CORDS

Connecting Organizations for
Regional Disease Surveillance

CORDS Conference

29 - 30 January 2018, Bangkok, Thailand.

Abstract Book

CORDS Conference

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Message from the Organizers

Dear Guest,

Connecting Organizations for Regional Disease Surveillance (CORDS), The Rockefeller Foundation, and Ending Pandemics (formerly the Skoll Global Threats Fund) are honored to welcome you to the CORDS 2018 Conference, a side meeting of **the Prince Mahidol Award Conference, held at the Centara Grand & Bangkok Convention Centre at CentralWorld, Bangkok, Thailand, 29-30 January 2018.**

CORDS is a global initiative that works to catalyze collaboration among regional disease surveillance networks across the world in order to improve their capacity to prevent, detect, and control the spread of epidemics. Our vision is a world united against disease. CORDS is comprised of six international networks which include: the Asia Partnership on Emerging Infectious Diseases Research (APEIR), the East African Integrated Disease Surveillance Network (EAIDSNet), the Mekong Basin Disease Surveillance Consortium (MBDS), the Middle East Consortium on Infectious Disease Surveillance (MECIDS), the Southern African Centre for Infectious Disease Surveillance (SACIDS), and the Southeast European Center for Surveillance and Control of Infectious Diseases (SECID).

Message from the Organizers

The two-day CORDS Conference is an integral component of PMAC 2018, reinforcing the overarching theme **"Making the World Safe from the Threats of Emerging Infectious Diseases."** Under the specific topic **"Advancing Regional Collaboration for Improved Global Health Security"**, the Conference will bring together more than 120 representatives from regional disease surveillance networks and the global public health field across the world to share experiences and best practices, and plan future collaborative action. It includes four sessions following CORDS strategic objectives: i) Building capacity; ii) Promoting Innovation; iii) Advancing One Health; and iv) Building sustainable networks.

We value your participation in the CORDS 2018 Conference and look forward to a productive meeting and fruitful exchanges.

Yours sincerely,

Pr. Amin Soebandrio
Chairman, CORDS

Pr. Charlanne Burke
Associate Director,
The Rockefeller Foundation

Dr. Christophe Longuet
Executive Director, CORDS

Dr. Mark Smolinski
President, Ending Pandemics

Message from CORDS Chairman

Dear colleague,

I warmly welcome you all to the CORDS 2018 Conference. As Chair of CORDS and the Steering Committee Chairman of the Asia Partnership on Infectious Disease Research (APEIR), I see first-hand the importance of collaborating across countries and regions around the globe to make the world a safer place. Our CORDS conference will be a unique moment to share lessons learned by regional networks on important topics such as **"Innovating in surveillance using a digital approach", "Making One Health surveillance work"** and **"Addressing antimicrobial resistance using the One Health Approach".** You will be able to exchange with peers from 35 countries and 5 continents and with internationally renowned experts from prominent organizations who strive to fight against infectious epidemics worldwide.

I wish you a productive and inspiring experience.

With best regards,

Prof. Amin Soebandrio

Message from CORDS Executive Director

Dear Guest,

I am delighted to welcome you to the CORDS 2018 Conference in beautiful Bangkok. We are honored to host this two-day side event of the Prince Mahidol Award Conference (PMAC) under the specific theme of **'Harnessing the Power of Public - Private - Community Partnerships for Preventing, Detecting, and Responding to Zoonotic Diseases and Antimicrobial Resistance.** Our conference, organised in collaboration with the six CORDS networks - APEIR, EAIDSNet, MBDS, MECIDS, SACIDS and SECID - will provide an important opportunity to learn from each other and develop future collaborations. Other networks from West Africa, the Mediterranean region and the Indian Ocean will also actively participate and provide their perspective in the fight against epidemics.

We are very grateful to our co-organisers The Rockefeller Foundation and Ending Pandemics (formerly known as the Skoll Global Threats Fund) who have made this important meeting possible. I hope you find the conference both enjoyable and informative. Please do contact any of the CORDS team members if they can be of assistance during your stay.

With warm regards,

Dr. Christophe Longuet

Organizers

CORDS

Connecting Organizations for Regional Disease Surveillance

CORDS is a global initiative that works to catalyze collaboration among regional disease surveillance networks across the world in order to improve their capacity to prevent, detect, and control the spread of epidemics. CORDS is comprised of six international networks: the Asia Partnership on Emerging Infectious Diseases Research (APEIR), the East African Integrated Disease Surveillance Network (EAIDSNet), the Mekong Basin Disease Surveillance Consortium (MBDS), the Middle East Consortium on Infectious Disease Surveillance (MECIDS), the Southern African Centre for Infectious Disease Surveillance (SACIDS), and the Southeast European Center for Surveillance and Control of Infectious Diseases (SECID).
Our vision is a world united against disease.

www.cordsnetwork.org

Ending Pandemics

In December 2017, The Skoll Global Threats Fund Board of Directors spun out Ending Pandemics as an independent entity focused on eliminating this global threat to humanity. Ending Pandemics works with partners across the globe to unlock the potential to find, verify, and respond to outbreaks faster no matter where they might emerge on the planet.

http://endingpandemics.org/

The ROCKEFELLER FOUNDATION

For more than 100 years, the Rockefeller Foundation has brought people together to try to solve the world's most challenging problems and promote the well-being of humanity. The Rockefeller Foundation supports work that fights to secure the fundamentals of human well-being - health, food, energy, jobs - so that they're within reach for everyone, everywhere in the world. Today, its portfolio of work in health includes support for Planetary Health, Universal Health Coverage, and Disease Surveillance Networks, with the goal of ending millions of preventable deaths through more equitable, effective health systems in communities around the world.

www.rockefellerfoundation.org

Partner

FONDATION MÉRIEUX

For over 50 years Mérieux Foundation, an independent family foundation with public interest status, has worked on the ground with local partners to improve the living conditions for mothers and children, and build the infrastructure and knowledge that underpin the surveillance and control of infectious diseases in developing countries. Mérieux Foundation is active today in over twenty countries.

www.fondation-merieux.org/en/

About CORDS

We are a Non-Governmental Organization comprised of six international networks, working to reduce and prevent the spread of infectious diseases by exchanging information between surveillance systems globally. Our vision is a world united against disease.

In our increasingly mobile world, early detection is vital in limiting life-threatening infections to their area of origin. The collective expertise of our networks and their close relationships with local communities are critical in facilitating timely detection and response to serious outbreaks such as Zika, Ebola and Yellow Fever. We are committed to promoting the One Health approach which recognizes that the health of humans is connected to the health of animals and the environment.

Over the past five years, CORDS has established a thriving network of networks that is helping prevent pandemics; by improving capacity, advancing one health, promoting innovation and building sustainable networks. As a network of networks, CORDS's role is, by definition, facilitative. Its value is in connecting its' members, creating spaces for ideation and innovation, enabling regional action, and using results and learning to inform work across regions and the broader global health landscape.

The key achievements of CORDS' activities since coming into operation in 2012 are best viewed through three lenses:

1. Network Connectivity - who is participating and how are they connecting?

- An example of CORDS work in connectivity is the One Health 'incubators' held in 2015/16, which engaged participants from 14 countries representing all six CORDS networks. These incubators brought together human, animal and environmental health experts to explore the relationship between human health, animal health and environ mental factors, and to develop innovative ways to facilitate multi-sec toral collaboration and problem solving. As a result, network members have cultivated trusting relationships, and established a foundation for continued collaboration.
- By connecting these regional networks, the regions learn from one another and tap into one another's local and extended networks of expertise. For example, all six regional networks came together in the fall of 2016 for a roundtable meeting with experts from the recent Zika Virus outbreak in Brazil, to exchange and learn from each other, for a roundtable meeting in 2016. This initiative was spearheaded by CORDS' two South East Asian networks; Mekong Basin Disease Surveillance network (MBDS) and the Asia Partnership for Emerging Infectious Disease Research (APEIR) following an increase in locally transmitted cases of Zika in the region.

About CORDS

2. Network Health - What is CORDS's capacity to sustain participation and enable the network to achieve its' shared goals?

- CORDS has benefitted from the financial support of The Rockefeller Foundation, Ending Pandemics (formerly known as Skoll Global Threats Fund), Bill & Melinda Gates Foundation, Nuclear Threat Initiative, Canadian Ministry for Foreign Affairs, Search for Common Ground, and Fondation Mérieux. As a result, CORDS has been able to function for 5 years as a backbone organisation, connecting regional networks and fueling work within the regions.
- CORDS has established, and continues to improve, the infrastructure critical for effective information sharing across regions. This infrastructure is both soft and hard: drawing on program staff with strong, trusting relationships across the networks , in addition to a range of information sharing, engagement tools and network practices (including mechanisms for disseminating information and news, a newsletter about network events and learnings; convening meetings of critical stakeholders, collaborative learning webinars to share knowledge and best practice, social media; and an in-progress directory for connecting network members)

3. Network Results-What progress is CORDS making towards its ultimate goal of reducing and preventing the spread of infectious diseases?

Improved Capacity: CORDS has helped regional networks build their own capacity through its global public health perspective, relationships and presence beyond the six regional networks, and through delivery of CORDS member services.

- To share and build on recent lessons learned from Ebola in West Africa, CORDS hosted a series of Ebola Intensified Preparedness Program (IPP) workshops in East and West Africa. The IPP workshops identified practical actions that could lead to earlier detection, such as building closer relationships with communities, improved first detector capacity, and establishing better information sharing and communication across different administrative levels.
- CORDS trained 93 highly influential multipliers countries (Uganda, Burundi, Zambia, DR Congo, Kenya, Zimbabwe, Ghana, Tanzania, Burkina Faso, South Sudan, Malawi, Guinea, Liberia, Sierra Leone, Togo, Senegal, Serbia, Nigeria, Cameroon, Mali, and Côte d'Ivoire). The significance of effective community engagement emerged as a critical theme and was subsequently detailed in a peer-reviewed journal.
- CORDS supported APEIR network to extend its links with other countries in extending its' links across the region- facilitating negotiations with Singapore and Malaysia regarding potential membership during the Zika roundtable meeting in late 2016. This meeting marked the first time Singapore publicly shared information regarding its response and challenges to tackling the Zika outbreak.

Promoted Innovation: CORDS has identified and secured funding for research and innovation within and across the regions.

- CORDS secured funding and engaged countries across regions to collaborate on a Leishmaniasis gap analysis operational research project. Participating countries included Albania, Jordan and Pakistan. The results were particularly relevant for Albania, as data generated from the research were used to advocate for increased prioritization of this neglected disease, and additional resources for the treatment of Leishmaniasis.
- A number of important outcomes have arisen, including the development of improved treatment guidelines, strengthened laboratory surveillance, better diagnostics, the development of new research and increased engagement with the WHO regional office. Data generated from this research were used to advocate for increased prioritization and additional resources for the treatment of this neglected tropical disease in Albania; and allowed the Pak One Health Alliance (POHA) to mobilize additional funding to support further work on vector borne diseases in Pakistan.
- CORDS supported SACIDS and EAIDSNet to build upon a successful pilot project using mobile technologies for disease surveillance by securing funds to co-develop an EpiHack to develop specific aspects of the participatory surveillance project further. The EpiHack laid the groundwork for CORDS, SACIDS, EAIDSNet, InSTEDD and other stakeholders to progress the development of a prototype participatory surveillance solution in the region.

Advanced One Health:

- CORDS organized and convened One Health Incubators across several networks (EAIDSNet, SECID and MBDS). These were workshops that helped the regions develop One Health action plans by engaging decision makers working in human, animal and environmental health in the region. A national One Health forum was created in Uganda as a result of the Incubator held for EAIDSNet and SACIDS.
- CORDS worked with the SACIDS and EAIDSNet networks, to hold a joint stakeholders conference in December 2015 aimed at catalyzing the conceptualization of new approaches to One Health programming. This culminated in the formation of a 'Community Level One Health Security' paradigm, along with the ongoing development of, recognizing that communities are the key driver and a suite of new projects recognizing the key contribution of communities' in detecting and responding to disease outbreaks.

About CORDS

Advanced One Health:

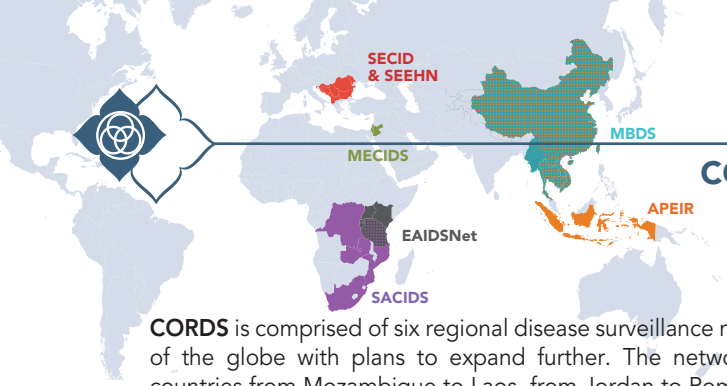
- A series of Risk Communication and Risk Management workshops within the framework of One Health have been held in Europe (SECID/MECIDS), Africa (SACID/EAIDSNet), and Asia (MBDS), allowing networks to develop qualitative insights into conditions and influencing factors for earlier disease detection in each region.
- The cross-network One Health Incubator workshops organized and convened by CORDS for EAIDSNet and SACIDS led to a National One Health forum being established in Uganda.

Built Sustainable Networks

- CORDS played a critical role in the formation of a new regional network in West Africa (WANIDS), to address the urgent need for significantly improved information sharing across the region highlighted by the outbreak of Ebola. Working in collaboration the West African Health Organization (WAHO), CORDS was able to expedite the official launch of WANIDS in March 2016 by mobilizing experience and expertise from other regional members to inform the creation of the new network by sharing their organizational structures, work plans and operational models.

Lessons learned and future opportunities for impact:

- The nature of CORDS' approach underscores the power of facilitative coordination in effective global health strategy. By listening closely to network members' specific needs knowledge, and concerns; forging relevant connections across the regions and providing opportunities for members to connect on areas of mutual interest. We have learned that each can overcome their unique challenges, and achieve their shared goals.
- Going forward, CORDS has a critical role to play in facilitating follow through. It is not enough to convene a series of one-off meetings. CORDS can enable action in the regions by facilitating the developing of regional action plans, coaching on follow through, and providing support with resource mobilization.
- There is a clear need for deeper investment in building the capacity of regional networks; supporting each network in developing its' capacity to reach beyond its region, and connect with the global agendas of international bodies (such as WHO, FAO, OIE), will help to cement the value addition and unique role CORDS occupies in the global health landscape



CORDS is comprised of six regional disease surveillance networks, covering much of the globe with plans to expand further. The networks cover twenty-eight countries from Mozambique to Laos, from Jordan to Romania and from Tanzania to Cambodia.

The Asia Partnership on Emerging Infectious Diseases Research

The Asia Partnership on Emerging Infectious Diseases Research (APEIR) was initiated in 2006 to promote regional collaboration in avian influenza research. In 2009, the network expanded its scope to include all emerging infectious diseases. APEIR partners include public health and animal researchers, officials and practitioners from Cambodia, China, Lao PDR, Indonesia, Thailand and Vietnam. APEIR is aiming to accommodate, and facilitate the researchers with and within countries in order to support activities on knowledge generation (through research and surveillance), facilitate research capacity building, and encourage and accommodate policy and social advocacy through the network and partnership.

For more information, please visit: http://www.apeir.net

The East African Integrated Disease Surveillance Network

The East African Integrated Disease Surveillance Network (EAIDSNet) is a collaborative, intergovernmental initiative between the National Ministries for human and animal health and the National health research and academic institutions of Burundi, Kenya, Rwanda, Uganda and Tanzania.

At EAIDSNet we work together to improve the health of the people of East Africa by promoting the exchange and dissemination of appropriate information on emerging diseases, combining our disease surveillance systems within the region and ensuring continuous exchange of expertise and best practice on infectious disease. Overall we want to reduce morbidity and mortality due to common communicable diseases in our region.

For more information, please visit: https://www.eac.int/health/disease-prevention/east-african-integrated-disease-surveillance-network

CORDS Networks

The Mekong Basin Disease Surveillance Consortium

The Mekong Basin Disease Surveillance Consortium (MBDS) comprises six countries: Cambodia, China (Yunnan and Guangxi Provinces), Laos P.D.R., Myanmar, Thailand and Vietnam and a growing number of development partners who all seek to reduce mortality caused by outbreak-prone diseases in the sub-region.

In 2007 the Ministers of Health of the six participating countries signed a Memorandum of Understanding to continue cooperating indefinitely.

The 2006-2007 MBDS influenza country-level and regional pandemic preparedness exercises were the first of their kind anywhere in the world. We are well connected with the other CORDS networks and are currently working with:

The Asia Partnership and CORDs on Emerging Infectious Diseases Research and a research project aiming to improve biosecurity
The East African Integrated Disease Surveillance Network on implementing mobile phone technology to improve infectious disease surveillance and a project to improve surveillance of infections in maternal and child health.

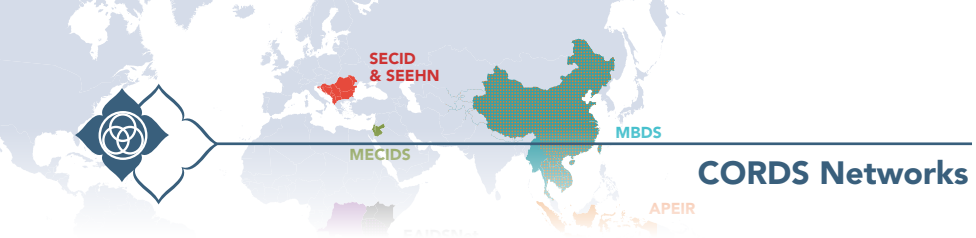
For more information, please visit: http://www.mbdsnet.org

The Middle East Consortium on Infectious Disease Surveillance

The Middle East Consortium on Infectious Disease Surveillance (MECIDS) seeks to advance the capabilities for early infectious disease detection, control and response between its member countries of Israel, Jordan and the Palestinian Territory, with plans to expand the network to all countries in the region. Our primary health concerns are food-borne illnesses, avian influenza and Leishmaniasis, a disabling and disfiguring disease.

We offer training courses and workshops for multinational health workers from the region and promote our website as a platform for informing others about new disease outbreaks and reporting on avian influenza via a secure area. Our vision is long term health, stability and security in the region.

For more information, please visit: http://www.mecidsnetwork.org



The Southern African Centre for Infectious Disease Surveillance

The Southern African Centre for Infectious Disease Surveillance (SACIDS) is a One Health Virtual Centre that links academic and research institutions involved with infectious diseases of humans and animals in the Democratic Republic of Congo (DRC), Mozambique, South Africa, Zambia and Tanzania. SACIDS operates in smart partnership with center of research and training excellence in industrialized countries as well as international research institutions.

The focus of SACIDS is to address infectious diseases in the endemic settings of Africa, through a collaborative effort between natural and social sciences to advance the understanding of interactions between humans, animals and the environment to improve public and animal health.

SACIDS mission is to harness innovation in science and technology to improve Africa's capacity to detect, identify and monitor infectious diseases of humans, animals and their ecological interactions in order to better manage the epidemic risk posed by them. The work of SACIDS has focused on capacity building, supporting career development of young scientists through MSc, PhD and postdoctoral training, while helping universities to create supportive research-focused career environments. The Headquarters of SACIDS is located at Sokoine University of Agriculture (SUA), Morogoro, Tanzania.

For more information, please visit: http://www.sacids.org

The Southeast European Center for Surveillance and Control of Infectious Diseases

The mission of the Southeast European Center for Surveillance and Control of Infectious Diseases (SECID) is to develop and support projects of public interest that are linked primarily to health system development initiatives, the practical implementation of which, helps to improve the surveillance and control of communicable diseases and strengthen health security in the countries of South - Eastern Europe and beyond.

SECID aims to make the connection between national public health institutions, universities, government, private agencies, professional and civil society organizations, individual professionals; operating in the region of South East Europe and beyond. By connecting these various stakeholders, this improves their collective ability to detect and respond to infectious diseases and unusual health events in cross-border areas, within the countries. Ultimately, the collaborative nature of SECID network serves to strengthen regional cooperation, security and development.

SECID provides a coordination platform for South-Eastern European countries, to ensure better use of support provided by various agencies. Since its inception, the strong nature of the cooperation within SECID has enabled the network to be a reliable partner and strong supporter for all donors and partners.

For more information, please visit: https://www.secids.com

Conference Steering Committee

Prof. Wiku ADISASMITO, *APEIR*

Prof. Prasert AUEWARAKUL, *APEIR*

Ms. Oceane ANDRIAMANARIVO, *CORDS Secretariat*

Dr. Sibounhom ARCHKAWONGS, *MBDS*

Prof. Golubinka BOSEVSKA, *SECID*

Mr. Yunus KARSAN, *SACIDS*

Dr. Marlo LIBEL, *Ending Pandemics*

Dr. Christophe LONGUET, *CORDS Secretariat*

Prof. Julius LUTWAMA, *EAIDSNet*

Dr. Sovann LY, *MBDS*

Dr. Filomena NAMUBA, *SACIDS*

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Ms. Sabrina SALEM, *CORDS Secretariat*

Prof. Amin SOEBANDRIO, *APEIR*

Dr. Bakary SYLLA, *CORDS Secretariat*

Dr. Willy WERE, *EAIDSNet*

Dr. Ruthi YISHAI, *MECIDS*

Monday, 29 January 2018

Time	Theme	Speakers
8:30 – 9:00	Registration	
9:00 – 9:05	Welcome Address	**Dr. Christophe Longuet,** Executive Director, ***CORDS*** **Prof. Amin Soebandrio,** Chairman, ***CORDS***
9:05 – 9:15	Keynote Address I	**Prof. Charlanne Burke,** Associate Director, ***The Rockefeller Foundation***
9:15 – 9:25	Keynote Address II	**Prof. Larry Brilliant,** Chair of the Board, ***Ending Pandemics***
9:25 – 9:40	Special Lecture: Lessons learned from HIV for the Next Pandemic	**Prof. Françoise Barré Sinoussi,** Nobel Laureate, ***Institut Pasteur, Paris***

Session 1: Promoting Innovation
Chair: Prof Julius Lutwama, EAIDSNet
Co-Chair: Dr Mohmmad Abdallat, MECIDS

9:45 – 10:00	Lecture: Promoting Innovation for Efficient Healthcare Systems	**Prof. Itamar Grotto,** ***Israeli Ministry of Health***
10:00 – 10:45	Panel: Innovation in Disease Surveillance	Innovative Tools for Event Detection: The Promise and the Peril, **Prof. Ann Marie Kimball,** Chatham House The WHO Health Emergencies Program : Platforms and Systems to Manage Public Health Risks and Emergency Events, **Dr. Oliver Morgan,** ***WHO*** Ending Pandemics, **Dr. Mark Smolinski,** ***Ending Pandemics***

Time	Theme	Speakers
10:45 – 11:15	Coffee break & Poster session	
11:15 – 12:15	Panel: Innovation in disease Surveillance Using a Digital Approach	Innovative tools and Approaches for Surveillance in Animal Health **Dr. Julio Pinto,** ***FAO*** East Africa Public Health Laboratory Networking Project Strengthens Disease Surveillance Using Regional Web based Reporting system **Dr. Benedict Mushi,** ***EAPHLN*** Using Smart Phones Occupied with Intelligent Mobile & Web Apps for Electronic System of Disease Surveillance in Tanzania, **Mr. Eric Beda,** ***SACIDS*** Inter-sectoral and Inter-network Collaboration for Improving Disease Surveillance in East & Southern Africa **Prof. Esron Karimuribo,** ***SACIDS*** Open discussion
12:15 – 13:00	Panel: Improving Laboratory-Based Disease Surveillance	Building Capacities for Influenza Surveillance in the Republic of Macedonia (2014-2017) **Dr. Vladimir Mikikj,** ***SECID*** Genomic Profiling of Multidrug Resistance Tuberculosis among Patients in Tanzania **Dr. Bugwesa Katale,** ***SACIDS*** Seroepidemiological Study to Identify Middle East Respiratory Syndrome Corona Virus (MERS-coV) Transmission in Jordan, Israel and Palestinian Authority **Dr. Sami Sheikh Ali,** ***MECIDS*** Open discussion
13:00 – 14:00	Lunch break & Poster session	

Session 2: Advancing One Health
Chair: Prof Mark Rweyemamu, SACIDS
Co-Chair: Dr Sovann Ly, MBDS

Time	Theme	Speakers
14:00 – 14.15	Lecture: Emerging infections: Interventions from a One Health Perspective	**Prof. Ab Osterhaus,** Center of Infection Medicine and Zoonosis Research at ***Hannover Veterinary University***
14:15 – 15.05	Panel: Making One Health Surveillance Work	Pan African network for Rapid Research, Response, Relief and Preparedness for Infectious Disease Epidemics (PANDORA) **Dr. Willy Were, *EAIDSNet/SACIDS*** Estimating the Economic and Social Consequences for Patients Diagnosed with Human African Trypanosomiasis in Muchinga, Lusaka and Easter Provinces of Zambia (2004-2014), **Dr. Martin Simuunza, *SACIDS*** Gap Analysis of a Neglected Global Disease of Marginalized People 'Leishmaniasis', Jordan, Albania and Pakistan (2015), **Dr. Sami Sheikh Ali, *MECIDS*** Open discussion
15:05 – 15:30	Coffee break & Poster session	
15:30-16.50	Panel: Addressing Antimicrobial Resistance Using the One Health Approach	Antibiotic use and antimicrobial resistance **Dr. Jorge Pinto Ferreira, *OIE*** The SACIDS One Health Approach to Genomics Driven Surveillance for Antimicrobial Resistance - a Potential Collaboration with EAIDSNet **Dr. Stephen Mshana, *SACIDS*** Antimicrobial Resistance in Macedonia Compared with Balkan region and Europe: Results of CAESAR network **Prof. Golubinka Bosevska, *SECID*** Strengthening Regional Role in EID research: the APEIR experience **Prof. Wiku Adisasmito, *APEIR*** The Fleming Fund One Health Program on AMR **Dr. Toby Leslie, *Mott MacDonald*** Open discussion
16:50-17.00	Wrap-up of day 1	

Tuesday, 30 January 2018

Session 3: Network Capacity Building
Chair: Prof Silvia Bino, SACIDS
Co-Chair: Prof Amin Soebandrio, APEIR

Time	Theme	Speakers
9:05 – 9:15	Lecture: Africa Centers for Diseases Control and Prevention: An Opportunity to Strengthen Public Health Networks on the Continent	**Dr. John Nkengasong,** Africa CDC
9:15 – 10:15	Panel: Building Capacity in the Regions	National Public Health Institutes as the Frontline of Global Health Security **Dr. Chikwe Ihekweazu, *Nigeria CDC*** Operational Research Project Management experiences, Challenges and Lessons Learned in East Africa Public Health Laboratories Networking Project **Dr. Mary Karimi, *EAIDSNet*** Reproducibility of Results and Performance of TB diagnostics in East Africa Public Health Networking Project in Kenya **Dr. Willie Githui, *EAIDSNet*** The Australian government 's new Health Security Initiative for the Indo-Pacific Region, **Ms. Madeleine Moss, *Indo-Pacific Centre for Health Security and JEE Alliance*** Open discussion
10.15-10.45	Coffee break & Poster session	

Time	Theme	Speakers
10:50 – 12.00	Panel: Building Capacity in the Regions	A Network to Enhance Regional Cross-border Collaboration on Health-related Issues, **Dr. Yi Seng Doeurn, *MBDS*** Mediterranean Programme for Intervention Epidemiology Training as an Approach to Addressing International Health Risks in the Mediterranean Region **Dr. Gordana Kuzmanovska, *SECID*** The Process of Evaluating Timeliness of Outbreak Detection and Response in Southeast European Region **Dr. Kujtim Mersini, *SECID*** Influenza Season 2016-2017 in Serbia, Sentinel Surveillance of Severe Acute Respiratory Infection **Dr. Dragana Dimitrijevic, *SECID*** Canada's Priorities to Mitigate Global Biological Threats, **Dr. Robert Clark, *Canada's Global Partnership Program*** Open discussion
12.00 - 12.30	Poster session	
12:30 – 14:00	Lunch Break	

Session 4: Building Sustainable Networks

Chair: Dr Sovann Ly, MBDS
Co-Chair: Prof Julius Lutwama, EAIDSNet

14:00 – 14:15	Lecture: Building Sustainable Networks	**Prof. Suwit Wibulpolprasert, *International Health Policy Program Foundation and Ministry of Public Health Thailand***
14:15 – 15:05	Panel: Network Experiences	Sustaining and Strengthening Capacity of Regional Networks and Partnership to Respond to Emerging Infectious Diseases in Asia **Prof. Wiku Adisasmito, *APEIR*** Evolution of MBDS Network and the Regional Importance of Collaboration **Dr. Moe Ko Oo, *MBDS***

Time	Theme	Speakers
		The Evolution of SACIDS from Concept towards a Sustainable Structure **Prof. Gerald Misinzo, *SACIDS*** Open discussion
15:05 – 15:30	Coffee break & Poster session	
15:30 –16:50	Panel: Network Experiences	Strengthening Communicable Disease Response in South East Europe through Regional Networking and Establishing a Regional Development Center **Prof. Silvia Bino, *SECID*** Tracking Inter-country Transmission of Salmonella Infantis using the Laboratory-based Surveillance Network Established by MECIDS **Dr. Ravit Bassal, *MECIDS*** The role of EMPHNET in Responding to Public Health Challenges in the Eastern Mediterranean Region **Dr. Mohannad Al-Nsour, *EMPHNET*** Building Sustainable Networks: Experiences and challenges of EAIDSNET **Prof. Julius Lutwama, *EAIDSNET*** Building sustainable laboratory networks, **Mr. Benoit Miribel, *Fondation Mérieux*** Developing a Regional Surveillance Network in West Africa **Dr. Bakary Sylla, *CORDS*** Establishing One Health Disease Surveillance Network: A Recent Convergence in South Asia, **Prof. Sithar Dorjee, *Khesar Gyalpo University of Medical Sciences of Bhutan*** Open discussion
16:50 – 17:00	Conference Closing Remarks	**Dr. Christophe Longuet, Prof. Amin Soebandrio**

Dr. Christophe Longuet

Christophe Longuet, MD, MPH, is Executive Director of CORDS since January 2017.Previously he was, for almost 10 years, Medical Director at Fondation Mérieux, responsible for training programs on Infectiology, Vaccinology and Epidemiology, also in charge of projects to improve access of vulnerable populations to health services in Africa, Asia and the Caribbean. During the Ebola outbreak in West Africa, he participated in the care of patients in Guinea and in therapeutic research in Sierra Leone.

Since 2014, he is member of the Ethics Committee of INSERM, the French National Institute of Health and Medical Research.

Specializing in tropical diseases, he participated in HIV/AIDS and malaria research, and in patient care research at Bichat Claude Bernard Hospital, Paris, and Croix Rousse Hospital, Lyon, France and in research on access to HIV treatment in Africa.

Dr. Christophe Longuet graduated from the Medical Faculty of Reims, France. He holds a master's degree in Public Health from the Catholic University of Louvain, Belgium, and a master's degree in Health Economics from Paris Dauphine University.

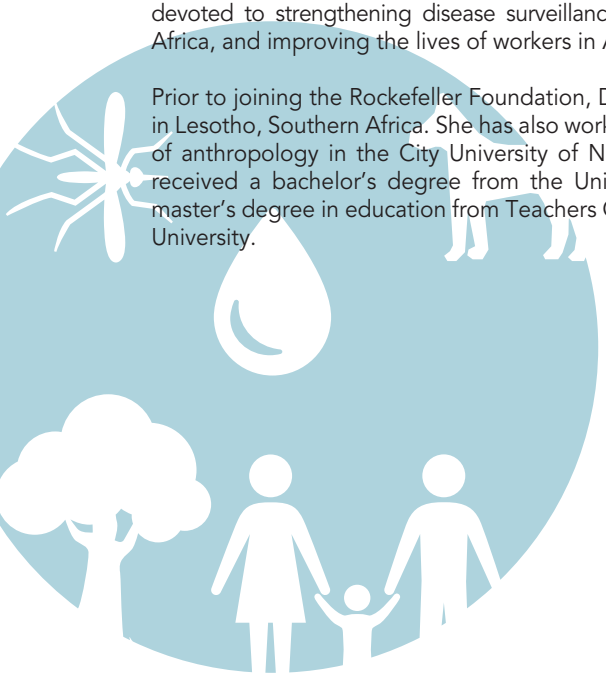
Prof. Amin Soebandrio

Professor Amin Soebandrio graduated from the Medical Faculty, University of Indonesia, with a Clinical Microbiology Specialization from the same institution, was awarded PhD in Immunogenetics by the Kobe University Japan. Has research interest in Emerging and Re-emerging Infectious Diseases and Antimicrobial Resistance. Served as Chairman of Expert Panel of the National Committee for Zoonotic Diseases from 2009 until 2017. From 2000 until 2013, served as Senior Advisor and Deputy Minister at the Ministry of Research and Technology. Currently is the Advisory Board Chairman of the i3L (Indonesia International Institute for Life-sciences), Steering Committee Chairman, Asian Partnership for Emerging Infectious-diseases Research (APEIR), Chairman of CORDS, Member of Expert Panel of Indonesian GHSA Committee, and Member of National Committee for Bioethics. Present position is the Chairman of Eijkman Institute for Molecular Biology since 2014.

Dr. Charlanne Burke

Charlanne Burke joined the Rockefeller Foundation in 1991. As Associate Director, she assists in developing strategic direction and providing administrative oversight for select Foundation initiatives. She is currently working on initiatives devoted to strengthening disease surveillance networks in Southeast Asia and Africa, and improving the lives of workers in America.

Prior to joining the Rockefeller Foundation, Dr. Burke served in the Peace Corps in Lesotho, Southern Africa. She has also worked as an adjunct assistant professor of anthropology in the City University of New York (CUNY) system. Dr. Burke received a bachelor's degree from the University of California, San Diego, a master's degree in education from Teachers College, and a Ph.D. from Columbia University.

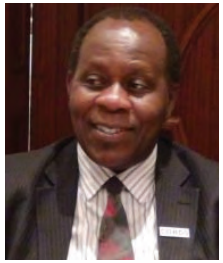


Dr. Larry Brilliant

Larry Brilliant, MD, MPH, is the author of Sometimes Brilliant: The Impossible Adventures of a Spiritual Seeker and Visionary Physician Who Helped Conquer the Worst Disease in History. He currently serves as the acting Chairman of the Board of Ending Pandemics. He is also a Senior Adviser at the Jeff Skoll Group.

Dr. Brilliant was formerly Skoll Global Threats Fund's President and CEO. Before that, he was Vice President of Google and Executive Director of Google.org. He is board certified in preventive medicine and public health, and is co-founder of The Seva Foundation, an international NGO whose programs and grantees have given back sight to more than 3.5 million blind people in over 20 countries.

Dr. Larry lived in India for more than a decade working as a United Nations medical officer where he played a key role in the successful World Health Organization (WHO) smallpox eradication program in South Asia. He was professor at the University of Michigan and founding chairman of the National Biosurveillance Advisory Subcommittee. He is on the boards of the Skoll Foundation and Salesforce Foundation.



Dr. Julius Julian Lutwama

Professor Julius Lutwama is a Senior Principal Research Officer with the Ministry of Health at the Uganda Virus Research Institute, Entebbe. Dr. Lutwama trained as an Entomologist, obtaining his PhD in 1991, and received further specialized training in molecular virology and entomology at the Centers for Diseases Control, Fort Collins, Colorado, USA. He is the Acting Deputy Director of the Institute and he is the head of the Department of Arbovirology, Emerging and Re-Emerging Viral Infectious Diseases at the Uganda Virus Research Institute (UVRI). He also heads the WHO Collaborating National Influenza Center and the Highly Infectious Diseases Diagnostic Laboratory at UVRI.

Dr. Lutwama is Honorary Associate Professor in the Department of Medical Microbiology at the Makerere University College of Health Sciences. Over the 32 years of research work at UVRI, he has worked on many virus diseases including Influenza, Ebola, Marburg, Cremian Congo Hemorrhagic Fever, O'nyong-nyong, Bwamba, Pongola, Yellow Fever, Rift Valley Fever, Dengue, Zika, West Nile, etc.

He is a member of several local and international health sciences Task Forces, committees and associations. He heads and coordinates a number of collaborating programs at UVRI. His research interest is in field and laboratory research and epidemic aid investigations of vector-borne viral infections and their arthropod vectors, and other emerging viral infections, defining disease etiologies, ecology, and pathogenesis for disease diagnosis, surveillance, prevention and control.

Dr. Mohammad Abdallat

Dr. Mohmmad Moussa Abdallat is presently the Director of Communicable Diseases at the Ministry of Health (MOH), the Hashemite Kingdom of Jordan. Dr. Abdallat received his MD (Medicine) from Damascus University and is a licensed medical doctor (Jordanian Medical Association), also certified in Community Medicine as well as in Applied Field Epidemiology (MOH and CDC Atlanta, Georgia, USA).

Dr. Abdallat has long experience in Public Health, Communicable Diseases including Infectious Diseases spanning of over eighteen years (1999-present). During this period he has been mainly involved in different positions and areas of activity at the MOH in Jordan including: Primary Health Care, Head of Infection Control Department, National Avian Flu coordinator in collaboration with the WHO, SARI Program Manager in collaboration with the Navy American Medical Research Unit (NAMRU-3), International Health Regulations focal point in collaboration with WHO as well as focal point with the Global Health Security Agenda.

In addition, Dr. Abdallat has been nominated as a Leader Program (ICEID 2015, Atlanta, Georgia, USA) as well as nominated for demonstrating excellence in Science as a candidate for the Charles C. Shepard Science Award Assessment, 2015 for his published work on "Hospital Associated Outbreak of Middle East Respiratory Syndrome Coronavirus: A Serologic, Epidemiologic and Clinical Description" (Clin. Inf. Diseases 2014, 59 (9): 1225-33).

Dr. Abdallat was elected as the new MECIDS head of the board and chairman in November 2017.

Dr. Mark Smolinski

Mark Smolinski, MD, MPH, brings 25 years' experience in applying innovative solutions to improve disease prevention, response and control across the globe. Mark is leading a well-knit team bringing technologists; human, animal, and environmental health experts; and key community stakeholders together to co-create tools for early detection, advanced warning, and prevention of pandemic threats. Community health workers, village volunteers, farmers and the interested public in Albania, Brazil, Cambodia, Europe, Laos, Myanmar, Tanzania, Thailand and the United States are among those using their own solutions to address pressing local needs. Since 2009, Mark has served as the Chief Medical Officer and Director of Global Health at the Skoll Global Threats Fund (SGTF) where he developed the *Ending Pandemics in Our Lifetime Initiative* in 2012. His work at SGTF created a solid foundation for the work of Ending Pandemics, which was spun out as an independent entity on January 1, 2018.

Prior to SGTF, Mark developed the Predict and Prevent Initiative at Google.org, as part of the start team at the philanthropic arm of Google. Working with a team of engineers, Google Flu Trends, a project that had tremendous impact on the use of "big data" for disease surveillance, was created in partnership with the U.S. Centers for Disease Control. Mark has served as Vice President for Biological Programs at the Nuclear Threat Initiative, a public charity directed by CNN founder Ted Turner and former U.S. Senator Sam Nunn. Before NTI, he led an 18 member expert committee of the National Academy of Medicine on the 2003 landmark report, *Microbial Threats to Health: Emergence, Detection, and Response*. Mark served as the Sixth Luther Terry Fellow in Washington, D.C. in the Office of the U.S. Surgeon General and as an Epidemic Intelligence Officer with the U.S. Centers for Disease Control and Prevention.

Mark received his B.S. in Biology and Medical Degree from the University of Michigan in Ann Arbor. He is Board Certified in Preventive Medicine and Public Health and holds an M.P.H. from the University of Arizona, where he was recognized as the 2016 Alumnus of the Year. Mark was on the investigation team that discovered hantavirus, a newly identified pathogen in 1993. His passion for helping all peoples of the world save lives and improve livelihoods motivates partners on five continents.

Dr. Mark Rweyemamu

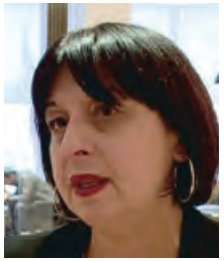
Professor Mark Rweyemamu BVSc, PhD, FRCVS, is a Tanzania veterinarian and specialist in infectious diseases. He has worked and published on the major infectious diseases of animals, such as rinderpest and foot and mouth disease, that constrain food security and livelihoods. He has worked in Tanzania, Kenya, Ethiopia, Brazil, Italy and the UK. His current research interests focus on the application of One Health approaches to studying infectious diseases of humans and animals in the endemic settings of Africa.

He was from 1992 to 2001 Head of the FAO Infectious Diseases Group and inaugural Head of the FAO EMPRES program on coordination of global rinderpest eradication. Previously, he set up the FAO/AU Pan African Veterinary Vaccine Centre and was Virologist and Chief Veterinary Research Officer for Tanzania; Head of the Virus Diseases at the then East African Veterinary Research Organisation, Muguga, Kenya; Head of Wellcome FMD Vaccine Research at Pirbright, UK, and Pfizer International Director of Veterinary Vaccine Research for Latin America, based in Brazil.

Prof. Rweyemamu has consulted widely for national governments and international organizations. He was a member of the EFSA Working Group on assessing the risk of Foot and Mouth Disease introduction into the EU from developing countries, and The Foresight study on Infectious Diseases – Preparing for the Future. He was from 2009-2017 member of the Scientific Advisory Board of The Pirbright Institute in the UK. He also sits on the Board of Trustees of GALVmed, a public-private partnership that focuses on supporting the development of biologicals and therapeutics for orphan diseases in developing countries, the CORDS Executive Board, and the One Health Platform International Supervisory Board.

Dr. Sovann LY

Dr. Ly Sovann is currently the Director of the Communicable Disease Control Department in the Ministry of Health of Cambodia. After graduating in Medicine from the University of Medical Science in Phnomh Penh, Cambodia, he then went on to obtain a Dilploma in Tropical Medicine and Master's degree in Clinical Tropical Medicine from the University of Mahidol in Thailand. Dr Sovann has held a number of position with the Cambodian Ministry of Health, including Head of the Clinical Disease Surveillance Bureau, Coordinator of SARS and Avian Flu Control. He has been a spokesperson for the Cambodian Ministry of Health since 2014, and is currently the Chair of the Mekong Basin Disease Surveillance Network.



Dr. Silvia Bino

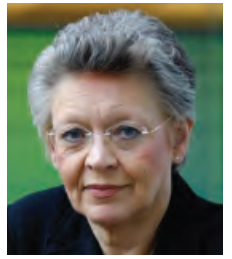
Dr. Silvia Bino, MD, PhD, is the Head of the Control of Infectious Diseases Department of the Institute of Public Health, Associate Professor of Infectious Diseases at the Faculty of Medicine, Tirana University, Albania and SECID Board President.

She was the Director of National Public Health Institute from 2000-2006, and has devoted her career to novel strategies to control infectious diseases and strengthen surveillance systems in resource poor countries. She has coordinated infectious diseases control programs, (including the immunization program), and helped to establish syndromic based early warning surveillance system and others in Albania.

She has also coordinated surveillance, diagnostic, and response activities for pandemic influenza A (H1N1) 2009, and SARI and seasonal influenza in Albania and beyond in South East European Region as part of the SECID network to strengthen cross border surveillance and control of communicable diseases.

She has been a consultant to WHO and other UN agencies and served as a member of the Strategic Advisory Group of Experts on Immunization until April 2009, the Review Committee on the Functioning of the International Health Regulations (2005) in relation to Pandemic Influenza A (H1N1) in 2009 and later on the Pandemic Influenza Preparedness Framework Advisory Group. Recently she was a member IHR Emergency Committee on Zika virus and observed increase in neurological disorders and neonatal malformations.

She has trained and led public health research in Albania, Belgium, Switzerland, the UK and US.



Dr. Françoise BARRÉ-SINOUSSI
Nobel Laureate 2008; Honorary President of the Institut Pasteur International Network, Institut Pasteur, Paris, France

Françoise Barré-Sinoussi, PhD, has been involved in retrovirology research since the early 1970's and is widely recognized for her contributions to HIV/AIDS research, in particular the discovery of HIV in 1983. Until 2015, as Research Director at the National Institute for Health and Medical Research (INSERM) and Professor at the Institut Pasteur in France, she was leading research programs on HIV/AIDS pathogenesis, in particular on mechanisms required to control HIV/SIV infection and/or harmful T cell activation induced in response to HIV/SIV infection. Along with her research activities, Françoise Barré-Sinoussi has been strongly implicated in promoting multidisciplinary and translational science. In 2010, she launched the International AIDS Society (IAS) "Toward an HIV Cure" initiative, as part of her strong involvement in advocacy to accelerate scientific evidenced- based public health interventions on HIV/AIDS prevention, care and treatment. She has long experience of collaboration in resource limited settings through the Institut Pasteur International Network and the coordination of ANRS research programs in Cambodia and Vietnam. Today she serves as Honorary President of the Institut Pasteur International Network and of the Virology Department of the Institut Pasteur in Paris.

Françoise Barré-Sinoussi is author and co-author of more than 300 original publications and of more than 125 review articles. Since 2009, she has served as a member of the National Academy of Science in France, and was recently awarded the rank of Grand Cross of the French Legion of Honor.

Lessons Learned from HIV for the Next Pandemic

The past three decades of HIV/AIDS science are a good example of a broad multidisciplinary response to an emerging human threat, resulting in key breakthroughs in prevention, diagnosis and treatment. It has been, and still is, a model for the response against any other emerging/re-emerging diseases, according to the humanist and very modern view of Louis Pasteur of translational science for globally improving the health of populations, no matter who they are and where they are.

Dr. Itamar Grotto
Associate Director General
Israeli Ministry of Health, Israel

Professor Itamar Grotto, MD, MPH, PhD, is the Associate Director General of the Israeli Ministry of Health (MoH) since 2017. In this position he is the Chief Physician and is responsible for the Medical Aspects of the Ministry of Health Management. He leads the regulatory activities of the hospitals and community services, as well as of Public Health. He is also responsible for Emergency Preparedness and Response.

In his previous position starting in 2007, he was nominated as the Director of Public health Services of the MoH. In that capacity, he led a major change in the preventive services, and updated the immunization basket. He also led a National Health Promotion program aimed to prevent obesity and related diseased. During his time in service, the fields of Environmental Health and Food Safety underwent through major regulatory reforms. In 2013, Prof. Grotto led the response of the Israeli MoH to the silent transmission of wild poliovirus, which resulted in polio re-eradication from Israel with no clinical cases. Prof. Grotto served also as the Head of the Army Health branch in the Military Corps of the Israel Defense Force and retired as a Lieutenant Colonel. He is a lecturer and researcher at Ben-Gurion University.

His main research activities are in the fields of infectious diseases epidemiology and health behaviors among adolescents and young adults, as well as public health policy development. Prof. Grotto authored in more than 190 scientific publications. On September 2017, Prof. Itamar Grotto was elected by the Regional Committee of the European Region of the World Health Organization (WHO) as a member of the Executive Board of WHO, effective May 2018.

Professor Grotto is a graduate of Tel-Aviv University Medical School. In addition, he completed a master's degree in public health cum laude and a PhD. in management of health systems.

In 2014 he received an excellence award in senior staff management from the Civil Service Commission and in 2016 he received the Ben-Gurion University distinguished graduate award for his special contribution to science and society.

Promoting Innovation for Efficient Healthcare Systems

Israel is one of the leading countries in terms of health indexes, with life expectancy of 82 years and infant mortality of 3.1 per 1,000 live births. These outcomes are more impressive if taking into considerations the relatively low expenditure on health as percentage of the GDP. Some possible explanations to this efficiency include excellent community health services, governmental supply of public health services and ongoing quality improvement and innovation. In my presentation, I will give examples of applying Digital Health innovative solutions for a high performing health care system. These include application of data analysis ("Big Data") for early preventive and curative treatments; development of applications and devices that assist in monitoring patients as well as healthy populations; combination of both Big Data and innovative applications and Precision Medicine.

Finally, I will address the role of "conventional" public health approaches, in which it also has to be looked for innovative solutions and will give some recent examples from Israel.

Dr. Ann Marie Kimball,
Senior Consulting Fellow,
Centre on Global Health Security

Ann Marie Kimball, MD, MPH, FACPM, is a physician and epidemiologist. A strategic adviser for The Rockefeller Foundation, she served as technical and strategic lead for the Bill and Melinda Gates Foundation surveillance strategy formation. She was also senior program officer with the foundation, prior to which she served as Professor of Epidemiology at the University of Washington School of Public Health where she is now Professor Emerita.

During her tenure at UW, Dr. Kimball founded and directed the APEC Emerging Infections Network, and led research and training programs in Peru and Thailand.

Her research focus on global trade and emerging infections earned her a Fulbright New Century Scholars award and a Guggenheim Scholars award.

She is the author of *"Risky Trade: Infectious Diseases in an Era of Global Trade"* and has authored numerous scientific publications and served on several Institute of Medicine panels. Most recently she led The Rockefeller Foundation evaluation of their global disease surveillance network portfolio. She is a fellow in the American College of Preventive Medicine and member of the National Biosurveillance Advisory group, Centers for Disease Control.

Innovative Tools for Event Detection: The Promise and the Peril

The Ebola epidemic in West Africa claimed more than 22,000 cases and 11,000 deaths and brought into high relief the interdependency of global health security. Full enfranchisement of LMICs in information flow is an imperative for alerts, not only for their populations but also for the world at large. This talk will review the potential of key new innovations in disease detection from the lab bench to the organization.

Question: Given the continued uneven access to health services and internet services what innovative methods hold promise for assisting developing and lower middle income countries in timely alerts about clusters of infectious diseases?

Traditional disease surveillance relies on access to care, diagnosis, confirmation of the diagnosis, mobilization against disease, and investigation with intervention for mitigation. Since 2008, participants in the Global Health Security Initiative (GHSI) have shared a consolidated, curated feed of internet- based information to cull timely alerts about disease clusters, epidemics and potential pandemics. Opening this innovative stream of event based surveillance joins a number of promising innovations coincidentally coming on line including whole genome sequencing, phylogenetic analyses of animal and human virions, community based surveillance, and geo-ecological descriptions of the most spillover prone areas of the globe.

This presentation relies on document review, and case studies to bring forward the potential power of this basket of new technologies.

Conclusion: There are no "leapfrog" technologies for robust disease surveillance. Nonetheless if thoughtfully executed, this new basket of technologies may provide directional situation awareness to decision makers in LMICs. Full thought partnership by intended users and reinforcement of health systems overall will maximize success.

Dr. Oliver Morgan,
Director Health Emergency Information & Risk Assessment
Health Emergencies Program,
World Health Organization

Dr. Oliver Morgan, PhD, MSc, FFPH, is the Director of the Health Emergency Information and Risk Assessment Department in the WHO Health Emergencies Programme. From 2007 through 2016, Dr. Morgan worked for the US Centers for Disease Control and Prevention during which time he held critical leadership positions in the Ebola response between November 2014 and February 2016 (CDC Atlanta Ebola Response Incident Manger and CDC Country Director in Sierra Leone). From March 2010 to October 2014, Dr. Morgan was the CDC Country Director in the Dominican Republic. Dr. Morgan was an Epidemic Intelligence Service Officer at CDC from 2007 to 2009 with the International Emerging Infections Program, during which time he conducted projects in Thailand, Bangladesh, Kenya, Uganda, and Guatemala. Before joining CDC, Dr. Morgan worked for the UK Health Protection Agency, leading epidemiological investigations of outbreaks (enteric, vaccine preventable, hospital acquired, zoonotic, respiratory, and sexually acquired infections), chemical and radiation exposure incidents, terrorist bombings in London, natural disasters, and humanitarian civil conflicts. Dr. Morgan has also worked as a consultant to WHO/PAHO in several countries. Dr. Morgan's academic achievements include a doctorate in epidemiology from Imperial College London and extensive publication in peer reviewed journals and reference books.

The WHO Health Emergencies Programme: Platforms and Systems to Manage Public Health Risks and Emergency Events

In 2016, the World Health Organization established a new Health Emergencies Program. Key functions of the new Program include early detection of health events, systematic assessment of public health risks, and reliable communication of information to the global public health community. To deliver on these key functions, the WHO Health Emergencies Program has leveraged existing digital platforms and created new systems for the global management of public health risks and emergency events. The presentation will provide an overview of the platforms and systems used by the WHO Health Emergencies Program."

Julio Pinto (DVM, PhD) joined the Animal Health Service in FAO in May 2006. Having graduated in Veterinary Science in the University of Chile in 1994, he completed his PhD studies in Veterinary Epidemiology and Economics at The University of Reading, United Kingdom, in 2000 completing his thesis on *"Hazard analysis of classical swine fever (CSF) reintroduction in Chile"*.

Dr. Pinto joined the World Organisation for Animal Health (OIE) in Paris where he worked in the animal health information department and international trade issues related to animal health between February 2003 and May 2006. In June 2006 he joined the FAO's Animal Health and Production Division in Headquarters in Rome. Since then, Dr. Pinto is leading the FAO's Global Disease Intelligence and Early Warning program, and responsible for disease intelligence, information systems and projects related to animal disease surveillance and risk assessment and strengthening epidemiology capacities in veterinary services. Dr. Pinto is leading the development of FAO's global animal health information system for animal diseases *(EMPRES-i)* and mobile technologies tools for disease reporting and surveillance *(EMA-i)* implemented in Uganda and Zanzibar (Tanzania). He is the technical focal point from FAO to the Joint FAO/OIE/WHO Global Early Warning System for Animal Diseases and Zoonosis (GLEWS+).

He is providing regular technical assistance to countries or regions in the assessment, design and implementation of disease surveillance programs, field disease outbreak investigation, good emergency management practices, animal health information systems, prevention and control of animal diseases, supporting animal health policies, and technical backstopping to animal health systems worldwide.

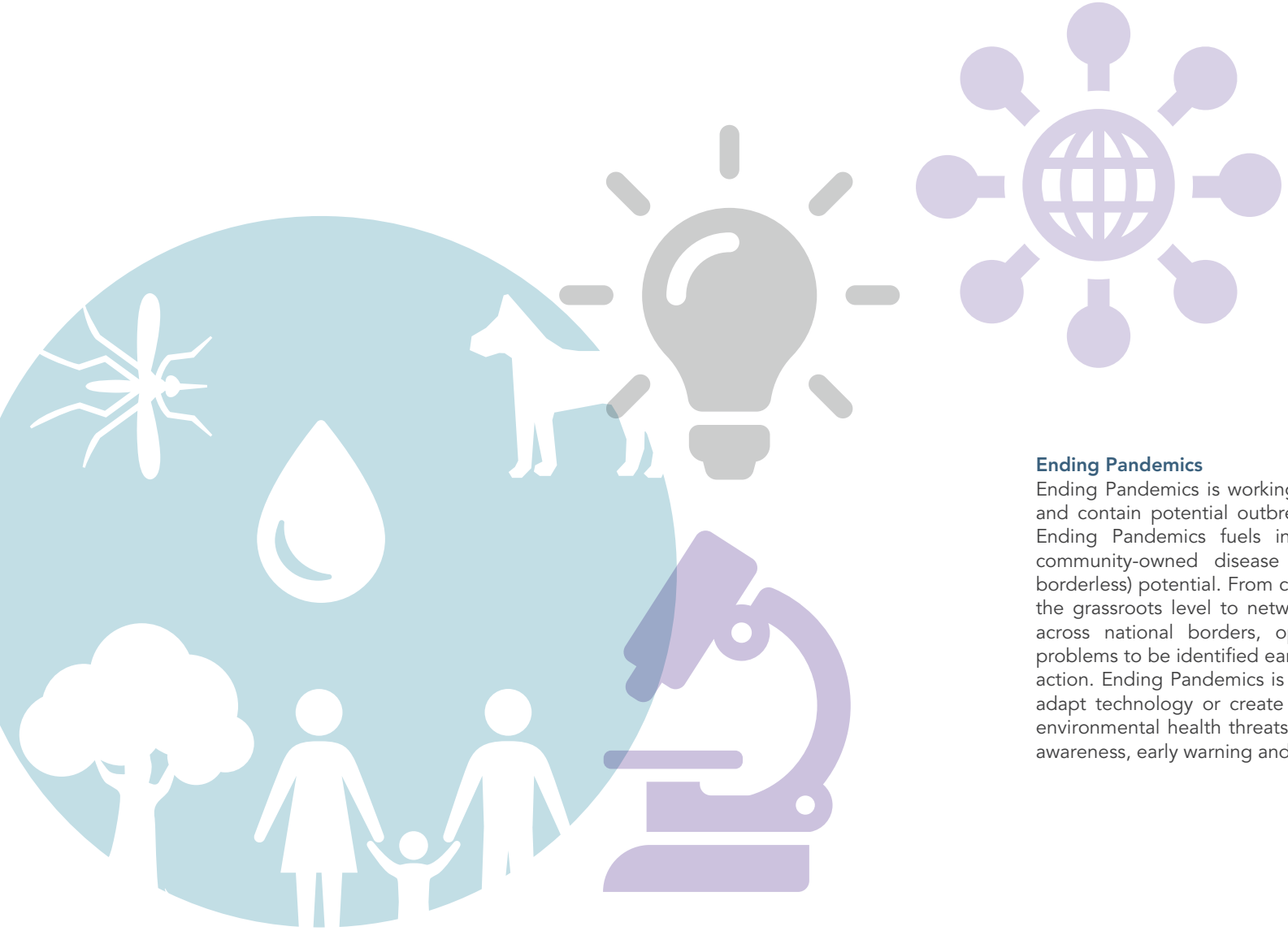
Innovative Tools and Approaches for Surveillance in Animal Health

Diseases are emerging and re-emerging rapidly in different regions and ecosystems due to different drivers, including increased human population, intensification of livestock production, deforestation, climate change, social unrest, trade and changes in land use and agroecology. We should ask ourselves why, as a global community, we have not been effective at implementing robust global surveillance and an early warning system capable of detecting early signals of disease emergence.

Dr. Julio Pinto
Animal Health Officer, Animal Production and Health Division
Food and Agriculture Organization

The FAO provides regular policy and technical advice to countries on how to prevent, control or eradicate animal disease. FAO has developed the Event Mobile Application (EMA-i), which is an android app for data collection and real-time disease reporting. EMA-i has been used in some districts of Uganda since 2013 and, recently, a project implemented by FAO on the island of Zanzibar (Tanzania) and mainland include the use of EMA-i. A similar project is implemented in Zimbabwe and other countries in Africa.

In addition to developing mobile devices to facilitate disease reporting and access to veterinary services and advice for animal health and production to livestock farmers, FAO has also introduced some specific approaches for implementing participatory disease surveillance. Those who report animal disease outbreaks or human cases of zoonotic diseases may not necessarily be professionals, but participating/reporting in this way creates a sense of ownership, and this helps to ensure a more sustainable system. FAO has also been involved in supporting the long-term development of national surveillance capacity in countries throughout Asia and Africa through field epidemiology training programs for veterinarians (FETPV). Linking veterinary epidemiology and laboratory networks to gather and share disease and non-disease data, as well as linking outbreak information with data related to the pathogen characteristics, can help in describing epidemiological and genetic dynamics in a spatial and temporal context. FAO promotes and support veterinary services from low and middle income countries on the use of Risk Assessment (RA) as a powerful tool for evaluating the likelihood of the entry, establishment and spread of a hazard and assessing the likely biological and economic consequences. The outputs of RA can guide effectively the design the risk based surveillance and the implementation of risk management options.



Dr. Mark Smolinski
President Ending Pandemics

Ending Pandemics

Ending Pandemics is working with partners across the globe to find, verify and contain potential outbreaks faster. Applying a One Health approach, Ending Pandemics fuels ingenuity that generates locally created and community-owned disease surveillance solutions with boundless (and borderless) potential. From crowd sourced solutions empowering millions at the grassroots level to networks of dedicated health professions reaching across national borders, open-source technology is allowing potential problems to be identified early the appropriate response set into immediate action. Ending Pandemics is committed to helping all peoples of the world adapt technology or create new solutions to monitor human, animal and environmental health threats in an integrated system capable of situational awareness, early warning and rapid response.

Prof. Ab Osterhaus
Director, Center of Infection Medicine and
Zoonosis Research at Hannover Veterinary University

Virologist and veterinarian, Ab Osterhaus is professor and director of the Center of Infection Medicine and Zoonosis Research at Hannover Veterinary University. He led numerous international projects, discovered dozens of human and animal viruses, and studied their pathogenesis and intervention strategies. He has published over 1200 scientific papers, trained over 80 PhD students, and received numerous prestigious awards.

Prof. Osterhaus is member of the Dutch and German Academies of Sciences, and Commander of the Order of the Dutch Lion. He is Chairman of the *One Health Platform*, Editor in Chief of the *One Health Journal* and Co-Chair of the *5th International One Health Congress*, to be held in Saskatoon, Canada, from 22 to 25 June 2018 (www.onehealthcongress.com).

Emerging infections: Interventions from a One Health Perspective

The vast majority of emerging and re-emerging pathogens in humans are of animal origin. Most, if not all, of this ever growing threat has its origins in wildlife, while humans are exposed either directly or through indirect domestic animal contacts. After having crossed the species barrier, the pathogen may directly spread efficiently among humans, like Ebola virus, or may need further adaptation to allow efficient intra-species transmission, like avian influenza viruses.

Effective and economical ways of protecting mankind from emerging diseases in most cases would best be based on combatting zoonotic pathogens or emerging human viruses close to, or at, the animal source. Major successes with this strategy have been made by vaccination of foxes and dogs against rabies in Europe[1], and of domestic poultry against avian influenza in SE-Asia[2]. Recent successes in the field of novel vaccine development may allow the future control of other emerging infections at the source, like MERS by vaccination of dromedary camels[3], camel handlers and healthcare workers, whereas control of Ebola outbreaks at the source may best be achieved by vaccination of contacts of exposed individuals and healthcare workers.

After the eradication of smallpox and halting vaccination campaigns in humans, outbreaks of monkey pox have continued to occur in humans with increasing severity in the naïve human population. Newly developed generations of safe and effective vaccines against orthopox viruses may well be used to prevent and contain future outbreaks at the source[4]. Similarly, after the expected eradication of measles from the human population, new generations of measles vaccines may well be needed to prevent and contain the expected introduction of animal morbilliviruses into a naïve human population[5].

The animal origin of virtually all new human viral threats not only necessitates immediate initiation of studies on the pathogenesis and natural history of emerging viruses in their respective host species of origin, but also offers the opportunity to rapidly develop animal models to evaluate intervention strategies, that may then take advantage of the rapid development and use of diagnostic and epidemiological methods, vaccines, antivirals and antibodies in a One Health approach.

1. Freuling CM, et al., Philos Trans R Soc Lond B Biol Sci. 2013; 368(1623).
2. Swayne DE, Avian Dis. 2012; 56(4 Suppl): 818-28.
3. Haagmans BL, et al., Science. 2016; 351(6268): 77-81.
4. Stittelaar K, et al., Nature. 2006;439(7077): 745-8.
5. Stittelaar KJ, et al., Vaccine. 2001;19(27): 3700-9.

Dr. Jorge Pinto Ferreria
Charge de mission within the Science and
New Technologies Department
at World Organization for Animal Health (OIE)

Jorge Pinto Ferreira is a Doctor of Veterinary Medicine, originally from Portugal, with five years of clinical experience (dairy production); a Masters in Food Safety; a PhD (as Fulbright scholar) in Population Medicine (with a graduate certificate in public policy) and a recent Diplomate of the European College of Veterinary Public Health. Doctoral studies were dedicated to Methicilin-resistant Staphylococcus aureus transmission between people and animals.

Worked as a consultant in Switzerland, between 2012-2017 (SAFOSO AG), and among other AMR projects, was part of the EFFORT consortium (www.effort-against-amr.eu/). Joined recently the World Organization for Animal Health (OIE), being part of the AMR team, collaborating in particular with other international organizations (WHO, FAO, Codex).

Antibiotic Use and Antimicrobial Resistance,
The OIE has been highly engaged in Tripartite AMR work, together with WHO and FAO. In this presentation, some of the ongoing Tripartite projects and their outputs will be presented (e.g. "The Tricycle Project": Integrated Global Survey on ESBL-producing E. coli using a "One Health" approach). Also featured will be the very recently published "Second OIE Annual report on antimicrobial agents intended for use in animals".

Dr. Toby Leslie
Global Technical Lead, The Fleming Fund Management Agent,
Mott MacDonald

Dr. Toby Leslie, an infectious disease epidemiologist awarded his PhD. from the London School of Hygiene and Tropical Medicine in 2010. He has worked in research, disease control, program design and health systems strengthening within academia, NGOs, donor organizations and as a consultant. His work has been on a range of infectious disease projects in Africa and Asia. He is currently the Global Technical Lead for the Fleming Fund Grants program at MottMacDonald, since 2016.

The Fleming Fund One Health Program on antimicrobial resistance (AMR)

"One Health" is easier to say than to do, but addressing antimicrobial resistance in bacterial pathogens has been described as "the quintessential One Health issue". The range of stakeholders and differing approaches to surveillance make it a challenge across sectors which requires strong leadership. It requires coordinated and urgent action across all three of the One Health domains if investments in control of AMR are to achieve their full potential. However, AMR also gives a golden opportunity to make integrated, One Health, surveillance of AMR a reality. The presentation will cover the approach being taken by the UK Government funded Fleming Fund to support One Health approaches to AMR surveillance in low- and middle-income countries in Africa and Asia. We aim not just to be saying "One Health", but to be doing it.

Dr. John Nkengasong
Director, Africa Centers for Disease Control and Prevention

Dr. Nkengasong is Director of the Africa Centers for Disease Control and Prevention. Until recently, he served as the deputy principal director (acting) of the Center for Global Health, United States Centers for Disease Control and Prevention (U.S. CDC). He received a Masters in Tropical Biomedical Science at the Institute of Tropical Medicine in Antwerp, Belgium, and another Masters Degree in Medical and Pharmaceutical Sciences at the University of Brussels School of Medicine and a Doctorate in Medical Sciences (Virology) from the University of Brussels, Belgium.

Between 1993-95 he was Chief of the Virology and the WHO Collaborating Center on HIV diagnostics, at the Department of Microbiology, Institute of Tropical Medicine, Antwerp, Belgium. He joined the U.S., CDC in 1995 as Chief of the Virology Laboratory, U.S., CDC Abidjan, Ivory Coast. He has received numerous awards for his work including the U.S. Secretary of Health and Human Services Award for excellence in Public Health Protection Research, the Sheppard Award, the U.S. Director's Recognitions Award, and, most recently, the William Watson Medal of Excellence, the highest recognition awarded by CDC.

He is also recipient of the Knight of Honour Medal by the government of Cote d'Ivoire, and was on June 19th, 2017 knighted as the officer of Loin by the president of Senegal, H.E. Macky Sall, for his significant contributions to public health

Africa Centers for Disease Control and Prevention: an Opportunity to Strengthen Public Health Networks on the Continent

In September 2014, at an assembly devoted to responding to the Ebola outbreak, African leaders formally endorsed an accelerated timeline to launch the Africa Centres for Disease Control and Prevention (Africa CDC), together with five regional centres. Several compelling reasons argued for the establishment of the Africa CDC: 1) rapid population growth leading to increased and rapid population movement across the continent and the world (the estimated population of Africa was 280 million in 1960 and 1.2 billion in 2016, and is estimated at 2.4 billion by 2050; 2) existing endemic (HIV, TB, and Malaria), emerging infectious pathogens, and the ascendance of antimicrobial resistance; 3) increasing incidence of non-communicable diseases and injuries; 4) persistently high maternal mortality rates; and 5) threats posed by environmental toxins.

The Africa CDC will advocate for a network model to better harness public health assets on the continent. As such, the Addis Ababa headquarters will be linked to five Regional Collaborating Centers (RCCs) in Egypt, Nigeria, Gabon, Zambia, and Kenya, respectively. Each RCC region will be equipped with laboratories with advanced diagnostic capacity to rapidly detect known and unknown pathogens and will house a Regional Integrated Surveillance and Laboratory Network (Africa CDC RISLNET) to leverage all available public health assets in their respective regions, including universities, national public health institutes, private laboratories, centres of excellence, non-governmental organizations, and veterinary networks.

The Africa CDC will advocate and promote the establishment or strengthening of National Public Health Institutes (NPHIs) in each member state, resulting in an African Public Health Network (APHN) of NPHIs. These institutions will serve as coordinators of the One Health approach to disease control and prevention including coordinating engagements with ministries of agriculture, health, communications, defense, wildlife, and communication. The operating model outlined above, if well implemented, will constitute the Africa health security strategy (AHSS). AHSS will serve to facilitate and define a continental dimension to the global health security agenda. The Africa CDC will work in close collaboration with the WHO and other public health bodies to better coordinate and create synergies to efficiently respond to disease threats on the continent and implement the AHSS.

Dr. Chikwe Ihekweazu is Chief Executive of the Nigeria Centre for Disease Control and until recently the Acting Director of the Regional Centre for Disease Control for West Africa. Trained as an infectious disease epidemiologist, Dr. Ihekweazu has 20 years' experience of working in senior public health roles and has held leadership positions in several National Public Health Institutes, including the South African National Institute for Communicable Diseases, the UK's Health Protection Agency, and Germany's Robert Koch Institute. Dr. Ihekweazu has led several short-term engagements for WHO, mainly in response to major infectious disease outbreaks around the world.

Dr. Ihekweazu is a graduate of the College of Medicine of the University of Nigeria and has a Masters in Public Health (MPH) program from the Heinrich-Heine University, Dusseldorf, Germany. He was then awarded a Fellowship for the European Program for Intervention Epidemiology Training and subsequently completed his Public Health specialisation in the UK.. Dr. Ihekweazu is on the board of the NGOs Public Health Foundation of Nigeria, Nigeria Health Watch, Society for Family Health, Education as a Vaccine, and the Africa Policy Advisory Board of ONE. He is a TED Fellow and co-founder TEDxEuston. In between public service, he was Managing Partner of EpiAfric - a health consultancy firm based in Abuja and curator of the health policy advocacy platform Nigeria Health Watch.

National Public Health Institutes as the Frontline of Global Health Security

Outbreaks of infectious diseases, such as the Ebola virus disease epidemic in West Africa, have caught the attention of the global health community because of perceived and real threats to local, national, and global health security and their economic impact. Sustainable action to prevent the emergence and spread of infectious diseases and ensure global health security requires investment in local sources and strengthening of national and local health security capacity. A vital investment for many countries is the establishment of science-led national public health institutes (NPHIs).

Dr. Chikwe Ihekweazu
Chief Executive,
Nigeria Centre for Disease Control

National Public Health Institutes (NPHIs) play a very important role in the prevention, detection, response and control of spread of infectious diseases. NPHIs provide leadership in disease surveillance and outbreak investigations, reference laboratory services, including specialist diagnostic services for rare organisms, and advise their governments on development and evaluation of public health interventions. In West Africa, only nine out of 15 countries have identified an NPHI- also known as a national coordinating institute in some countries.

Nigeria Centre for Disease Control (NCDC) is Nigeria's national public health institute. In the last year, the NCDC has responded to outbreaks of Monkeypox, Cerebrospinal Meningitis (CSM), Cholera, Lassa fever, Yellow fever and other infectious diseases, limiting their spread. The NCDC like other NPHIs, is structured to work with very limited bureaucracy ensuring immediate response to disease threats and outbreaks. In June 2017, the NCDC led the coordination of the Joint External Evaluation (JEE) of International Health Regulations (IHR) capacities in Nigeria, working to identify gaps in ensuring national health security.

Conclusion: Establishment of NPHIs provides the crucial national resources required to underpin the prevention, detection, and response to outbreaks of emerging infections on the frontlines. These organizations should be designed with relevant disciplines and expertise to ensure they are fit for purpose, such as technical, epidemiological, microbiological, research, and communication skills, and supported by adequate and stable financing from local and international sources. To build strong, science-based institutions takes time and effort; however, but it is the only sustainable way to the development of a robust global health response capacity to emerging and re-emerging infections.

Robert Christopher Clarke, DVM, PhD, a former Assistant Deputy Minister/Deputy Chief Public Health Officer at the Public Health Agency of Canada has over 35 years' experience leading the strategic policy development, planning and delivery of broad based science programs at the federal and international level. He has in-depth experience in the analysis and management of complex risk issues, infectious diseases, biosecurity relating to WMD, critical infrastructure, emergency preparedness/ response and has taught risk management in government to graduate students and government officials.

Dr. Clarke has held senior executive positions at the Public Health Agency of Canada, Health Canada, the Canadian Food Inspection Agency, and Agriculture Canada. He completed a three-year assignment as Visiting Professor of Epidemiology and Community medicine in the Faculty of Medicine at the University of Ottawa and was also Executive Director of the McLaughlin Centre for Population Health Risk Assessment at the Institute of Population Health.

Dr. Clarke is Past-Chair of the Board of Directors of the International Vaccine Centre in Saskatoon. He has previously served as a member of the Board of Scientific Counsellors for the Centers for Disease Control and Prevention in Atlanta, Member of the Advisory Board for the Institute of Infection and Immunity at the Canadian Institutes of Health Research, member of the Advisory Board for the Caribbean Public Health Agency and on the Board of Directors of PRIONET Canada. He is currently a consultant to Canada's Global Partnership Program.

Dr. Robert Clark
Canada's Global Partnership Program

Canada's Global Partnership Program (GPP); priorities and activities to mitigate global biological threats.

Canada's Global Partnership Program (GPP) was created in response to The Global Partnership Against the Spread of Weapons and Materials of Mass Destruction that was launched at the G8 in 2002. The GPP is one of the largest contribution programs of the Department of Global Affairs Canada (GAC). Activities of the program aim to reduce the threats posed by nuclear, radiological, biological and chemical terrorism. This presentation will discuss the projects and priorities relating to biological threats. The current GPP priorities for Strengthening Global Biological Security are:

- Secure and account for materials that represent biological proliferationthreats.
- Develop and maintain appropriate and effective measures to prevent, prepare for and respond to the deliberate misuse of biological agents.
- Strengthen global networks to rapidly identify, confirm and respond to deliberate biological attacks.
- Reinforce and strengthen biological non-proliferation principles, practices and instruments.
- Reduce proliferation risks through the advancement and promotion of safe and responsible conduct in biological sciences.

Dr. Suwit Wibulpolprasert
International Health Policy Program Foundation
and Ministry of Public Health Thailand

Dr. Suwit Wibulpolprasert MD, is a general practitioner, public health specialist, administrator and policy advocator. He began his career as a Director and practitioner in four rural district hospitals in Thailand from 1977-1985. Later, he was the Director of the Northeastern Public Health College; Director of the Food and Drug Administration Technical Division; Director of the Bureau of Health Policy and Plan; Assistant Permanent Secretary and Deputy Permanent Secretary of the Ministry of Public Health.

His main interests are health policy and planning, and global health. He has been extensively involved in research and development in the areas of human resources for health; health economics, health-care financing and universal health coverage; international trade and health; health promotion; health information; and pharmaceuticals. He has published more than 100 papers, reports and books locally and internationally.

In Thailand, Dr. Suwit is the editor of a local journal for para-medical personnel and had produced radio and television programmes on health and social issues for more than 15 years. He used to be an elected member of the Thai Medical Council for 22 years, and also its Secretary General and Vice President.

At present, he is the Board Member of the Health Systems Research Institute, the National Health Security Office, the National Electronics and Computer Technology Center, and the National Nanotechnology Centre. He founded and chairs the Thai Health Information Systems Network (THINK).

Dr. Suwit is also the Vice Chair of the International Health Policy Program Foundation (IHPF) and the Health Intervention and Technology Assessment Foundation (HITAF), the Chair of the Institute for the Development of Human Research Protections Foundation (IHRPF), and the Chair of the Health and Society Creation Foundation and Asia-Pacific Observatory on Health Systems. Prior to his retirement, he served the highest government official rank as a Senior Advisor in Disease Control to the Thai Ministry of Public Health. Since December 2015, he is an adviser to the Ministry of Public Health on Global Health. Currently, he also serves as a Member of the National Health Security Board, Health Systems Research Institute Board, and the National Research and Innovation Policy Council.

Building Sustainable Networks to achieve CORDS' vision and mission (with Dr. Anond Kulthummanusorn)

A network is the supreme form of needed capacity to successfully tackle all difficult challenges. To achieve CORDS' vision of A World United Against Infectious Disease, strong network among all members is 'a must'. The most important challenges of the network are the effectiveness and the sustainability. This presentation focuses on how CORD network's vision and mission can be achieved effectively.

Dr. Sithar Dorjee is a Regional Epidemiology Network Specialist of FAO. He is also working as a Director for Strategic Planning and International Relations, and Assistant Professor of Epidemiology at the University of Medical Sciences of Bhutan.

He has obtained PhD from Center for Epidemiologic Research, University of Prince Edward Island of Canada, and a Master's Degree in Veterinary Epidemiology from Massey University in New Zealand. He is a veterinarian by profession.

He worked as a Regional Coordinator for One Health Epidemiology Fellowship Program for 4 South Asian countries with Massey University for 2.5 years previously.

He has also worked in Bhutan Agriculture and Food Regulatory Authority for more than 15 years looking after Regulatory Epidemiology, Animal Biosecurity, Food Safety, and Biosafety sections.

He has long experiences in research, teaching, training medical and veterinary doctors including regulatory inspectors on epidemiology, research methodology, food safety, infectious disease modelling, disease outbreak investigation, data analysis including network analysis and spatial epidemiology. His special interests include infectious diseases, food safety, continued education and computer simulation modelling

Establishing One Health Disease Surveillance Network: A recent convergence in South Asia,

South Asia is home to about one-fourth (1.8 billion people) of world's population with India and Bangladesh being the most densely populated countries. The region is considered one of the hotspots for emerging diseases. It is endemic for many important infectious diseases like avian influenza, rabies, anthrax, malaria, dengue, Japanese encephalitis and outbreaks of newly emerging diseases due to viruses such as Nipah, Crimean-Congo haemorrhagic fever (CCHF) and Kyasanur Forest disease occur regularly.

Dr. Sithar Dorjee
Regional Epidemiology Network Specialist of FAO,
Emergency Center for Transboundary Animal Diseases
at Khesar Gyalpo University of Medical Sciences of Bhutan

The region has rich biological diversity and there is strong interaction at the human-animal-wildlife interface, presenting greater threats for emergence and spread of diseases. This is exacerbated by occurrence of extremes of climate change, rapid economic growth, globalization, large-scale land use change and degradation.

Yet, healthcare and public health systems—and regional cooperation on disease surveillance—are far from optimal. Considering the region's vulnerabilities to newly emerging infectious diseases, regional cooperation is essential for early detection and rapid action.

An inaugural workshop was conducted from 11 to 13 December 2017 in Bangkok involving eight South Asian countries to establish a One Health Disease Surveillance Network for South Asia. The eight countries shared current capacities in animal and human disease surveillance and One Health initiatives. All countries committed to establishing a regional network to strengthen a cross-sectoral, cross-border approach to finding, verifying, and responding to outbreaks faster and effectively using One Health approach. The governance structure, roadmap, responsibilities and next steps have been developed.

In conclusion, the workshop has enabled the prospect of establishing a robust South Asia One Health Disease Surveillance Network to become a reality. In this presentation, the vision, opportunities and benefits of establishing this network will be presented.

Profiles of Invited Speakers and Summary of their Presentation

Dr. Mohannad Al-Nsour
Chair, EMPHNET

Mohannad Al-Nsour is an internationally recognized expert in field epidemiology, research and public health systems. Dr. Al-Nsour assumed several positions as a researcher, advisor, and director in Jordan. He also served as a consultant on several assignments with the US Centers for Disease Control and Prevention, the World Health Organization and the American University of Beirut. Dr. Al-Nsour has led EMPHNET since 2009, providing strategic and operational oversight, and supporting the enrichment of Field Epidemiology Training Program's and public health in the region. Under Dr. Al-Nsour's leadership, EMPHNET emerged as a regional entity that leads initiatives to promote public health, advance field epidemiology and improve performance of FETPs in the region.

Dr. Al-Nsour is a speaker at the national and regional level covering public health topics such as leadership, field epidemiology, and creating new opportunities. As a certified trainer, Dr. Al-Nsour has extensive experience, with outstanding teaching skills. His areas of expertise are infectious diseases, non-communicable disease and cancer epidemiology.

Abstracts
Oral presentations

Session 1: Promoting Innovation

Innovation in disease surveillance using a digital approach

Abstract S1.1 East Africa Public Health Laboratory Networking Project Strengthens Disease Surveillance Using Regional Web Based Reporting System

Benedict Pius Willy Were, Martin Matu

East African Integrated Disease Surveillance Network, P.O Box 1009, Arusha, Tanzania

Background

The burden of infectious diseases in the East African Community is high. Mechanisms to improve disease surveillance and response include the Integrated Disease surveillance and Response (IDSR) and International Health Regulations (IHR2005). The East Africa Public Health Laboratory Networking Project (EAPHLNP) contributes to strengthening surveillance through its support to a network of 40 Laboratories in East Africa (Uganda, Rwanda, Burundi, Tanzania and Kenya). The EAPHLN Project works closely with the East African Community secretariat (EAC) through East African Integrated Disease Surveillance Network (EAIDSNet). One of the major limitations for the surveillance program in the region is delayed reporting of public health events that may need regional attention. An electronic system that could link the region was suggested as a solution.

Methods

Disease surveillance and ICT experts under the EAPHLN Project and EAIDSNet determined the design, development and deployment of a web based electronic information management system for disease surveillance and laboratory data for the member states in the EAC. The system collates surveillance and laboratory data from country specific disease surveillance data systems. The data are shared through a regional coordination mechanism. The system is robust and can report on any number of selected diseases.

Results

The Web-Based electronic reporting system has strengthened timely sharing of disease surveillance data among EAC partner states and provided a platform for mounting prompt and coordinated joint response to public health emergencies. Regional weekly reports on cholera, meningitis, bloody diarrhea, MDR tuberculosis, malaria, and measles are shared among stakeholders. Alerts are provided when thresholds for selected conditions are surpassed.

Conclusions & Lessons Learned

Use of an electronic data collection system has facilitated timely sharing of disease surveillance data among EAC partner states. This puts the region at a better level to respond to public health events due to infectious diseases.

Abstract S1.2 Using Smart Phones with Intelligent Mobile and Web Apps for Electronic System of Disease Surveillance in Tanzania

Eric Beda[1,2], Calvin Sindato[1,2], Esron Karimuribo[1,2], Mpoki Mwabukusi[2], Reinfred Ngologngolo[2], Godluck Akyoo[2], Leonard Mboera[2], Julius Lutwama[3], Mark Rweyemamu[1,2]

1. Sokoine University of Agriculture
2. Southern Africa Centre for Infectious Disease Surveillance
3. East African Integrated Disease Surveillance Network

Background

Disease surveillance today is more complex. Data collection systems need to capture information from various sources; clinical, demographical, ecological and climatological data. All these are important in epidemic responses. Such data, other than clinical cases, are not systematically captured by official surveillance systems in most developing countries and in particular Tanzania

Hence our objective was to design and develop a tool that promotes participatory surveillance by assisting in the rapid capture of health related data from various sources and devise a mechanism to seamlessly integrate and/or share such data into national surveillance system so as to aid the detection and management of disease outbreaks

Methods

We convened an EpiHack event comprising of human and animal health experts, ICT experts from Tanzania, Uganda, Malawi, Burundi, USA, and Thailand to develop system requirements. From this we developed *AfyaData*, an open source mobile and web application pair that combines easy data gathering and management, interactive feedback, decision support through a one health repository and public health analytics with graphing and mapping features. We then trained key stakeholders in Morogoro Urban and Ngorongoro district on using these tools and deployed it within the districts. The system will be deployed in Narok County Kenya from July 2017.

Results

Over 58 digital forms have been created between September and December 2015 to assist in the collection of health related data, ranging from official public and animal health disease surveillance forms, community based syndromic surveillance forms, environmental data forms to disease specific surveillance forms; with over 1000 forms submitted to the system. This demonstrates how mobile technologies may be used to simplify deployment of new surveillance systems for different types of data sources. Data collected has the potential to share and/or feed into national surveillance system. Animal and public health officials have commended on the suitability of the tool to support national surveillance system.

Conclusions & Lessons Learned

The integration of new data sources into national surveillance systems will require a policy level attention in government structures and planning. Socially this will involve promoting public participation in capturing and reporting of health related events within their communities and technically this relates to developing and sharing Application Programmers Interfaces (APIs) that will make it possible for organizations and public in general to securely and seamlessly feed it into the national surveillance systems in near real time. Innovative mobile apps are well placed to increase relative data sources and public participation in disease surveillance.

AfyaData has demonstrated its ability as an ergonomic and efficient data collection tool for health related data. It is capable of capturing location, images and videos that are key data items that may aid management of outbreaks. In addition it supports many languages and has a feedback feature, ensuring engagement of data collectors.

Acknowledgements

This work was supported by the Skoll Global Threats Fund Grant to SACIDS-EAIDSNet.

Abstract S1.3 Inter-sectoral and Inter-Network Collaboration for Improving Disease Surveillance in East & Southern Africa

Esron Karimuribo[1], Calvin Sindato[1], Eric Beda[1], Willy Were[2], Njenga Kariuki[2], Mpoki Mwabukusi[1], Scott Teesdale[3], Jennifer M. Olsen[4], Leonard Mboera[1], Mark Rweyemamu[1]

1. Southern African Centre for Infectious Disease Surveillance, Africa Centre of Excellence for Infectious Diseases in Southern and Eastern Africa, Sokoine University of Agriculture
2. East, Central Southern Africa Health Community (ECSA-HC)-East African Integrated Disease Surveillance and Response Network collaboration (EAIDSNet).
3. Innovative Support to Emergencies, Diseases & Disasters (InSTEDD), USA
4. Skoll Global Threats Fund, USA

Background

The Southern African Centre for Infectious Disease Surveillance and East African Integrated Disease Surveillance Network together with ministries responsible for human and animal health and their research and higher learning institution networks have joined efforts to optimize the national and regional disease surveillance programmes using One Health and digital solution approaches to strengthen risk management of infectious diseases.

Methods

The EpiHack™ and inception workshop held in Tanzanian in December 2014 and August, 2015, respectively, brought together experts from the animal and human health sectors as well as information, communication and technology (ICT) developers to collaborate in providing solutions to challenges facing infectious disease surveillance and response in the Southern and Eastern African regions. The Techno-Health Innovative Laboratory comprising the design and implementation team of epidemiologists and ICT programmers in collaboration with the U.S.-based Innovative Support to Emergencies, Diseases, and Disasters transformed the innovative ideas into development of digital disease surveillance tool.

Results

An open source digital disease surveillance tool has been developed and branded as the *"AfyaData"*. Fifty Community Health Reporters (CHRs) and 59 officials from human and animal health sectors in Morogoro, Arusha and Dar es Salaam regions in Tanzania have been trained to use *AfyaData*. They were provided with smartphones installed with *AfyaData* and the system was deployed in the regions in August 2016 to support both community-based and official disease reporting systems for general and specific diseases i.e. cholera. From August 2016 to June 2017, 2,269 cases have been reported in domestic animals (2,094) and humans (175) from community level.

The system has provided permissive environment for network actors from human and animal health sectors to working together using One Health approach in the surveillance of diseases in line with International Health Regulations, World Organization for Animal Health, and Integrated Disease Surveillance and Response requirements, basing on One Health principle to complement the Global Health Security Agenda.

Conclusions & Lessons Learned

The inter-sectoral and inter-network collaboration approaches have supported development of digital technology to enhance bridging and integration of human and animal disease surveillance systems using One Health and community participatory methods. The *AfyaData* system will be deployed in five districts in Morogoro and two districts in Dodoma regions of Tanzania, and in Narok County Kenya from July 2017. We will also be supporting the Non-Governmental Organizations with digital technology in their disease surveillance programs. We are exploring on formal collaboration with other CORDS networks and official surveillance systems in SADC and EAC countries.

Acknowledgments

This work was supported by Skoll Global Threats Fund Grant #14-02688

Improving laboratory-based disease surveillance

Abstract S1.4 Building Capacities for Influenza Surveillance in the Republic of Macedonia (2014-2017)

Valdimir Mikikj, G. Bosevska, G. Kuzmanovska, K. Stavridis, D. Kocinski, R. Stolesaka-Ilioska, Z. Cvetanovska, E. Jancheska, M. Kuzmanovska, S. Memeti

Institute of Public Health, 50 Divizija, No 6, 1000 Skopje, Macedonia

Background

In Macedonia influenza surveillance relies only on the national system for mandatory reporting of communicable diseases. In the season 2014/2015, with support from Southeast European Center for Surveillance and Control of Infectious Diseases (SECID), we initiated a project for sentinel surveillance of Influenza-like Illnesses (ILI) and Acute Respiratory Infections (ARI). The objectives of the sentinel surveillance are to build capacities to obtain more precise data on the disease burden, intensity, circulating viruses and to implement timely preventive measures.

Methods

Sentinel surveillance started with six sites in season 2014/2015, by season 2016/2016, 14 ILI/ARI sites were included covering 1.7% of the Macedonian population. We used WHO-2014 case definitions for ILI/ARI. Staff working in the sentinel sites were trained on case definitions, sampling protocols and other aspects of the surveillance twice per year. Nose and throat swabs were obtained from the first ILI cases presenting in each site every week. Biological specimens were analyzed in the reference influenza laboratory at Institute of Public Health. We used MS Excel and QGIS to analyze epidemiological and virological data, MEM was used to determine the intensity of influenza season.

Results

In the period of 2014-2017 we conducted 6 trainings with participation of more than 72 health professionals from sentinel sites and public health experts. From sentinel sites, we collected 181 ILI samples, 35.4% were positive for influenza. During the same period, 244 non-sentinel specimens were collected, 37.7% positive for Influenza. Influenza B predominated in 2014/2015, influenza A/H1N1pdm09 and B/Victoria co-dominated in 2015/2016, Influenza A/H3 was predominant in 2016/2017. Season 2016/2017 was characterized with early peak (weeks 51-03) with very high intensity level (MEM), in the sentinel system 66.7% of sites provided timely weekly aggregated reports.

Conclusions & Lessons Learned

Over a period of three years, with support of SECID and CDC we built capacities for sentinel influenza surveillance, both of the sentinel sites and core surveillance team. Although early in implantation and with relatively small population under surveillance, sentinel ILI/ARI surveillance is providing high quality and timely data, comparable with those obtained from universal reporting of communicable diseases, but with fewer human and material resources. We will work to further increase quality of epidemiological and virological data, based on the findings from the evaluation of this system.

Abstract S1.5 Genomic Profiling of Multi-drug Resistance in Tuberculosis among Patients in Tanzania, Dr Bugwesa Katale, SACIDS

Bugwesa Z Katale[1,2], Nsiande A Lema[3], Susana G Campino[5], Mark M Rweyemamu[4], Jody E Phelan[5], Julius D Keyyu[2], Erasto V Mbugi[1], Hazel M Docrell[5], Taane G Clark[5,6], Mecky I Matee[1]

[1]Department of Microbiology and Immunology, Muhimbili University of Health and Allied Sciences (MUHAS), P.O. BOX 65001, Dar es Salaam, Tanzania
[2]Tanzania Wildlife Research Institute (TAWIRI), P.O. BOX 661, Arusha, Tanzania
[3]Field Epidemiology and Laboratory Training Programme, Dar es Salaam, Tanzania
[4]Southern African Centre for Infectious Diseases Surveillance (SACIDS), Sokoine University of Agriculture, P.O. BOX 3032 Chuo Kikuu, Morogoro, Tanzania
[5]Faculty of Infectious and Tropical Diseases, London School of Hygiene &Tropical Medicine (LSHTM), Keppel Street, London WC1E 7HT, UK
[6]Faculty of Epidemiology and Population Health, London School of Hygiene &Tropical Medicine (LSHTM), Keppel Street, London WC1E 7HT, UK

Background

Tuberculosis disease (TB), caused by *Mycobacterium tuberculosis* bacteria, remains a public health threat globally. Drug resistant TB is caused by the accumulation of mutations in genes coding for drug-targets or converting enzymes and promoters, and makes the disease more difficult to control. The availability of whole genome sequencing (WGS) has improved the understanding of mutations associated with drug resistance. Our study determined the molecular basis of drug resistance in *M. tuberculosis* isolates from northern Tanzania.

Methods

The study was an unmatched case control study that involved Mycobacteria sourced from 16 patients that were resistant to at least rifampin (RFP) and isoniazid (INH) (termed multi-drug resistant TB (MDR-TB), and from 7 TB patients who were sensitive to rifampin (RFP) and isoniazid (INH) at Kibong'oto Infectious Hospital, northern Tanzania. Genomic mycobacterial DNA from culture isolates were whole genome sequenced, and mutations in candidate resistance genes against anti-TB drugs investigated.

Results

We found mutations in the *katG* (INH) and *rpoB* (RFP) genes that code for MDR-TB. The Ser315Thr and Ser450Leu substitutions in the *KatG* and *rpoB* genes were, respectively, the most prevalent mutations observed in MDR-TB isolates. We found mutations in other resistance loci associated with first-line treatments, including *embB* (Ethambutol), *rps*L (streptomycin), *gid* (streptomycin), and *pncA* (pyrazinamide). Mutations were also observed in *gyrB* and *rrs* genes which are known to associate with resistance to flouroquinolones and amikacin drugs, respectively, indicating extensive drug resistant strains. *M. tuberculosis* Isolates were primarily from lineage 3 (CAS-Kili), which is the predominant lineage in Tanzania.

Conclusions & Lessons Learned

The study revealed a range of mutations that drive resistance to anti-TB drugs, suggesting diversity in the drug resistance of *M. tuberculosis* isolates in Tanzania. Using such knowledge of the genetic diversity in Tanzanian strains could assist with developing rapid diagnostics for clinical patient management.

Acknowledgements

This study was funded by the Southern African Centre for Infectious Diseases Surveillance (SACIDS) and London School of Hygiene and Tropical Medicine (LSHTM) under Wellcome Trust Grant WT087546MA. The Ministry of Health, Community Development, Gender, Elderly and Children in Tanzania is thanked for financial support during sample collection. The Kibong'oto hospital in Tanzania is also acknowledged for their permission to conduct this study.

Abstract S1.6 Seroepidemiological Study to Identify Middle East Respiratory Syndrome Corona Virus (MERS-coV) Transmission in Jordan, Israel and the Palestinian Authority

Sami Sheikh Ali, Ramlawi A, Abdeen Z, Haddadin A, Bassal R, Abdul-Hai A, Glatman-Freedman A, Al-Abdallat MM, Shohat T, Cohen D

Middle East Consortium for Infectious Disease Surveillance

Background

MERS-CoV was first isolated in 2012 in Saudi Arabia and has spread across Middle Eastern countries since. Cases detected outside the Arabian Peninsula were associated with travel to an endemic Middle East country or resulted from secondary local transmission. Located close to the epicenter of the emerging MERS-coV, Jordan, Israel, and the Palestinian Authority conducted through the Middle East Consortium for Infectious Diseases Surveillance (MECIDS) a large sero-epidemiological study aimed at detection of potential transmission of MERS-CoV in the 3 countries with special emphasis on high risk groups.

Methods

In autumn 2015, healthy pilgrims to Mecca were interviewed and screened for antibodies to MERS-CoV before they departed for Mecca (n=478) and 1-3 months after their return (n= 522). In addition, blood samples were obtained from subjects who visited Mecca in 2013 and 2014 (287), from the general population (n=614), from inhabitants of villages where positive MERS-CoV camels were detected (n=265) and from camel owners or handlers (n=58). Sera were initially tested for MERS-CoV IgG antibodies by ELISA (Euroimmun, Germany) and positive results further confirmed by the plaque reduction neutralization test (PRNT) at Erasmus MC, Rotterdam, Netherlands.

Results

Seropositive MERS-CoV IgG samples were detected by ELISA in 2 of healthy asymptomatic female volunteers from the general population in Jordan (age 38 and 50, respectively) and in a female pilgrim from Israel (age 53) who had influenza-like illness while being in Saudi Arabia. These and a few additional sera with borderline results by ELISA were found negative by PRNT. All the other serum samples screened by ELISA tested negative. Interestingly, around a third of pilgrims experienced respiratory morbidity during their stay in Saudi Arabia but all were seronegative for MERS-CoV IgG.

Conclusions & Lessons Learned

Pilgrimage to Mecca is not associated with increased risk of MERS-CoV acquisition despite the extremely intensive population "mixing". No camel to human transmission was identified. Yet, as high risk populations, pilgrims and camel shepherds should be aware of MERS-CoV modes of transmission and maintain hygiene preventive measures. MECIDS has established a platform of collaboration that proved to be instrumental when addressing regional emerging infectious diseases such the case of MERS-CoV.

Abstracts Oral presentations

Session 2: Advancing One Health

Making One Health Surveillance Work

Abstract S2.1 Gap Analysis of a Neglected Global Disease of Marginalized People 'Leishmaniasis', Jordan, Albania and Pakistan (2015)

Sami Sheikh Ali[1], Silvia Bino[2], Syed Mursalin[3], James Crilly[2]

1. Middle East Consortium for Infectious Disease Surveillance
2. Southeast European Center for Surveillance and Control of Infectious Diseases
3. Pak One Health Alliance

Background

Leishmaniasis has a devastating effect on marginalised communities. Around 1.6 million new cases occur every year. The cutaneous form of the disease can lead to distressing and disfiguring skin ulcers and scarring, while visceral leishmaniasis, is invariably fatal if not treated

Methods

Gap Analysis was carried out by regional disease surveillance networks Southeast European Center for Surveillance and Control of Infectious Disease SECID/, *Middle East Consortium on Infectious Disease Surveillance* MECIDS and Pakistan Pak One Health, supported by CORDS over the course of 2015

Results

In Albania, visceral leishmaniasis is predominantly a paediatric disease in impoverished communities with 80% of new cases being detected in children. It remains the country with the highest number of cases in Europe. In Jordan, patients with the cutaneous form often initially resort to ineffective traditional remedies leading to delays in seeking medical treatment. This results in an increased risk of residual scarring and disfigurement. Jordan is at significant risk of introducing anthroponotic cutaneous leishmaniasis (ACL) from Syrian refugees, among whom this is endemic. In Pakistan there are an estimated 50,000 new cases of cutaneous leishmaniasis (CL) each year. Initially prevalent in refugee communities from Afghanistan, it has also become established in host communities in Balochistan and elsewhere in north-west Pakistan.

Conclusions

Leishmaniasis is a low priority for health authorities. One area that needs to be addressed is to change regulations to enable the registration and importation of anti-leishmanial drugs. Clear national policy and adoption of "One Health" approach and multi-sectoral coordination for control of leishmaniasis are therefore the priority, along with and increase advocacy and commitment at the highest levels of government.

Abstract S2.2 Pan African Network for Rapid Research, Response, Relief and Preparedness for Infectious Disease Epidemics (PANDORA)

Willy Were[1], Leonard Mboera[2], Martin Matu[1], Benedict Mushi[1] ,Stanley Sonoiya[1], Mark Rweyemamu[2], Julius Lutwama[1]

1. East African Integrated Disease Surveillance Network (Burundi, Kenya, Rwanda, Uganda, Tanzania)
2. Southern Africa Center for Infectious Diseases

Background

Many infectious disease epidemics have afflicted resource-limited sub-Saharan Africa. Developing tailored capability in disease detection and early warning systems based on the new concepts and techniques would help to avert the high morbidity, mortality and economic loss caused by the epidemics. The Southern Africa Center for Infectious Diseases Surveillance (SACIDS) and the East Africa Integrated Disease Surveillance Network (EAIDSNet) through East, Central and Sothern Africa Health Community (ECSA-HC), will jointly implement a Pan-African Network for Rapid Research, Response, Relief and Preparedness for Infectious Disease Epidemics (PANDORA) project. The project aims at building regional and national capacities to cope with and build resilience to infectious diseases epidemics.

Methods

Routine epidemiological data, research, information and communications technology, climate forecasting, mathematical and statistical modeling and computational skills will be utilized to form the backbone for early warning systems for epidemic-prone diseases of humans and animals. SACIDS will lead advanced university training programs on modeling, molecular analysis of pathogens and computational skills. EAIDSNet will lead in strengthening cross-border community involvement and laboratory capacity and also provide platforms for dissemination of progress. Both teams will develop and expand use of electronic systems for collection and sharing of human and animal disease surveillance data.

Results

Trained scientists will add value to the skill mix in the region. Epidemic models, mobilized communities, improved laboratories and the novel digital systems for data collection, analysis and dissemination will form an early warning system for epidemics; the occurrence of epidemics and therefore human suffering and economic loss will reduce.

Conclusions & Lessons Learned

A system to nurture and take advantage of synergies in disease surveillance networks in resource-limited settings is about to be initiated in the East, Central and Southern Africa regions. Resources will be required to sustain and roll it out across the continent

Abstract S2.3 Estimating the Economic And Social Consequences for Patients Diagnosed With Human African Trypanosomiasis in Muchinga, Lusaka and Easter Provinces Of Zambia (2004-2014)

Martin Chitolongo Simuunza[1], Allan Mayaba Mwiinde[1], Boniface Namangala[1], Chitalu Miriam Chama-Chiliba[2], Noreen Machila[1,3], Neil Anderson[4], Alexandra Shaw[3,5] and Susan C Welburn[3]

1. Department of Disease Control, School of Veterinary Medicine, University of Zambia, Lusaka
2. Department of Economics, University of Zambia, Lusaka
3. Division of Infection and Pathway Medicine and Centre for Infectious Diseases, School of Biomedical Sciences, College of Medicine and Veterinary Medicine, University of Edinburgh, UK
4. The Royal (Dick) School of Veterinary Studies and the Roslin Institute, University of Edinburgh, UK
5. AP Consultants, Walworth Enterprise Centre, Andover, UK.

Background

Acute human African trypanosomiasis (rHAT) caused by *Trypanosoma brucei rhodesiense* is associated with high mortality and is fatal if left untreated. Only a few studies have examined the psychological, social and economic impacts of rHAT. In this study, mixed qualitative and quantitative research methods were used to evaluate the socio-economic impacts of rHAT in Mambwe, Rufunsa, Mpika and Chama Districts of Zambia.

Methods

Individuals diagnosed with rHAT from 2004-2014 were traced using hospital records and discussions with communities. Either they, or their families, were interviewed using a structured questionnaire and focus group discussions were conducted with affected communities. The burden of the disease was investigated using Disability Adjusted Life Years (DALYs), with and without discounting and age-weighting. The impact of long-term disabilities on the rHAT burden was also investigated.

Results

Sixty four cases were identified in the study. The majority were identified in second stage, and the mortality rate was high (12.5%). The total number of DALYs was 285 without discounting or age-weighting. When long-term disabilities were included this estimate increased by 50%. The proportion of Years of Life with Disability increased from 6.4% to 37% of the undiscounted and un-age-weighted DALY total. When a more active surveillance method was applied in 2013-14, the cases identified increased dramatically, suggesting a high level of under-reporting. Similarly, the proportion of females increased substantially, indicating that passive surveillance may be failing this group.

An average of 4.9 months of productive time was lost per patient as a consequence of infection. The health consequences included pain, amnesia and physical disability. The social consequences included stigma, dropping out of education, loss of friends and self-esteem, and acquired muscular and nerve deformity. Results obtained from focus group discussions revealed misconceptions among community members which could be attributed to lack of knowledge about rHAT.

Conclusions & Lessons Learned

The social and economic impact of rHAT on rural households and communities is substantial. Improved surveillance and strengthening of local medical services are needed for early and accurate diagnosis. Disease prevention should be prioritised in communities at risk of rHAT, and interventions put in place to prevent zoonotic disease spill over from domestic animals and wildlife. Supportive measures to mitigate the long-term effects of disability due to rHAT are needed.

Acknowledgements

We would like to sincerely thank all of the many research participants that were involved in this study and the numerous government officials and others who assisted.

Addressing Antimicrobial Resistance using the One Health Approach

Abstract S2.4 The SACIDS One Health Approach to Genomics Driven Surveillance for Antimicrobial Resistance - a Potential Collaboration with EAIDSNet

Stephen Mshana[1], Nyambura Moremi1, Linda Falgenhauer[2], Mecky Matee[3], Trinad Chakraborty[2]

1. Department of Microbiology and Immunology, Catholic University of Health and Allied Sciences, Bugando, Mwanza, Tanzania.

2. Institute of Medical Microbiology, Justus-Liebig University, Schubertstrasse 81, 35392, Giessen, Germany

3. Department of Microbiology and Immunology, Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania

Background

Anti-microbial resistance (AMR) is a complex global issue which requires a concerted inter-sectoral, One Health approach as a collaborative effort between the natural and social sciences to understand the interaction between humans, animals and the shared environment.

Methods

A total of 600 humans, 984 animals and 70 environmental sites were sampled from the city of Mwanza, Tanzania. Whole genome sequence was done in 118 selected ESBL isolates (25 from animals, 25 from humans, 15 from environment and 53 from neonates).

Results

Varieties of *Escherichia coli* genotypes carrying ESBL genes were found to circulate between humans, animals and environment. The *Escherichia coli* ST38 carrying $bla_{\text{CTX-M-15}}$ was detected in all compartments while Escherichia coli of the clonal complex ST-10 (ST-44 and ST-617) which was also detected in humans was predominant clone in animals. The Klebsiella pneumoniae of the ST45 carrying $bla_{\text{CTX-M-15}}$ was predominantly found to infect and colonize the neonates. In addition to the $bla_{\text{CTX-M-15}}$, these isolates were found to carry multiple resistance genes for quinolones and aminoglycosides.

Conclusions & Lessons Learned

The dissemination and persistence of *bla*$_{CTX-M-15}$ in different compartments in the city of Mwanza appeared to be due to the horizontal transfer of multiple IncF and IncY plasmids. A One Health study of the flow of antimicrobial resistomes in different ecosystems will lead to an understanding of the antimicrobial resistance complexity, which will contribute to rational selection/definition of cost-effective interventions and policy. We have establish within SACIDS a capability for genomic resistome surveillance, which now permits us to propose a 2-stage AMR collaboration program with EAIDSNet based on a 2-level approach: **Level 1** to involve One Health based phenotypic antibiotic surveys by national public health and veterinary laboratories, possibly through the ECSA: **Level 2** to comprise genomic resistome analysis, as described above to be undertaken by SACIDS associated laboratories with capacity for genomics.

Acknowledgments

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Abstract S2.5 Antimicrobial Resistance in Macedonia Compared with the Balkan region and Europe: Results of the CAESAR Network

Golubinka Bosevska, Panovski N., Kakaraskoska Boceska B.[1], Cekovska Z., Kaftandzieva A, Hristova K, Milevska Kostova N, Lo Fo Wong D, van de Sande-Bruinsma N

Institute of Public Health, 50 Divizija, No 6, 1000 Skopje, Macedonia

Background

Antimicrobial resistance (AMR) is constantly growing national, European and global threat, thus jeopardizing the ability to treat even simple infections. The growth of AMR threatens the progress made in the past in the treatment of life-threatening diseases such as tuberculosis and pneumonia. Infection with resistant bacteria can occur to anyone, at any age, in any country, reducing the possibility of treating contagious diseases, and increases the death rate more often. In addition, the resistant bacteria spread quickly not only among humans, but also among animals and thus constitute a reservoir of bacteria that can spread rapidly among humans and animals. Infected animals, due to bacteria resistance, are hard to treat, which causes animal suffering and economic loss. One of the first steps to combat AMR was to introduce surveillance systems which will provide an essential scientific foundation for clinical and public health practice. In 2013 as recommended by the World Health Organization (WHO), in R. Macedonia the Central Asian and Eastern European Surveillance of Antimicrobial Resistance (CAESAR) system was introduced for surveillance of AMR.

Aim

To overview the antimicrobial resistance (AMR) in Europe with focus on the Balkan region, and especially the Republic of Macedonia

Methods

AMR data for Europe were obtained from European Antimicrobial Resistance Surveillance Network (EARS-Net), coordinated and funded by ECDC, which has been producing annual reports on AMR since 2002. Such reports are also produced by the WHO since 2013, and introduction of the CAESAR system for surveillance of antimicrobial resistance in non-EU European and Central Asian countries. Both systems are compatible with the methodology of collecting, checking and processing of data and performs surveillance of AMR in eight bacterial pathogens of public health importance: *E.coli, Kl.pneumoniae, P.aeruginosa, Acinetobacter, St.pneumoniae, S.aureus, E.faecalis* and *E.faecium*. Only data from invasive (blood and cerebrospinal fluid) isolates are included.

Results

CAESAR network results in Macedonia: in total, for a four-year period (2013-2016), 896 isolates were submitted in this network. There is high percentage of resistance to almost all isolates to the antibiotics/group of antibiotics: MRSA (37-48%); ESBL *E.coli* (59-73%); ESBL *Kl.pneumoniae* (82-100%); carbapenem resistant *Kl.pneumoniae* (0-17%); *VRE faecium* (50-65%); CRAB (71-84%). The percentages of resistance of invasive strains in the Balkans are significantly higher than the average in EU member states. The average percentage of EU includes those of the three member countries of the Balkan Peninsula (Bulgaria, Greece and Romania). With only two exceptions (Cyprus and Slovakia), the highest rates of resistance always originate from one of the Balkan countries.

The percentages of resistance of invasive strains isolated in Serbia, Bosnia and Herzegovina, Kosovo are very similar to those in Macedonia. A special feature of these countries is the high percentage of vancomycin-resistant enterococci, 60-65%, which distinguishes them from other Balkan countries. Another feature relating to Greece and Serbia, is their high rates of carbapenem-resistant klebsiella, which is not characteristic of other countries in the surrounding regions. However, it left open the possibility that these high rates of resistance are not real, i.e. they are higher than actual rates. For example, when Macedonia would have isolated nearly as many invasive strains as the average in Europe, the number of isolated strains should be around 745 per year, but the actual numbers were 189 in 2013; 218 in 2014; and 217 in 2015. In our country, the practice of taking blood cultures is strictly selective upon failure of the initial treatment, which affects the appearance and selected strains. This means that the detected resistance is higher than the actual levels of resistance. Thus, all the countries in the CAESAR network are in the B category of quality results. On the other hand, the problem of isolating a small number of strains annually prevents their appropriate statistical processing, which affects the validity of the conclusions.

Conclusions & Lessons Learned

Percentages of resistance in invasive strains isolated in the Republic of Macedonia are significantly higher than the average in the EU, and similar to those in South Europe and the Balkan region countries. Urgent activities aimed at reducing the development and spread of AMR in Macedonia and Balkan region are needed. They must target the following specific objectives: Improve awareness and understanding of antimicrobial resistance through effective communication, education and training of population health workers, veterinarians, politicians and others; reinforcing the monitoring of consumption of antibiotics and resistance bacterial resistance to antibiotics in human and veterinary medicine; reducing the incidence of infection through effective sanitation, hygiene and preventive measures; optimization of the use of antibiotics in human and veterinary medicine; and cooperation with institutions dealing with the problem of antibiotic resistance (ECDC, WHO, World organization for health of animals (OIE) and other networks).

Abstract S2.6 Strengthening the Regional Role in EID Research: The APEIR (Asia Partnership of Emerging Infectious Disease) Experience

Wiku Adisasmito, Vilda Rachman Amir, Nurul Maretia Rahmayanti, Amin Soebandrio

Indonesia One Health University (INDOHUN), Faculty of Public Health, Universitas Indonesia, Depok, Indonesia

Background

APEIR is a research network with members and partners from 30 institutions in 5 countries: Cambodia, China, Lao PDR, Indonesia, Thailand and Vietnam that enables experts from across sectors to do joint research in emerging infectious disease (EID). APEIR was initiated in 2006, named APAIR (Asia Partnership on Avian Influenza (AI) Research). It was to promote regional collaboration in AI research. APAIR's focus was expanded in 2009 to EID, subsequently APAIR changed its name to APEIR. In 2009 to 2011, APEIR conducted 5 research activities on AI. In 2012-2016, APEIR run a second set of collaborative research that covered two topics: Biosecurity and EID response. The former was a joint project between APEIR, MBDS, and ASEAN+3 FETN. The latter covered antimicrobial resistance and wildlife trade themes, including knowledge generation, capacity building, and policy advocacy activities. In 2011 to 2016, APEIR co-facilitated Ecohealth Field Building Leadership Initiative (FBLI) to conduct research, capacity building, and knowledge translation in Southeast Asia (SEA) and China.

Methods

In maintaining enthusiasm and energy for its activities, APEIR keeps striving to expand the network with academic experts. APEIR has been challenged with new wave of One Health (OH) that has better research capacity and great infrastructure through universities. Thus, APEIR was moved to the Indonesia One Health University Network (INDOHUN), a university network that covers 20 universities member and OH networks in SEA and Africa. This incorporation makes APEIR a stronger network.

APEIR has overcome challenges in organizing multi-country research networks, particularly in harmonizing all of the key players. From developing proposal until writing publications, a coordination dynamic occurs. For instance, in developing proposals, besides producing great ideas, establishing and maintaining communication among members can require great determination. APEIR manages to make people work together. It requires a strategic approach and lobbying of relevant parties. This has brought APEIR bigger coverage, from regional to global level. Currently, APEIR is developing cross-sector policy harmonization on AMR that covers CORDS networks. APEIR and CORDS have succeeded in gaining the interest and agreement of development partners on this topic. It is also attractive to donors since they prefer to collaborate with organizations that can cover several countries and have government partners to ensure knowledge translation will take place.

Results

APEIR advances One Health by collaborating as part of EID research. APEIR widens the collaboration with Harvard University and University College London in developing proposals on food system and antimicrobial resistance. Currently, APEIR is in process to gain ASEAN legal entity as organization on EID in the region.

Conclusions & Lessons Learned

APEIR as a research platform works to support public health development and improvement in SEA (EID hotspot) and China. APEIR is incorporated with INDOHUN in order to strengthen the network and its research capacity. APEIR has overcome challenges by harmonizing coordination dynamics across research network, which requires determination.

Session 3: Network Capacity Building

Abstract S3.1 Operational Research Project Management Experiences, Challenges and Lessons Learned in East Africa Public Health Laboratories Networking Project

Karimi, M, Kariuki J. Wanzala P, Mwangi M, Sang W, Kiptoo MJuma E, Kitole B, Too R, Aberi R. Too E., Githui W

East African Integrated Disease Surveillance Network

Background

Effective project management revolves around a cycle of planning, implementation, coordination, constant evaluation, and report-writing for all activities. Logistics seem simple and straightforward, often the role they plays in scientific undertakings is overlooked. It is usually assumed that research starts and ends in the laboratory, overlooking the fact that for research activities to be successful requires exceptional planning to ensure that the resources are available as per the approved work-plan. This entails determination of what, when, who, why and how it is to be done. Recent studies indicate that logistics-related activities impact significantly on research undertakings. The objective of the study was to document the project management experiences and lessons learnt in coordinating and implementation of EAPHLNP-OR activities.

Methods

To implement the operational research component of the EAPHLNP, KEMRI established an Operational Research (OR) Secretariat to coordinate the project activities in Kenya as well as provide leadership to regional principal investigators. In consultation with the project Secretariat, the role of the administrator involved planning, organizing, communicating, and coordinating regional meetings, linking KEMRI research team with study site hospital administration and research teams in the various counties. Key activities of project implementation involved; managing financial aspects (budget and financial reports preparation), logistical coordination, procurement of training materials, organizing meeting venues, taking minutes, travel arrangements and participation in scientific report writing. Control mechanisms such as dairies, ledger books, work-plan charts and schedules were essential in capturing, managing and monitoring the progress of the project activities.

Results

Interpersonal skills were essential at all stages of the project. The critical stage was the forming, storming, and norming stages where group dynamics and conflicts took center stage and threatened to stall the OR Project. Timely and constant communication with study sites coordinators and prioritization of scheduled project activities was critical in ensuring all parties were kept informed on the progress of the OR activities. The use of dairies and schedules provided the necessary feedback at administrative level on project performance and at research level by providing information in user-friendly formats. Key challenges included fluctuating funding levels, group dynamics and conflicts as well as staff transfers.

Conclusions & Lessons Learned

Successful project management in OR required an administrator to coordinate the utilization of the available resources both capital and human.

Abstract 3.2 Reproducibility of Results and Performance of TB Diagnostics in East Africa Public Health Networking Project in Kenya

Willie Githui[1,2], Mwangi M[1,2], Wanzala P[1,2], Sang WK[1,2], Juma E[1,2], Aberi RM[1,2], Kiptoo M[1,2]

1. Kenya Medical Research Institute (KEMRI) Center for Respiratory Diseases Research, P.O. Box 47855 – 00200, Nairobi, Kenya.

2. East African Integrated Disease Surveillance Network

Background

Reproducibility of laboratory results and performance of diagnostic tools form major part of quality assurance in diagnosis, which is key to patient care. There is no documented comparison of reproducibility of results and performance of TB diagnostics in different geographical settings. These were determined in an East Africa Public Health Laboratory Networking Project - Operational Research (EAPHLN-OR) TB study sites in Kenya.

Methods

People presumed to have TB, aged 18 years and above were enrolled in a cross-sectional study between 2013 and 2016 at nine selected public health facilities in Kenya. Spot and morning sputum specimens collected from participants on two consecutive days with a total of 5,715 specimens. At the study site, a proportion of each specimen was processed for ZN, FM and GeneXpert MTB/RIF. The remaining portion was shipped to the Kenya Medical Research Institute (KEMRI) laboratory, Nairobi. ZN, FM, GeneXpert and Lowensen Jensen (LJ) cultures were done according to standard procedures. KEMRI laboratory personnel were blinded of the study site results. Data were processed with MySQL and IBM SPSS version 24 software. Reproducibility was determined by Kappa values using specimens as unit of analysis and performance by diagnostic values (sensitivity, specificity, positive/ negative predictive values) using the patient as unit of analysis. LJ culture was used as gold standard. Results at the study sites were compared with those from KEMRI.

Results

GeneXpert had excellent Kappa value (0.855(95% CI: 0.834-0.876) and was significantly higher than ZN microscopy (0.721(95% CI: 0.708-0.734), FM Kappa value (0.749 (95% CI: 0.736-0.762), indicated substantial agreement. Specific results for the three diagnostic tools varied across the sites for microscopy but were not significantly different for GeneXpert. Marginal significant incremental sensitivity of microscopy at study sites for ZN (69.9% (95%CI: 64.3-75.5); and FM (76.7% (95% CI: 71.1-82.3); compared to KEMRI ZN (68.7% (95% CI: 63.1-74.4); and FM (70.8% (95% CI: 64.8-76.8). Sensitivity of GeneXpert at study sites (81.4% (95%CI: 71.4-91.3); was not significantly different from that at KEMRI (81.4% (95%CI: 71.4-91.3). Specificity of GeneXpert at the site was not significantly different from KEMRI but significantly lower than microscopy both at site and KEMRI. Microscopy results varied across study sites but not significantly different for GeneXpert. A similar pattern was observed for positive/ negative predictive values.

Conclusions & Lessons Learned

GeneXpert indicated excellent reproducibility of results but no significant difference in performance in different study sites in Kenya, suggesting that under ideal conditions GeneXpert is reliable irrespective of site setting. However, with higher specificity and positive/negative predictive values, microscopy could compliment GeneXpert in detection of mycobacteria especially in settings with inadequate capacity including infrastructure, human resource and high workload.

Abstract S3.3 Use of a Network to Enhance Regional Cross-Border Collaboration on Health–Related Issues - Evolution and Regional Importance of Collaboration

[1]Sovann Ly [2]Bounlay Phommasack, [3]Nguyen Dang Vung, [1]Touch Sok [4]Pasakorn Akarasewi, [5]Li Mingzhhu, [6]Soe Lwin Nyein, [7]Moe Ko Oo, [8]Natalie Phaholyothin

1. Cambodian Ministry of Health
2. Lao Ministry of Health,
3. Vietnam Ministry of Health
4. Thai Ministry of Public Health
5. Chinese Ministry of Healt,
6. Myanar Ministry of Health and Sport
7. Secretariat of the Mekong Basin Disease Surveillance (MBDS) Bangkok,
8. The Rockefeller Foundation

The sharp reduction in the budget for supporting health projects in many countries in the Asian region has threatened the progressive efforts of the member states to comply with the core capacities required by the International Health Regulation (2005). The MBDS network was severely affected by this threat as well. As a consequence, the MBDS Board agreed to create the MBDS Foundation in 2012, which is an international foundation registered in Thailand as a legal entity whose role is to ensure financial sustainability and accountability. MBDS has developed a Master Plan and an Operation Plan for the region and for the member countries based on 7 strategies as well as strengthened coordination and collaboration with development partners through the MBDS Secretariat. MBDS is a pioneer for multi-country cross-border collaboration.

The strength of the MBDS network lies in political commitments from member countries' senior leaders, long standing relationships among national and sub-national levels stakeholders, regular communications among all MBDS Coordinators from Central and Provincial levels, and a strong Secretariat that is responsive to member countries. Another key strength is that implementing activities from MBDS supports member countries' requirements and to complement each other through conducting joint activities and building trust and accountability among member countries and partners for more than a decade. In addition to those above coordination mechanism and partnerships, the Memorandum of Understanding (MOU) was reviewed, updated and signed by the Health Ministers during the World Health Assembly (WHA) and Sub-National level MOU for respective areas for operational purposes.

Currently, MBDS is implementing regular cross border information sharing among member countries, event base surveillance reporting with mobile application, strengthening Bio-Threat surveillance in border areas, collaboration with Mahidol BIOPHICS for time to detect for outbreak information and surveillance capacity building activities with support from Rockefeller Foundation, Canada's Global Partnership Program and Skoll Global Threat Funds.

Abstract S3.4 Mediterranean Programme for Intervention - Epidemiology Training as an Approach to Addressing International Health Risks in the Mediterranean Region

Gordana Kuzmanovska, Vladimir Mikikj, Kristina Stavridis, Dragan Kochinski, Largime Ballazhi, Golubinka Boshevska, Shaban Memeti, Maja Kuzmanovska

Institute for Public Health of the Republic of Macedonia, Skopje, 50-ta Divizija, No-6

Background

The Mediterranean region includes countries from Europe, Africa and Asia with common public health problems. Climate change, high turnover of people and goods, military conflicts and migrant crises increase the risk of new or previously eliminated/eradicated infectious diseases. This imposes the need for a regional approach to effectively address emerging threats from communicable diseases in the region.

The Mediterranean Program for Intervention Epidemiology Training (MediPIET) is a sustainable training programme in intervention epidemiology funded by the European Commission/Directorate General for Development and Cooperation – EuropeAid. It is implemented by Spanish Consortium (ISCIII-FIIAPP), under the scientific leadership of European Centre for Disease Prevention and Control (ECDC). MediPIET is based on 2-year 'learning-by-doing' course that trains individuals, but more broadly also supports sustainable training infrastructures, a regional network of trainers/supervisors and the overall capacities in the Mediterranean. The purpose is to consolidate a competent workforce with the necessary competence in intervention epidemiology to carry out essential public health functions for prevention and control of national and cross-border challenges posed by communicable diseases.

The main goal for starting up this long-term Mediterranean Programme for Intervention Epidemiology Training is to enhance health security in the Mediterranean region by supporting the networking of experts and capacity-building for prevention and control of natural or man-made threats to health linked with communicable diseases. This will be possible through the achievement of more specific goals:

1. Training national trainers and supervisors
2. Training a regional cadre of field epidemiologists competent in intervention epidemiology
3. Disseminating experience, knowledge and skills
4. Fostering country commitment/ownership and regional networking
5. Establishing the basis of a long-term regional training programme aimed at creating a suitably skilled public health workforce.

Methods

A review of the results of the three-year implementation of the MediPIET program.

Results

MediPIET is program for the study of interventional epidemiology through practical work. The curriculum is based on a 2-years "on the job training" including 10 weeks of taught modules, 92 weeks of in-country projects and 4 weeks of international assignment. There are 9 modules for fellows and external participants: Introductory course; Review modules (2), Diseases-oriented modules (2), Methods-oriented modules (2), Humanitarian crisis module and CBRN module, also modules for supervisors - Trainings of trainers (ToT). 18 partner countries -14 from the Mediterranean Region (Albania, Algeria, Bosnia and Herzegovina, Egypt, Jordan, Kosovo, Lebanon, Libya, Republic of Macedonia, Montenegro, Morocco, Palestine, Serbia, and Tunisia), four Black Sea countries (Armenia, Georgia, Moldova, Ukraine), two observer countries (Israel and Turkey) and three EU countries (Greece, France and Spain) are included in the project.

In all countries, training centers have been established, with a total of 24 candidates covered in both cohorts as fellows, under the supervision of supervisors (two from every country) and four scientific coordinators. The first cohort completed a course of nine theoretical modules, held in the period October 2014 - November 2016, and graduated at the time of the second Annual Scientific Conference (ASC) in Marrakesh, Morocco in November 2016. The second cohort, which started in November 2015 and should end in October 2017, already finished with the sixth module. Each of these modules was attended by approximately 40 participants – fellows and external participants. The presence of at least 10 experts of different fields at every module (educators, supervisors, scientific coordinators) is significant. Establishment of sustainable training infrastructures, a regional network of trainers and supervisors, and the provision of training materials in these countries, as well as the transfer of knowledge at the local level – "cascade trainings", have begun.

Conclusions & Lessons Learned

The project implemented by the Spanish Consortium (ISCIII-FIIAPP) and the ECDC's scientific leadership strengthens the country's capacities and creates the basis for the development of a sustainable network of experts for interventional epidemiology that can contribute to tackling threats associated with communicable diseases in the Mediterranean region.

Abstract S3.5 The Process of Evaluating Timeliness of Outbreak Detection And Response In Southeast European Region

Kujtim Mersini[1,2], Jonilda Sulo[1,2], Ledia Agolli[1,2], Adela Vasili, Sanjin Musa, Goran Cerkez, Angel Kunchev[4], Armend Iseni, Vladimir Mikik, Vesna Stefanovska, Isme Humolli, Arijana Kalaveshi, Borna Plese, Daniel Cohen[4], James Crilly[1,2], Silvia Bino[1,2]

1. Southeast European Center for Surveillance and Control of Infectious Diseases
2. Institute of Public Health, Albania
3. Institute of Public Health of Federation of Bosnia and Herzegovina, Bosnia and Herzegovina
4. Ministry of Health, Bulgaria
5. Institute of Public Health, Macedonia
6. Institute of Epidemiology, Faculty of Medicine, Skopje, Macedonia
7. Institute of Public Health, Kosovo*
8. Institute of Public Health, Croatia
9. School of Public Health, Tel Aviv University

Background

Timeliness is of the essence in detection and response of infectious diseases outbreaks but for several reasons, disease surveillance systems are not very timely. To better understand gaps and underlying reasons, and propose improvements of surveillance systems, a multi-country analysis and evaluation of Time to Detect and Time to Respond (TDTR) to diseases outbreaks is being carried out by Southeast European Center for Surveillance and Control of Infectious Diseases (SECID). Here we will present the experience of the TDTR process and the identified challenges in SECID member countries.

Methods

Five member countries of SECID: Albania, Bosnia and Herzegovina, Bulgaria, Macedonia and Kosovo are fully involved in the regional TDTR analysis with the participation of Croatia and Serbia. A standardized spreadsheet template has been developed and used by the countries to collect in a structured format the surveillance and response timelines data. The analysis of time lags between detection, confirmation, reporting and responding were estimated through descriptive methods based on measures of central tendency, accompanied by related standard deviations and complemented with graphical representations through bar charts and box plots.

Results

The data and surveillance process analysis show that the existing surveillance activities present notable gaps. In particular, some key issues are affecting disease reporting. The current system does not always allow for analysis of disease, event or outbreak and timeliness of detection and response, especially when the activities are part of different institutions. Most of the activities related to surveillance and response are multi-sectoral and all sectors have their own information systems. During document collection it seems that response systems are not well described and documented to allow their timeliness analysis with the detection system. The different systems are not connected, and tracking and management of different outbreaks, events and their response is very difficult to document for further analysis.

Conclusions and Lessons Learned

SECID member countries have a long history of network collaboration toward strengthening disease surveillance, early warning and IHR implementation. Most of the countries have paper-based disease reporting and this poses a major concern related to timeliness measures. Electronic communication between all partners especially the veterinary system are necessary steps to be followed in order to mitigate the untimely reporting, enable early disease notification and improve timely response. TDTR analysis and evaluation is a not only a learning opportunity but has practical benefits for all SECID member countries in order for them to develop timely harmonized surveillance and response systems.

Abstract 3.6 The 2016-2017 Influenza Season in Serbia, Sentinel Surveillance of Severe Acute Respiratory Infection

Dragana Dimitrijević, Lidija Stanković, Sonja Mitov Šćekić
Institute of Public Health of Serbia **Dr. Milan Jovanović Batut**" **Dr. Subotića** 5, Belgrade, Serbia

Background

The threat of new and highly pathogenic respiratory pathogens emerging around the world requires continuous global influenza surveillance. Sentinel surveillance of severe acute respiratory infections (SARI) was implemented in Serbia in November 2009. 11 sentinel hospitals in 4 cities participated in the SARI surveillance system. Intensive care units (ICUs), infectious disease, pediatric and respiratory disease wards were all represented. The aim of this study is to provide the review of sentinel surveillance of SARI in Serbia in 2016-2017 influenza seasons as well as to point out the importance of activities of "Southeast European Center for Surveillance and Control of Infectious Diseases" (SECID) to enhance surveillance for severe acute respiratory infection with influenza in Serbia.

Methods

During October 2016 to May 2017 both epidemiological and virological data were collected and analyzed on a national level and weekly basis. For laboratory confirmation of influenza, real time polymerase chain reaction (RT-PCR) was used from combined nasal and throat swabs.

Results

The start of the influenza season was registered in week 49 of 2016. Influenza activity peaked between weeks 50 of 2016 and 3 of 2017, with the positivity rate higher than the >50%. A total of 730 SARI cases were reported. Among these cases, 507 (69.5%) respiratory specimens were collected and tested for influenza viruses. The number of positive samples was 228 (45%). The highest proportion of laboratory-confirmed influenza cases was 68.4% in week 50/2016. All three viruses were confirmed: A(H3), A(H1)pdm09 and B. A viruses predominated, accounting for 99.6% of all sentinel SARI detections. Of those subtyped, 72.7% were A (H3).

In total, 13 deaths among sentinel SARI laboratory-confirmed influenza cases have been reported. All of them were from ICUs. Of all fatal cases, 13 (100%) were due to influenza A with 11 (85%) of those subtyped being A(H3) viruses. Confirmed reported cases of influenza type A virus infection have predominantly been in adults aged 5-14 and 30-64 years or older. Thanking to SECID, we integrated laboratory surveillance with epidemiological influenza surveillance and also we created and programmed the necessary sets of automated reports in compliance with pre-defined criteria.

Conclusions & Lessons Learned

In Serbia, influenza activity started earlier than usual with a predominance of influenza virus A(H3). Integration of laboratory surveillance with epidemiological surveillance highlights the importance of maintaining and improving national influenza surveillance capacity and shows the excellence of collaboration with SECID, which should be continued.

Session 4: Building Sustainable Networks

Network Experiences

Abstract S4. 1 Sustaining and Strengthening Capacity of Regional Networks and Partnership to Respond to Emerging Infectious Diseases in Asia

Wiku Adisasmito, Vilda Rachman Amir, Nurul Maretia Rahmayanti, Amin Soebandrio

Asia Partnership on Emerging Infectious Disease Research (APEIR)

Background

The regional network of APEIR (Asia Partnership of Emerging Infectious Disease) has sustained more than a decade of collaboration with 30 institutions in 5 countries, including Cambodia, China, Lao PDR, Indonesia, Thailand and Vietnam. In the last 3 years, 2 different research projects were conducted separately in each of the countries with the same methodological design. The research titles are "Eco health approach to develop a strategy for the prudent use of antimicrobials to control resistance in human, animal, and environmental health in Asia (AMR)" and "Surveillance of emerging infectious diseases in wildlife trade to increase awareness for zoonosis prevention and wil dlife conservation".

Methods

This research paper will synthesize both of those research results and find keywords related to "sustainable network" and "capacity building" in accordance to APEIR's vision to strengthen its' network in Asia through a solid partnership with the ASEAN (Association of South East Asia Nations) countries in facing the challenge of EIDs in Asia.

Results

Sustainable regional partnership in two different areas, which are antimicrobial resistance and wildlife trade are interconnected in responding to emerging infectious diseases in Asia.

Conclusions & Lessons Learned

A network of government officials, researchers' and universities network would be ideal to strengthen the regional capacity in responding to emerging infectious disease.

Abstract S4.2 Evolution of MBDS network and the regional importance of collaboration

Sok Samnang[1], Sovann LY[1], Bounlay Phommasack[2], Nguyen Dang Vung[3], Touch Sok[1], Pasakorn Akarasew[4], Li Mingzhhu[5], Soe Lwin Nyein[6], Moe Ko Oo[7], Natalie Phaholyothin[8]

1. Cambodian Ministry of Health
2. Lao Ministry of Health
3. Vietnam Ministry of Health
4. Thai Ministry of Public Health
5. Chinese Ministry of Health
6. Myanmar Ministry of Health and Sport
7. Secretariat of the Mekong Basin Disease Surveillance (MBDS)- Bangkok
8. The Rockefeller Foundation

The sharp reduction in budget to support health projects in many countries with in the Asian region has threatened the progressive efforts of member states to comply with the core capacities required by the International Health Regulations (2005). The reduced financial e nveloped had an impact on MBDS's network. As a consequence, the MBDS Board agreed to create the MBDS Foundation in 2012. MBDS Foundation is an international foundation registered in Thailand as a legal entity that has a key role in ensuring financial sustainability and accountability for MBDS.

MBDS has developed a Master Plan and an Operational Plan for the region and for its member countries based on 7 strategies, strengthened coordination, and collaboration with development partners via the MBDS Secretariat. MBDS is a pioneer of multi-country cross border collaboration. The strength of the MBDS network lies in political commitments from member countries' senior leaders, long standing relationships between national and sub-national levels stakeholders, regular communications among all MBDS Coordinators from Central and Provincial levels, and a strong Secretariat that is responsive to member countries. Another key strength is that MBDS led implementation activities has supported member countries' requirements and complemented each other through conducting joint activities which serve to build trust and accountability among member countries and partners. This has been evident for more than a decade.

In addition to the above mentioned coordination mechanisms and partnerships, the Memorandum of Understanding (MOU) devised to facilitate multi country collaboration was reviewed, updated and signed by the Health Ministers during the World Health Assembly (WHA). A Sub-National level MOU exists covering respective areas for operational purposes. Currently, MBDS is implementing regular cross border information sharing among member countries, event based surveillance reporting using a mobile application, coordinates the strengthening of Bio-Threat surveillance in border areas, collaboration with Mahidol BIOPHICS for time to detect for outbreak information and surveillance capacity building activities with the support of Rockefeller Foundation, Canada's Global Partnership Program and Skoll Global Threats Fund.

Abstract S4.3 The Evolution of SACIDS from Concept towards a Sustainable Structure

Gerald Misinzo, Janusz Paweska, Gerald Misinzo, Aaron Mweene, Mecky Matee, Leonard Mboera, Esron Karimuribo, Dominic Kambarage, Jean-Marie Kayembe, Jean Jacques Muyembe, Dacia Correa, Julius Lutwama, Mark Rweyemamu

SACIDS Africa Centre of Excellence for Infectious Diseases in Southern and Eastern Africa

Background

Africa has the highest burden of infectious diseases and yet the least capacity for its risk management. The Africa strand of the 2004 – 2006 global Foresight study on future risks of infectious diseases (of humans, animals and plants) advocated a quantum leap in the development of that capacity. Its Pan African Vision for infectious diseases envisaged a concerted effort of developing capacity for the detection, identification and monitoring of infectious diseases through regional virtual centers that should progressively evolve into centers of excellence and which, along with other institutions, would eventually be linked by an Africa CDC.

In December 2007, the Bellagio Call for Action included a commitment *"to promote the development of national capacities and new regional networks, particularly in Africa and South Asia"*. The 2013-15 West Africa Ebola virus epidemic demonstrated how far Africa continues to be from realizing such visions for the risk management of infectious diseases.

Methods

The Southern African Centre for Infectious Disease Surveillance (SACIDS) was formed in January 2008, by universities and national research institutions involved with infectious diseases in the SADC region, primarily in the Democratic Republic of Congo (DRC), Mozambique, South Africa, Tanzania and Zambia, with its Headquarters located at Sokoine University of Agriculture in Tanzania.

The Mission of SACIDS was set as to harness innovation in science and technology in order to improve Africa's capacity for the detection, identification and monitoring of infectious diseases of humans, animals and their interactions in order to better manage the risk posed by them.

The location of SACIDS Headquarters in Tanzania, a country that transcends southern and East Africa, has facilitated the geographical relevance of its mission. Consequently, all the SACIDS disease surveillance projects have tended to be designed as collaborative between SACIDS and EAIDSNet.

Results

As an infectious diseases surveillance enhancing agency, SACIDS core business focuses on enabling postgraduate and professional short course training as well as research. We have therefore developed into a leading One Health organization in Africa, whose setup and strategy are driven by the epidemiology of infectious disease in Africa. We approach One Health as a joint inter-sectoral enterprise for addressing infectious diseases in people and animals – beyond just emerging diseases and beyond just zoonosis. We work towards "outsmarting the pathogen", and we operate as a community of practice and in a Virtual Centre setting.

Between 2008 and 2016 we trained 62 MSc students in One Health based programs, 11MPhil/Research MSc, 10 PhD, 17 Postdocs, and 239 Professionals who have attended short courses (Summer School). These trainees have been from Tanzania (198), Zambia (64), DRC (38), Mozambique (17), South Africa (1), Other SADC and EAC countries (22 – Botswana, Malawi, Zimbabwe, Burundi, Kenya, Rwanda and Uganda). Several of the SACIDS alumni now occupy senior positions in government, universities, and national research institutions.

In 2013 we developed a new Business Plan which set out 3 goals for SACIDS: (i) Research and Training Platform; (ii) Regional One Health Forum; (iii) Impact and Institutional Change.

We are developing core competences in pathogen molecular biology, analytical epidemiology and social sciences as they apply to emerging and vector-borne viral diseases, animal viral disease epidemics of food security importance and cross-cutting issues. We have developed competence in mobile technology assisted disease surveillance across the human and animal health sectors.

Accordingly, in 2016 out of SACIDS we generated two Africa Centres of Excellence for Infectious Diseases of Humans and Animals in Eastern and Southern Africa: one based at the University of Zambia, which focuses on emerging and zoonotic diseases and one (SACIDS-ACE) as a jointly managed Centre by Sokoine University, Muhimbili University of Health and Allied Sciences and the Tanzania National Institute for Medical Research. Beyond Tanzania, African key member institutions of SACIDS include the South African National Institute for Communicable Diseases (with the largest BSL-4 Laboratory in Africa), the DRC Institute for Biomedical Research (which has been associated with the study of the epidemiology of Ebola since 1976) and the Uganda Virus Research Institute, the oldest virology establishment in East Africa.

Conclusions & Lessons Learned

The transformation into Africa Centres of Excellence funded by governments, through the World Bank, means that the SACIDS concept is being mainstreamed into sustainable structures.

SACIDS has developed a conceptual framework for transforming disease surveillance in Africa: Community Level One Health Security, which is shared with EAIDSNet. Together with EAIDSNet, we are well placed to collaborate with the AfricaCDC and CORDS to revolutionize disease surveillance in Africa by exploiting technologies and strategies that focus on detecting and identifying unusual disease events at community level and in remote areas.

Acknowledgements

We wish to acknowledge the collaboration with our Smart Partners, especially the LSHTM, RVC, The Pirbright Institute and Hokkaido University as well as our funders, especially the Wellcome Trust, The Rockefeller Foundation, Skoll Global Threats Fund and the World Bank.

Abstract S4.4 Strengthening Communicable Disease Response in South East Europe through Regional Networking and Establishing a Regional Development Center

Silvia Bino, Goran Cerkez, Dusan Kojic, Alen Seranic, Angel Kunchev, Iva Pem Novosel, Shaban Memeti, Golubinka Bosevska, Stela Georghita, Boban Mugosa, Adriana Pistol, Dragana Dimitrijevic, Naser Ramandani, Ledia Agolli.

Southeast European Center for Surveillance and Control of Infectious Diseases, Albania.

Background

After a decade of political and health system changes, internal migration and disruption in social cohesion, South East European countries experienced a rise in the communicable disease threats and required a novel approach to infectious disease surveillance and response. A new collaboration was established among the governments of Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Moldova, Montenegro, Romania, Serbia, and the former Yugoslav Republic of Macedonia by envisioning an infectious diseases regional surveillance network within the Southeastern European Health network (SEEHN) established in 2001 as the health component of the Stability Pact Initiative for the region.

Methods

We describe here the process of transforming the first efforts to establish a regional network on infectious diseases surveillance and response into a sustainable regional network run by a regional development center and compare them with the following transformation from crisis and emergency phase to the development and continuous collaboration through cross border projects and initiatives. Four phases of network evolution, different initiatives and their possible impact as well as the efforts toward its sustainability are analyzed using SWOT analyses.

Results

Communicable diseases surveillance and control was seen as the priority for the region and the first phase was characterized with contact mapping and meetings to discover priorities and human capacities investments as well as discover the new approaches of building trust. The second phase was related mainly to the analysis of national policies and guidelines and importance of cross border policies and guidelines. Surveillance system analysis and ways forward and communication pathways were also established, as well as in the framework of new IHR (2005). The organogram of network management was established. The third phase was dedicated to selected issues such as laboratory capacities strengthening and cross border influenza surveillance and response and pandemic preparedness. The selected issues were used to strengthen network capacities and actively involve all the members and increase trust and government and donor interest. The fourth phase was characterized by regional cooperation, increase of expert involvement, in project developments, use of the One Health approach, and management autonomy, while maintaining a partnership with governments.

Conclusions & Lessons Learned

Surveillance networks cannot be established immediately as their importance will grow after showing the benefits. Every sustainable network has to grow through different phases. Building of trust, expert community of practice, join projects, and the autonomy of management and partnering with governments and other institutions by agreements or projects of common interest and benefit make such surveillance networks more sustainable.

Abstract S4.5 Tracking Inter-Country Transmission of Salmonella Infantis using the Laboratory-Based Surveillance Network Established by MECIDS

Ravit Bassal[1,2], Sheikh Ali S[2], Ramlawi A[2], Haddadin A, Al Shuaibi N[2], Agmon V[2], Yishai R[2], Leventhal A,[2] Al-Abdallat MM[2], Shohat T[2], Abdeen Z[2], Cohen D[2]

1. Israel Center for Disease Control, Israel Ministry of Health, Chaim Sheba Medical Center, Tel-Hashomer 52621
2. Middle East Consortium for Infectious Disease Surveillance

Background

In 2005, the Middle East Consortium for Infectious Disease Surveillance (MECIDS) established a regional, laboratory-based surveillance network to facilitate identification of local and trans-border transmission of food-borne diseases. We used this platform to investigate if the emerging shift in predominance of *Salmonella* serotypes associated with salmonellosis in Israel, namely Salmonella Infantis replacing *Salmonella* Enteritidis and *Salmonella* Typhimurium, was also observed in the Palestinian Authority and Jordan correlating with the level of food exchange between the countries.

Methods

The MECIDS *Salmonella* laboratory-based surveillance comprises patients referred to sentinel laboratories for stool and/or blood cultures, food-handlers referred to sentinel laboratories for stool cultures and food items received by food laboratories. In the 3 countries, specimens are tested for the presence of *Salmonella* using harmonized standard operating procedures. Organisms defined as *Salmonella* at sentinel laboratories are submitted to the National Reference Laboratories for confirmation and phenotype and genotype characterization.

Results

After many years in which *Salmonella* Enteritidis and *Salmonella* Typhimurium were the leading serotypes causing non-typhi salmonellosis in Israel, from 2009 onwards *Salmonella* group C serotype Infantis became the predominant serotype accounting for more than 30% of the *Salmonella* spp. isolated from stool samples of patients with gastroenteritis. Careful examination of the *Salmonella* serogroups isolated in the Palestinian Authority and Jordan showed at the same time, similar emergence of *Salmonella* group C in the Palestinian Authority but not in Jordan where serogroup B dominated. Moreover Salmonella isolates from human and food specimens archived in Jordan (n=277) and Palestinian Authority (n=103) and further serotyped, showed that in the Palestinian Authority 40% of isolates were S. Infantis (leading serotype) whereas in Jordan only 3% were S. Infantis while the leading serotypes were S. Agona, S. Anatum and S. Blockley.

Conclusions & Lessons Learned

The *Salmonella* laboratory-based surveillance established by MECIDS proved to be sensitive and specific in the identification of regional trends in *Salmonella* species temporal predominance most probably directly associated with the extent of food products exchange among the 3 countries, and corresponding to foodborne transmission of the pathogen.

Abstract S4.6 The Role of EMPHNET in Responding to Public Health Challenges in the Eastern Mediterranean Region

Mohannad Al-Nsour, Eastern Mediterranean Public Health Network

The Eastern Mediterranean Public Health Network (EMPHNET) is a non-profit organization that was established in 2009 with the goal of improving health status in the Eastern Mediterranean Region (EMR). It builds national and regional capacities in several priority public health areas, such as outbreak investigation, disease surveillance, rapid response, International Health Regulations (IHR) implementation and more. EMPHNET provides technical assistance by supporting Field Epidemiology Training Programs (FETPs). Its main technical areas of focus include applied epidemiology and research, non-communicable disease, communicable disease, and health security.

EMPHNET collaborates with associations, institutions, networks and organizations that hold similar views. Its efforts grew by building a network of expertise, which it sees as one of its strongest attributes for meeting public health needs in the region. EMPHNET supports and promotes innovative approaches in meeting the various public health challenges of the region. In addition, EMPHET is guided by its commitment to change and acknowledges the importance of knowledge sharing as an ongoing process.

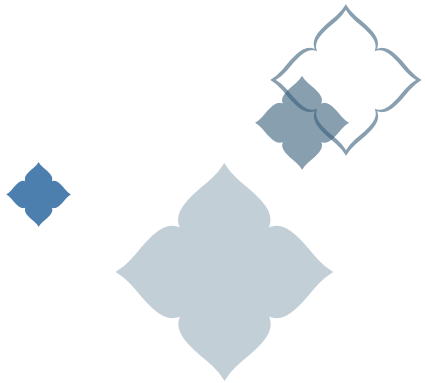
The EMR has been known for ongoing socio-political unrest throughout contemporary history. For decades, the region has been home to both man-made and natural disasters. Most recently, the advent of the Arab Spring in Late 2010 spread through the EMR countries, causing major insurgencies and civil wars in Iraq, Libya, Syria, and Yemen that continue today. Major earthquakes have hit Pakistan and Afghanistan in the last five years. Together, these factors have created an excess of unprecedented public health challenges. Despite the ongoing efforts undertaken by governments to improve health outcomes, increasing population growth together with escalating health needs have made it difficult for them to bring about positive gains. Therefore, it becomes crucial to look for sustainable strategies to counteract the increasing challenges and to introduce new health initiatives and programs to offset staggering improvements in health outcomes. Field Epidemiology Training Programs (FETPs) have been identified as one of the main strategies to overcome these challenges.

Abstract S4.7 Building Sustainable Networks: Experiences and Challenges of EAIDSNET

Dr. Julius Lutwama, East Africa Integrated Disease Surveillance Network

The East African Integrated Disease Surveillance Network (EAIDSNet), which was established in 2000, is a regional collaborative initiative of the National Ministries of the East African Community Partner States responsible for human, animal health, wildlife and the environment in collaboration with national health research and academic institutions. The overall goal of EAIDSNet is to reduce morbidity and mortality due to common communicable diseases in the East African Region through the establishment of a strong network capable of generating and exchanging useful epidemiological information for early warning of impending epidemics as well as supporting joint planning and implementation of disease control measures.

Over its 17 years of existence, EAIDSNet has progressively achieved recognition, particularly with regards to capacity to conduct cross border activities and inter-country assistance with diseases control. Despite this recognition, EAIDSNet has gone through numerous experiences and challenges in adhering to systems of governance, maintaining interest, attracting resources and fostering sustainability. There have been additions of new partner states, changes in organization of the responsible national ministries, lack of funded projects, lack of trust and transparency among all partner states, etc., all of which have variously affected the sustainability of this regional network. Never the less, a number of key factors have been identified towards ensuring sustainability.



Abstracts
Poster presentations

Promoting Innovation

Exploring User Acceptability of New Laboratory Tuberculosis Diagnostic Tools in the Kenya EAPHLNP-OR Satellite Study Sites

James Kariuki Ngumo, Wanzala P, Mwangi M, Orina F, Sang W, Kiptoo M, Karimi M Kitole B, Too R , Aberi R , Too E, Juma E , Githui W

East African Integrated Disease Surveillance Network

Background
The East Africa Public Health Laboratories Networking Project through KEMRI has been evaluating new diagnostic tuberculosis tools which include the Xpert® MTB/RIF (GeneXpert), and the LED-FM microscopy. These new tools were introduced in five EAPHLNP satellite sites by the Ministry of Health through a World Bank support since 2012. Introduction of new tools are usually done without consultation of the end-users.

Objective
To document user acceptability of new laboratory tuberculosis diagnostic tools in the Kenya EAPHLN OR Project Satellite sites.

Methods
Descriptive study using a cross-sectional design. A non-probabilistic convenient sampling was used to identify laboratory respondents per site. Sixteen laboratory staff who had used the new TB diagnostic tools at four satellite sites were included in the interviews. Questionnaire was used to collect information on user acceptability to utilize the new tuberculosis diagnostic tools. In-depth interview guide was used in discussion with key informants to document the perception towards introduction of new diagnostic tools, infrastructure, procurement, turnaround time and future recommendation.

Results
All laboratory staff indicated that they understood the concept of GeneXpert compared to 75.0(95%CI 53.8-96.2%) for LED-FM. LED-FM was rated poor by 9/16 (56.3%) respondents compared to GeneXpert. While 12/16 (75%) respondents reported that LED-FM had low turn-around time. GeneXpert was a safe equipment to use compared to ZN because users were not exposed to fumes and easy to operate. Staff experienced difficulties in stain preparation for ZN, identification and differentiations of bacilli from artefacts. GeneXpert was reported to detect more TB cases than LED-FM and ZN since it was able to amplify low volume / quantities of bacilli.

Conclusions & Lessons Learned
GeneXpert was preferred diagnostic tool compared to LED-FM. However, both tools have challenges when used independently which can be effectively addressed through argumentation.

Implications for Practice Quality of service maybe improved when both tools are used.

An Electronic Syndromic Surveillance System for early Detection and Control of Livestock Diseases in Marsabit County, Kenya

Boku Bodha, Halima Katelo, Stephen Basele, Absolomon Kihara, Simon Chuchu, Henry Kiara, George Wamwere-Njoroge, Bernard Bett

East African Integrated Disease Surveillance Network

Background
Livestock diseases constrain socioeconomic development of the pastoralists' communities in northern Kenya through their negative impacts on livestock production and trade. To address this challenge, the Department of Veterinary Services and its partners are piloting an alternative surveillance and response interventions to support existing disease control efforts. We describe a new electronic syndromic surveillance system that has been set up in Marsabit County to enhance the collection, collation, analysis and dissemination of animal health data and information.

Methods
It comprises a cloud server linked to a series of data collection phones operated by field veterinarians based at the sub-county locations. The veterinarians collect animal health data during their routine active surveillance missions including participatory disease search, or via telephone contacts with community disease reporters (CDR) who are based at the village and have been trained on disease recognition. In the latter case, each CDR calls the veterinarian he/she reports to whenever there is a case to be reported but the veterinarian is expected to make weekly phone calls to each CDR to check whether there has been any incident that needs to be reported during the intervening period. Field veterinarians upload the syndromic reports to the on-line server at the end of each day.

Results
The system was initiated in August 2017 and thus far, syndromes that have been displayed by the word cloud include diarrhea, watery stool, breathing difficulties, grunting and bleating. A few mortalities have also been captured in graphical displays on the dashboard in sheep and cattle. A few challenges have also been reported by the users of the system including smart phone-reporting app compatibility hitches.

Conclusions & Lessons Learned
Reports that are being provided by the field teams on the challenges they are facing with the system are being addressed to improve reporting efficiency. This system would enable the identification of disease trends in real-time, and hence it can greatly improve the existing early warning systems.

How Smart Computer Algorithms May Enhance Detection of Diseases in Human and Animal Populations in East and Southern Africa

Eric Beda, Calvin Sindato, Esron Karimuribo, Mpoki Mwabukusi, Reinfred Ngologngolo, Godluck Akyoo, Leonard Mboera, Julius Lutwama and Mark Rweyemamu

Southern African Centre for Infectious Disease Surveillance, Africa Centre of Excellence for Infectious Diseases in Southern and Eastern Africa

Background

Effective participatory disease surveillance is fundamental to the timely detection of outbreaks with epidemic potential. As access to point of care diagnostics is limited, most of these systems tend to focus on diagnosis and reporting of clinical manifestations. As the public engages more in public health, more and more data may be collected and thus more resources are required to analyze data and respond to individual events. Artificial Intelligence and/or smart algorithms may assist to reduce this load by systematically training/matching symptoms to pre-authored standard case definitions of various diseases and trigger alerts when specific thresholds are met

Methods

Southern African Centre for Infectious Disease Surveillance (SACIDS) in collaboration with stakeholders from ministries responsible for human and animal health, and their institution and research networks has developed One Health Knowledge Repository (OHKR) to improve public health management. OHKR is a decision making expert system that helps local communities, ministries responsible for human and animal health as well as regional animal and human health desks to make prompt and appropriate decision required to prevent and control diseases.

SACIDS commissioned specialists from human and animal health sectors to analyze and assign weights as regard to level of significance for each particular clinical manifestation on a specific disease i.e. to what extent a named clinical manifestation explains a particular disease on its own. We also reviewed each priority disease and authored key messages to be used as response to various levels of stakeholder (from community and health care settings) when matched. We Equipped and trained community health reporters (CHR) with AfyaData app, on how to identify, collect and submit symptoms to our system. Our system received these symptoms and ran them through a custom algorithm and made suggestions on likelihood of disease per report based on clinical manifestations, species, season and geographical location used as input parameters by CHR.

Results

From August 2016 to June 2017, clinical manifestations reported in goats and sheep, suggested the infectious conditions identified by our system and likelihood percentage (p) in goats and sheep were Peste des Petits Ruminants (PPR) (70%) and Contagious Caprine Pleural Pneumonia (CCPP) (65%). The most probable infectious diseases in cattle were Contagious Bovine Pleural Pneumonia (60%) and Brucellosis (30%). The most probable disease in pigs was African Swine fever (70%), and in chicken was Newcastle disease (70%). The most probable infectious diseases in humans were cholera (60%), typhoid fever (60%) and malaria (50%).

Preliminary performance appraisal of our system has been carried in an outbreak investigation in Ngorongoro where the system reported the most likely diseases in goats being PPR and CCPP. Laboratory investigation conducted for ground-validation detected a proportion of infection in blood samples collected from goats at 63% (n=240) and 48% (183) for PPR and CCPP, respectively.

Conclusions & Lessons Learned

Participatory epidemiology is a fundamental tool in public health, among many challenges we found out that keeping the public engaged and willing to report on a regular basis requires regular response and/or feedback to each report submission. Smart algorithms have potential to suggest on most likely disease condition to inform strategic confirmation. Preliminary validation of OHKR suggests over-prediction of PPR by 7% and CCPP by 17%. Further validation is required to improve the system performance.
From disease surveillance perspective, having timely access to these symptoms and/or detected diseases visually mapped provides crucial epidemiological intelligence and/or information for managing outbreak responses. We learnt that smart algorithms and artificial intelligence may be a worthy tool to enhance disease detection.

Acknowledgement

This work was supported by the Skoll Global Threat Grant to SACIDS-EAIDSNet.

Participatory Surveillance System- A supplementary tool to improve Influenza-like Illness in Southeast European Countries

Jonilda Sulo, Craig Dalton, Artan Simaku, Mirsada Mulaomerovic, Nina Rodic Vukmir, Angel Kunchev, Vladimir Drazenovic, Vladimir Mikik, Bozidark Rakocevic, Odette Popovici, Dragana Dimitrijevic, Arijana Kalaveshi, Kujtim Mersini, Silvia Bino

Southeast European Center for Surveillance and Control of Infectious Diseases

Background

Internet-based surveillance tools have enabled innovative methods of reporting Influenza-Like Illness (ILI) through self-reporting by the general population. Multiple Influenza participatory surveillance systems are operating in different countries of the world since 2003 including InfluenzaNet (11 countries of Europe), FluNearYou (USA) and Flutracking (Australia). South East European (SEE) countries including Albania, Bosnia and Herzegovina Bulgaria, Croatia, Macedonia, Moldova, Montenegro, Romania, Serbia and Kosovo* have established ILI/ARI/SARI surveillance systems based on reports from health care workers (HCW) but have not yet established a participatory ILI surveillance system.

Methods

We compared the current HCW based ILI/ARI surveillance system with the Australian Flu tracking system. The comparison is made on attributes such as: case definitions, target population, reporting methods, timeliness, and accuracy of data, representativeness, and other components of the systems.

Results

The EU countries (Croatia, Bulgaria and Romania) uses the ECDC case definition while the others use the WHO one which is similar to the Flutracking ILI case definition. The SEE HCW ILI/ARI/ surveillance is a weekly paper-based system that collects data on patients who seek mainly primary health care services during the influenza season. This system is generally affected by gaps in estimating in advance and rapidly the number of influenza cases and consequently delays the response to any upcoming influenza epidemic. Flutracking is as well a weekly online survey of ILI symptoms, health seeking behavior and absence from normal duties.

The most important differences between the two systems relate to timeliness and representativeness. Flutracking disseminates reports approximately one week after the onset of symptoms are experienced whereas SEE HCW disseminate reports in an average of seven days after patient hospitalization. The SEE HCW system is representative of people who present for health care but misses those picked up by Flutracking who report symptoms but do not seek care. Flutracking is biased towards upper socioeconomic status and working age participant while SEE system is based by the accessibility and cost barriers of attaining health care services.

Conclusions & Lessons Learned

Integration of participatory surveillance within the national influenza surveillance in SEE countries will empower better estimation of illness and its specific symptoms and understanding of the deeper surveillance pyramid from community based attack rates, through health seeking behavior to hospitalization and laboratory testing. Additionally, both systems are complementary and their integration is crucial to improve cross border early warning and collaboration between SEE countries.

A Novel Field Multiplex PCR Tool to Detect Plasmodium Falciparum K13 Propeller Mutations Associated with Artemisinin Resistance

Laurence Ganee, Nimol Khim, Alexandra Iannello, Eric Legrand, Sophie Blein, François Nosten, Mehul Dhorda, Elizabeth Ashley, Kyaw Myo Tun, Frédéric Ariey, Aledandre Pachot, Karine Kaiser, Françoise Gay-Andrieu, Didier Ménard

bioMérieux, Chemin de l'Orme, 69289 Marcy l'Etoile, France

Background

Artemisinin-based combination therapies (ACTs), first-line treatment of uncomplicated falciparum malaria since 2001, have drastically improved patient management in endemic countries. However, *P. falciparum artemisinin* resistance (ART-R) emerged in Southeast Asia in 2008-2009. At present, the risk of its global spreading is considered a major threat which could greatly jeopardize malaria elimination efforts. Mutations in *P. falciparum* propeller domain of a Kelch gene located on the chromosome 13 (K13) have been recently associated with ART-R. To date, five K13 mutants, confined to Southeast Asia and China, have been validated as conferring ART-R. In ART-R free areas, especially in sub-Saharan Africa, real-time molecular surveillance with standardized protocols needs to be urgently implemented to detect possible invasion by K13 mutant alleles.

Methods

Our objective was to optimize a multiplex PCR assay for detecting the five validated K13 mutants (F446I, Y493H, R539T, I543T, C580Y) and evaluate its performances (sensibility / specificity). A semi-automated workflow including an easyMAG® extraction platform and an Argene Solution reagents for real-time PCR was set up and optimized. The final protocol is based on the use of a new format of dried blood spots (DBS) for sample collection to avoid cross-contaminations. Parasite DNA extractions are performed in less than 1 hour followed by 3 real-time PCR duplexes targeting 5 K13 mutants and an internal control targeting a non-K13 P. falciparum gene. The integrated research project conducted at the Institut Pasteur in Cambodia (Phnom Penh) is based on 701 specimens collected in Cambodia and Myanmar from symptomatic patients and asymptomatic individuals with *P. falciparum, P. vivax* or mixed *P. falciparum/P. vivax* infections along with samples collected from malaria free individuals.

Results

We obtained interpretable results for 24 specimens in < 4 hours and a limit of detection comparable to the PCR/Sanger sequencing approach, used as reference method. The internal control detected <1 *P. falciparum* parasite per µL in blood spotted into DBS.

Among our set of samples, the C580Y was the most frequent mutation (proportion of 43.5%) followed by the F446I mutation (proportion of 16%). The Y493H and R539T mutations were less frequent while no I543T mutant were detected. The specificity of the assay was above 99% for all 4 mutations tested (F446I, Y493H, R539T and C580Y). The sensitivity of the assay was higher to detect the C580Y and R539T mutants (>95%) compared to the F446I and Y493H mutants (87% and 90%, respectively). The percentage agreement between results from our assay and the PCR/Sanger sequencing of blood samples collected from symptomatic patients (N=520), was 99% for the Y493H and R539T mutants and >97% for the F446I and C580Y mutants.

Conclusions and Lessons learned

This study demonstrates the reliability and the suitability of our assay for field epidemiological surveillance of K13 mutants associated to ART-R in malaria endemic settings. Our new tool is able to detect the main K13 mutants which have been validated as conferring ART-R, in less than 4 hours for 24 specimens. The performances (sensitivity/specificity) of our assay are similar to the PCR/Sanger sequencing approach but with a simpler interpretation and quicker process. Our tool appears to be more appropriate for use in resource-limited countries. To confirm our preliminary data, a multicenter study has been scheduled to be conducted at the end of 2018 in Africa

Advancing One Health

Prevalence, Virulence Genes and Antimicrobial Resistance of Shiga-toxigenic E.coli in Diarrhea Patients from Kitale, Kenya

Rael Jepkinyor Too[1], Ngari M[2], Kikuvi G.M[6], Matey E.J[1], Koima J[4], Chebii J[4],Wanzala P[7], Kiptoo M.K[5], Githui W.A[3], Sang W.K[1]

East African Integrated Disease Surveillance Network

Background
Shiga toxin-producing Escherichia coli (STEC) are among the most important causes of foodborne diseases. They cause illnesses ranging from mild diarrhea to more severe conditions that may progress to hemorrhagic colitis (HC) and hemolytic uremic syndrome (HUS). The burden of STEC in patients with diarrheal illness in Kitale hospital, Trans-Nzoia County had not been established.

Methods
Stool samples from patients seeking treatment for diarrheal illness and had consented to participate in the study were collected, cultured for enteric bacteria and identified using conventional biochemical methods. Suspect E.coli isolates were further characterized using Conventional multiplex PCR. Antimicrobial susceptibility testing was done for all pathogenic isolates using Kirby Bauer disc diffusion method.

Results
A total of 295 participants were enrolled; median age 120 months (IQR: 36-312). Children aged <5years were the majority of whom 54% (160) were females. The prevalence of pathogenic *E.coli* was 19%56/295 and STEC was the most prevalent at 5.4%16/295. Virulence genes *(Stx_1, Stx_2, eaeA**and *HlyA* *) were observed in 13, 19, 9 and 14 in STEC isolates respectively. The most common gene was Stx_2 and combinations of *(Stx_1 +Stx_2 +hlyA)* genes. Antimicrobial resistance to commonly prescribed antibiotics were observed for all *E.coli* isolates except one (1.8%; 95% CI=0.1-9.6%). No STEC isolates showed resistance to Furazolidine drug. However, Trimethoprim / Sulfamethoxazole) was the drug which exhibited the highest resistance at (94%, 95% CI 70 to 99%).

Conclusions & Lessons Learned
Prevalence of STEC was 5.4%, *(Stx_1 +Stx_2 +hlyA)* virulence genes combination was the most common. High resistance to commonly prescribed antibiotics were observed in *E.coli* isolates and may be an existing problem that needs further research investigation.

Exposure Factors and Clinical Features Associated with Culture Positivity among Patients Presumed to Have TB Disease in Kenya

Peter Wanzala, Mwangi M, Sang WK, Kiptoo M, Githui WA

East Africa Integrated Disease Surveillance Network

Background
Tuberculosis (TB) remains a major cause of morbidity and mortality worldwide. Diagnosis of pulmonary TB (PTB) in adults is usually done using clinical triaging cardinal signs and symptoms followed by direct smear microscopy and sometimes with molecular techniques such GeneXpert where available. There is limited information on the association between exposure factors and other clinical features apart from the cardinal signs with gold standard culture positivity. This study determined sociodemographic factors, clinical features and laboratory diagnostic results associated with culture-confirmed PTB.

Methods
A total of 1869 people presumed to have TB were enrolled in the cross sectional study between 2013 And 2016 in Kenya. During the triage, clinical history and physical examination were done. TB clinical symptoms and signs were recorded in a structured medical form and included: productive cough, weight loss, night sweats, low-grade fever (classical cardinal signs and symptoms) difficulty in breathing, ease of air entry and percussion and auscultation findings. (respiratory signs and symptoms) general patient condition, body temperature, body mass index, blood pressure, pulse, respiratory rate, heart sounds (vital signs and symptoms), conjunctival presentation(anaemia), neck swellings (lymphadenopathy), Sputum smear microscopy (Ziehl-Neelsen, Light-Emitting Diode Fluorescent Microscopy), GeneXpert and Lowenstein-Jensen (LJ) solid culture as a gold standard for isolation of mycobacteria. Capilia Immunochromatographic assay was used to identify Mycobacterium tuberculosis complex. Data was analyzed with SPSS software and was presented as frequency and percentages. The odd ratio (OR) and 95%CI were performed using a multivariate logistic regression model.

Using a systematic backward approach, non-significant variables were removed from the model until no further variables were eligible for removal to arrive at the final parsimonious model. A p-value of <0.05 in the final model was considered statistically significant.

Results
Significant results from the final parsimonious multivariate logistic regression model included sociodemographic factors such as: only one study site AOR=3.91 (95%CI= 1.76-8.71) and age group (20-29 years) AOR=2.13 (95%CI=1.10-4.10). Male gender showed marginal association 1.39 (95%CI=0.96-2.01). Significant physical examination findings were weight loss AOR=1.94 (95%CI=1.16-3.25) and hepatomegaly AOR=0.22 (95%CI=0.05-0.92). Other cardinal signs and symptoms of TB were not significantly associated. Microscopy had higher odds ratios of detecting TB culture positivity than GeneXpert.

Conclusions
Clinical signs and symptoms associated with TB in the parsimonious multivariate logistic regression model may be indicative of health seeking behavior of people presumed to have TB. Furthermore, this information provides basis for consideration of additional signs and symptoms for early TB clinical diagnosis.

Building an Effective Algorithm for Molecular Testing of Different Respiratory Viruses Posing a Threat to Children's Health

Svetla Angelova, Ivelina Trifonova, Irina Georgieva, Silviya Voleva, Iren Tzocheva Snezhina Lazova, Snezhana Parina, Penka Perenovska, Neli Korsun

Southeast European Center for Surveillance and Control of Infectious Diseases

Background
Acute respiratory tract infections (ARTI) occupy the largest deal in the structure of infectious morbidity and mortality among young children worldwide. ARTI are associated with a significant number of outpatient visits, frequent hospitalizations and poses a serious challenge to child health care system. Approximately 80% of ARTI was found to have a viral etiology. This study aims to promoting an effective algorithm build for molecular determination the contribution and clinical impact of the most common respiratory viruses (influenza A / B viruses, Respiratory Syncytial Virus (RSV), metapneumovirus (hMPV), parainfluenza viruses (PIV type 1/2/3), rhinoviruses (RV), adenoviruses (AdV) and bocaviruses (BoV)) in cases of ARTI among children aged under 5 years during the 2014/15, 2015/16 and 2016/2017 winters seasons in Bulgaria.

Methods
From October 2014 to May 2017, a total of 1023 nasopharyngeal specimens of children under 5 years of aged, who were ambulatory treated (21%, 214/1023) or hospitalized 79%, 809/1023) either for influenza like illness (ILI) or acute respiratory illness (ARI), were collected in different regions of the country and tested in the National Laboratory "Influenza and Acute Respiratory Diseases" for influenza viruses A/B, RSV, hMPV, PIV 1/2/3, RV, AdV and BoV. Detection and typing/ subtyping of respiratory viruses were carried out using Real Time PCR analysis. A lot of the surveyed children developed complications of respiratory tract (laryngotracheitis, bronchiolitis, pneumonia) or central nervous system (CNS) (meningitis, encephalopathy, meningoencephalitis).

Results

A total of 778 respiratory viruses were detected in 1023 (76%) patient's samples. A single infection was found in 703 (90.4%) children; 73 (9,4%) were co-infected with two viruses, and two children (0,2%) – with 3 viruses. Among all detected viruses, 237 (30.5%) were influenza viruses. The number (%) of identified non influenza viruses was following: RSV - 310 (39.8%); HMPV - 57 (7.3%); PIV-1 - 4 (0.9%), PIV-2 - 13 (1.7%), PIV-3 – 28 (3.5%), RV – 85 (10.9%), AdV - 71 (9.1%) and BoV 5 (0.6%). The detection rate of influenza viruses among patients with laryngotracheitis was 28%; bronchiolitis – 9.5%; pneumonia - 19% and neurological complications – 23.8%. Regarding to the non-influenza viruses these proportions were 68%, 88.3%, 70.9% and 39.3%, respectively. RSV was the most common virus identified in children with bronchiolitis (56.4%).

Conclusions & Lessons Learned

Clinical manifestations in different viral infections are similar and therefore the etiological diagnosis based only on clinical parameters is unreliable. Accurate diagnosis is important in terms of adequate therapeutic approach. The study is initial, promoting rapid algorithm for molecular testing a wide range of common pathogens involved in early childhood respiratory infections. Our data show that RSV participated with the largest deal in the development of bronchiolitis among young children, while pneumonia and CNS complications were associated most frequently with influenza viruses.

Awareness and Knowledge on the Prevention of Pandemic H1N1 in the School Population of King's College Buddo, Uganda

Nicholos Owor, Barbara Namagambo, John T Kayiwa, Timothy Byaruhanga, Irene Nabukenya, Barnabas Bakamutumaho, Julius J Lutwama

East African Integrated Disease Surveillance Network

Background

Between June and August 2015, an outbreak of an Acute Respiratory Infection (ARI) spread through King's College Buddo, in Wakiso District in Uganda. In response, on July 25th, 2015, an outbreak investigation team from the National Influenza Centre-Uganda Virus Research Institute (NIC-UVRI) were dispatched to respond to the outbreak. The objectives of this investigation were to determine the cause and magnitude of the respiratory infection, and assess the level of awareness and knowledge about possible preventive measures.

Methods

Nasopharyngeal and oropharyngeal swabs were collected from n=38 students who reported to the school clinic having ARI symptoms within 10 days to the interview. All specimens were tested by rRT-PCR at the NIC laboratory. 1000 self-administered questionnaires were rolled out to collect information regarding demographic characteristics, level of awareness and perception, on influenza vaccination. Data collected was entered into EPI info software and analyzed using SPSS software.

Results

From the n=38 Samples collected 25 [66%] were positive for influenza A pdm (H1N1) while 13[34%] were negative. A total of n=679 questionnaires were completed with a mean age of the participants being 15 years. Most common symptoms identified were sneezing/runny nose 438[18.1%], dry cough 372[15.4%], sore throat 286[11.8%] and fever 284[11.7%]. On awareness, 251[37.0%] knew about Influenza infection and 561(81.2%) sought medical care. Regarding influenza vaccine, 440[64.8%] had never received, 108[15.9%] had received, and 131[19.3%] did not know if they had received an influenza vaccine. In all, 198[29.2%], had heard about Influenza vaccination.

Conclusions & Lessons Learned

Awareness of flu pandemics and vaccination as a preventive measure were low among study participants; and mechanisms for confirmation of infection were lacking. As schools are at higher risk of influenza outbreaks, strategies for increased awareness through mass media and medical campaigns on vaccination would be a solution to avoid its spread and complications.

Cryptosporidium Genotyping in Israel

Tamar Grossman[1,2], Shifra Ken-Dror[2], Julia Vainer[2], Elsa Pavlotzky[2], Amal Awad[2], Orli Sagi[2], Vered Agmon[2], Esther Marva[2], Lea Valinsky[2]

1. Public Health, The Ministry of Health, Ya'akov Eliav 9, Jerusalem
2. Middle East Consortium on Infectious Disease Surveillance

Background

Cryptosporidium is a protozoan parasite that is associated with gastrointestinal illness. In immune-compromised individuals the infection may develop into a prolonged life-threatening disease. Although being a mandatory reported disease in Israel not much is known about its prevalence and associated morbidity, as its laboratory detection is challenging. The parasitology reference lab has recently introduced molecular tools for epidemiological surveillance. An outbreak of *Cryptosporidium* occurred in west Galilee in 2015. A laboratory investigation including molecular detection, genotyping and demographic analysis was carried out.

Methods

Demographic data regarding Cryptosporidium cases identified at Clalit Health Care, HMO and Hospital clinical laboratories, during 2015 was analyzed.

Stools received for parasitology examination at the Clalit Haifa and Western Galilee Laboratory were tested for Cryptosporidium spp. using a combination of a commercial (Seegene) real-time PCR, Immunochromatograpy (Coris) and microscopy after acid-fast staining. Other clinical labs of Clalit use copra-antigen assays and microscopy according physician's specific request.

Available stool samples received at the reference center were confirmed to be positive by an in-house real-time PCR (CDC) targeting the 18S gene. The Cryptosporidium genotype was determined by further analysis of the 18S rRNA gene. Subtyping was achieved by analysis of the gp60 gene.

Results

During 2015, 145 patients with *Cryptosporidium* were detected at the Haifa and Western Galilee lab. Peak of infection rate was recorded between August to November. Most of the patients (127) were children between the ages of 1 and 5. Stool samples from 21 of the outbreak patients were genotyped and subtyped, along with additional samples from infected patients elsewhere in Israel.

Genetic analysis revealed that the outbreak *Cryptosporidium* belonged to the genus *C. hominis*. The gp60 analysis demonstrated two human-transmitted subtypes, IeA11G3T3 and IbA6G3; the later was found only outside Haifa City. *C. hominis* IeA11G3T3 was the most prevalent subtype in other areas in Israel. Two cases of *C. parvum* IIdA20G1 were found in the south of Israel. The latter is a zoonotic subtype prevalent in certain areas of Egypt.

Conclusions & Lessons Learned

Here, for the first time, the molecular epidemiology of cryptosporidiosis in Israel is explored. The data suggest that Cryptosporidium subtypes are shared with neighboring countries more than with Europe. Gathering of molecular-epidemiology data contributes to elucidation of the regional transmission routes and infection sources, a larger base of molecular information is desirable.

Prevalence, Antimicrobial Susceptibility and Molecular Typing of Methicillin- Resistant Staphylococcus Aureus from Raw Bovine milk in Morogoro Municipality, Tanzania

Michael Ziwa[1,2] Jibril Mohammed[2], Huruma N. Tuntufye[2], Lucas Matemba[2], Adela Kisanga[2], Mecky I. Matee[2]

1. Sokoine University of Agriculture, P.O. Box 3019, Chuo Kikuu, 67125 Morogoro, Tanzania

2. Southern African Centre for Infectious Disease Surveillance, Africa Centre of Excellence for Infectious Diseases in Southern and Eastern Africa

Background

Methicillin-Resistant *Staphylococcus* aureus (MRSA) in raw milk can be transmitted from animals to humans. This study was performed to determine the prevalence of MRSA in raw bovine milk in the Morogoro Municipality, Tanzania.

Methods

A total of 117 raw milk samples were cultured on Baird-Parker medium to isolate *S. aureus* and PCR was used for identification of *S. aureus* species, mecA and coagulase genes. Coagulase negative *S. aureus* were confirmed using tube coagulase; DNAse, API Staph tests with *S. aureus* ATCC 25923 and *Staphylococcus epidermidis* ATCC 12228 included as positive and negative controls, respectively. MRSA isolates were typed using Staphylococcus protein A gene. Kirby-Bauer Disk Diffusion method was used for antimicrobial susceptibility testing on the following drugs, clindamycin (2µg), vancomycin (30µg), trimethoprim-sulfamethoxazole (25µg), tetracycline (30µ) and penicillin G (10 IU), oxacillin (1µG) and cefoxitin (30µg). An isolate was considered to be resistant to methicillin if found to be resistant to both oxacillin (1µG) and cefoxitin (30µg).

Results

Seventy-five (64.1%) isolates were positive for catalase and coagulase reactions, while 42 (35.9%) were positive for catalase but negative for coagulase reactions. Of the 75 isolates, species specific PCR identified 46 coagulase positive and 2 coagulase-negative *S. aureus.* Resistance to clindamycin, vancomycin, trimethoprim-sulfamethoxazole, tetracycline, penicillin G, oxacillin and cefoxitin was 23.9%, 2.2%, 30.4%, 41.3%, and 71.7%, 6.5% and 4.4%, respectively. Resistance to clindamycin, vancomycin, trimethoprim-sulfamethoxazole, tetracycline and penicillin G for coagulase positive *S aureus* was 23.9%, 2.2%, 30.4%, 41.3% and 71.7%, respectively, compared to 11.9%, 0%, 2.3%, 4.8% and 16.7% observed in coagulase-negative staphylococci. Twelve (26.1%) of the coagulase positive *S. aureus* isolates exhibited multi-drug resistant (MDR). None of the coagulase-negative staphylococci isolates were MDR. Resistant to both oxacillin and cefoxitin was seen in 2 (4.2%) of the coagulase positives and 1 (2.4%) from the coagulase negative isolates. PCR screening detected the *mecA* gene in one coagulase-negative staphylococci and two Coagulase-negative *S. aureus* isolates, while spa typing revealed spa type t2603. The prevalence of MRSA was found to be 4.2%.

Conclusions & Lessons Learned

This study reports for the first time the presence of presumptive coagulase-negative variant of MRSA, which was assigned a spa type t2603, and multi-drug resistant S. aureus isolates in bovine raw milk in Morogoro.

Acknowledgement

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Seroprevalence of Brucellosis among cattle and the associated risk factors in South Kivu, Eastern of DR Congo

Bwihangane Birindwa[1], P.N. Bisimwa[1], P. S. Baenyi[1], S. Wasso[1], Kinimi. E[1] and G.C. Gitao[3]

1. Molecular biology laboratory, Université Evangélique en Afrique; Faculty of Agriculture and Environmental studies, Department of Animal Production, Po. Box 3323, Bukavu R D Congo

2. Parasitology, Microbiology and Pathology, Veterinary Medicine faculty, Sokoine University of Agriculture (SUA), Morogoro, Tanzania

3. Parasitology laboratory, University of Nairobi, Department of Pathology, Faculty of Veterinary Medicine Microbiology and Parasitology, Po Box 29053-00625, Uthiru, Kenya

Background

Brucella is one of the major zoonotic pathogens worldwide, and it is responsible for enormous economic losses as well as considerable human morbidity in endemic areas. Bovine brucellosis is usually caused by Brucella abortus and occasionally by Brucella melitensis where cattle are kept together with infected sheep or goats. Brucellosis is amongst the 'neglected zoonosis. Largely due to lack of public awareness, it is one of the most important zoonotic infections, especially in pastoral and mixed crop-livestock farming systems in Africa. In D.R. Congo, the livelihood of smallholder farmers is heavily dependent on cattle, which apart for milk production. There is a lack of information on the status of Brucella and its associated risk factors in animals and humans. We studied the epidemiology and risk factors of Brucella infection in cattle.

Methods

Across sectional study was carried out in different farms in South-Kivu, in Eastern of DRCongo. A total of 835 serum samples were collected from 100 herds of cattle and analyzed using Rose Bengal test (RBT) and the competitive ELISA (Enzyme-Linked Immunosorbent Assay) test kits (Svanova Biotech, Uppsala, Sweden) following the manufacturer's instruction. A structured questionnaire was designed to identify potential risk factors for Brucellosis.

Results

The results showed the overall individual animal brucellosis seroprevalence of 27.3% with high rate of 45.0% in Ruzizi County. The animal age, grazing system and ecological zone, were dependently associated with brucellosis seroprevalence, while the seroprevalence was independent of sex, it decreased with increasing age. Cattle of 1-3 years old had higher seroprevalence compared to those > 6 years with respectively 47.0% and 7.1%. Cows kept in communal grazing system were highly seropositive than the ones kept in Cowshed systems with respectively 28.2% and 8.1%.

Conclusions & Lessons Learned

The brucellosis is presence in DRCongo with a highest seroprevalence du to sharing farm's facilities for grazing and watering of cattle compared to the other study areas which kept their herds as self-contained units.

Brucellosis seroprevalence was observed to decrease with increasing age of cattle. Animals kept in communal grazing system were more Brucella positive than those kept in cowsheds.

The introduction of control measures such as avoiding mixing of cattle without screening for brucellosis and promoting the use self-contained units instead of shared facilities could benefit these smallholder dairies. Further studies of serological and molecular works are suggested in all species including in human due to the high rate consumption of unpasteurized milk due to cultural issues.

Prevalence and Risk Factors of Faecal Carriage of Extended Spectrum β-lactamase Producing Enterobacteriacea amongst Food Handlers in Lower Basic Schools in the West Coast Region of The Gambia.

Bakary Sanneh[1], Abou Kebbeh[1], Haruna S. Jallow[1], Ida Fatou Ceesay[1] , Yaya Camara[2] Balla Jatta[2], Sana M. Sambou[2], Ebrima Barrow[3], Fatou Sowe[4], Alpha B.A Jallow[5] Lusubilo Witson Mwamakamba[6], Sheriff Mohamed[6], Yuki Minato[6], Ignatious Baldeh1, Matheu Alvarez Jorge Raul7, Antoine Andremont[8]

1. National Public Health Laboratories, Ministry of Health and Social Welfare, Kotu Layout, The Gambia
2. Epidemiology and disease Control Department, Ministry of Health and Social Welfare, Kotu Layout, The Gambia
3. Medical Microbiology laboratory, Edward Francis Small Teaching Hospital, The Gambia
4. Directorate of Health Promotion and Education, Ministry of Health and Social Welfare, Kotu Layout, The Gambia
5. World Health Organization, Country office, The Gambia
6. World Health Organization, Inter-country support team, Ouagadougou, Burkina Faso
7. Food Safety and Zoonosis Department, World Health Organization, Geneva, Switzerland
8. University Paris-Diderot Medical School, France

Background

The isolations of ESBLs producing Enterobacteriaceae among healthy carriers in the community triggered sounded the alarm of an impending public health threat and thus the need to investigate carriage of these bacteria among food handlers in The Gambia.

Methods

This study enrolled 600 participants from 60 Lower Basic Schools in West Coast Region of the country. Stool samples collected from the participants and presumptively screened for the ESBLs producing Enterobacteriaceae by using selective Drigalski agar supplemented with 2mg/L cefotaxime and confirmed using cefotaxime and ceftazidime with and without clavulanic acid. The associations of risk factors to the faecal carriage of ESBLs producing Enterobacteriaceae were performed using SPSS version16 by Pearson Chi squared and Fishers Exact test.

Results

The prevalence of Faecal carriage ESBL producing Enterobacteriaceae among food handlers was 6.37% (36/565). The study found 50% (18/36) and 5.5% (2/36) of these ESBL producing bacteria were ampC and cabapenemase resistance phenotype respectively. The most abundant ESBL producing enterobacteriaceae were Klebsiella spp (9/36), Escherichia spp(8/36) and Enterobacter aerogenes (5/36).The use of antibiotics in the last 3 months was found to be significantly associated (P=0.012) with the fecal carriage of ESBLs producing Enterobacteriaceae.

Conclusions & Lessons Learned

Our study had established the low prevalence of faecal carriage of ESBL producing Enterobacteriaceae among food handlers who could serve as potential reservoirs for the spread of these multidrug resistance bacteria in the food chain.

Vector Borne Disease Readiness and Training Needs Assessment Study- Using One Health Approach- Pakistan

Syed Mohammad Mursalin, Pak One Health Alliance & Punjab Health Department & One Health Association of South Asia (OHASA)

Background

Vector Borne Diseases (VBDs) are emerging as a serious public health problem which may be exacerbated if no measures are taken now for preparedness of their outbreaks. Unfortunately, Pakistan has all the pro factors for vector borne diseases (VBDs). Malaria is endemic across most of the territory of Pakistan with some 50,000 malaria-attributable deaths each year. Dengue fever is emerging as a major public health threat in many countries. The incidence of anthroponotic cutaneous leishmaniasis (ACL) has increased dramatically in the last two decades. Congo Fever (CCHF) outbreaks are frequent during sacrificial seasons.

Methods

This collaborative study focused on determining gaps with respect to surveillance, prevention, management of VBDs with an assessment of corresponding training needs. A two-pronged approach utilizing both qualitative and quantitative methods was applied. This comprised of an extensive literature review, data collection on open and closed ended questionnaires, an informants-group meeting, extensive meetings with managers, the facility staff, community workers and the community itself.

Results

The study revealed that reasonable levels of arrangement do exist at provincial and district levels. Infrastructure, equipment and staff are available and are functioning. In general, the study found that VBD drugs are available free of cost, diagnostic laboratories are in place, campaigns are conducted, staff are trained and Epidemic Outbreak Committees do exist. Similarly, reporting and surveillance systems are working, alerts are monitored, contingency plans and guidelines for outbreaks are also there to a certain extent. However, all of these resources are too verticalized with no synergies among programs or adoption of 'One Health approach'.

Community-based One Health Participatory Disease Surveillance Using Digital and Mobile Technologies in East and Southern Africa – A SACIDS – EAIDSNet Collaborative Project

Calvin Sindato, Esron Karimuribo, Eric Beda, Mpoki Mwabukusi, Leonard Mboera and Mark Rweyemamu

Southern African Centre for Infectious Disease Surveillance, Africa Centre of Excellence for Infectious Diseases in Southern and Eastern Africa

Background

The current human and animal disease surveillance systems and strategies in East and Southern Africa operate in silos, with poor/no linkage to community where disease outbreaks typically erupt. Recognizing the need to enhance early detection, timely reporting and prompt response, the Southern African Centre for Infectious Disease Surveillance in collaboration with the East African Integrated Disease Surveillance Network, ministries and institutional networks responsible for human and animal health in Tanzania and Kenya deployed a participatory community-based disease surveillance system.

Methods

A digital disease surveillance tool was developed and branded as AfyaData. Twenty-nine Community Health Reporters (CHRs) from Morogoro Urban and Ngorongoro Districts in Tanzania have been equipped with smartphones installed with AfyaData and trained on its use for syndromic disease surveillance using One Health approach. Eight CHRs will be trained and the system will be deployed in Narok County Kenya in July 2017. The system is supported by One Health Knowledge Repository (OHKR), a knowledge-based decision support tool, developed for endemic and epidemic prone diseases of humans and animals.

Results
From August 2016 to June 2017, 2,269 (domestic animals=2,094 and humans=175) cases were reported from community level. Larger proportion of animal (90%, n=2,094) and human (69%, n=175) cases were reported in Ngorongoro district bordering with Kenya in the northern Tanzania. The environmental potential risk factors reported included improper disposal of domestic waste, limited use of toilets, contamination of water sources and unhygienic food vending practices. The most probable diseases identified by OHKR in cattle included Malignant Catarrhal Fever, Contagious Bovine Pleural Pneumonia, brucellosis and anthrax; in goats were Peste des Petits Ruminants and Contagious Caprine Pleural Pneumonia; in chicken was Newcastle disease; in pigs was African swine fever; and in humans included malaria, typhoid fever, cholera, rabies and anthrax.

Conclusions & Lessons Learned
Inter-sectoral and inter-network collaborations enabled development and deployment of participatory community-based digital disease surveillance system using One Health approach. The system has potential to promote cross-border disease surveillance and complement national and regional disease surveillance programs.

Acknowledgement
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SEGA One Health: an Effective Regional Network in the Indian Ocean to Protect Human and Animal Populations

Harentsoaniaina Rasamoelina-Andriamanivo, Harimahefa Razafimandimby, Loic Flachet, Laurent Filleul, Maherisoa Ratsitorahina, Jastin Bibi, Vasantrao Gujadhur, Said Anli Aboubakar, François Chieze, Fils Andriamainty, Deodass Meenowa, Jimmy Melanie, Charaffoudine Onzade, Ariane Halm, Richard Lepec, Eric Cardinale

Indian Ocean Commission, Mauritius

Background
Previous outbreaks such as Ebola in West Africa showed that sensitive surveillance, laboratory support, data collection and reporting management are critical. The SEGA One health regional network was created after the 2005-2006 outbreak of Chikungunya that has heavily affected the five island states of the Indian Ocean Commission (IOC), with the support of the "Agence Française de Développement". It aims at building these capacities at the regional and national levels.

Methods
The network is based on three pillars: i) health information sharing between countries, ii) capacity building, iii) integration of other disciplines (biologists, entomologists, veterinarians). The network is driven through an epidemic intelligence unit based at the IOC in Mauritius with the support of two technical focal points per country and a steering committee.

The network activities include six programs: disease and event-based surveillance, field epidemiology training programme, external laboratory quality assessment (EQA), surveillance of antimicrobial resistance, surveillance of insecticide resistance and new information and communication technology (NICT) applied to surveillance. The network provides its support to any state member to manage any health crisis at the request of this latter.

Results
A regional epidemiological bulletin is widely distributed (334 issues since 2009). From 2010 to 2016, 488 human health events notifications have been shared. The main reported diseases are dengue with 38% of notifications followed by chikungunya (12%), influenza (10%), plague in Madagascar (7%) and malaria (6%). Around 140 outbreak investigations were carried out of which 13% concerned animal diseases. The network supported the concerned state members for major crisis such as animal foot and mouth disease in Mauritius in 2016 and plague in Madagascar in 2017.

For the SEGA One health programs, we can cite: ten national surveillance systems launched or reinforced, 23 FETP graduated, ten surveys of laboratory EQA completed, surveillance of resistance (antibiotic and insecticide) functional at regional level. Regarding NICT, e-health and/or m-health surveillance systems were set up at national level in Seychelles and Comoros, and for a pilot district in Madagascar. A regional event-based e-surveillance system was established for animal health with 64 veterinarians involved.

Conclusions & Lessons Learned
The key factors to the network success are the respect of sovereignty principles, clear establishment of trust and confidence, collective decision making among health professionals and the implementation of the "One health" concept. In March 2017, the Ministries of Foreign Affairs of the five state members signed a charter to renew their commitment and allow the sustainability of the network.

Persistent Domestic Circulation of African Swine Fever Virus in Tanzania, 2010-2017

Gerald Misinzo, Clara Yona, Merijn Vanhee, Edgar Simulundu, Mariam Makange, Mark Rweyemamu and Hans J. Nauwynck

Southern African Centre for Infectious Disease Surveillance (SACIDS) - Africa Centre of Excellence for Infectious Diseases of Humans and Animals in Southern and Eastern Africa

Background
African swine fever (ASF) is a highly fatal viral hemorrhagic disease of domestic pigs. In Africa, ASF virus (ASFV) circulates in sylvatic and domestic cycles, with outbreaks in domestic pigs resulting from viral spill from the sylvatic cycle. The aim of this study was to investigate the relationships of ASF outbreaks in Tanzania.

Methods
Tissue samples were collected from domestic pigs that died during outbreaks reported in Tanzania between 2010 and 2017 followed by nucleotide sequencing and phylogenetic analysis of the variable 3'-end of *B646L* gene of ASFV.

Results
The ASFV strains collected during this study (accessions MF437289 - MF437310) clustered with p72 genotypes II, IX and X. Genotype II ASFV strains were found in Southwestern, Central and Eastern Tanzania, genotype IX in Northwestern parts of Tanzania and genotype X from Western, Northeastern and central Tanzania.

Conclusions & Lessons Learned
Each ASFV genotype is restricted within defined zones in the country. Genotype II ASFV, which is exotic to Tanzania, is spreading within Tanzania and is likely spread beyond its boundaries. Bleach of quarantine measures including transportation of pigs affected pigs and poor biosecurity measures are factors responsible for virus persistence.

Acknowledgement
This work was supported by the Wellcome Trust Grant WT087546MA to SACIDS at Sokoine University of Agriculture, Tanzania and the Flemish Interuniversity Council (VLIR UOS) of the Belgian Development Cooperation

A Multi-sectoral Response to Manage the Ebola Infection in Uganda

Carolyn Namatovu, Deo. B. Ndumu, Kenneth Mugabi, Milton Bahati

East African Integrated Disease Surveillance Network

Background
Ebola virus disease (EVD) is a serious hemorrhagic fever that is associated with 25%-90% case fatality rate among human victims. It is a zoonosis whose natural reservoir is believed to be fruit bats, although other mammals are involved in the transmission chain. In mid-2012, Uganda experienced an EVD outbreak in Kibaale district, in the western part of the country. While the main objective of government was to manage and contain the outbreak at source, there was a challenge of limited community involvement awareness. Because of limited prior information given to the affected population about the planned activities and the negative media reports, there was initial negative perception and reluctance to participate in control measures. We describe what was achieved using the One Health approach to successfully manage the EVD outbreak at the time.

Methods
The National Task Force engaged several players with funding from RESPOND: Local area political leaders supported the activities through mobilization. The Ministry of Health (MOH) team located the human Ebola suspected cases. Health educators sensitized communities on the planned activities. Veterinary professionals collected whole-blood samples from domestic animals especially pigs and dogs from homesteads of Ebola suspected patients and immediate neighbors. Blood samples were delivered to the National Animal Disease Diagnostics and Epidemiology Centre (NADDEC), and aliquots were shipped to Uganda Virus Research Institute (UVRI) for diagnosis. Disinfection of equipment and safe disposal of used consumables "on site" were done by the investigating team.

Results
The EVD outbreak was contained at source due to the One Health approach used.

Conclusions & Lessons Learned
A multi-disciplinary team that included local leaders and professionals made investigation and management of EVD easier in a community that was initially resistant.

Multi-sectoral approach is necessary to effectively control zoonotic diseases. Community health education and involvement of all stakeholders is vital during outbreaks.

An overview of the Trichinellosis outbreak in Cajetina, Serbia, 2016

Aleksandra Andric, Dragana Dimitrijevic, Marija Baralic, Sladjana Pavic

Southeast European Center for Surveillance and Control of Infectious Diseases

Background
Trichinellosis belongs to the group of zoonoses. A Trichinellosis outbreak in Cajetina was detected on the 22nd January 2016 when a hunter from Cajetina was hospitalized at the infectious department of the General Hospital in Uzice, after being suspected of being afflicted with trichinellosis. The patient had consumed dried wild boar meat in late December 2016. During the outbreak, 300 people consumed infected meat, sausages, and ham from two wild boars and a deer.

Methods
For the analysis of the outbreak, the descriptive epidemiological method was applied. We described the basic clinical and epidemiological characteristics of the patients as well as the most important results of the epidemiological-epizootiological research of this outbreak. The survey instrument was an epidemiological questionnaire.

Results
In Uzice General Hospital, since the detection of the outbreak, 273 persons had been examined and 114 of them were reported as infected. In Uzice General Hospital there were 19 hospitalized patients (14 adults and 5 children). The mean age of the patients was 32.3 years, ranging from 3 to 64 years. Male to female ratio of cases was 1.75:1. The diagnosis was based on the epidemiological data, clinical and laboratory findings. *Trichinella britovi* was identified using the multiplex PCR method at the National Laboratory for parasites.

Conclusions & Lessons Learned
The mode of transmission in this outbreak was via the consumption of sausages and hams originating from wild pork infected by trichinellosis britovi. Trichinoscopic examination (digestion method) of slaughtered boar's meat and the underlying thermal processing of meat and meat products are preventative practices that should be employed to avoid infection. In order to prevent future outbreaks, it is essential to conduct activities that improve the knowledge of people working in the preparation food about the risk of food-borne diseases.

Mapping of Mycobacterium Tuberculosis Complex Genetic Diversity Profiles in Tanzania and Implications for SACIDS-EAIDSNet Collaboration

Erasto Mbugi, Bugwesa Z. Katale Elizabeth M. Streicher Julius D. Keyyu, Sharon L. Kendall , Hazel M. Dockrell , Anita L. Michel , Mark M. Rweyemamu Robin M. Warren Mecky I. Matee, Paul D. van Helden David Couvin, Nalin Rastogi

Southern African Centre for Infectious Disease Surveillance, Africa Centre of Excellence for Infectious Diseases in Southern and Eastern Africa

East African Centre for Integrated Disease Surveillance

Background

Although various TB studies have been conducted in Tanzania, none has given detailed information on all the major phylogenetic lineages of tubercle bacilli and their distribution. In addition, none of the studies compared Tanzanian strain patterns with those prevailing in neighboring countries and sub-regions to underline differences relating to the presence of specific lineages. The aim of this study was to assess and characterize *Mycobacterium tuberculosis* complex (MTBC) genotypic diversity in Tanzania, as well as in neighboring East and other several African countries.

Methods

We used spoligotyping to identify a total of 293 *M. tuberculosis* clinical isolates (one isolate per patient) collected in the Bunda, Dar es Salaam, Ngorongoro and Serengeti areas in Tanzania. The results were compared with results in the SITVIT2 international database of the Pasteur Institute of Guadeloupe.

Results

Genotyping and phylogeographical analyses highlighted the predominance of the CAS, T, EAI, and LAM MTBC lineages in Tanzania. The three most frequent Spoligotype International Types (SITs) were: SIT21/CAS1-Kili (n=76; 25.94%), SIT59/LAM11-ZWE (n=22; 7.51%), and SIT126/EAI5 tentatively reclassified as EAI3-TZA (n=18; 6.14%). Furthermore, three SITs were newly created in this study (SIT4056/EAI5 n=2, SIT4057/T1 n=1, and SIT4058/EAI5 n=1). We noted that the East-African-Indian (EAI) lineage was more predominant in Bunda, the Manu lineage was more common among strains isolated in Ngorongoro, and the Central-Asian (CAS) lineage was more predominant in Dar es Salaam (p-value<0.0001). No statistically significant differences were noted when comparing HIV status of patients vs. major lineages (p-value=0.103). However, when grouping lineages as Principal Genetic Groups (PGG), we noticed that PGG2/3 group (Haarlem, LAM, S, T, and X) was more associated with HIV-positive patients as compared to PGG1 group (Beijing, CAS, EAI, and Manu) (p-value=0.03).

Conclusions & Lessons Learned

This study provided mapping of MTBC genetic diversity in Tanzania (containing information on isolates from different cities) and neighboring East African which could have implication for cross-border transmission in the shared Masai ecosystem between Tanzania and Kenya. The findings also highlight the differences in MTBC genotypic distribution between Tanzania and other African countries. Not only that but also predominance Central Asian strain in Dar es Salaam which could be indicative of a shared risk from Asian region. This work in addition, allowed underlining of spoligotype patterns tentatively grouped within the newly designated EAI3-TZA lineage (remarkable by absence of spacers 2 and 3, and represented by SIT126) which seems to be specific to Tanzania. However, further genotyping information would be needed to confirm this specificity.

Acknowledgement

The Southern African Centre for Infectious Disease Surveillance (SACIDS) is acknowledged for providing a Postdoctoral Research Fellowship to EVM and PhD candidacy for BZK. Financial support was received from the Wellcome Trust Grant [WT087546MA]; MUHAS Sida Sarec Small Grant [000/3177]. Prof Mark Rweyemamu, The Executive Director of SACIDS is acknowledged for stimulating the idea and advice. The London International Development Centre in the UK and staff are acknowledged for collaboration. We thank the participants' authorities in Tanzania for allowing us to conduct our study in Dar es Salaam and The Serengeti ecosystem. The WHO Supranational TB Reference Laboratory, Tuberculosis & Mycobacteria Unit, Institut Pasteur de la Guadeloupe is acknowledged for stimulation of ideas to mine data from TB database for evaluation of TB strains in Tanzania as related to other African Countries

*Bla*CTX-M-15-producing Enterobacteriaceae from Inanimate Surfaces of Tanzanian Tertiary Hospital: The Need to Improve Infection Prevention and Control Measures

Nyambura Moremi[1], Heike Claus[2] Vitus Silago[1], Pardon S. Kabage[1], Mecky Matee[3], Ulrich Vogel[2], Stephen E. Mshana[1]

1. Department of Microbiology and Immunology, Catholic University of Health and Allied Sciences, Bugando, Mwanza, Tanzania.

2. Institute of Hygiene and Microbiology, University of Wuerzburg, Wuerzburg, Germany.

3. Department of Microbiology and Immunology, Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania

Background

The contamination of inanimate hospital surfaces has been linked to outbreaks of healthcare-associated infections caused by extended-spectrum beta-lactamase (ESBL)-enterobacteriaceae (ESBL-PE). This study investigated the presence of gram-negative multidrug-resistant pathogens on inanimate surfaces of the Bugando Medical Centre (BMC), a tertiary hospital in Mwanza, Tanzania.

Methods

Non-repetitive hospital surfaces samples were collected between June and August 2015. Samples were cultured onto plain MacConkey Agar and MacConkey Agar supplemented with 2µg/ml of cefotaxime. Identification and antimicrobial susceptibility testing were done by VITEK-MS and VITEK® 2 systems, respectively. PCR and DNA sequencing were performed to detect ESBL genes followed by multilocus sequence typing (MLST) to detect clonality of the isolates.

Results

Of 138 hospital surfaces samples collected, 48 (34.8%) had significant growth of gram-negative bacteria. Isolated bacteria were *Enterobacter cloacae* 19 (39.6%), *Acinetobacter baumannii* 13 (27.1%), *Klebsiella pneumoniae* 11 (22.9%) and *Escherichia coli* 5 (10.4%). ESBL-producing Enterobacteriaceae were confirmed in 30 (62.5%) of the 48 isolates and one *Acinetobacter baumannii* was resistant to carbapenems. The *bla*CTX-M-55 was detected in 12/16 (75%) of the isolates and four isolates carried *bla*CTX-M-55. Four Escherichia coli isolates carried *bla*CTX-M-55 were typed as ST405. Escherichia coli ST405 was detected in all BMC surgical wards except the premature babies' unit which had Escherichia coli ST410. *Bla*OXA-23 gene was detected in carbapenemase-producing *Acinetobacter baumanii* from adult intensive care unit (ICU).

Conclusions & Lessons Learned

Contamination of hospital surfaces with ESBL-PE is alarmingly high. Detection of ESBL-producing *Escherichia coli* ST405 and ST410 previously reported in clinical isolates at the same hospital calls for revised infection and prevention control practices. Isolation of carbapenem-resistant *Acinetobacter baumannii* in ICU can result into untreatable infections especially in low-income countries. Presence of dominant *Escherichia coli* ST405 clone indicate the possibility of common source of contamination which require further investigation.

Acknowledgement

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Capacity Building

Effect of Increase User Fees in Accessing New Tuberculosis Diagnostic Services in the East Africa Public Health Laboratory Network supported project sites: Experience from Tanzania.

Erica Sandi, G Kimaro, E Ngadaya, R. Shemtandulo, N. Mgina, GS Mfinanga

East African Integrated Disease Surveillance Network

Background
In Tanzania, Tuberculosis (TB) services are mostly provided in public health facilities. Some of the facilities including Musoma and Sumbawanga regional Hospitals increased user fee, however Mnazi Mmoja referral hospital (MMRH) did not. This paper reports on the effects of increasing user fees on the utilization of TB diagnostic services in these facilities.

Methods
We retrospectively analyzed data on the utilization of TB diagnostic services between July 2013 and June 2015 in these three facilities. User fees in Musoma increased substantially from 2USD to 5USD in July 2014. In Sumbawanga hospital user fees increased step-wise starting from 1USD to 2USD in July 2014 and from 2USD to 3USD in January 2015. We compared TB services utilization before and after change of user fees.

Results
Overall, a total of 7483 presumptive TB patients were registered in all three facilities between July 2013 and June 2015; 50.2% were males. Fifty three percent (3969/7483) and 3514 (28%) of these patients were registered before and after the increase of user fee respectively. Of 3969, 1579 (39.8%) were from Musoma, 922 (23.2%) from Sumbawanga and 1468 (37.0%) from MMRH. Of 3514 patients, 983 (28%), 952 (27.1%) and 1579 (44.9%) were from Musoma, Sumbawanga and MMRH respectively. Number of presumptive TB patients seeking TB diagnostic services at Musoma decreased significantly by 38% (from 1579 to 983) after the increase of user fees (p=0.001). More females (817; 51.8% vs 458, 35.9%) attended Musoma before user fees was increased as compared to males whose attendance did not differ much (761; 48.2% vs 525; 53.4%); p=0.01. There was no significant decrease of number of patients utilizing TB diagnostic services at Sumbawanga and MMRH.

Conclusions & Lessons Learned
Increase of user fees decreased the utilization of TB services significantly. Female patients were more affected by the change.

Epidemiology, Clinical Presentation and Diagnostic Methods for Histoplasmosis

Nsengiyumba Nestor, East African Integrated Disease Surveillance Network

Background
IThe purpose of this research is to show that in Africa, Asia and a part of America, there is a disease not known by many health personnel that is of significant public health importance. Histoplasmosis is a systemic mycosis caused by a dimorphic fungus, Histoplasma capsulatum which has two varieties namely Histoplasma capsulatum var. capsulatum, agent of the American histoplasmosis and Histoplasma capsulatum var. duboisii agent of African histoplasmosis.

Methods
The study period was carried out over 5 months, from February 2015 to July 2015 by the Institute for Medical Research - Kuala Lumpur -Malaysia

Results
To have a better health through a good diagnosis of the fungi early by detection of the pathogen using new technology of diagnostic methods. Different type of Histoplasmosis will be isolated especially Histoplasma capsulatum var. capsulatum, agent of the American histoplasmosis and Histoplasma capsulatum var. duboisii agent of African histoplasmosis

Conclusions & Lessons Learned
Histoplasma are pathogens to human, so that fast and accurate result can provide better and earlier treatment of the patients. Direct examination, serological tests, culture and molecular methods are the tools for diagnosis of histoplasmosis in clinical samples. The specimen must be handled with precautions as is potentially pathogen (hazardous) and must be used biosafety cabinet BSL3. Amphotericin B and itraconazole are the treatment for histoplasmosis. Continuous training of laboratory personal, improved and updated diagnosis methods and better laboratory facility must be established in management of histoplasmosis.

RESAOLAB: West African Network of Biomedical Analysis Laboratories

Louise Delorme, Jean-Louis Machuron, Lorène Fofana, Josette Najjar and the 7 Ministries of Health

Background

A clinical biology system that provides high-quality services is essential to improve public health and monitor epidemics: improving laboratories means saving many patients' lives, making treatments more effective and reducing hospital stays. In West Africa, laboratories lack the resources that clinicians need to provide reliable diagnoses. The field of diagnostics has received the least amount of aid and funding from governments in the last few decades. RESAOLAB*, the West African Network of Biomedical Analysis Laboratories, is the first regional program to respond to this public health problem by addressing all the factors that affect the management and performance of laboratories. Designed in collaboration with West African health professionals, it is adapted to the realities in the field.

Methods

RESAOLAB helps health ministries and laboratory directorates establish national policies for developing clinical biology laboratories to improve the quality of their services. The program seeks to implement action plans to improve the skills of laboratory staff, the quality of analyses, surveillance of infectious diseases, and the creation of laboratory networks at the national and regional level.

Close collaboration between health ministries in the 7 member countries is the key to the program's success. Operational units in each ministry are responsible for implementing the program's initiatives, following guidelines set out by an International Steering Committee, which meets at least once a year. The WHO, WHO-AFRO, the West African Health Organization (WAHO), and the West African

Results

RESAOLAB's goal is to strengthen regional and national governance of laboratory systems.

With the help of RESAOLAB, laboratory directorates have already been established in 4 countries.

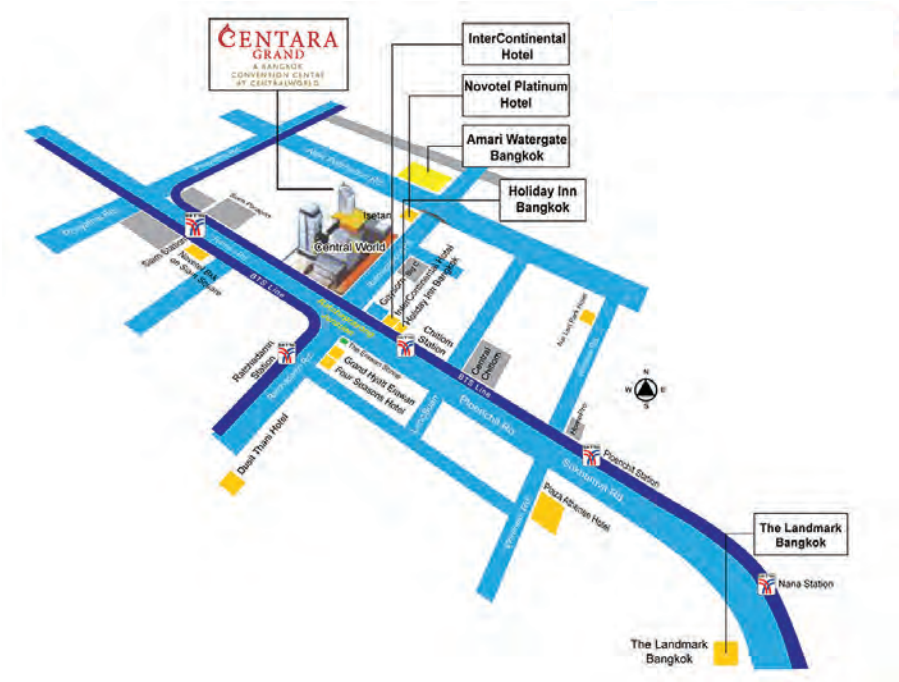
1. Over 700 public and private laboratories in the Network and under supervision in the 7 countries
2. Over 250 training courses with 20 participants in each one
3. 1 laboratory information management system to support epidemiological surveillance
4. A skill development program including 14 training modules
5. 25 continuous training centers built or renovated in 7 countries

More than 200 laboratories with an external quality control program.

Conclusions & Lessons Learned

At the regional level, the creation of an intercountry network allows laboratories to pool lessons learned and harmonize national clinical biology policies. It promotes exchanges and helps strengthen South-South cooperation. It also provides member countries with greater leverage to advocate on behalf of laboratories. RESAOLAB is heavily involved in preparedness and response to outbreaks and plays an important role in strengthening diagnostic capacities.

Useful information for delegates



Venue

CENTARA GRAND & BANGKOK CONVENTION CENTRE AT CENTRALWORLD

The CORDS Conference 2018 will be held on the 29th and 30th of January 2018, at Centara Grand at CentralWorld, opposite the Arnoma Grand Hotel Bangkok.

Abstracts

The CORDS Abstract Book can be downloaded from the CORDS webpage *www.cordsnetwork.org*

Certificates of attendance

Certificates of attendance will be provided during the conference on the, 29th and 30th of January 2018

Dress code

The dress code for the conference will be business casual. Please be aware that the venue will be air-conditioned. We advise you to bring clothes for warm weather.

Poster Exhibition

The exhibition area is located in front of Ballroom B on the 23rd Floor.

The exhibition will be open on Monday 29th and Tuesday 30th of January from 8:30 am to 5:30pm.

Emergency telephone number

Fire, police and ambulance services are available by calling 1155.

Food

Café's and restaurants in the venue are open early and late to the public and offer a variety of food and drinks.

Tour and information desk

The information desk is located in front of the meeting room. Please contact staff sightseeing for further information.

Language

English is the official language of the CORDS Conference 2018

Liability and insurance

It is highly recommended that all participants carry adequate travel and health insurance as the organizers will not accept liability for any accidents, illnesses and injuries that may occur during the conference.

Lost and found

Please report lost and found items to the information desk

Program Changes

The Programme is correct at the time of printing. However, the organizers cannot assume liability for any changes due to external or unforeseen circumstances. The organizers reserve the right to alter the program as necessary.

Airport transfers

Airport transfers are supported by CORDS. To confirm your pick up date and time, please contact the information desk during the 29th and 30th of January.

CORDS Secretariat

CORDS Secretariat is based in Lyon, France, where the World Health Organization and other public and private organizations also work to advance global health and fight infectious diseases. Part of **CORDS** team is located in England, in London and Oxford.

The team is composed of:

Christophe Longuet, Executive Director
christophe.longuet@cordsnetwork.org

Sabrina Salem, Executive Assistant
sabrina.salem@cordsnetwork.org

Bakary Sylla, Senior Consultant
bakary.sylla@cordsnetwork.org

Océane Andriamanarivo, Intern
oceane.andriamanarivo@cordsnetwork.org

Emma Orefuwa, Programme Manager
emma.orefuwa@cordsnetwork.org

Anna Noack, Communications Consultant
anna.noack@cordsnetwork.org

Paul Asquith, Resource Mobilisation Manager
paul.asquith@cordsnetwork.org

The team wish you a fruiful conference.

Connecting Organizations for
Regional Disease Surveillance


" A World United Against
Infectious Disease "