Conclusion: Unavailability of some resources, lack of adequate restful spaces for breaks, delayed intercommunication between the departments, lack of a safe environment for reporting and learning from errors and lack of reward impacted negatively on quality service provision. These should thus be addressed to enhance health care workers perceptions in their ability to provide quality care.

Key Words: Quality of Care, Organizational Factors, Health Care Workers Perspectives

Abstract No. 140.

THE CHANGING LANDSCAPE IN FUNDING OF HIV/AIDS PROGRAM; PERSPECTIVES AND EXPERIENCES OF CAREGIVERS OF PEDIATRIC PATIENTS AT KISII TEACHING AND REFERRAL HOSPITAL

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Background: Acquired immunodeficiency syndrome (AIDS) secondary to Human immunodeficiency virus (HIV) infection remains one of the most serious public health challenges as it is associated with high rates of mortality and morbidity. The cost of care is enormous, and most treatment services have been offered successfully through donor funding. However, a reduction in funding opportunities has been reported and this may affect the quality of caring for children living with HIV/AIDS.

Methods: A cross-sectional descriptive design with a phenomenological approach was used to conduct a study at Kisii Teaching and Referral Hospital, whereby data was collected to saturation levels using an in-depth interview (IDI). A purposive sampling technique was used to select potential participants from in-patient and Comprehensive care centers and an in-depth interview was conducted on those who met the inclusion criteria. The audio files for the IDIs were transcribed into a Microsoft text document, transferred into an R version 4.0.2 type of software by the researcher, and a thematic review was done. The field notes and interview transcripts were read and re-read for an understanding of the general impression of emerging themes, whereby a qualitative data analyst was engaged for assistance in the analysis, and findings were presented narratively

Findings: Eight respondents were drawn from KTRH pediatric in-patient ward and Comprehensive Care Center, 25% and 75% respectively. The demographic information revealed that 75% of the respondents were women, 25% men, and all had at least a high school certificate. All the respondents asserted that the transition from a robust donor funding of the HIV/AIDS regime to a reduced one had significant challenges. The reduction of funds had reduced the frequency of drugs disbursement from 6 months to two weeks supply and nutritional supplement programs being terminated. Some caregivers had tried to cope by farming, table banking, and casual laboring.

Conclusion: The study showed that a significant transition challenge evidenced by the caregivers taking up the role to fill gaps in care through out-of-pocket payments to pick drugs, consultation, and laboratory services which initially were supported 100 percent by donors. This led to compromised care of children living with HIV and increased caregivers' expenditure exacerbating the negative experiences that caregivers have with children post-funding. However, it is a reality and as a result, some have resorted to alternatives for survival though with straining.



Abstract No. 141.

The Impact of Strengthening Community Health Services on Malaria Cases That Receive Prompt and Effective Treatment in Migori and Kwale Counties

Athuman Chiguzo (KEMRI)*

Introduction: In Migori and Kwale Counties, Malaria is the leading cause of morbidity and mortality and accounted for 40 and 30% of outpatient attendance respectively in 2011. A community based comparative analytical intervention study design was implemented at baseline and four years post-intervention to measure the impact.

The intervention in this study refers to strengthened community health services by established community health units as well as trained Community Health Volunteers (CHVs) on malaria case management.

Methods: Mixed method cross-sectional baseline and endline household surveys were carried out in Migori and Kwale counties which constituted the intervention and control study sites respectively. The primary study participants were heads of households while secondary participants were Focus Group Discussions and Key Informant Interviews. Health facility data on malaria morbidity were gathered on monthly basis from four Community Health Units each in both intervention and non-intervention areas between January 2013 to December 2016.

Results: The study found out that malaria incidences among the general population in Migori County significantly reduced from 36.7% in 2013 to 29.6% in 2016 (z -value = 2.175; 95% CI) compared to Kwale where it decreased slightly from 63.7% to 61.0% (z -value = 0.679; 95% CI). The mean annual malaria cases for those above five years for all facilities decreased significantly from 154/1000 in 2013 to 69/1000 in 2016 in Migori County (z = 2.1104 at 95% CI) compared to Kwale County that decreased slightly from 113/1000 in 2013 to 69/1000 in 2016, (z = -0.90175 at 95% CI). The mean annual malaria morbidity among children under five in all health facilities in Migori decreased significantly from 132/1000 in 2013 to 40/1000 in 2016, (z = 2.9371 at 95% CI) compared to Kwale where it increased slightly from 624 in 2013 to 768 in 2016, (z = -0.5247 at 95% CI).

Testing for malaria in 2013 and 2016 in Migori increased significantly z =+27.35; 95%CI compared to Kwale, z =+4.799; 95%CI. Those who took ACTs within 24hrs of onset of fever increased significantly in Migori z =5.54; 95%CI compared to Kwale z =1.30; 95%CI.

Conclusion: The study concludes that the approach of strengthening community health services (level one) by using trained CHVs is feasible and has demonstrated a faster and perhaps sustainable means of achieving the objective of 100 % of fever cases receiving prompt treatment within 24 hours.

Abstract No. 142.

Changes in technology adaptation: A case of Bungoma County Hospital

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Introduction: Patients /clients seeking treatment in Bungoma County Hospital were going through numerous processes because of too much writing from one department to the other. Retrieving their records for reference would also sometimes prove difficult. Arising from this phenomenon, the hospital management team decided to investigate the reasons for the cases of the sometimes missing records and explore possible solutions to address these problems. The objective of this paper is to describe the reasons and lessons learnt from the interventions that led to the use of a paperless system at Bungoma County Hospital.

Methodology: This was a descriptive case study. The hospital management committee (HMT) met, discussed and agreed to adopt a computerized system. During the budgeting, some money was set aside for the said purpose. Thereafter, all requirements were assembled including installation of computers in various departments. Moreover, the hospital hired an IT (information technology) personnel to manage and maintain the system; conducted continuous medical education to the hospital staff; and set the date of commencement. The heads of departments were then notified at a meeting on when to start using the computers.

Findings: The health records department was given the mandate to lead the process. They would run periodic reports, analyze them and present the data at different levels (records department, top hospital management, clinicians, HMT); identifying gaps and employing strategies on how to overcome them. Through frequent analysis of the data generated and meetings held with clinician's, data capture in the system increased and compared to what was being reported earlier, there was more consistency in reporting. Over time this intervention has saved the hospital money that was previously used to procure medical stationery in the outpatient department. This money could be used for other needs in the hospital. Additionally, the revenue collected increased by about 20% owing to the use of the electronic system.

Lessons Learnt: Involving the leadership and gaining their support in decision making is key in improving health systems. Data demand and information use is very critical in-service delivery. Hospitals should continuously analyse and present the data generated to make informed decisions on day to day to improve health services.

Conclusion: Health facilities should routinely be analyzing and using the information generated to improve health systems and even the quality of services offered.



Abstract No. 143.

Early lessons from the study “Health and Demographic Surveillance System (HDSS): Developing a sustainable data infrastructure for longitudinal population-based epidemiological studies in Kwale and Homa Bay counties, Kenya”.

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Background: A Health and Demographic Surveillance System (HDSS) monitors a population’s demographic and health dynamics over time. A population’s demographic dynamics impacts its overall health (McDonald et al. 2012). While national civil registration systems can capture such information, the infrastructure for registering vital statistics may be weak in developing countries (Ye et al. 2012), despite growing demand for timely and accurate data. NUITM-KEMRI Project had run two HDSSs, in Mbita (Homa Bay County) and Kwale (Kwale County). Various tools and systems have been developed and introduced despite various challenges, such as the low usability of collected data. The study will further upgrade the system using improved digital technologies. A pregnant Woman and Infant Registration (WIRE) system has also been implemented in Kwale area, which captures indicators on the Mother and Child Health (MCH) Handbook. The study will link WIRE system with HDSS to expand the scope of studies using HDSS data for greater diversity and usability. This presentation is for sharing findings encountered at an early stage of our study implementation.

Methods: Study design is a longitudinal study in geographically defined areas (Mbita and Kwale sites). NUITM-KEMRI HDSS platform on proprietor applications will be established based on a baseline survey on all the households in the coverage areas. Our approach to villages is aligned with the Community Units (CUs). Our Kwale site comprises 12 CUs with nine linked health facilities. The study starts in Kwale area and will reach Mbita site later. A baseline household survey will be first conducted to base the HDSS database. Then, selected life events (migration, death, birth, marriage) will be registered closely with community health volunteers (CHVs). CHVs will contact data managers responsible for registering reported life events at each event.

Results: The baseline survey in Kwale site was completed in December 2021, having used an open- source application, ODK Collect, which allowed us to save data input time to a great extent. The study is in the process of data verification. The baseline survey has captured about 10,500 houses and 57,400 people of 102 villages. The study observed many missing birth years and phone numbers, errors of village registration, and gender mistakes because of confusion on the term “household head” and “spouse”. Three out of 126 CHVs of the coverage area have refused to cooperate because of motivation. The WIRE operation will capture the information from MCH handbooks, but they are currently out of stock. **[Conclusion]** The HDSS database will be functional after uploading rectified household information. WIRE system at the participating facilities will start the registrations following the MCH Handbook distribution and necessary training. Continuous supply of MCH Handbooks will be essential for the effective operation of WIRE system.

Abstract No. 144.

Evaluation of the Influenza Surveillance System in Kenya, 2017–2018

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Background: Influenza is a viral respiratory disease considered global threat since it has potential to trigger outbreaks and pandemics. Globally, seasonal influenza viruses’ mortality ranges from 291 243–645 832 annually, of which 17% occurs in Sub-Saharan Africa. In Kenya, influenza is present throughout the year for instance, 2011 recorded Influenza B (31%), influenza A (62%) and subtyped (7%), influenza surveillance system not evaluated for the period under review. Evaluations recommended to identify areas for improvement and provide evidence of data reliability for policymaking.

Methods: CDC surveillance system evaluation guidelines used to evaluate performance of the influenza surveillance system at Division of Disease Surveillance and Response Kenya. MS Excel data abstraction tool used to extract data from influenza database register for year 2017–2018. Variables collected included demographic, clinical, period of reporting and laboratory results data. Attributes evaluated include; data quality, completeness and representativeness. Descriptive statistics performed.

Results: Records reviewed from 2017–2018, with 4763 cases tested, median age was 0.9 years (Range 0 – 92) years, most cases being below 5yrs, and male were 2632(55.3%), 2018 reported higher number of confirmed flu cases at 62% (209/336). Among 7% (336/4763) influenza positive cases type A was most common at 79.8% (268/336). On vaccination status 1.7% (85/4763) of the cases got flu shots, with only 4% (3/85) testing positive among the vaccinated, the system picked 15.8% (754) malnutrition case, 3.5% (167) Neurological and 2.6% (126) case of TB. All sentinel sites reported at 100% (9/9). From the data quality audit conducted 50% (3/6) of the variables assessed met the upper limit threshold set at 80%.

Conclusions: The system performed overall satisfactorily and provided reliable and timely data, gaps in data quality were noted. Most facilities reported cases throughout the surveillance period. Protective effect of vaccine was noted with few positive cases among vaccinated, however Low uptake of flu vaccine persists. We recommend sensitization on flu vaccine and close collaboration with associated departments such as nutrition, psychiatry and tuberculosis to bolster reporting and enhancing treatment outcomes for these patients.

Key words: Sentinel Influenza, Human Pandemics Kenya Virus Diseases

Abstract No. 145.

EVALUATION OF MEASLES SURVEILLANCE SYSTEM KENYA, 2019-2020.

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Background: Measles is a highly contagious, vaccine-preventable viral disease common among children aged below 5 years and nonimmune persons of any age. Measles case-based surveillance helps in monitoring the progress of measles eradication. We described epidemiological characteristics of Measles cases and evaluated the Measles surveillance system.

Methods: Using the WHO case definition for measles, we abstracted national case-based measles surveillance data from January 2019 to December 2020. We used the revised CDC guidelines to evaluate guidelines and assessed simplicity by conducting a face-to-face Key Informant Interview. Representativeness was assessed by reviewing the characteristics of reported measles cases across all 47 counties. We assessed demographic characteristics, clinical information using descriptive statistics.

Results: We reviewed 1030 records 773 (75.4%) were reported in 2020, while 252 (24.6%) were reported in 2019. The median age was 5 years (IQR 5years), 464(45.05%) were female, 573(55.63%) were below 5 years old. The trend of measles cases in the two years showed peaks in the first quarter and gradual reduction in the second quarter. 379(36.8%) cases had incomplete data across the counties. From the key informant interview, the surveillance system was simple but lacked laboratory diagnosis at the county level. All 47 counties reported measles cases, West Pokot reported 330 (32.04%), Garissa 83 (8.06 %), Lamu,1(0.10%) cases, Clinical Characteristics, among the suspected measles cases 115(11.2%) were positive,523(50.8 %) were negative,379(36.8%) had missing data while 11(1.1%) were indeterminate, only 120(11.7%) cases were confirmed by laboratory tests, 371(48.1%) by Epi link. Among the suspected measles cases 52.6% (308/586) were unvaccinated of which 10.4%(32/308) were IgM antibodies positive,6.5%(18/278) were vaccinated.

Conclusion: The majority of the cases occurred in those aged below 5 years. measles infection remains a burden especially in West Pokot, with sub-optimal laboratory confirmation across the counties since diagnosis is conducted in KEMRI which was discussed during key informant interview. We recommend enhancing active surveillance, increasing routine immunization coverage, and leveraging on outreaches especially where the health facilities are inaccessible to reach the unvaccinated children.

Keywords: Measles; Vaccines; Kenya; Laboratories; Data Analysis.

Abstract No. 146.

A COMPARATIVE STUDY ON STRENGTHENED COMMUNITY HEALTH SERVICES FOR UTILIZATION OF MALARIA CONTROL INTERVENTION IN MIGORI AND KWALE COUNTIES OF KENYA

Athuman Chiguzo (KEMRI)*

Background: Malaria is the leading cause of morbidity and mortality and accounted for 40% and 30% of the outpatient attendance in 2011 in Migori and Kwale counties respectively. Perhaps, one reason for this high morbidity is the lack of capacity to deliver malaria interventions. Community Health Volunteers (CHVs) are individuals chosen by the community and trained to address health issues of individuals, households and communities. They are catalysts, whose role is to enable individuals take control of their health.

Methods: A community based comparative analytical intervention study design was implemented at baseline and four years Post-intervention to measure the impact of strengthened community health services. The independent variables are established community health units and trained CHVs while dependent variables are malaria cases and utilized malaria control interventions. Migori and Kwale counties were compared before and after intervention. Kwale County served as control. A baseline and follow-up Household Surveys in each of the counties were conducted to act as the pre-data and post-data respectively.

Results: In general malaria cases reduced significantly in Migori $z=3.0645$; 95% CI between baseline and endline surveys compared to Kwale $z=-0.8431$; 95%CI. Testing for malaria in 2013 and 2016 in Migori increased significantly $z=+27.35$; 95%CI compared to Kwale, $z=+4.799$; 95%CI. Those who took ACTs within 24hrs of onset of fever increased significantly in Migori $z=5.54$; 95%CI compared to Kwale $z=1.30$; 95%CI. Nets in use the night before survey by children <5 years increased significantly in Migori $z=+22.36$; 95%CI compared to Kwale $z=+1.04$; 95%CI. Nets in use the night before survey by pregnant women increased significantly in Migori $z=+4.41$; 95%CI compared to Kwale $z=+0.679$; 95%CI.

Conclusions: The study concludes that involving and engaging trained CHVs contributes significantly to malaria morbidity reduction.



Abstract No. 147.

A multicenter randomized controlled trial to determine the effect of real-time digital feedback on quality of bag-valve-mask ventilation

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Background: Effective bag-valve-mask ventilation is critical for the reduction of perinatal asphyxia-related stillbirths and neonatal deaths; however, providers often fail to achieve and maintain effective ventilation skills following training. The Augmented Infant Resuscitator (AIR) device attaches to standard bag-valve-masks and provides clinicians with visual feedback on the presence of air leaks, blocked airways, harsh breaths, and improper ventilation rates. We evaluated the effect of this real-time digital feedback on ventilation quality as well as on the time to and the duration in effective ventilation in a multi-center randomised controlled study in Uganda and Boston, Massachusetts, United States.

Methods: Birth attendants were computer randomised to receive either real-time AIR device visual feedback (intervention arm) or no device feedback (control arm). Intervention arm participants received a two-minute orientation on how to interpret AIR device feedback using a single-page iconography chart. Both intervention and control participants were randomised to three blinded ventilation scenarios on identically appearing manikins whose airways were either normal, partially leaking air, or partially obstructed. In this analysis, the quality of the ventilation of normal manikins among intervention and control arm participants was compared.

Results: We enrolled 270 birth attendants, 60 (22.2%) from the U.S. and 210 (77.8%) from Uganda. A total of 293 ventilation sessions were completed by 204 providers randomised to ventilate at least one normal manikin. Birth attendants ventilating with AIR device feedback achieved effective ventilation 2.0 times faster, 13.8s [95% CI 10.6, 17.1], compared to controls, 27.9s [95% CI 21.6, 34.3], $p < 0.0001$. The duration of effective ventilation was also 1.5 times longer in the intervention arm, 72.1s [95% CI 66.7, 77.5] compared to the control arm, 47.9s [95% CI 41.6, 54.2], $p < 0.001$.

Conclusion: Real-time digital feedback on ventilation quality from the AIR device facilitates faster attainment and longer maintenance of effective manikin ventilation among birth attendants in Uganda and the U.S.





SCIENTIFIC SESSION

23: GENOMICS



Abstract No. 148.

Essential diagnostics: strengthening methods and capacity for evidence-based diagnostic practice for effective national and county programs in Kenya

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Background: Diagnostic testing is an essential component of the health system and a vital consideration in the roll-out of Universal Health Coverage but complex to implement. To explore gaps and discuss a roadmap for strengthening methods and capacity for evidence-based diagnostic practice for effective national programs in Kenya, we conducted stakeholder-engagement workshops with stakeholders involved in the diagnostic field at the national and county level in Kenya.

Methods: Between August and September 2021, we held three workshops, one with national stakeholders and two with county stakeholders. The attendees were drawn from Kenya Medical Research Institute and other research institutions, the Ministry of Health, County Health Officials, Referral Public Hospitals, National Public Health Laboratory Services, African Public Health Laboratory Services, The Foundation for Innovative New Diagnostics, Academic institutions, and Private laboratories. We did not limit to any disease focus in order to get a landscape overview of the state of essential diagnostics in Kenya.

Results: In total 102 participants attended the workshops held in Naivasha (n= 30), Kisumu (n=31) and Siaya (n=41). The following gaps to evidence-based diagnostics were brought forward:

- There is a significant lack of systematic approaches in handling diagnostic data and evidence to make decisions.
- Laboratories in Kenya fall short in policy management or presenting data to inform decisions. There is a significant deficit in data management and utilization.
- There is poor updating of laboratory guidelines. The last national laboratory guidelines were prepared in 2006 with no further updates.
- Dissemination and implementation of existing laboratory and diagnostic guidelines is a challenge
- There is a lack of clarity on whether current laboratory indicators are adequate to inform decisions on testing
- The process of introducing new tests or algorithms is erratic; new algorithms are introduced when existing ones have barely taken root leading to a waste of resources
- Influence, politics, donor community, and authority are still significant in decision-making.
- Global frameworks to guide evidence to decision-making were perceived as complex by the group and did not consider the complexities of decision-making in Kenya.

Abstract No. 149.

β -Thalassemia pathogenic variants in a cohort of children from the East African coast.

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Presenter: Johnstone Makale

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Background: β -Thalassemia is rare in sub-Saharan Africa. Previous studies have suggested that it is limited to specific parts of West Africa. Based on hemoglobin A2 (HbA2) concentrations measured by HPLC, we recently speculated that β -thalassemia might also be present on the East African coast of Kenya. Here, we follow this up using molecular methods.

Methods: We used raised hemoglobin A2 (HbA2) values (> 4.0% of total Hb) to target all HbAA members of a cohort study in Kilifi, Kenya, for HBB sequencing for β -thalassemia (n = 99) together with a sample of HbAA subjects with lower HbA2 levels. Because HbA2 values are artifactually raised in subjects carrying sickle hemoglobin (HbS) we sequenced all participants with an HPLC pattern showing HbS without HbA (n = 116) and a sample with a pattern showing both HbA and HbS.

Results: Overall, we identified 83 carriers of four separate β -thalassemia pathogenic variants: three β 0-thalassemia [CD22 (GAA→TAA), initiation codon (ATG→ACG), and IVS1-3' end del 25bp] and one β + -thalassemia pathogenic variants (IVS-I-110 (G→A)). We estimated the minimum allele frequency of all variants combined within the study population at 0.3%.

Conclusions: β -Thalassemia is present in Kilifi, Kenya, an observation that has implications for the diagnosis and clinical care of children from the East Africa region.



Abstract No. 150.

Identification and characterization of novel viral pathogens among arthropod vectors using High-Throughput Sequencing: The KEMRI-viral haemorrhagic fever laboratory experience

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Background: Emerging and re-emerging arthropod-borne infections have caused significant human health and economic burden globally. These infections have been associated with recurring outbreaks such as dengue, chikungunya, yellow fever, and rift valley fever. Majority of the emerging viruses causing these infections are zoonotic. The events that lead to spillover of these pathogens from their zoonotic origins as well as sustained human-human transmission involve competent vectors such as mosquitoes, ticks, sandflies and biting midges. The response and mitigation strategies for fighting these infections are mostly dependent on surveillance programs, which allows the early detection of novel pathogens and timely response before they can cause outbreaks. High throughput sequencing (HTS) provides a more accurate identification and characterization of pathogens causing these diseases. This study highlights HTS strategies currently employed by KEMRI-VHF Laboratory to identify and characterize potential viral pathogens among vectors.

Methods: The samples were collected during routine surveillance and included mosquitoes, ticks, sandflies, and biting midges. Prior to sequencing, potentially novel pathogens were amplified in cell cultures; vero and C6-36 cell-lines. The amplified viruses were harvested and subjected to high-throughput sequencing using the Illumina miseq platform. Library preparation was carried out using the Truseq-Stranded mRNA Kits, following the instructions of the manufacturer. Sequence analysis involved data cleaning, de novo sequence assembly and homology search to determine the taxonomic identity of the viruses. Further analysis was also carried out to determine the phylogenetic placement and the origin of the identified viruses.

Results: Out of the 72 isolates subjected to sequencing to date, 26 of them were successfully sequenced. Majority of the viral genomes successfully assembled were complete, with the segmented viruses also resulting in the recovery of all the expected segments. The viruses that were characterized included those that can be considered as novel, based on ICTV guidelines on the naming of new viruses. Twenty two (22) of the viruses characterized fall in families that were previously associated with epidemics; Togaviridae, Flaviviridae, Peribunyaviridae, Rhabdoviridae, and Reoviridae families. Other viruses that were characterized were insect-specific including those under the Iflaviridae, Partitiviridae, and Chuviridae families as well as the recently discovered Negevirus taxon.

Conclusion: The study reports the successful sequencing of a number of novel pathogens, with potential public health implication. The methods employed here have shown great promise despite the existing challenges. Continued improvement of these methods such as the use of viral enrichment strategies is necessary for better and more efficient protocols of sequencing.

Abstract No. 151.

Evaluation of urine dipstick test reliability in UTI diagnosis

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Background: Culture is the gold standard diagnosis for Urinary Tract Infections (UTIs). However, most hospitals in poor-resource countries lack adequately equipped laboratories and relevant expertise to perform culture and therefore heavily rely on dipstick tests as an alternative diagnosis method for UTIs. This method is easy and inexpensive to perform and produces results within a short period of time (Approximately five minutes) hence making it popular in many hospitals in Kenya. The basis of dipstick diagnosis includes high leukocyte count and esterase and nitrates positivity.

Objective: We set to determine the reliability of dipstick as an accurate diagnostic test for UTI using culture as the reference gold standard method. The Objectives of the study were to: 1. Determine sensitivity, specificity, negative and positive predictive values of leukocytes esterase and nitrates tests for UTI diagnosis. 2. Determine estimated UTI prevalence based on leukocytes esterase and nitrates tests.

Methods: The study recruited 1,898 patients with UTI symptoms seeking treatments in six health centres located in Nairobi, Makueni, and Nanyuki metropolitans. The urine samples were subjected to both dipstick and culture analysis. The culture was done on CLED with the growth of $\geq 1 \times 10^5$ CFU/mL being considered as UTI positive.

Results: a) Nitrates test results Sensitivity = 89.8%, Specificity = 50.7%, Positive predictive value = 19.8% and Negative predictive value = 97.4% UTI prevalence by nitrate test = 11.9% b) Leukocytes test results Sensitivity = 66.4%, Specificity = 56.3%, Positive predictive value = 56.5% and Negative predictive value = 66.2% UTI prevalence by leukocytes esterase = 46.0% c) From a culture of 1,898 urine samples, 1,027 were positive for UTI (a prevalence of 54.1%), 288 fell below 1×10^5 CFU/mL threshold and were considered as contaminants while 583 yielded no growth.

Conclusion: The prevalence of UTI based on both leukocytes and nitrates was below 54.1% based on culture, which is the gold standard. The dipstick alone is therefore not a reliable diagnostic test for UTI hence culture should be done for accurate results.



Abstract No. 152.

Genome-wide Association Study of Vitamin D status in Africans

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Background: Previous studies indicate that vitamin D deficiency may be prevalent in populations living in Africa despite year-round sunshine. Although there have been several vitamin D genome wide association studies (GWAS) that describe genetic variants that influence vitamin D status in Europeans, none has been performed in Africans.

Methods: In this study, we conducted a discovery GWAS of 25 hydroxyvitamin D (25OHD) concentration in 4,349 African children from Kenya, Uganda, Burkina Faso, The Gambia and South Africa. We performed association analyses using Genome-wide Complex trait Analysis (GCTA), meta-analysis of the site-specific GWAS summary data using Metasoft, and fine mapping using FUMA.

Results: We found 3 independent signals across 2 chromosomes that were significantly associated with 25(OH)D levels. These signals were mapped in vitamin D metabolism genes that have been reported in previous GWAS, namely vitamin D binding protein (GC), 25-dihydroxylase (CYP2R1), 7-dehydrocholesterol reductase (DHCR7), and nicotinamide adenine dinucleotide synthetase 1 (NADSYN1). However, most of the vitamin D associated variants that were reported in previous European GWASs did not replicate in the current GWAS, suggesting that Africans may have a different genetic architecture of vitamin D status than Europeans. We are currently performing a replication GWAS in individuals of African ancestry from the Jackson Heart Study (n = 3,029) and UK Biobank (n = 7,700).

Conclusions: Findings from this GWAS would have many applications, including improving our understanding of vitamin D biology, predicting Africans who are genetically predisposed to vitamin D deficiency, and evaluating the association between vitamin D and various clinical conditions through Mendelian Randomization studies.

Abstract No. 153.

GENOMIC ANALYSIS OF KENYAN INFLUENZA B VIRUS MATRIX AND NON-STRUCTURAL PROTEINS; A PRELIMINARY REPORT

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Introduction: Human influenza B viruses are causative agents of acute respiratory infections (ARIs) and more specifically influenza-like-illness (ILI). Studies have shown that the virus is associated with high morbidity and mortality in developed and developing countries. The viruses undergo constant genetic mutations but at a slower rate compared to influenza A viruses. The matrix (M) plays an important role during virus entry, assembly, and uncoating and while the non-structural (NS) protein plays a role in inhibiting the host antiviral response during the virus replication cycle. Currently, there is limited information on the genetic evolution of the M and NS proteins in the influenza B viruses in Kenya.

Broad Objective: We aimed at evaluating the genetic evolution of the matrix (M) and non-structural (NS) proteins of viruses isolated between 2005 – 2017 at the ARI Unit, CVR, KEMRI.

Methods: Over 600 influenza B positive samples from surveillance carried out between the years 2005 – 2017 within Nairobi and its environs were cultured on MDCK cell line and confirmed via HA assay. Isolates with high titres had their RNA extracted using QIAGEN RNA minikit according to kit manufacturer's instruction. Thereafter, the samples were amplified using primers recommended by Zhou, et al., (2014), and Sanger sequenced using primers by Tewawong, et al., (2015). The software MEGA X was used for the genomic analysis.

Results: Interestingly the M and NS sequences from this preliminary data have aligned themselves among the 2 influenza B lineages, that is the Victoria and Yamagata lineages. The local sequences have also aligned themselves to the vaccine strains used during the period of study.

Conclusions: Though with some variability local samples have aligned with influenza B lineage and vaccine strains. There is a need to regularly survey the levels of genetic variability in local circulating strains as this will inform on vaccine compatibility of local strains.



Whole genome analysis of an African G4P[6] human rotavirus strain identified in a diarrheic child in Kenya: Evidence for porcine-to-human interspecies transmission and reassortment

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Background: Human group A rotaviruses (RVAs) are the leading viral pathogens causing severe gastroenteritis in the young of both humans and many animal species worldwide [1]. RVA strains having the unconventional G4P[6] genotype have been sporadically identified in diarrheic patients in different parts of the world [2]. However, the whole genome of only one human G4P[6] strain from Africa (Central Africa) has been sequenced and analyzed, and thus the exact origin and evolutionary pattern of the African G4P[6] strains remain to be elucidated [3]. In this study, we characterized the full genome of an African G4P[6] strain (RVA/Human-wt/KEN/KCH148/2019/G4P[6]) identified in a stool specimen from a diarrheic child in Kenya to gain an insight into the evolutionary and transmission dynamics of the strain.

Methods: Strain KCH148, and locally circulating strains KCH534, KCH1184 and KCH1187 were identified in stool specimens from diarrheic children in Kiambu County in the central region of Kenya during the hospital-based HuRVA strain surveillance program in this area in 2019-2020. Genomic dsRNA of the four study strains was extracted from stool suspensions using a QIAamp Viral RNA Mini Kit (Qiagen), and the dsRNA was subjected to direct Illumina MiSeq next-generation sequencing without amplification of RVA genomes as described previously [4]. Analysis of the MiSeq sequencing data was carried out using CLC Genomics Workbench v8.0.1 (CLC Bio). The HuRVA nucleotide sequences were translated into amino acid sequences using GENETYX v11 (GENETYX). Maximum-likelihood phylogenetic trees were constructed for all 11 genes using MEGA7.0.26.

Results: Full genome analysis of strain KCH148 revealed a unique Wa-like genogroup constellation: G4-P[6]-I1-R1-C1-M1-A1-N1-T7-E1-H1. NSP3 genotype T7 is commonly found in porcine rotavirus strains. Phylogenetic analysis showed that 10 of 11 genes of strain KCH148 (VP7, VP4, VP6, VP1-VP3, NSP1, and NSP3-NSP5) appeared to be of porcine origin, while the remaining NSP2 gene appeared to be of human origin. Therefore, strain KCH148 was found to have a porcine rotavirus backbone and thus is likely to be of porcine origin.

Conclusion: Strain KCH148 is likely to have been derived through interspecies transmission and reassortment events involving porcine and human rotavirus strains. To our knowledge, this is the first report on full genome-based characterization of a human G4P[6] strain from East Africa. Our observations demonstrate the diversity of human G4P[6] strains in Africa, and will provide important insights into origin and evolutionary pattern of zoonotic G4P[6] strains on the African continent.

Keywords: Group A rotavirus; Full genome analysis; Zoonotic G4P[6] strains; Reassortment; Kenya; Africa





SCIENTIFIC SESSION

24: TB 3



Abstract No. 155.

Reproducibility of ZN smear microscopy results between KEMRI and North-Star Alliance on sputum specimens collected from long-distance truck drivers and commercial sex workers who participated in a TB and HIV prevalence study in Mlolongo, Machakos County

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Background: Reproducibility is the ability of an entire experiment or study to be duplicated, either by the same researcher or by someone else working independently. A particular experimentally obtained value is said to be reproducible if there is a high degree of agreement between measurements or observations conducted on the same specimens using the same tool either by the same person or by different people in different locations. Accordingly, reproducibility of laboratory results forms a major part of quality assurance in diagnosis, which is key to the care of patients particularly those with tuberculosis (TB) globally. This study aimed to determine the reproducibility of laboratory results of Ziehl Neelsen (ZN) smear microscopy between Kenya Medical Research Institute (KEMRI) and Northstar Alliance (NSA) study site laboratory.

Methods: This was a cross-sectional study on prevalence of tuberculosis and HIV among long distance truck drivers and commercial sex workers in Mlolongo, Machakos County, conducted between August 2019 and February 2020. A total of 493 sputum specimens were collected from consenting participants. A portion of each specimen was aseptically used for processing ZN microscopy, which was the only diagnostic tool at the study site laboratory. The remaining portion was triple packaged and shipped to the TB research laboratory at KEMRI, Nairobi, for a repeat of ZN smear microscopy. Known positive and negative ZN slides were used as quality controls both at KEMRI and the study site laboratories. Study site results were blinded from the KEMRI laboratory team. Periodic monitoring and evaluation including benchmarking were conducted during the project period. The NSA laboratory staff was trained during the inception of the project and participated through the end of the project. Each participant produced one spot specimen.

Data processing was done using MySQL and IBM SPSS version 24 software. Reproducibility of laboratory results, where the specimen was the unit of analysis, was determined by Kappa values. Results from the same specimens at the study site were compared with those from the KEMRI TB research laboratory.

Results: Results for ZN microscopy from the study site laboratory were compared with those from KEMRI for quality control purposes.

The turnaround time for comparative ZN was between 1-2 days.

There was moderate agreement of 69.5% between KEMRI and study site, with Kappa values of >0.50 {95% CI (64–81%)}, with KEMRI identifying more positives than the study site.

Table 1: Comparison of results from ZN smear with ZN SITE as gold standard.

N=19 ZN smear

ZN SITE –TB	POSITIVE	NEGATIVE
POSITIVE	5	2
NEGATIVE	5	7

Conclusion: There is need for periodic training and monitoring of study site staff with the aim of improving performance in ZN smear microscopy

Abstract No. 156.

Identification of direct smear negative, GeneXpert negative, LJ negative and MGIT-ZN positive mycobacteria strains isolated from sputum specimens of long distance truck drivers and commercial sex workers enrolled in a prevalence of TB and HIV study in Mlolongo

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Background: Tuberculosis (TB) is one of the leading causes of death worldwide. Currently, GeneXpert has been identified as a rapid and more sensitive diagnostic and identification tool for Mycobacterium tuberculosis complex (MTBc). Despite MTBc being the major cause of TB globally, strains other than MTBc like nontuberculous mycobacteria are increasingly causing TB disease. Apart from GeneXpert which identifies MTBc, there is no other routine diagnostic tool which can identify majority of mycobacterial strains. This may cause misdiagnosis of TB leading to inappropriate patient treatment and management. This study aimed to identify direct smear negative, GeneXpert negative, LJ negative and MGIT-ZN positive mycobacteria strains isolated from sputum specimens of long-distance truck drivers (LDTD) and commercial sex workers (CSW) enrolled in a study to determine prevalence of TB and HIV in Mlolongo, Machakos County. **Methods:** This was a cross-sectional study where a total of 493 sputum specimens were collected from people presumed to have TB in a population of LDTD, their assistants and CSW in Mlolongo. Each participant produced one spot specimen. Specimens were processed for GeneXpert, direct Ziehl-Neelsen (ZN) and Fluorescence smear microscopy and culture in both solid Lowenstein Jensen (LJ) and liquid Mycobacterium Growth Indicator Tubes (MGIT). Only those with ZN positive were considered as culture positive. ZN and Hain molecular assay (Hain Lifescience, Nehren, Germany) were used for identification of isolates. Resistant ratio method was used to determine susceptibility patterns to isoniazid, rifampicin, and ethambutol. The database was designed and managed using MySQL. To ensure quality, data cleaning and validation was performed before analysis using IBM SPSS software. Descriptive statistics for categorical variables were estimated as percentages. **Results:** Out of 493 sputum specimens processed, a total of 34 (6.9%) were positive for mycobacteria



by direct microscopy (ZN=13 and FM=19), GeneXpert (27) and culture (LJ =22 and were all positive by MGIT-ZN=34). Seven out 34 (20.6%) MGIT-ZN positive specimens were negative for mycobacteria by ZN and FM, GeneXpert and LJ. These were identified by Hain molecular technique. Six of these were MTBc and were all susceptible to first line anti-TB drugs. One strain was identified as *Mycobacterium intracellulare*, was resistant to first line anti-TB drugs and was isolated from a female (CSW) who was also HIV positive. Conclusion: Seven strains that could not be identified by routine diagnostic tools and were identified by Hain molecular assay indicating the need for incorporating more sensitive molecular identification tools in routine diagnosis of TB to enhance timely strain identification for appropriate patient management

Abstract No. 157.

PREVALENCE OF PNEUMOCYSTIS JIROVECI IN TB SMEAR NEGATIVE PATIENTS AND RETREATMENT CASES AT THE COAST GENERAL HOSPITAL

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Background: A typical fungi (*Pneumocystis jirovecii* also known as *P. jirovecii*) is the cause of severe pneumonia, morbidity, and mortality in immunocompromised patients. The seemingly low prevalence of *P. jirovecii* pneumonia in sub-Saharan Africa has been attributed low diagnosis and research on pneumocystis pneumonia (PCP). The high sero-prevalence of HIV/AIDS is significant predisposition to PCP and other opportunistic pathogens including tuberculosis (TB). The diagnostic challenge of *P. jirovecii* in sub-Saharan countries means patients are treated empirically thus fueling antibiotics resistance.

Objectives: The study aimed to determine the significance of PCP in TB smear negative and re treatment patients with or without HIV infection at the Coast General Hospital.

Methodology: A total of 100 expectorated sputum samples from consented TB Smear negative patients with were analyzed by Toluidine Blue O stained microscopy and Nested PCR targeting the *P. jirovecii* mitochondrion large sub unit r RNA (mtLSUrRNA) gene was done using standard molecular techniques. Results: Amongst 100 culture-negative, TB suspected patients, median age 39 yrs (IQR18-78) of who 62 were male and 38 were female. *P. jirovecii* was detected in 10.9% in Toluidine staining procedure and 30.3% by nested PCR in expectorated sputum sample.

Toluidine blue stain detected *P. jirovecii* cysts in 27.17% of the patients. The Nested PCR detected 38% positive for *P. jirovecii*. The sensitivity and specificity of nested PCR as compared to TBO staining was 4.27% and 20.6% respectively. PCR test and detected additional 25 patients than toluidine O staining technique. TBO had an acceptable sensitivity and very high specificity as compared to the PCR technique.

Recommendations: PCP is a significant cause of morbidity among TB smear negative and re treatment patients that could be misdiagnosed. Considering cost, simplicity, and efficacy, we recommend TBO as the most practical diagnostic test and expectorated sputum (ES) as the most practical biologic specimen for use in resource-constrained setting. There is need to strengthen technical and infrastructural capabilities for diagnosis and management PCP in TB and other related opportunistic fungal pathogens.

Abstract No. 158.

Tuberculosis a risk factor for clinically significant chronic respiratory disease in Nairobi, Kenya

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Background: There is increasing interest in the long-term consequences of pulmonary tuberculosis (TB)- post TB lung disease (PTLD). Community based surveys reported that a past history of TB is associated with abnormal obstructive lung function especially in low- and middle-income countries (LMICs). It has been suggested that TB could be a significant risk factor for chronic obstructive pulmonary disease (COPD) with an attributable fraction of 6.9% in LMICs. We have recently characterized the chronic respiratory diseases (CRD) presenting at a hospital out-patient clinic in Nairobi. We report here the association between TB and CRD in Kenya, however, in contrast to previous community studies we have focused on a hospital population of patients with chronic respiratory symptoms. Method: A cross-sectional study of consecutive adult patients (>18 years) with chronic respiratory symptoms (>8 weeks) attending outpatient department at Mbagathi Hospital in Nairobi. Patients were excluded if there was a clinical suspicion of TB or a positive GeneXpert sputum test. Participants were assessed by respiratory questionnaire and the diagnosis of reviewing clinicians was ascertained. Spirometry was performed to internationally recommended standards and compared with GLI2012 reference values. Results: 209 patients were recruited, consented and enrolled, 119 (57%) were female, median age 40 (IQR 30-51, range 18-80), 22 (13%) had ever smoked. All were symptomatic, mean (95% CI) FEV1 87% (83-90), FEV1/FVC 77% (75-79). Sixty-five (31%) were considered to have asthma by the reviewing clinician, 47 (23%) had chronic bronchitis and although only 3 (1.4%) were diagnosed with COPD, 35 (20%) fulfilled the spirometric criteria for COPD (FEV1/FVC<0.7). Previous TB was associated with an increase in productive cough (61% vs 40%, p=0.011), decreases in diagnosed asthma (14% vs 36%, p=0.005) and chronic bronchitis (11% vs 26%, p=0.047) but no difference in wheeze or dyspnoea. TB was associated with reduced FEV1 % predicted: 75% (68-82) vs 90% (86-94), p<0.001. Although more patients fulfilled the spirometric criteria for COPD if they had a history of previous TB this was not statistically significant 26% vs 18%, p=0.328. The attributable fraction of COPD due to previous TB was 29%. Conclusion: In this small study of patients with chronic respiratory symptoms attending a hospital clinic, 20% had a history of previous TB and TB contributed to 29% of the COPD in the clinic. Previous TB was associated with a reduced likelihood of physician diagnosis of asthma or chronic bronchitis





SCIENTIFIC SESSION

25: COVID-19



Abstract No. 159.

Developing a Covid Tracking System to improve data management and patient follow up in Kisumu

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Background: Kenya like other countries across Africa and the globe, has been hit hard by the COVID-19 pandemic. So far, the country has experienced four waves of the pandemic that occurred in the months of August and December (2020); and April and August (2021). This has happened in both the rural and urban centers, with more numbers of infections recorded in the urban towns, contributed partly by access to better diagnostic and reporting mechanisms and the high population density in these areas. Standard methods of collecting clinical information and epidemiological data from Covid-19 patients are time consuming, prone to error, and make it difficult to analyze data to identify important trends.

Methods: Working with clinical staff at Jaramogi Oginga Odinga Teaching & Referral Hospital (JOOTRH) and Kisumu County Hospital (KCH), our team has developed a Covid Tracking System (CTS), designed to improve patient follow up and simplify data access and analysis. The current system includes all reporting indicators required by the Ministry of Health, it links cases with their close contacts and allows for tracking contact status for 14 days, and simplifies reporting by allowing the export of a comprehensive spreadsheet that can be used to track key indicators.

Preliminary Results: Since 17th August 2021, a total of 69 cases have been entered into the CTS at the two implementing hospitals. Of these 69 cases, 40 were female, 15 were admitted to the hospital and 9 required ventilation. While most (58) were from Kisumu County, there were also cases from Homa Bay, Mombasa, Kisii, Kakamega, and Busia who were tested at participating facilities. In total, 28 contacts from these clients were followed up for 14 days. None of them developed symptoms. The team has successfully built rapport with the hospital staff providing Covid-19 services, as well as with the Ministry of Health and has developed a collaborative working relationship with the subcounty surveillance officers.

Future Prospects: Planned iterations of the CTS include addition of features to: (1) enable the automated reporting of key indicators, and (2) support vaccine rollout, including encouraging vaccination, tracking vaccine retention, and collecting key data points regarding vaccine efficacy. Once this is done, a pilot is planned for several high-volume facilities in different counties of Kenya to evaluate the utility of the CTS in improving tracking and management of Covid-19 cases and exposures.

Abstract No. 160.

Detection of multiple SARS-CoV-2 variants of concern (VOC) in Nairobi, Kenya between March 2021 and July 2021.

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Background: SARS-CoV-2 variants of concern (VOC) with increased transmissibility, disease severity and immune escape continue to emerge, posing a major public health challenge, globally. The emergence and rapid spread of the VOC among the populations has been shown to cause new waves of COVID-19 outbreaks, often translating into increased morbidity and mortality rates. Kenya has experienced at least three waves of COVID-19 epidemics.

Methods: To investigate the reason for the sudden surge in the number of reported COVID-19 cases and deaths by the Ministry of Health, Kenya, beginning early March 2021, we carried out whole genome sequencing on select random SARS-CoV-2 RT-PCR confirmed positive COVID-19 samples collected in Nairobi region (including surrounding areas) and received at KEMRI's Sample Management and Repository Facility (SMRF) between March 2021 and July 2021, to provide a glimpse on molecular properties of the viruses. A total of 63 SARS-CoV-2 genomes were analyzed.

Results: Our analyses revealed that three SARS-CoV-2 variants of concern circulated in Nairobi, Kenya in the studied period. The Alpha (B.1.1.7) lineage predominated (62.7%), followed by Delta (B.1.617.2, 35.8%) and Beta (B.1.351, 1.5%). The Alpha (B.1.1.7) VOC were most frequent from March 2021 to May 2021, while the Delta (B.1.617.2) dominated beginning June 2021 through July 2021. Sequence comparison revealed that all the Kenyan viruses were genetically similar to those that circulated in other regions. Except for a few that appeared interspersed among the foreign strains, the majority of Kenyan viruses clustered together in their respective phylogenetic lineages/clades. Overall, data from this study show the presence of multiple lineages of SAR-CoV-2 VOC in Nairobi region, Kenya between March 2021 and July 2021. It also confirms that the sudden increase in COVID-19 infections, particularly in Nairobi and Kenya as a whole, during the studied period, was attributable to the introduction and community transmission of SARS-CoV-2 VOC among the populace.

Conclusion: Overall, our findings provide evidence of the circulation of SARS-CoV-2 variants of concern (VOC) in Nairobi, Kenya during the study period, suggestive that the surge in the number COVID-19 cases and deaths experienced in the country at this period, may be attributed to the spread and community transmission of these viruses among the population.



Abstract No. 161.

Household genomic epidemiology of SARS-CoV-2 in rural coastal Kenya

Charles N Agoti (KEMRI)*

Background: Household environments are characterized by frequent person-to-person contacts and potential transmission of respiratory infections. We used whole genome sequencing to describe the molecular epidemiology of SARS-CoV-2 in households in rural coastal Kenya.

Methods: We collected 1,802 nasopharyngeal/ oropharyngeal swabs from 137 households (502 participants) in Kilifi County between 10th December 2020 and 14th September 2021. These households were selected because a member had been confirmed to have SARS-CoV-2 infection by routine health service testing, or because a member was a close contact of a confirmed case. RT-PCR positive samples with a cycle threshold of < 30.0 were targeted for genome sequencing. Phylogenetic relationships were inferred using maximum likelihood methods and the number of independent introductions into the households inferred using both pairwise nucleotide differences and ancestral state reconstruction approaches.

Results: A total of 332 samples from 155 participants in 71 households tested SARS-CoV-2 positive, 132 (39.7%) of which yielded genomes with $>80\%$ coverage (73 participants in 41 households). All recovered genomes were classified within lineages of known variants of concern: Alpha ($n=60$), Beta ($n=18$) and Delta ($n=54$). Of the 41 households with sequence data recovered, 26 (63%) had one distinct introduction, 10 (24%) had two introductions, 4 (10%) had three introductions and 1 (3%) had four introductions. Among these sequenced households 31 within household transmission events and 16 interhousehold transmission events were identified from the genomic data.

Conclusion: We found both frequent SARS-CoV-2 transmission within households and its multiple introductions into households. Genomic data adds value in estimating household attack rates by distinguishing single from multiple introductions. Transmission of SARS-CoV-2 infection within and between households is common in rural Kenya, is often asymptomatic, and realistic measures to mitigate infection spread within households are needed to reduce the disease burden.

Abstract No. 162.

Accuracy of the Panbio™ COVID-19 antigen rapid test device for SARS-CoV-2 detection in Kenya, 2021: A multicenter field evaluation

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Background: Accurate and timely diagnosis is essential in limiting the spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection. Real-time reverse transcription-polymerase chain reaction (rRT-PCR) is the reference standard for SARS-CoV-2 detection. However, rRT-PCR has limitations such as requiring a specialized laboratory, costly reagents, and a long turnaround time. Antigen rapid diagnostic tests (Ag RDTs) have been useful in diagnosing other respiratory pathogens. These tests provide a feasible alternative to rRT-PCR since they are quick, relatively inexpensive, and can be used in non-laboratory settings. The Ministry of Health (MoH) in Kenya recommends that Ag RDTs have a sensitivity $\geq 80\%$ and specificity $\geq 97\%$.

Methods: This evaluation was conducted at 11 health facilities in Kenya between March and July 2021. We enrolled persons of any age with acute respiratory illness (cough or difficulty in breathing or sore throat or coryza, with onset < 2 weeks), severe acute respiratory illness (fever or temperature $\geq 38^\circ\text{C}$ and cough, with onset < 10 days and requiring hospitalization), influenza-like illness (temperature $\geq 38^\circ\text{C}$ and cough, with onset < 10 days), and asymptomatic individuals who had contact with a confirmed COVID-19 case. We collected demographic and clinical information. Two nasopharyngeal specimens were collected from each participant by a trained surveillance officer for Ag RDT testing and rRT-PCR. We calculated the performance (sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of the Panbio™ Ag RDT against the Centers for Disease Control and Prevention (CDC) rRT-PCR as the reference test.

Results: We enrolled 2,310 participants and validated the Ag RDT in 2,245 individuals (Table 1). Overall sensitivity of the Ag RDT was 46.6% (95% CI: 42.4-50.9%), specificity 98.5% (95% CI: 97.8-99.0%), PPV 90.8% (95% CI: 86.8-93.9%) and NPV 85.0% (95% CI: 83.4-86.6%). Among symptomatic individuals, sensitivity was 60.6% (95% CI: 54.3-66.7%) and specificity was 98.1% (95% CI: 96.7-99.0%). Among asymptomatic individuals, sensitivity was 34.7% (95% CI 29.3-40.4%) and specificity was 98.7% (95% CI: 97.8-99.3%). In persons with onset < 5 days (67.8%), sensitivity was 67.1% (95% CI: 59.2-74.3%), and 53.3% (95% CI: 40.0-66.3%) among those with onset > 7 days (17.9%). The highest sensitivity was 87.0% (95% CI: 80.9-91.8%) in symptomatic individuals with cycle threshold (Ct) values ≤ 30 .

Conclusion: The overall sensitivity and PPV of the Panbio™ Ag RDT were much lower than expected, especially among asymptomatic individuals. However, the Ag RDT exceeded the MOH threshold for acceptability in 12% of individuals with high viral loads (Ct ≤ 30). The specificity of the device was high and satisfactory; therefore, a positive result may not require confirmation by rRT-PCR. A negative result should be interpreted based on clinical and epidemiological information and may require retesting by rRT-PCR.



Abstract No. 163.

Performance Evaluation of 3 RT-PCR Kits for the Detection of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)

Samwel Symekher (KEMRI)*; Janet Majanja (KEMRI); Silvanos M Opananda (KEMRI); MESHACK WADEGU (KEMRI); Esther Wanguche (KEMRI); Wallace Bulimo (KEMRI); Samoel Khamadi (KEMRI)

Background: The coronavirus disease 2019 (COVID-19) caused by the severe acute respiratory coronavirus 2 (SAR-CoV-2) has infected more than 270 million people with over 5 million deaths worldwide, is mainly detected via nucleic acid detection. We aimed at evaluating the performance of three (KH Medical, DaAn and Sansure) commercial real-time reverse transcriptase polymerase chain reaction (RT-PCR) kits commonly used in the KEMRI, CVR ARI lab for the detection of SARS-CoV-2 since comparison data is lacking.

Methods: A total of 86 randomly collected samples had their ribonucleic acid (RNA extracted using QIAGEN RNA extraction kit using standard protocols recommended by the kit manufacturer. The samples were then tested for the presence of SARS-CoV-2 nucleic acid using recommended procedures by the 3 kit manufactures and ran on a AB 7500 fast platform.

Results: Twenty seven (n=27; 31.4%) of the samples were positive for SARS-CoV-2. There was variance in the ct values for the different targets including the internal control per test kit.

Conclusion: The three RT-PCR kits assessed in this study showed acceptable analytical performance characteristics with comparative analysis of commercial COVID-19 RT-PCR kits should be performed routinely.

Abstract No. 164.

Knowledge, attitudes and practices regarding Coronavirus Disease-2019: A cross-sectional survey among residents of Busia and Migori Counties, western Kenya

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Background: Coronavirus disease 2019 (COVID-19) has caused great disruptions to socio-economic and health systems. Kenya reported its first case in March 2020 and instituted public health mitigation measures. Adherence to infection prevention and control (IPC) measures is essential for successful mitigation of the pandemic and is affected by the public's knowledge, attitudes and practices (KAPs). This study assessed the COVID-19 KAPs of residents of Busia and Migori border counties.

Methods: From April-June 2021, we conducted cross-sectional surveys by administering an electronic questionnaire using tablets to 1428 adults. We assessed participant's experiences and behavioural determinants towards COVID-19 and MOH COVID-19 IPC guidelines.

Results: Of those surveyed, 63% were females and 85% were below 55 years old. Most respondents (82%) did not know anyone who had tested positive for COVID-19. However, 2% had tested positive and 8% knew someone who had died from COVID-19. More than half of the respondents (56%) were aware of COVID-19 presence in Kenya.

Cough (70%), fever (64%), headache (50.6%) and shortness of breath (46%) were the most frequently reported symptoms. Face masks (90%), wash hands (86%) and keeping physical distance (69%) were the known preventive measures. Most respondents (80%) were worried about COVID-19; 55% about loss of life and 31%, risk of infection. About a third (33%) reported being at high risk of infection. Many respondents (57%) reported they would be unsure if they were infected because the symptoms of COVID-19 were difficult to identify. Most respondents (61%) were satisfied with MOH COVID-19 messaging and IPC measures while 39% thought they needed improvement or were inappropriate.

To prevent COVID-19, respondents mainly washed their hands (91%) and wore masks (89%). Half of the respondents did not use hand sanitizer mainly because it was expensive (63%). While 60% respondents always wore masks in public, discomfort with mask wearing was reported by 49%. Most respondents (86%) had experienced economic side-effects of the pandemic, social effects by 67% and health effects by 40%. The need to earn an income (54%), to care for others outside the home (43%) and social gatherings (33%) were the main barriers to self-isolation.

Conclusion: While respondents had moderate knowledge of COVID-19, many would be uncertain if they were infected. There was low COVID-19 risk perception among respondents, despite community transmission in the study sites. While hand washing and mask wearing were the main preventive behaviours, discomfort was a huge potential barrier to mask wearing. Economic effects of the pandemic and the likelihood to ignore self-isolation due to the need to earn an income were widespread. Together, the above could negatively impact the main IPC measures of handwashing, wearing masks, physical and social distancing, and healthcare seeking. Customise IPC strategies for populations without a fixed income



Abstract No. 165.

Estimate of agreement between two commercial kits for molecular detection of SARS-CoV-2

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Background: The first case of COVID-19 in Kenya was reported on 12th March 2020. To contain the spread of SARS-CoV-2, WHO recommends timely and accurate diagnostic testing of suspected cases and their contacts. The Acute Respiratory Illness (ARI) laboratory has been involved in testing for SARS-CoV-2 using various commercial kits. The most frequently used kits are the DaAn Gene 2019-nCoV kit (Daan Gene Co., Ltd, China) followed by the RADI COVID-19 Detection kit (KH Medical Co., Ltd, Republic of Korea). Understanding the relative performance of different kits may assist laboratories in maintaining consistent results, especially when a variety of test kits are used.

Objective: The objective of this study was to assess the comparison of two kits in detection of SARS-CoV-2

Methods: Extraction of nucleic acid from 83 nasopharyngeal/ oropharyngeal swabs was carried out using RADI PREP Swab and Stool DNA/RNA kit (KH Medical Co., Ltd, Republic of Korea). Real time RT-PCR assays were carried out for both kits and run on an ABI 7500 FAST Real Time RT-PCR machine (Applied Biosystems, USA). Results were entered into an excel sheet indicating Cycle threshold (Ct) values. Overall percent agreement (POA), positive percent agreement (PPA) and negative percent agreement (PNA) were calculated using DaAn gene kit as the non-reference standard. Cohen's kappa coefficient was calculated with 95% CI.

Results: Test controls met the manufacturer's and quality requirements. DaAn gene kit detected 30/83 (36.1%) SARS-CoV-2 positive samples while RADI test kit detected 26 /83 (31.3%). RADI kit detected 5 (6%) inconclusive samples. This was caused by the S gene target that did not meet the manufacturer's Ct threshold cutoff. The 5 samples were excluded from calculation of comparative analysis between the two kits leaving a total of 78 samples. The RADI kit S and RdRp targets had a median Ct of 31 and 26 respectively while DaAn gene kit targets had a median Ct of 27 and 25 for ORF1ab and N genes respectively. The PPA between the two kits was 96.3% (95% CI 81.7% - 99.3%) while the PNA was 100% (95% CI 93.0% - 100%). The POA between the two tests was 98.7% (95% CI 93.1% - 99.8%). The kappa coefficient was 0.971 (95% CI 0.916 -1.00) indicating an almost perfect agreement.

Conclusion: DaAn gene kit was used as the non-reference standard due to its performance in detecting SARS-CoV-2 samples as reported elsewhere (Wang et al, 2020). Furthermore, it is the most frequently used kit in our current setting. There was 96.3% agreement in detection of SARS-CoV-2 cases between the two kits and 100% agreement in detecting negatives hence low possibility of getting false positives. Although the two kits compared well, the major disadvantage of the RADI COVID-19 detection kit is the presence of inconclusive results due to non-amplification of the S gene target in some samples. This phenomenon should be investigated further.

Abstract No. 166.

In-vitro isolation, culture and characterization of SARS-CoV-2 virus in Kenya Abstract

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Background: The emergence of SARS-CoV 2 from Wuhan, China in late November 2019 raised a global health concern that eventually became a pandemic affecting almost all the countries of the world. The respiratory disease has infected over 270 million people worldwide with over 5 million deaths recorded so far. This has led scientists to focus their efforts on understanding the virus so as to come up with effective means to diagnose, treat, prevent and control this pandemic.

Methodology: One of the areas of focus is in-vitro isolation of this virus, which plays a key role in understanding the viral dynamics in the laboratory. In this study, we report the isolation of the local circulating SARS-CoV-2 in Kenya from clinical samples. The samples were cultured on Vero CCL-81 cells followed by RNA extraction from the supernatants, and finally performing RT-PCR. The DNA sequence was sent for genome sequencing and phylogenetic analysis done to determine the SARS-CoV-2 strain in circulation.

Results: Of the four samples infected in Vero cells, three samples showed extensive cytopathic effects three days post-infection following the initiation. The isolated SARS-CoV-2 virus formed distinctly visible plaques at a dilution of 1000X. A multiplex PCR was conducted on 14 samples targeting the RdRp protein, where 13 of them tested positive for SARS-CoV-2.

Conclusion: This study was able to show that Vero CCL-81 cells are able to support SARS-CoV-2 virus amplification and quantification due to the formation of viral plaques after inoculation. Detection of SARS-CoV-2 targeting the S and RdRp genes was shown to be effective. More study needs to be done to sequence the viral genomes from isolates to identify the circulating strains in Kenya, which will also offer a road map in the development of diagnostics and vaccines to control the spread of the disease.



Abstract No. 167.

BURDEN OF UNDIAGNOSED COVID-19 IN PATIENTS ADMITTED AT 3 COUNTY REFERRAL HOSPITALS IN WESTERN KENYA

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Background: The Kenyan Ministry of Health (MOH) developed “The Kenya COVID-19 Emergency Response Project” which aims to prevent, detect and respond to COVID-19. Early clinical surveillance suggested that a large proportion of patients who met SARs CoV-2 testing criteria were not tested. Suspected COVID-19 cases are identified by screening teams posted at the hospital entrance. However, some patients become symptomatic after admission or change their recalled history after passing through the screening process. Early in the pandemic, pediatric testing was rare as signs and symptoms of pediatric infection conform poorly with suspected COVID-19 case definitions. We implemented supplementary screening of untested patients who met the MOH COVID-19 criteria to strengthen the epidemic data being passed on to County Governments and MOH and identify additional patients with COVID-19 for isolation and contact tracing.

Methods: This study was conducted at Migori, Homa-Bay, and Kisii County referral hospitals in partnership with the County Governments. The first two children and three adults admitted on weekdays, who met suspected COVID-19 case definition, but had not been tested by the MOH team were selected for the study. Patients who became symptomatic after admission were also eligible. Designated hospital testing teams collected samples from the selected patients according to MOH protocols. Samples were shipped to KEMRI’s Centre for Microbiological Research for testing and results were reported to National MOH, County Executive Committee, and the County Medical Laboratory coordinator. COVID-19 cases were handled by the respective County COVID-19 response teams as per the MOH guidelines. Descriptive analysis of the additional cases identified, and the prevalence of SARS CoV-2 among untested patients was conducted. We also compared clinical and demographic correlates of COVID-19 among paediatric patients to understand which children may benefit from additional testing.

Results: The systematic testing protocol was implemented from August 2020-December 2021. Cumulatively, 895 adults were tested, of which 183 (20.4%) were positive for SARS-COV-2. In addition, 1034 children were sampled and 133 (12.9%) tested positive. The cumulative prevalence among MOH-untested SARI cases (adults and children) was 16.4%. Non-exclusive breastfed children were five times (odds ratio: 5.16, 95%CI: 1.39-19.2, p=0.013) more likely to be infected than exclusively breastfed children. Other clinical and sociodemographic characteristics had no statistically significant association with confirmed COVID-19 in children.

Conclusion: There were gaps in screening and testing for COVID-19 in health facilities which may expose other patients and healthcare providers to SARS-CoV-2. Strengthening hospital-based surveillance and testing of all admitted patients who meet the criteria for SARS-COV-2 testing, including children and patients who develop symptoms on the ward may be needed.

Abstract No. 168.

Population’s risk perception of COVID-19 infection in Kajiado and Machakos counties, Kenya

Lilian N. Nyandieka, Erastus Muniu, Stephen Onteri, Violet Wanjihia, Schieller Mbuka, Priscah Otambo, Joseph Mutai, James kariuki, Sharon Mokuu, Miriam Bosire, David M. Mingu

Introduction: The COVID-19 pandemic has been of great public health concern posing challenges to populations and governments across the world, including Kenya. The objective of this study was to assess the population’s risk perception of infection and factors that may influence individual response to preventive messages in the counties of Kajiado and Machakos.

Method: The study applied convergent parallel mixed method design targeting 300 respondents aged 18 years and above from community units, 20 In-Depth Interviews and 15 Focus group discussions with different populations in each county. 30 in-depth interviews and 29 Focus group discussions were conducted. Quantitative data was collected using Open Data Kit application while qualitative data was audio-recorded. Survey data was downloaded into an excel file, validated and exported to SPSS Ver 22.0 for analysis. Audio-recorded interviews were transcribed verbatim and subjected to context and thematic analysis.

Results: A total of 573 respondents from the two counties participated in the study, 72.3% being females and 27.7% males. The median age was 38 years, Interquartile Range (IQR) 28 & 52 years and ranged from 18 to 91 years with 63% aged between 25-54 years. With respect to education, 72.4% and 46.2% had finished Primary and secondary education, respectively.

86.7% perceived corona as a very serious disease and 93.0% acknowledged that they were at risk of contracting corona disease if they do not take any preventive measure. Those who perceived corona as a very serious disease were slightly older (median age 39 years) compared to somehow serious (median age 31 years).

Over half, 58.1% and 55.8% of the responded were very concerned of contacting corona and worried that their family member or friend might be infected with corona virus, respectively. 60.2% reported there were likelihood of someone within their location contacting corona disease.

Qualitative findings indicate that majority of the informants perceive the elderly, people with pre-existing conditions such as HIV, diabetes, pressure, asthma and other chronic illnesses and pregnant women to be at risk of Covid 19 infection due to challenged immunity. The health care providers, matatu and boda boda personnel, students and the police were also considered to be at risk. People who attended political rallies and Community Health Volunteers were also mentioned as being vulnerable and therefore at risk. There are those that acknowledged that anyone was at risk so long as they did not take measures to protect themselves.

Conclusion: The study findings indicate that the general population’s risk perception of COVID-19 infection is high. However, there were a few that did not feel at risk because they did not believe Covid 19 existed. Various populations perceive themselves as being at risk of COVID-19 infection.



Abstract No. 169.

Factors Influencing Willingness to Receive Covid-19 Vaccine in Kisii National Polytechnic Staff

Peter Godner (KEMRI)*; Stella Kemunto Atuti (Kisii National polytechnic)

Kenya has brought COVID-19 vaccine for emergency use. However, willingness to receive the vaccine may be affected by varying factors across the country. Therefore, this study aimed to investigate the factors that influence willingness to receive the vaccine among Kenyan adults especially in kisii National polytechnic. A population-based cross-sectional online

survey was conducted among a sample of 200 kisii National polytechnic staff (age 18 years and older). The statistical analysis included univariate, bivariate and multivariate regression model. Findings show that 25% (n = 50) of respondents were willing to receive the vaccine. Respondents with 1–2 children (aOR: 1.77, 95% CI: 1.00–3.13, P = . 048), perceived risk of being infected (aOR: 1.48, 95% CI: 1.03–2.14, P = . 03), perceived impact on daily life (aOR: 2.53, 95%CI: 1.45–4.44, P = . 001), history of co-morbidities (aOR: 2.04, 95% CI: 1.37–3.04, P < . 01), price of the vaccine (aOR: 3.58, 95% CI: 2.34–5.47), physician's recommendation to receive vaccine (aOR: 2.06, 95% CI: 1.38–3.06, P < . 01), vaccines supplied by government (aOR: 2.31, 95% CI: 1.64–3.25, P < . 01)

were found to be motivating factors for willingness to receive the vaccine. Findings indicate that willingness to receive the vaccine is likely to be affected by socio-demographic, and health system factors. This should be carefully considered in the rollout of the vaccination plans in kenya.

Key Words: Pandemic, COVID-19, vaccine, factors, willingness, Kenya



SYMPOSIUM 5: FOOD ENVIRONMENT RESEARCH IN KENYA

Access to healthy food is considered a key determinant of dietary behaviour which has a major impact on nutritional status, disease burden and health outcomes. Kenya is undergoing a nutrition transition, characterized by a change from our traditional staple foods to the adoption of western diets that have more saturated fat, less fibre, more sugar and salt. These dietary changes are part of the explanation for the increased burden of diet-related chronic diseases, such as obesity, cancers, hypertension and diabetes. Palpable socioeconomic disparity exists at the population-level on access (spatial and economic) to affordable, healthy and nutritious food. Using a natural experimental design, we evaluated the role of a new supermarket in Kisumu on food shopping practices, dietary behaviours, food security and body composition among local residents, and how these changes vary by socioeconomic status. Preliminary results from this study will be presented and discussed.





POSTERS



SUB THEME: STRENGTHENING HEALTH SYSTEMS

Abstract No. 170.

EVALUATING THE CATSYSTEM TO IMPROVE CERVICAL CANCER CARE IN KENYA: A MIXED METHODS STUDY

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Introduction: Although preventable with early detection and treatment of cervical intraepithelial neoplasia, 5,250 new cases of cervical cancer are diagnosed annually in Kenya, and 3,286 women die. The CATSystem is an eHealth intervention that aims to improve patient retention in cervical cancer services by: (1) coordinating services between previously unlinked points of care (screening, laboratory, treatment, referral), (2) using algorithm-driven alerts to prompt provider follow up when patients' cervical cancer services are overdue, and (3) notifying patients when they are required to visit the hospital through automated short messaging service (SMS).

Methods: A mixed-method pilot study to evaluate CATSystem implementation was conducted at a level 5 hospital in Kenya. Six months of retrospective data (April - September 2019) obtained from review of hospital records prior to implementation of CATSystem (n=1,702) was compared with 10 months of CATSystem intervention data (n=491, October 2019 - July 2020). The primary outcome was the proportion of women with a new positive screening result who received guideline-based treatment (LEEP/Cryotherapy, referral for radiation/chemotherapy) following a positive screening. Qualitative interviews with implementing providers assessed facilitators and barriers to utilization and identified modifications to the CATSystem to improve its utility.

Results: 38 out of the 491 (7.7%) patients enrolled in the CATSystem had a screening test positive for cervical neoplasia during the study period, compared to 50 of the 1,702 patients in the retrospective data (2.9%). Fourteen of the 38 (36.8%) CATSystem participants versus 4 of the 50 (8%) historical controls received appropriate follow up care, $p=0.007$. Two of the four identified cancer cases in CATSystem were referred for treatment to referral facilities vs. zero during the retrospective period. Providers felt the alerts gave them a more comprehensive picture of their patients than the paper-based registers. Challenges to implementation included limited knowledge of cervical cancer guidelines among providers, limited personnel to conduct screening and enter data, slow uploading of data, and need for improved training on CATSystem use. Provider recommendations included use of SMS to: (1) notify providers when their patients need services and (2) provide post-operative instructions to patients after colposcopy, LEEP, or cryotherapy.

Discussion: This pilot data showed a 5-fold improvement in the proportion of women with a positive screen who received appropriate treatment, suggesting that the CATSystem could be a powerful tool to improved retention in cervical cancer care. Qualitative data indicated that the CATSystem is feasible and acceptable among Kenyan providers. Modification to address provider-identified challenges and to respond to user recommendations can be integrated into the next iteration of the CATSystem.

SUB THEME: EMERGING AND RE-EMERGING INFECTIOUS AND PARASITIC DISEASES PREVENTION, CONTROL AND ELIMINATION

Abstract No. 171.

Assessing the severity of COVID-19 among patients with latent TB infection in Western Kenya

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Background: The World Health Organization estimates that over 2 billion people are infected with tuberculosis (TB) and that more than 9 million became ill with TB annually. The emergence of the coronavirus disease-19 (COVID-19) pandemic has posed a public health challenge globally however, its severity among persons infected with TB is not known. We sought to explore the impact of latent TB infection on the severity of COVID-19 illness in a TB endemic region of sub-Saharan Africa.

Methods: The study began enrolling participants with laboratory-confirmed COVID-19 on 3 Feb 2021 who will be longitudinally followed for 12 months. The symptom severity of COVID-19 patients was categorized daily as asymptomatic, mild, moderate, or severe for 14 days. QuantiFERON-TB Gold Plus (QFT) (Qiagen, Germantown, MD, USA) was used to assess latent TB infection (LTBI), and results were reported as QFT positive (QFT+), or QFT negative (QFT-). Participants with indeterminate QFT results were excluded from this analysis. Participants consenting to provide a sputum specimen received an Xpert MTB/RIF test (Cepheid, Sunnyvale, CA, USA) to assess for active TB disease.

Results: We share preliminary results using data accumulated through 5 Nov 2021. 3,054 individuals were screened and 373 were diagnosed as SARS-CoV-2 infected and consented to enroll in the study. Positive or negative QFT test results were available for 106 individuals; 53% were female, their median age was 34 years (range 10-64) and 44% were QFT+. On the first day of diagnosis following SARS CoV2 infection, 11%, 44%, 42%, and 3% were asymptomatic or had mild, moderate, and severe symptoms, respectively. QFT positivity increased from 18% in 10-19-year-olds to 35% in 20-29-year-olds and 64% in both 30-39-year-olds and 40-49-year-olds. 56% of QFT+ and 45% of QFT- participants had severe or moderate COVID-19, respectively (Fisher's exact, $P=0.11$). On the day of diagnosis with SARS-CoV-2 infection, 11% and 16% were asymptomatic, 33% and 39% had mild COVID-19, 53% and 42% had moderate COVID-19 and 3% and 3% had severe COVID-19 in QFT+s and QFT-s, respectively. There was little difference between QFT status and the course of COVID-19 illness during the initial 14 days of daily follow-up



(Figure). One 57-year-old participant who was QFT+ with severe COVID-19 died but also had diabetes, hypertension and was smear-positive for malaria. Two other QFT+ and one QFT- participant were hospitalized. 87 participants received an Xpert test, one of whom, a QFT+ 31-year-old, was positive for TB. He recovered from COVID-19 within three days whilst successfully completing a six-month course of anti-TB therapy.

Conclusion: Latent TB infection was not associated with worse COVID-19 outcomes in this Western Kenya cohort. The course of COVID-19 illness was similar to other cohorts observed around the world. Additional clinical data will be gathered prospectively on this cohort by QFT status including HIV infection status.

Abstract No. 172.

Bionomics and ecology of *Anopheles merus* along the East and Southern Africa Coast.

Brian K Bartilol (KEMRI-WELLCOME TRUST)*; Irene Omedo (KEMRI-Wellcome Trust); Charles Mbogo (KEMRI); Joseph Mwangangi (KEMRI); Martin Rono (KEMRI - Wellcome Trust Research Programme)

Malaria transmission persists despite the scale-up of interventions such as long-lasting insecticide-treated nets (LLINs) and indoor residual spraying (IRS). Understanding the entomological drivers of transmission is key for the design of effective and sustainable tools to address the challenge. Recent research findings indicate a shift in vector populations from the notorious *Anopheles gambiae* (s.s.) as a dominant vector to other species as one of the factors contributing to the persistence of malaria transmission. However, there are gaps in the literature regarding the minor vector species which are increasingly taking a lead role in malaria transmission. Currently, minor malaria vectors have behavioural plasticity, which allows their evasion of vector control tools currently in use. To address this, we have reviewed the role of *Anopheles merus*, a saltwater mosquito species that is becoming an important vector of malaria transmission along the East and Southern African coast. We performed a literature review from PubMed and Google Scholar and reviewed over 50 publications relating to *An. merus*'s bionomics, taxonomy, spatial-temporal distribution and role in malaria transmission. We found that *An. merus* is an important vector of malaria and that it contributes to residual malaria transmission because of its exophilic tendencies, insecticide resistance and densities that peak during the dry seasons as the freshwater mosquitoes decline. Spatial and temporal studies have also shown that this species has increased its geographical range, densities and vectorial capacity over time. In this review, we highlight the resting behaviour and breeding habitats of this mosquito, which could be targeted for surveillance studies and control interventions.

Abstract No. 173.

Prevalence of tuberculosis and HIV among long distance truck drivers and commercial sex workers in Mlolongo, Machakos County.

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Background: Long distance truck drivers (LDTD) including their assistants and commercial sex workers (CSW) by nature of their duties, bear a disproportionate health burden, especially respiratory diseases, making them most vulnerable populations to contract TB, HIV or TB/HIV co-infections. This study aimed to determine prevalence of pulmonary TB and HIV among LDTD and CSW at Mlolongo. **Methods:** A cross-sectional study where consenting participants presumed to have TB were enrolled consecutively and by snowballing (outreach). Each participant produced one spot sample. Samples were dispatched to KEMRI for analysis using GeneXpert, FM and ZN microscopy. Culture was done on LJ and MGIT. Strain identification was done using ZN microscopy and HAIN assay. Drug susceptibility testing was performed with GeneXpert and Resistant Ratio (RR) method. Rapid HIV test was performed at the study site on those who consented. The database was designed and managed using MySQL. Data cleaning and validation was performed before analysis using IBM SPSS software. Descriptive statistics for categorical variables were estimated as percentages. Association between positivity and other independent factors was tested using Pearson chi-square test, at 5% level of significance. **Results:** A total of 493 participants aged 18 years and above were enrolled. Magnitude of TB was relatively high 34/493 (6.9%). TB positivity was higher in males (24/318 - 7.5%) than females (10/175 - 5.7%), with no significant difference. Over 50% of TB positive patients were identified from outreach visits compared to those attending the clinic. HIV positivity was 23/467 (4.9%), with 26 declining to give their HIV status. Significantly higher HIV positivity in females (17/166 - 10.2%) than males (6/301 - 2.0%) with an OR of 5.61(95% CI=2.17-14.52). Similarly, HIV positivity was significantly higher in CSW, 18/175 (10.3%), than LDTD, 5/172 (2.9%) with an OR of 3.83(95% CI=1.39-10.56). Of these, 3/23 HIV/TB co-infected, one male and two females. History of previous TB treatment was significantly associated with GeneXpert (p=0.051) and MGIT-ZN (p=0.029) TB positivity. Increased probability of TB infection among participants aged 31-35 years was 9.5% but not significant; (Age <26 years 7.6%; age 26 to 30 years, 5.3%, age >35 years 5.9%). There was no significant association between TB and HIV status. No MDR-TB was isolated. One sample resistant to first line anti-TB drugs using RR method was identified as *M. intracellulare*. **Conclusion:** Magnitude of TB and HIV is relatively high in the study population. There is need to adopt a holistic approach to TB diagnostics in line with recommendations on integrating lab based-testing for increased evidence-based TB diagnosis. Over 50% of TB and HIV positives from outreach indicate need to intensify outreach activities and sensitize the study population to facilitate early identification of TB and HIV for prompt initiation of appropriate treatment.



Abstract No. 174.

Project management experiences, achievements, and lessons learnt by study site personnel during a study on prevalence of pulmonary tuberculosis and HIV among long distance truck drivers and female sex workers in Mlolongo, Machakos County

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Background: Effective project management in research revolves around strategic management. The study aimed to document project management experiences, achievements, challenges and lessons learnt in implementing a study on prevalence of pulmonary TB and HIV among long distance truck drivers (LDTD) and Female Sex Workers (FSW) in Mlolongo.

Methods: Descriptive study conducted between August 2018-December 2021. Memorandum of Understanding (MOU) signed between KEMRI and North Star Alliance East Africa (NSA-EA). Project team of both parties was established to implement the study. Twelve study set-up meetings were conducted at different stages of the study attended by KEMRI and NSA-EA research teams. Meetings included preparation of MOU, inception of study site team, bi-weekly project monitoring and evaluation and end project report writing. Training on basic clinical and laboratory research methods was conducted by KEMRI team at Mlolongo Roadside Wellness Centre (RWC). RWC coordinator in consultation with KEMRI project team coordinated research activities at RWC which included; enrollment of participants at RWC and designated hotspots, administration of questionnaires including consenting of participants, sputum specimen collection, HIV testing, specimen analysis using ZN microscopy and packaging for shipment to KEMRI.

Results: Knowledge and skills acquired by RWC team was based on targeted audience observed ability to produce desired results.

Experiences: Individual roles of RWC were identified and well-articulated, enabling smooth coordination and linkage of different project tasks. Periodic meetings and reports sharing between KEMRI and RWC enabled uninterrupted service delivery. Real time documentation and verification of clinical and laboratory study processes improved turnaround time for study participants to get results and timely management for those found positive.

Achievements: RWC staff acquired knowledge and skills to conduct research within their routine activities. Identification of gaps enabled timely intervention measures for improved TB and HIV case finding at RWC and within the hotspots.

Lessons Learnt: Project management requires leadership skills to ensure efficient and effective service delivery. Team work and commitment are key for project success. Interpersonal communication skills are vital in dealing with FSW and LDTD groups when discussing TB and HIV issues already with negative impact of stigmatization. Good interpersonal relationship between RWC and participants increased awareness and willingness to participate in the study.

Challenges: MOU took long due to lengthy review process between the two institutions. Stigma associated with TB & HIV within communities was a major barrier to accessing health services. Sensitization was essential to break misconceptions on the same.

Conclusion: Basic knowledge and skills in research are crucial for successful research projects at routine-based health care centers.

Abstract No. 175.

Neonatal bacteraemia at secondary hospitals in Kenya (NeoBAC)

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Background: Clinical features of neonatal sepsis, a leading cause of neonatal death are non-specific and microbiology laboratories are rarely available in Africa. Initiation and choice of antimicrobials is dependent on a set of highly non-specific clinical signs. Admitted neonates are given first-line IV antibiotics, usually penicillin plus gentamicin, recommended by WHO. Other agents such as cephalosporins, amikacin, co-amoxiclav and ciprofloxacin are increasingly being used because of diagnostic uncertainty or antimicrobial resistance (AMR) concerns. Major knowledge gaps on aetiology and antimicrobial susceptibilities of neonatal sepsis in Africa exists. The main aim of the study is to determine the prevalence of clinically significant bacteraemia and its antimicrobial susceptibility profile at admission to public secondary level hospitals in Kenya.

Methods and preliminary results: Surveillance is being done at three secondary level hospitals (Kilifi, Kiambu and Mbagathi) including all in-born and out-born neonates (<28 days) admitted and being given IV antibiotics. Cumulatively, 3462 blood cultures have been collected before initiation of IV antibiotics and processed for clinical care, out of which 356(10%) were positive with 126(4%) being pathogens and 230(6%) were contaminants. The most common pathogens causing invasive disease were *Klebsiella pneumoniae* 41(32%), *Escherichia coli* 24(19%), *Staphylococcus aureus* 12(10%), *Streptococcus agalactiae* 11(9%), *Enterobacter cloacae* 9(7%) and *Acinetobacter baumannii* 8(6%) respectively. Of the 126 pathogens isolated, 80(63%) were Enterobacteriaceae with 47(59%) of these being extended-spectrum beta-lactamase (ESBL) producing Enterobacteriaceae. Clinical and demographic features, and outcomes will be tested for associations with bacteraemia, and with bacteraemia that is non-susceptible to first-line antimicrobials.

Conclusions: Knowledge of the prevalence, species and antimicrobial resistance profiles at the types of hospitals where there is extremely limited data will inform local and international treatment guidelines, infection control and antimicrobial stewardship initiatives, and potential clinical trials. The project will form part of wider efforts for the advocacy and design of appropriate microbiological services in Kenya and efforts towards rational antimicrobial prescribing.



Abstract No. 176.

DEMOGRAPHIC FACTORS ASSOCIATED WITH PATHOGENS DETECTED FROM INFLUENZA LIKE ILLNESS IN PATIENTS ATTENDING A NAIROBI SUB-COUNTY HOSPITAL

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Background: Acute respiratory infections (ARIs) are leading causes of morbidity and mortality, with several pathogens including viruses and atypical bacteria being implicated as causative agents. Conventional methods for the detection of these pathogens are considered labor-intensive and slow to perform, therefore nucleic acid detection was used and compared with associated patient demographic factors.

Objective: The determination of demographic factors associated with etiology of 17 selected respiratory pathogens (viruses and atypical bacteria) in patients with signs and symptoms of influenza like illness (ILI) visiting a Nairobi Sub-County health facility.

Methods: Patients with signs of ILI were recruited, where an oropharyngeal swab was collected with demographic, clinical information entered to a questionnaire. Nucleic acid extraction was carried out using QIAGEN Kit and reverse transcriptase polymerase chain reaction (RT-PCR) was carried out to detect influenza A and B; parainfluenza viruses, respiratory syncytial virus, human metapneumovirus, coronaviruses, influenza type C, human rhinovirus and human Bocavirus and atypical bacteria (Mycoplasma pneumonia, Chlamydia pneumonia and Legionella pneumophillia);

Results: Four hundred and seventeen (417) samples were collected, where 230 (55.2%) were from females while 177 (42.5%) were from males. The age range of the participants was 6 months – 12 years. Most of the participants resided in permanent houses (n=286; 68.6%), that were 1 roomed (n=286; 68.6%), with majority of the population in the houses being 1-3 (n=273; 65.5%). Many of the households had had non-smokers (n=317; 76%), utilized one type of fuel (n=196; 47%) which was paraffin (n=255; 61.2%) The most common sign of ILI was a cough (n=354; 84.9%) occurring between 4-7 days (n=199; 47.7%).

Overall, 352 pathogens were detected from the samples, where viruses (n=348; 98.7%) were majority. Slightly more pathogens were detected in females (n=204; 58%), patients who lived in non-smoking (n=269; 76.4%), 1 roomed houses (n=255; 72.4%), with a population of 1-3 people (n=244; 69.3%) and were using gas (n=215; 61.1%).

Discussions: The information collected here has greatly enhanced knowledge on the relationship between demographic data collected and pathogen etiology of ILI which will hopefully improve patient care and management.

Abstract No. 177.

Towards a Polio Free Kenya, Performance of AFP surveillance in Kenya 2005-2020

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Abstract: Background: Kenya has been polio-free since 2005, with five poliovirus outbreaks occurring following importations from neighboring countries. A highly sensitive surveillance system is critical for timely detection of outbreaks and interruption of transmission within the country. We describe the performance of Acute Flaccid Paralysis (AFP) surveillance in Kenya from 2005-2020.

Methods: We reviewed records of case patients from the national AFP surveillance database from 2005–2020. We analyzed socio-demographic characteristics, clinical presentation, and immunization status of oral polio vaccine (OPV) for case patients and calculated AFP surveillance and laboratory indicators according to the WHO standards. Population denominators were projected from Kenya National Bureau of Statistics census reports.

Results: Kenya reported 7,957 AFP cases from 2005-2020. Of these, 4,484 (55.4%) were aged <5 years and 4,223 (53.1%) were male. Paralysis of the lower limb occurred in 7,161 (88%) cases, 6,044 (76%) of cases had received ≥ 3 doses of OPV while the proportion of unvaccinated AFP cases decreased from 8.5% in 2005 to 1.5% in 2020. A total of 35 (0.4%) cases were confirmed poliomyelitis due to WPV and three due to cVDPVs, while 60 (7.5%) were classified as polio compatible. The annual non-polio AFP rate increased from 1.7/100,000 persons <15 years in 2005 to 3.9/100,000 <15 years in 2012 and declined to 1.8/100,000 persons <15 years in 2020. WHO target of 80% for stool adequacy was met in all the years, however, notification within 7 days of onset of paralysis level failed in all the years and reporting of laboratory results to the sub-national was met in 7/16 years. None of the non-polio AFP cases had a final diagnosis after classification as discarded.

Conclusion: The surveillance system is sensitive to detect poliovirus circulation in the country, however, the programme should address problems of delayed notification of AFP cases and delay in laboratory feedback. Additionally, the surveillance teams should follow up for the final diagnosis of cases as this ensures continuity of care for other causes of AFP.



Abstract No. 178.

Comparative Seroprevalence of Hepatitis B virus among Inmates and Low Risk voluntary Blood Donors in Garissa, Kenya 2021

Vincent Bahati (KENYATTA UNIVERSITY)*; George Gachara (KENYATTA UNIVERSITY); Prof. Wallace Bulimo (UNIVERSITY OF NAIROBI)

Background: Hepatitis B virus (HBV) infection is a potentially life-threatening infection that attacks the liver and can cause both acute and chronic disease. This creates a high risk of death from cirrhosis and liver cancer. Hepatitis B infection poses a major health concern globally. It is estimated that 257 million people are infected globally with 780,000 deaths reported annually. In Kenya, HBV prevalence stands at chronic states of intermediate range (5-7%) and high ($\geq 8\%$) with regional variations. Garissa County carries a high HBV infection risk with a reported prevalence of 14.1% in pregnant women attending antenatal care (ANC) clinics. This study was carried out to determine and compare the seroprevalence of HBV among inmates and voluntary blood donors at Garissa Main Prison and Garissa County referral hospital respectively.

Methodology: A total of 130 inmates and 130 voluntary blood donors were sampled in this study. Written informed consent was sought from each participating inmate and donor and none was remunerated or coerced to participate. The study participants' identity was coded using special numbers to ensure confidentiality. Ethical approval was granted from Kenyatta University Ethics and Review Committee (KU-ERC, PKU/2043/I1190). Similarly, research permit was granted by National Commission for Science, Technology and Innovation (NACOSTI) under License No. NACOSTI/P/20/4150. Serum was tested for Hepatitis B surface antigen (HBsAg) using a rapid test cassette (Amitech Diagnostics Inc.). A questionnaire was used to collect socio-demographic factors of the study participants. Data were entered and analyzed using SPSS version 20 and bivariate logistic regression was used to determine the association between socio-demographic factors and HBV seropositivity.

Results: Majority of the study participants were males (86.9% among inmates and 95.4% among blood donors). Majority (76.2%) of the inmates and of the donors (83.1%) were aged between 20-40 years while majority (51.4% of the donors and 81.5% of inmates) had only a primary school level of education. HBV seroprevalence was significantly higher among inmates compared to blood donors. Out of the total number of inmates tested, 7 (5.4%) were HBV seropositive. Conversely, among blood donors 4 (3.1%) were seropositive. There was a significant association between HBV seropositivity and gender among both the blood donors and inmates. There was no significant association between HBV seropositivity and both level of education and age.

Conclusion: Scanty data currently exists on HBV seroprevalence in Kenyan prisons and these study findings may be used as a proxy for other prisons within the country. Further studies to determine other predisposing risk factors should be conducted. Additionally, molecular studies to determine circulating HBV genotypes in this group of people and region are required.

Abstract No. 179.

IMPACT OF ROTAVIRUS VACCINATION ON ROTAVIRUS GASTROENTERITIS AND STRAIN DISTRIBUTION IN MBITA, WESTERN KENYA

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Introduction: A two-dose oral monovalent rotavirus vaccine, Rotarix, was introduced into the Kenyan National Immunization Programme in 2014. There is early evidence to suggest that these vaccines will have a significant impact in preventing and reducing the health burden of severe acute gastroenteritis (AGE) in Kenya. We aimed to evaluate the impact of rotavirus vaccination on rotavirus-specific AGE and strain distribution among children aged < 5 years in Mbita, Western Kenya following the vaccine implementation.

Methods: A total of 932 fecal samples were collected from children < 5 years of age presenting with AGE at Mbita Sub-County Referral Hospital (MSH) during the pre-vaccine (August 2011-July 2014) and post-vaccine (March 2019-March 2020) periods. The specimens were screened for rotavirus antigen using ELISA while multiplex semi-nested RT-PCR was used to determine the G and P genotypes. We compared rotavirus-specific AGE hospitalizations and strain distribution in the post-vaccine period with the pre-vaccine baseline. Rotavirus immunization coverage was estimated using the hospital and subcounty administrative data.

Results: In the pre-vaccine introduction period, 12.2% (47/386; 95% CI: 9.2-15.7%) of the children tested positive for rotavirus AGE. Following the vaccine introduction, we observed a rotavirus AGE prevalence of 9.0% (49/546; 95% CI: 6.9-11.7%), indicating an overall decline of 26.2% (95% CI: 14.9-47.8%) in rotavirus-related hospitalizations. Reductions in rotavirus hospitalizations were greatest among vaccine eligible children (< 12 months), with the peak in rotavirus AGE detection shifting to older children (12-23 months) following the vaccine introduction. Coverage with the last dose of rotavirus vaccine was 67%, with a dropout rate of 1.5%, indicating poor access albeit high utilization of the accessed vaccine in the study area. The frequency of G1P[8], which was the most dominant strain alongside G8P[4] in the pre-vaccine period at 18%, declined markedly in the post-vaccine period (12%). G3P[8] which was never detected in the pre-vaccine period became the most dominant genotype in the post-vaccine period at 33%, thereby displacing G1P[8]. There was increased detection of the uncommon G12P[6] (27% from 2%) and G12P[8] (12% from 0%) strains following the vaccine introduction.

Conclusion: Rotavirus vaccination has resulted in a considerable decline in rotavirus AGE and a shift in strain dominance in Mbita, Western Kenya. There was a shift in age distribution of rotavirus AGE toward older age groups which may be suggestive of a waning protective immunity conferred by the current rotavirus vaccine. Furthermore, our data underscore the need for increasing rotavirus vaccination coverage in this area so as to maximize the impact of the vaccine.

Keywords: Rotavirus; gastroenteritis; vaccine; strains; impact; Kenya.



Abstract No. 180.

Correlates of condom use at last sexual intercourse among adolescent girls and young women in central and western Kenya

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Background: In Sub-Saharan Africa, adolescent girls and young women (AGYW) are disproportionately affected by unintended pregnancy and sexually-transmitted infections (STIs), including HIV. Sub-Saharan African AGYW accounted for a quarter of all new HIV infections in 2017, despite being just 10% of the region's population. Data suggest that AGYW face many barriers to correct and consistent condom use as effective prevention against undesired pregnancy and STIs. We investigated condom use behavior among a large cohort of AGYW in the setting of sexual and reproductive health (SRH) service disruptions related to the Covid-19 pandemic.

Methods: The primary study enrolled sexually-active AGYW age 15-20 years in Thika, Kisumu, and Nairobi in a blinded, prospective randomized study of single dose HPV vaccination. Data on sex practices including condom use at last sexual intercourse were collected at enrolment and every 6 months up to month 18 of the study. Prevalence rates of condom use at last sexual intercourse were determined in this cohort pre- and post- the government of Kenya's Covid-19 lockdown in March 2020, and also among AGYW not on contraception. Multivariable Generalized Estimating Equation (GEE) poisson model was used to determine the correlates of condom use at last sexual intercourse.

Results: 1,589 participants were included in the analysis; 47% were minors, 90% were single and 70% reported secondary school as their highest level of education. Overall prevalence of condom use at last sexual intercourse was 53% at baseline, 32% at endline and reduced by 21% in Thika post-Covid-19 lockdown. AGYW in Nairobi and Thika were 32% and 37% less likely to use a condom compared to those in Kisumu (95% CI: 0.55 - 0.84, $p=0.001$) and (95% CI: 0.53- 0.76, $p< 0.001$) respectively. Adult girls were 8% less likely to use condoms as compared to minors (95% CI: 0.84 - 0.99, $p=0.031$). Attaining secondary school education and above was associated with a higher rate of condom use when compared to primary school education; (95% CI: 1.05 - 1.48, $p=0.009$) and (95% CI: 1.10 - 1.68, $p=0.004$) respectively. Participants who reported that they thought their partners were having sexual intercourse with others or were not sure of this were 35% and 8% less likely to use condoms as compared to those who thought their partners were faithful (95% CI: 0.44-0.96, $p=0.032$) and (95% CI: 0.81-1.04, $p=0.184$) respectively.

Conclusion: There were significant regional differences in condom use behavior, which may be related to local norms, health-related beliefs, and perceived HIV risk. The prevalence of condom use at last sexual intercourse among Kenyan AGYW is associated with age and educational attainment. The lockdown barrier into the Nairobi metropolis placed before Thika town posed a clinic access challenge to Thika participants.

Keywords: Adolescent girls and young women, Condoms

SUB THEME: DRUG DISCOVERIES AND THERAPEUTICS

Abstract No. 181.

In vitro antiviral activity of Cat's claw (*Uncaria tomentosa*) extract against influenza A virus

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Background: Influenza virus causes widespread respiratory illnesses resulting in significant morbidity and mortality worldwide. The rapid emergence of drug resistance against available antiviral drugs necessitates the need for new therapeutics. Natural products have been used traditionally to treat and manage various illnesses making them important for the identification and development of new drugs. Cat's claw (*Uncaria tomentosa*) is a tropical plant reported to possess various health benefits including antimicrobial, antioxidant, anticancer and anti-inflammatory activities. This study evaluated the anti-influenza activity of Cat's claw and elucidated the possible mechanism of action against influenza A virus.

Methods: Cat's claw bark was pulverized into fine powder. One gram was mixed with 10mL of either 80% ethanol, hot water, or alkaline water and agitated at RT for 24h. Air dried extract was reconstituted to 20mg/mL in respective solvents and used to evaluate cytotoxicity and antiviral activity against 5 strains of influenza A virus using crystal violet assay. Plaque formation assay was used to determine inhibitory effects of the extract on different stages of virus replication as follows; a) Pretreatment of cells (PTC): Cells were treated with extract and incubated at 37°C for 1h and then infected with virus, b) Pretreatment of virus (PTV): virus was mixed with extract and incubated at RT for 1h before infecting cells, c) Treatment during infection (TDI): extract and virus were simultaneously added to cells and incubated at 37°C for 1h, d) Treatment after infection (TAI): Cells infected with virus and then overlaid with agarose containing extract. Hemagglutination inhibition (HAI) assay was used to confirm plaque assay results.

Results: All extracts inhibited the replication of A/WSN/33 virus with IC₅₀ of 3.9, 2.3, and 6.2µg/mL for 80% ethanol, hot water, and alkaline extracts, respectively. Solvent controls did not show antiviral activity while IC₅₀ of Oseltamivir = 4.2µg/mL. The alkaline extract had least cytotoxicity (CC₅₀ = 125µg/mL) and was used for further analyses. It inhibited several strains of influenza A virus including A/PR/8/34(H1N1), A/Aichi/2/68(H3N2), clinical isolates of A/H1N1/2009 pandemic with IC₅₀ range of 3.8-19.5µg/mL. The results of different treatment protocols showed that the extract completely suppressed virus replication during TDI and PTV suggesting virucidal activity which was consistent with the HAI results.

Conclusion: Our data suggest that Cat's claw extract has virucidal effect on influenza virus particles and that the antiviral activity is strain-independent. The extract demonstrated potent antiviral activity against a oseltamivir-resistant clinical isolate of H1N1/2009 pandemic influenza. Our data demonstrates possible future use of Cat's claw in influenza management, however, more research is required to determine the active phytochemicals and antiviral activity in vivo.



Abstract No. 182.

CIRCULATION OF PHLEBOVIRUSES AND ARBOVIRUSES AMONG SANDFLIES FROM PARTS OF NORTH RIFT, KENYA

Edith C Koskei (KEMRI)*; Solomon K Langat (Kenya Medical Research Institute (KEMRI)); Rebecca Waihenya (JKUAT); Rosemary Sang (KEMRI)

Background: Until recently, arbovirus surveillance has mainly focused on mosquito and tick vectors resulting in the discovery of multiple mosquito-borne and tick-borne arboviruses. Few surveillance studies done in some parts of Kenya have shown the presence of mosquito-borne and novel arboviruses circulating among Phlebotomine sand-fly populations. This study sought to isolate and characterize arboviruses from the Phlebotomine sandflies sampled from selected regions in North Rift Kenya.

Methods: Arbovirus surveillance conducted between 2015 and 2017 led to the collection of approximately 20,000 sandflies translating to 820 sand-fly pools from three selected regions of North-rift Kenya namely Turkana, Baringo and West pokot counties. Virus isolation was performed on Vero cells and positive pools were tested by Polymerase Chain Reaction targeting Alphaviruses, Flaviviruses, Orthobunyaviruses and Phleboviruses and characterized by Whole Genome Sequencing.

Results: Out of 820 pools analyzed, 20 showed reproducible cytopathic effects. A total of 5 arboviruses, some of which are known to be mosquito-borne were detected. Characterization of the isolates led to the identification of Sindbis virus from four sandfly pools sampled from West Pokot county (3) and Baringo County (1). Ntepess Virus, which was recently discovered in Marigat region of Kenya was isolated from one pool from Baringo. Three novel viruses; Koutango-like virus, Chandipura-like virus and Bogoria-like virus were isolated from pools from Baringo, Turkana and West pokot counties respectively.

Conclusion: The study has successfully isolated and characterized viruses, some of which are known to be of medical importance. The findings suggest that sandflies are potential vectors of these viruses. Therefore, in addition to mosquitoes and ticks, Phlebotomine sandflies are important vectors to consider in arbovirus transmission dynamics. Novel viruses were also isolated suggesting that Phlebotomine sandflies are hosts to many potentially pathogenic viruses that remain unidentified. More studies need to be carried out to determine the public health importance/impact and the level of exposure of these viruses in humans and livestock populations in the study areas.

SUB THEME: ESSENTIAL SEXUAL, REPRODUCTIVE, ADOLESCENTS, MATERNAL AND CHILD HEALTH

Abstract No. 183.

Adverse neonatal outcomes at the maternity ward in Kitale County Hospital, Kenya, April – May 2021

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Introduction: Adverse neonatal outcomes such as prematurity, poor apgar scores and asphyxia are major contributors to morbidity and mortality in neonates. Characterization of these determinants of neonatal morbidity and mortality has not been done at Kitale County Hospital and we sought to bridge this gap. We characterized the adverse neonatal outcomes at Kitale County Hospital between April and May 2021.

Methods: We conducted a cross-sectional, retrospective descriptive study design by review of the post-natal maternity registers at the Kitale County Hospital. The case definition was any entry of a neonate born between April and May 2021. We collected information on sex, gestation at birth, birth weight and birth outcomes using a Microsoft Excel data collection tool. Descriptive analysis was done using measures of central tendency for continuous variables and proportions for categorical data.

Results: We collected data on 500 neonates. The males were 249(50.4%) and the mean birth weight was 3.1 kg (SD±0.54). Stillbirths were 16(3.2%) with fresh and macerated stillbirths being 5(31.3%) and 11(68.7%) respectively. Neonates with low birth weight (<2.5kg) were 44(8.98%) and those born premature (at <37 weeks) were 104(21.1%). Majority of the neonates had APGAR scores of >7 (92.9%, 94.7% and 95.5% at minute 1, 5 and 10 respectively). In the data quality audit, all the variables had accuracy and completeness of more than 80%.

Conclusion: A third of stillbirths occurred during labour or delivery while almost a third of all neonates were born premature at < 37 weeks and at least a tenth of them had low birth weight. We recommend sensitization training of healthcare workers in maternity and newborn care units, fetal growth monitoring and neonatal size evaluation, education on adequate nutrition and daily iron and folic acid supplementation during antenatal care to help reduce stillbirths and prevent low birth weight.

Key words: Neonate, low birth weight, antenatal care, preterm



Abstract No. 184.

Assessing COVID-related concerns and their impact on antenatal and delivery care among pregnant women living with HIV in Kenya

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Intro: Some studies indicate that pregnant Kenyan women were concerned about COVID-19 exposure during maternity care. We assessed concern regarding COVID-19 exposure and any impact on antenatal care (ANC) enrollment and/or hospital delivery among pregnant women living with HIV in Kenya.

Methods: Preliminary data were collected from pregnant women living with HIV enrolled in an ongoing cluster randomized trial to evaluate the impact of the HITSsystem 2.1 (MHR01121245) between October 1, 2020 and November 29, 2021. Women were eligible to enroll if they presented for care by 36 weeks gestation at one of the 12 hospitals included in the study (2 each in Mombasa and Kilifi, 8 in Siaya). The study was IRB approved and women provided written, informed consent. Participants were interviewed at study enrollment (n=1199) and delivery (n=771). A 5-point Likert scale (strongly disagree to strongly agree) assessed concerns about COVID-19 exposure and travel challenges. Gestational age at PMTCT enrollment and delivery location were compared among women who expressed COVID-19 concerns and those who did not.

Results: Of the 1199 women interviewed at baseline, 61 (5.1%) reported delayed ANC because of concerns related to COVID-19 exposure. A greater number (96 [8.0%]) worried about exposure to COVID-19 during delivery. A total of 321 women (26.8%) indicated that travel to/from the hospital was more difficult because of COVID-19. The average gestational age at PMTCT enrollment was similar among women who reported delaying ANC enrollment due to COVID-19 concerns compared with those who did not (17.7 weeks vs 18.1 weeks). Gestational age at PMTCT enrollment was similar among those who indicated COVID-related travel challenges compared to those who did not (18.5 weeks vs 17.9 weeks).

Among the 771 women who delivered, 767 had delivery location documented; 726 (64.7%) delivered in a health facility, 34 (4.4%) at home, 2 (<1%) delivered with the assistance of a traditional birth attendant, and 5 (<1%) delivered on route to the facility. Rates of home-based delivery among women who expressed concerns about delivering in a health facility (2/73, 2.7%) were lower than among women who did not express concerns (29/678, 4.6%), but there was too much uncertainty in these estimates to rule out an effect in either direction (Fisher exact test p=0.759). Similarly, there was little evidence of a reliable difference between rates of home delivery among women who indicated travel challenges (10/221, 4.5%) and those who did not (20/529, 3.9%; Fisher exact test p=0.683).

Conclusion: Few pregnant women living with HIV expressed concerns about COVID-19 exposure in the context of routine ANC or delivery care. Women with and without concerns had similar care seeking behaviors. The recognized importance of routine ANC care and facility-based deliveries may have contributed to these positive pregnancy indicators, even among women who worried about COVID-19 exposure.

Abstract No. 185.

Hepatitis B vaccination and testing dynamics among key populations in selected sites in Kenya

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effective preventive measures in reducing the incidence of chronic hepatitis B virus (HBV) infection and its consequences such as liver cirrhosis. Access to vaccination and testing are priority program strategies for control and entry to care and management. While there is universal HBV vaccination access to infants in the national Expanded Programme on Immunization, this is not the case for adults and children.

Objective: The currently ongoing study among the truck drivers and commercial sex workers seeks to determine testing and vaccination dynamics in selected sites in Mombasa, Machakos and Nakuru in the year 2020. Testing, access, vaccination status and knowledge on hepatitis was evaluated in this high-risk population.

Methods: A structured questionnaire was administered among 700 consenting adult participants. HBsAg Sero-testing was carried out onsite using a point of care diagnostics kit and all the samples were shipped to CVR, KEMRI for confirmatory testing by HBV ELISA. Analysis of test results and questionnaires provided data on testing and vaccination dynamics in this key population.

Results: Lack of knowledge on hepatitis was at 56% while only 4.5% of the participants had ever tested for hepatitis B. HBV prevalence was at 2.3% and knowledge on vaccination at 21%. Vaccination status was at 11% where 29% and 12% stopped at 1 and 2 dosage respectively. Failure to seek for vaccination was attributed to lack of awareness 78%, lack of access to vaccine 10% and not seeing the need for the vaccine at 2%. Correlates of vaccination included gender, education and marital status.

Conclusion: Hepatitis B testing and vaccination is low in this population. Gaps exist in HBV awareness and prevention among the key population. Further studies are required to evaluate risk factors, population dynamics and availability of services including vaccination for a tailored intervention in such a high-risk population groups.



Abstract No. 186.

Establishment of Tuberculosis Molecular Bacterial Load Assay (TB-MBLA) in Kenya

Asiko Ongaya (KEMRI)*; Paul Mwangi (KEMRI); Evans Amukoye (KEMRI); Wilber Sabiiti (University of St Andrews)

Background: The Tuberculosis Molecular Bacterial Load Assay (TB-MBLA) developed by University of St Andrews Infection Group is a reverse transcriptase quantitative polymerase chain reaction (RT-qPCR) test that uses primers and dual-labelled probes for 16S rRNA to quantify Mycobacterium Tuberculosis (MTB) bacillary burden. The Xpert MTB/RIF assay or traditional sputum smear microscopy cannot discriminate between alive and dead bacilli, and the culture approach delays results. TB-MBLA is able to identify live MTB bacilli

Objective: To train and implement the use of TB-MBLA in Kenya.

Methodology: Centre for Respiratory Diseases Research, KEMRI was identified as the site for training since it is a TB-based assay. A total of nine people were fully trained in different aspects of this assay. The training targeted four field workers (2 clinical officers, 1 nurse, and 1 field worker) and five laboratory scientists. Training was conducted in 3 ways: through online video training, sharing reading materials, and in-person laboratory and field training for a period of 3 months.

Results: Of the nine people trained, four were trained on how to collect samples meant for the TB-MBLA assay and transportation of samples to the laboratory. The four were able to effectively collect samples and transport them to the laboratory.

Five laboratory scientists were trained on sample storage, MTB RNA extraction, and the interpretation of results. Practical sessions and quality control tests were performed to evaluate the team.

Conclusion: A significant initial investment in RNA extraction and polymerase chain reaction equipment, as well as training in techniques and simplifying laboratory and field supply procurement systems, are required to attain the maximal value of using this assay in a high TB burden setting. Following the successful training and implementation of the Assay in Kenya; the Assay will be used in a study to monitor the treatment of TB and TB/HIV patients in Kenya in comparison to MTB culture and microscopy.

Abstract No. 187.

An Epidemiological Analysis of Environmental Surveillance of Polio in Kenya, Jan 2020 –August 2021

Stephen Ochieng Ombija (Kenya Medical Research Institute)*; Rosemary Nzunza (KEMRI); Evans Komen (KEMRI); Benlick Mwangi (KEMRI); Joanne H Hassan (kemri); Agnes Chepkurui (KEMRI); Fiona Aluoch Alaii (KEMRI); Mercy A Onyango (KEMRI); Janet Ngugi (KEMRI); DIANA WANJIRU WANJIKU (KEMRI); James Nyangao (KEMRI); Shadrack Mr. Barmasai (Kenya Medical Research Institute); Sheila Mbaabu (KEMRI); Jennifer Njomo (KEMRI); Robert Mainga (KEMRI); Moses Orina (KEMRI); Paul Muchai (KEMRI); Peter Maritim (KEMRI); Mary Njuguna (Kenya Medical Research Institute); Samoel Khamadi (KEMRI); Peter Borus (KEMRI)

Background: Global Polio Eradication was initiated in May 1988 after adoption of resolution by the 41st World Health Organization Assembly. The resolution aimed to eradicate polio by the year 2000. Kenya reported its last case of indigenous wild poliovirus in 1984. However, the country has since suffered outbreaks of circulating vaccine derived poliovirus type 2 and occurrence of VDVP, the last of which was detected in 2021. Majority of VDPV in Kenya have been detected from environmental surveillance (ES). In this paper we report on results from the polio environmental surveillance samples collected between the years 2020-2021 and processed using the recommended WHO polio ES samples processing algorithm.

Objective: To assess polioviruses in Environmental Surveillance samples using the standard WHO samples processing algorithm

Methods: We conducted analyses of laboratory data from processing of ES samples collected from all sites that submit samples to the polio laboratory for processing. All sites collected a 1 litre sample using the grab method, and samples were processed in the laboratory using the standard WHO algorithm. Data was captured both in an MS Excel tracking tool as well as an EPI INFO database.

Results: 337 ES samples were collected from 17 sites Jan 2020 to Aug 2021. Of these samples, 220 were positive on culture for enteric viruses including poliovirus. Out of the 17 sites Kaverera Bridge was the least performing with a performance of 45%. At week 34 2020 it recorded negative results for 3 consecutive collections. This is attributed to overdilution of the site from diverse effluents and lack of adherence to sample collection time. No wild type PV was isolated. However, circulating-VDPV were isolated from Garissa and Mombasa; Garissa on 22nd Dec 2020 which yielded cVDPV type 2 had 65nucleotide sequence difference to Sabin and with a Somalia ES sample isolate, as well as sample collected from Mombasa on 13/01/2021 which had a 59 nucleotide sequence difference with Sabin and was genetically linked to a different Somalia ES sample isolate. The cumulative environmental virus isolation rate for 2020-2021 was 65.28%. On quality indicators 329 samples were received in the laboratory in good condition under appropriate reverse cold chain, representing a cumulative percentage of 97.62%. 323 (95.84%) of samples were collected during the scheduled week and 331 (98.21%) of samples were collected at the scheduled time of before 9.00am.

Conclusion: The performance of Kenya PV ES surpassed the minimum WHO recommended targets for EV isolation rate, of samples arriving in good condition, as well as in samples being collected in the scheduled week and time. All samples arrived in the laboratory within 3 days of collection. To enhance the country's polio free status in the environment, healthcare workers awareness on environmental surveillance should be strengthened in least performing sites to improve on detection.



SUB THEME: MENTAL HEALTH AND OTHER NON-COMMUNICABLE DISEASES

Abstract No. 188.

INTEGRATING QUALITY IMPROVEMENT PRINCIPLES TO SCALE UP ADULT AND PAEDIATRIC TUBERCULOSIS ACTIVE CASE FINDING IN AROMBE DISPENSARY

Omune Everlyn Adhiambo (Ministry of health)*

Back ground: Arombe dispensary is a health facility in migori county which began implementing active case finding(ACF) since 2018 which is the systematic identification of presumptive TB cases from a predetermined target group or population while quality improvement is the formal approach to the analysis of practice performance and efforts to improve performance. The facility has catchment population of 12,682 with an expected annual target for notified TB cases at 54 cases per year which up to the end of 2020 had not been achieved .In January 2021 The facility formed a work improvement team and Using a fish bone the following root causes were identified to knowledge gaps amongst clinicians on active case finding , poor contact management of bacteriologically confirmed cases and weak community facility linkage due to lack of community health volunteer's knowledge on contact tracing and available support,

Objectives

- i. To increase TB case finding by 20%
- ii. To increase pediatric TB case finding to 10%.

Methodology

This is a retrospective study comparing data collected from the facility TB patient register and contact management from 2018 to 2020 before integrating quality improvement and 2021 after. The number of TB cases diagnosed was then analyzed.

Strategies employed were:

1. Training of two staffs on integrated TB and pediatric TB
2. ACME to sensitive facility staffs on active case finding to promote use of gene expert and refining use of contact management register.
3. Regular on job training and mentorship on screening and TB management.
4. Monthly tracking of indicators on the TB dash boards after QI meetings.
5. Sensitizing the community health volunteers on screening, contact tracing and community facility referrals of suspects.
6. Quarterly active case finding data review meeting.

Results

The following were the

TB CASES NOTIFIED

In 2018 when the facility began implementing active case finding only 32 cases of TB were notified and in 2019 increased to 47 (147%) cases, in 2020 49 (153%) cases. In 2021 with integrating quality improvement in active case finding the facility notified 67 (209 %) cases.

(c) PAEDIATRIC TB CASE FINDING

In 2018 when the facility began implementing active case finding only 1(3%) case of pediatric TB was notified and in 2019 increased to 5 (10.6%) cases, in 2020 no case of pediatric TB case was notified due to the covid-19 pandemic that reduce work load. In 2021 with integrating quality improvement in active case finding the facility notified 10 (14.9%) cases

CONCLUSION

Integrating quality improvement in active case finding in aids in identifying problems, solutions and tracking down progress essential in scaling up number of TB cases diagnosed.

RECOMMENDATIONS

1. Integrate quality improvement in TB active case finding in settings to boost active case finding.





In Search of Better Health

POST GRADUATE COURSES: MAY 2022 INTAKE

Applications are invited for admissions into the following programmes for self-sponsored students under the collaborative JKUAT/KEMRI postgraduate training (M.Sc. and Ph.D.) based at the KEMRI Graduate School.

1. Master of Science (M.Sc.) - 2-3 Year Programme
2. Doctor of Philosophy (Ph.D.) - 3-4 Year Programme

Course	Minimum Entry Requirements
MASTER OF SCIENCE (M.SC) PUBLIC HEALTH PROGRAMME 1. MSc. Public Health 2. MSc. Epidemiology and Biostatistics 3. MSc. Global Health BIOMEDICAL SCIENCES PROGRAMME 4. MSc. Medical Microbiology 5. MSc. Medical Virology 6. MSc. Medical Mycology 7. MSc. Medical Parasitology and Entomology 8. MSc. Molecular Medicine MEDICINAL CHEMISTRY/NATURAL PRODUCTS PROGRAMME 9. Medicinal Chemistry 10. Medicinal Phytochemistry	University degree with Upper Second Class Honours in the respective discipline from a University recognized by JKUAT Senate. OR University degree with Lower Second Class Honours in the respective discipline plus acceptable evidence of research ability or academic work recognized by JKUAT Senate. In addition to the above minimum admission requirements, applicants wishing to be in the programmes specified below must be holders of degrees indicated: - 1. M.Sc. in Medicinal Chemistry – holders of B Pharmacy or Botany or Chemistry or Biochemistry. 2. M.Sc. in Medicinal Phytochemistry – holders of a degree in: - Pharmacy, or Botany, or Chemistry or Biochemistry. OR - Be a holder of any other qualification accepted by the University Senate as equivalent to any of the above.
DOCTOR OF PHILOSOPHY (PhD) (In the MSc areas above)	Masters degree in relevant areas

The same information is readily available in our websites: www.jkuat.ac.ke and www.kemri.go.ke

*NB. These are the minimum requirements; other conditions may apply for individual programmes.

Application procedure and deadline

Candidates seeking admission are required to fill application forms obtained from the offices/Website indicated below upon payment of non-refundable application fees of Kshs.1,500/-. Completed application forms and original receipt for application fee should be returned to the KEMRI GRADUATE SCHOOL (Located at the Training Centre) KEMRI HEADQUARTERS, not later than 15th April, 2022.

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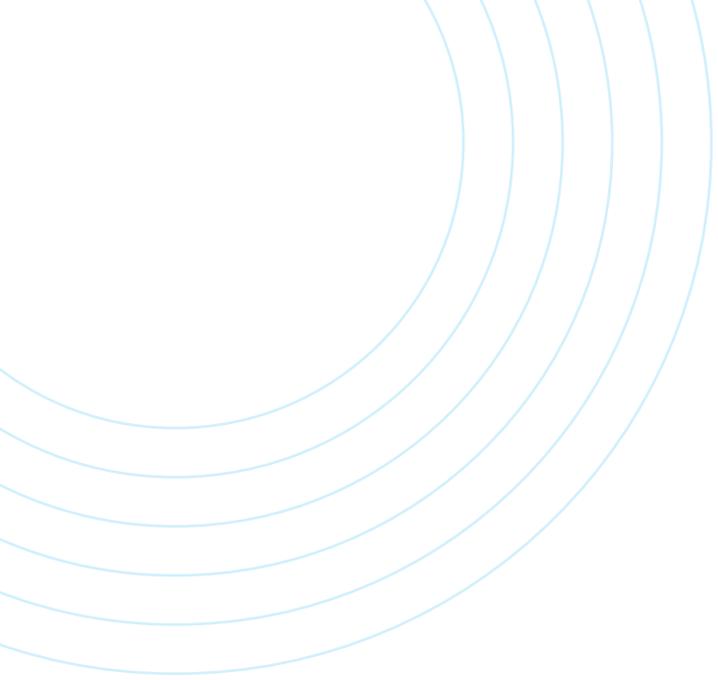
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