



THE BULLETIN OF THE SRI LANKA COLLEGE OF MICROBIOLOGISTS

INTERNATIONAL CONFERENCE ON INFECTIOUS DISEASES AND ANTIMICROBIAL RESISTANCE “COMMUNICATION AND COLLABORATION FOR CLINICAL EXCELLENCE”

08 - 11 AUGUST, 2018,
TAJ SAMUDRA, COLOMBO, SRI LANKA

PRE-CONGRESS WORKSHOP

Quality assurance and laboratory
accreditation

9 PLENARY LECTURES & 7 SYMPOSIA

with the participation of world's
leading experts

WORKSHOPS

ORAL PRESENTATIONS

POSTER PRESENTATIONS



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The Bulletin of the Sri Lanka College of Microbiologists

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**International Conference on Infectious Diseases and
Antimicrobial Resistance and the
27th Annual Scientific Sessions of**

The Sri Lanka College of Microbiologists

Inauguration Ceremony

08th August 2018 at 6.15pm

Taj Samudra

Colombo

Pre-Congress Workshop

Quality assurance and laboratory accreditation

08th August 2018

Taj Samudra

Colombo

Scientific Programme

09th & 11th August 2018

Taj Samudra

Colombo

MESSAGE FROM THE CHIEF GUEST



It gives me great pleasure in sending a congratulatory message on the occasion of the International Conference on Infectious Diseases and Antimicrobial Resistance and 27th Annual Scientific Sessions of Sri Lanka College of Microbiologists.

Sri Lanka College of Microbiologists has progressed immensely during the past few decades in growing to its present state to become one of the leading professional colleges in the country. The highly dedicated efforts of the members, contributed immensely towards strengthening of the microbiological services in Sri Lanka by expanding its role in the diagnosis, management, prevention and control of infectious diseases, combating antimicrobial resistance, education and research.

The theme chosen this year “Communication and collaboration for clinical excellence” is very timely and appropriate in keeping with the vision of the Ministry of Health.

With extreme gratitude while thanking the membership for taking timely efforts to enlighten the stakeholders on addressing the global health challenges, I wish the International Conference on Infectious Diseases and Antimicrobial Resistance and 27th Annual Scientific Sessions of Sri Lanka College of Microbiologists every success.

Dr. Sunil De Alwis

Additional Secretary (Medical Services),

Ministry of Health, Nutrition and Indigenous Medicine,

Colombo

MESSAGE FROM THE GUEST OF HONOUR



Infection prevention and control (IPC) is a scientific approach and practical solution grounded in infectious diseases, epidemiology, social science, and health system strengthening, designed to prevent harm due to infection to patients and health workers.

IPC occupies a unique position in the field of patient safety since it is universally relevant to health workers and patients at every single health-care encounter.

This role is considered critical to contribute to achieving several key WHO and global health priorities:

- **Combating antimicrobial resistance (AMR)** as IPC has a critical role to reduce both the spread of antibiotic resistant organisms and the occurrence of infection and thus, the need for antibiotic use with ultimate impact on AMR emergence.
- **Achieving Universal Health Coverage**, as quality is an essential component of UHC; IPC is a practical and evidence-based approach with demonstrated impact on **quality of care** across all levels of the health system.
- **Prevention of health emergencies including fulfilment of the international health regulations**, as the existence of strong IPC programmes and capacity constitutes the foundation for adequate preparedness and response to outbreaks.
- **Water, sanitation and hygiene (WASH)**, because IPC and WASH are naturally complementary; WASH provide the necessary and adequate infrastructures, materials and equipment enabling the implementation of appropriate IPC practices and behavioural change among health care workers and the community.

I would like to thank the colleagues of the Sri Lanka College of Microbiologists for their terrific efforts to promote IPC and AMR reduction and for the organization of this conference that has an excellent programme. I am sure that this will be a unique opportunity for organisers, speakers and participants to learn, network and establish collaborations.

Prof. Benedetta Allegranzi
Coordinator, Infection Prevention and Control Global Unit,
World Health Organization, Geneva, Switzerland

MESSAGE FROM THE PRESIDENT



It is my honour and pleasure to welcome all of you to the international Conference on Infectious Diseases and Antimicrobial Resistance 2018 in Colombo Sri Lanka. This Conference is organized as the 27th Annual Scientific Sessions of Sri Lanka College of the Microbiologists. International Conference on Infectious Diseases and Antimicrobial Resistance (ICID & AMR) is held on 8th, 9th, 10th and 11th August 2018.

The main conference will be held on 9th and 10th August 2018 with the participation of many renowned foreign and local resource persons. This consists of 9 plenaries and 7 symposia and is organized in collaboration with the Ministry of Health, Sri Lanka, National Science Foundation and many professional organizations.

As we need to work with other categories of staff to carry out our duties as microbiologists, it is very important that we train them as well as update their knowledge.

We work with medical laboratory technologists in the laboratory, with the pharmacists when carrying out Antibiotic Stewardship Programmes, with clinicians while working on Antibiotic Stewardship and providing clinical advice and in Infection Prevention and Control (IPC) activities as well as with nursing officers in IPC and Antibiotic Stewardship. Therefore the pre-congress workshop is organized in collaboration with the Sri Lanka Accreditation Board on Quality Assurance and Accreditation in Medical Laboratories. This is opened to laboratory personnel from all medical laboratory disciplines. The 2nd workshop is on Antibiotic Resistance for nurses and pharmacists. Another workshop is organized for the healthcare workers on IPC. The post congress workshop is on Antimicrobial Resistance Surveillance and WHONET for laboratory personnel as well as Information Technology Personnel.

More than 80 abstracts on research related to infectious diseases were received and 4 oral free paper sessions as well as 4 e-poster sessions are organized.

I hope this event will impart knowledge on numerous areas related to infectious diseases and antimicrobial resistance.

I wish this event success and thank all those who helped me and my council to organize this event.

Dr. Kushlani Jayatilleke

President,

Sri Lanka College of Microbiologists

INAUGURATION PROGRAMME

08th August 2018 at 6.15 pm

**Taj Samudra,
Colombo**

6.00 pm	Invitees take their seats
6.15 pm	Arrival of the Chief Guest Introduction of Members of the Council
6.30 pm	Ceremonial Procession
6.35 pm	National Anthem
6.40 pm	Traditional lighting of the Oil Lamp
6.50 pm	Welcome Address Dr. Pavithri Bandara <i>Hony. Joint Secretary</i>
6.55 pm	Address by the President Dr. Kushlani Jayatilleke
7.15 pm	Address by the Chief Guest Mr. Janaka Sugathadasa <i>Secretary, Ministry of Health, Nutrition and Indigenous Medicine, Colombo</i>
7.30 pm	Address by the Guest of Honour Prof. Benedetta Allegranzi <i>Coordinator, Infection Prevention and Control Global Unit, World Health Organization, Geneva, Switzerland</i>
7.40 pm	Award of SLCM Fellowships
8.20 pm	Tokens of appreciation to the speakers
8.40 pm	Vote of Thanks Dr. Kishani Dinapala <i>Hony. Joint Secretary</i>
8.35 pm	Ceremonial Procession leaves
8.40 pm	Cultural Show and Reception

PROGRAMME AT A GLANCE

Time	8th August 2018	9th August 2018	9th August 2018	10th August 2018	10th August	11th August 2018
Venue	Grand Crystal Ball Room	Grand Marquee	Grand Crystal Ball Room	Grand Marquee	Grand Crystal Ball Room	
8.30 am	Registration and tea	Registration and tea	Registration and tea	Registration and tea	Registration and tea	Registration and tea
9.00 am	Workshop 1 Pre-congress workshop on Quality assurance and laboratory accreditation	Key note address- Plenary 1: Microbiology and Infectious Disease: Is there a need for research?	Workshop 2 Antibiotic resistance	Symposium 5 Carbapenem and colistin resistant Gram negative organisms-Res: NAC-AMR/WHO	Workshop 3 Infection Prevention and Control	Workshop 4 AMR surveillance and WHONET
9.30 am						
10.00 am		Symposium 1 On infections and immunity-				
10.30 am				Plenary 4 - How knowledge on pk/pd can be used for combating AMR-		
10.45 am		Plenary 2 Immune-modulators- Solution for Antibiotic Resistance?-		Plenary 5 Outpatient Parenteral Antimicrobial Therapy		
11.30 am		Symposium 2 Pyrexia of unknown origin		Plenary 6 Antibiotic resistance in <i>H. pylori</i>		
12.00 noon						

Time	8th August 2018	9th August 2018	9th August 2018	10th August 2018	10th August	11th August 2018
12.15 pm		Plenary 3 Prevention of CA-UTI in era of collaboration		Symposium 6 Influenza and other viral respiratory infections		
1:00 PM	Lunch and close of programme	Lunch-Lunch time symposium-Case discussions on problems related to AMR	Lunch and close of programme	Lunch-Lunch time symposium-Vaccines	Lunch and close of programme	Lunch and close of programme
2.00 pm				Plenary 7 Getting buy into IPC-		
1.45 pm		Symposium 3 infection prevention and control	Free paper session 1		Free paper session 3	
3.00 pm				Symposium 7 Are we doing enough for AMR		
3.50 pm			Free paper session 2	Plenary 8-Rapid diagnosis of AMR	Free paper session 4	
4.15 pm		Symposium 4 Outbreak management				
4.20 pm				Plenary 9 Clostridium difficile infections- an emerging menace among elderlies in ICUs		
5.00 pm		Tea		Tea		

PRE-CONGRESS

Workshop 1 – 08th August 2018

Pre-Congress Workshop Programme on Quality assurance and accreditation

Chairpersons	Dr. Kushlani Jayatilleke & Ms. Chanditha Ediriweera & Ms. Chandrika Thilakaratne <i>Director / CEO</i>
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8.30 - 8.50am	Registration and tea
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8.50am - 12.30pm	Accreditation - ISO 15189 Internal Quality control in laboratory Calibration, uncertainty of measurement and LJ charts adverse event reporting and handling complaints audits and in-service training Risk assessment and minimization in laboratory EQA programmes
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12.30pm	Lunch
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MAIN PROGRAMME

Day 1 – 09th August 2018

8.30 - 9.00am	Registration and Tea
9.00 - 9.10am	Welcome address <i>Dr. Kushlani Jayatilleke</i> President, SLCM
9.10 - 10.00am	Plenary 1 Microbiology and Infectious Disease: Is there a need for research? Chairperson – Prof. Vasanthi Thevanesam <i>Prof. Malik Peiris</i> Director, Centre of Influenza Research, Professor, Chair in Virology, School of Public Health, The University of Hong Kong, Honorary Consultant Microbiologist, Queen Mary Hospital, Pokfulam, Hong Kong SAR
10.00 - 10.45am	Symposium 1 – On infections and immunity Chairpersons – Dr. Janaki Abeynayake and Dr. Dhanushka Dasanayake <i>Immunogenetics</i> <i>Prof. Suranjith Seneviratne</i> Consultant in Clinical Immunology and Allergy, Royal Free Hospital and University College, London <i>Management of immunological conditions – the Sri Lankan situation</i> <i>Dr. Rajiva de Silva</i> Consultant Immunologist, Medical Research Institute, Colombo.
10.45 - 11.30am	Plenary 2 Primary immune deficiencies Chairperson – Dr. Rajiva De Silva <i>Prof. Suranjith Seneviratne</i> Consultant in Clinical Immunology and Allergy, Royal Free Hospital and University College, London
11.30 - 12.15pm	Symposium 2 – Pyrexia of unknown origin Chairpersons – Dr. Panduka Karunanayake and Dr. Lilani Karunanayake <i>Current trends in diagnosing aetiology of PUO</i> <i>Dr. Anoma Geraldine Fernando</i> Consultant Microbiologist and Lead clinician for infection control, University Hospital Lewisham, United Kingdom <i>Principles of antimicrobial treatment of PUO</i> <i>Dr. Ami Neuberger</i> ID Physician, Israel

12.15 - 1.00pm	Plenary 3 Prevention of CA – UTI in era of collaboration Chairperson – Dr. Rohan Chinniah <i>Prof. Paul Anantharajah Tambyah</i> Professor, Department of Medicine, NUS Yong Loo Lin School of Medicine, Singapore, Senior Consultant, Division of Infectious Disease, University Medicine Cluster, National University Health System, Singapore
1.00 - 1.45pm	Lunch Lunch time symposium – Case discussions on problems related to AMR Moderator – Dr. Rohini Wadanamby <i>Prof. Paul Anantharajah Tambyah, Dr. Rohan Chinniah, Dr. Anoma Geraldine Fernando, Dr. Ami Neuberger, Dr. Shalini Perera</i>
1.45 - 4.15pm	Symposium 3 – Infection prevention and control Chairpersons – Dr. Malka Dasanayake and Dr. Ashok Perera <i>Guidelines in IPC – Are they evidence based</i> <i>Prof. Benedetta Allegranzi</i> Coordinator, Infection Prevention and Control Global Unit, World Health Organization, Geneva, Switzerland <i>Attitudes and practices – how to change?</i> <i>Dr. Rohan Chinniah</i> Consultant Clinical Microbiologist / Infection Control, Raja Isteri Pengiran Anak Saleha (RIPAS) Hospital, MoH, Bandar Seri Begawan, Negara Brunei Darussalam <i>Risk assessment and IPC practices</i> <i>Ms. Amy Kolwaite</i> Country Implementation Team Lead, International Infection Control Program Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention, United States of America <i>IPC in ICU setting – practices and evidence ?</i> <i>Dr. Anoma Geraldine Fernando</i> Consultant Microbiologist and Lead clinician for infection control, University Hospital Lewisham, United Kingdom <i>Operation theatre issues in infection control – Recent trends</i> <i>Dr. Ranganathan Iyer</i> Senior Consultant Clinical Microbiology ID and Infection control Gleneagles Global Hospital and Rainbow Hospitals for Children Hyderabad India, Lead Country Coordinator India, India

Sterilization and disinfection and WASH

Prof. Shaheen Mehtar

Chair Infection Control Africa Network, Head of UIPC, Fac Medicine and Health Sciences, Stellenbosch University, South Africa

Controversial issues in the field of infection prevention and control (IPC)

Prof. Dale Fisher

Infectious disease clinician, National University of Singapore, Singapore

4.15 - 5.15 pm

Symposium 4 – Outbreak management

Chairpersons – Dr. Jayanthi Elwitigala and Dr. Jude Jayamaha

CDC experience

Ms. Amy Kolwaite

Country Implementation Team Lead, International Infection Control Program
Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention, United States of America

Global Outbreak Alert and Response Network (GOARN)

Prof. Dale Fisher

Infectious disease clinician, National University of Singapore, Singapore

5.15 pm

Tea

Day 2 – 10th August 2018

- 8.30 - 9.00am** Registration and Tea
- 9.00 - 10.15am** **Symposium 5 – Carbapenem and colistin resistant Gram negative organisms**
Chairpersons – Dr. Enoke Corea and Prof. Priyadarshani Galappaththy
Recent trends in detection of patients with MDR GNB
Dr. Ranganathan Iyer
Senior Consultant Clinical Microbiology ID and Infection control Gleneagles Global Hospital and Rainbow Hospitals for Children Hyderabad India, Lead Country Coordinator India, India
Infection control measures in managing carbapenem and colistin resistant gram negative organisms
Prof. Benedetta Allegranzi
Coordinator, Infection Prevention and Control Global Unit, World Health Organization, Geneva, Switzerland
Treatment options for carbapenem – resistant and colistin resistant Gram negative organisms
Dr. Ami Neuberger
ID Physician, Israel
- 10.15 - 11.00am** **Plenary 4**
How knowledge on pk/pd can be used for combating AMR
Chairperson – Dr. Jananie Kottahachchi
Ms. Yvonne Iroegbu,
Antibiotic pharmacist, United Kingdom
- 11.00 - 11.45am** **Plenary 5**
Outpatient Parenteral Antimicrobial Therapy
Chairperson – Dr. Samanmalee Gunasekara
Prof. Dale Fisher
Infectious disease clinician, National University of Singapore, Singapore
- 11.45 - 12.30pm** **Plenary 6**
Antibiotic resistance in *H. pylori*
Chairperson – Dr. Roshan Jayasuriya
Dr. Shalini Perera
Consultant Microbiologist, Western Diagnostic Pathology in Western Australia, Australia

12.30pm - 1.15pm	Symposium 6 Influenza and other viral respiratory infections Chairpersons – Dr. Geethani Wickramasighe and Dr. Nayomi Danthanarayana <i>Local epidemiology of viral respiratory infections</i> <i>Dr. Jude Jayamaha</i> Consultant Virologist, Medical Research Institute, Colombo <i>Influenza: Virology, treatment and control</i> <i>Prof. Malik Peiris</i> Director, Centre of Influenza Research, Professor, Chair in Virology, School of Public Health, The University of Hong Kong, Honorary Consultant Microbiologist, Queen Mary Hospital, Pokfulam, Hong Kong SAR
1.15 - 1.45pm	Lunch <i>Lunch time symposium: Vaccines – How cost effective are they in Sri Lanka</i> Chairperson – Dr. Kanthi Nanayakkara <i>Prof. Suranjith Seneviratne, Prof. Malik Peiris, Prof. Jennifer Perera, Dr. Samitha Ginige, Dr. Deepa Gamage, Dr. Bhagya Piyasiri, Dr. Jude Jayamaha</i>
1.45 - 2.15pm	Plenary 7 Getting buy into IPC Chairperson – Dr. Pranitha Somaratne <i>Prof. Dale Fisher</i> Infectious disease clinician, National University of Singapore, Singapore
2.15 - 3.50pm	Symposium 7 Are we doing enough for AMR Chairpersons – Dr. Kumudu Karunaratne and Dr. R. Hanifa (SLMA) <i>WHONET – laboratory-based surveillance of antimicrobial resistance</i> <i>Dr. John Stelling</i> The Brigham and Women’s Hospital, Microbiology Department, Boston <i>Experience on antibiotic stewardship</i> <i>Ms. Yvonne Iroegbu</i> Antibiotic pharmacist, United Kingdom <i>Local experience on antibiotic Stewardship</i> <i>Dr. Kushlani Jayatilleke</i>, Consultant Microbiologist, General Hospital, Sri Jayawardhenapura / <i>Dr. Lasantha Rajakaruna</i>, Acting Consultant, District General Hospital, Mannar <i>Rapid diagnosis of AMR – importance and methods</i> <i>Dr. Ranganathan Iyer</i> Senior Consultant Clinical Microbiology ID & Infection control Gleneagles Global Hospital & Rainbow Hospitals for Children Hyderabad India, Lead Country Coordinator India, India

Syndromic Testing – Diagnosis of Infectious Diseases – Impact on patient care and antimicrobial stewardship

Dr. Aruna Poojary

Head of Department, Department of Pathology and Microbiology and Secretary of the Hospital Infection Control Committee at Breach Candy Hospital Trust, Mumbai, India.

An update on Global and National situation on AMR

Dr. B.V.S.H. Beneragama

Deputy Director General – Laboratory Services, Ministry of Health, Nutrition and Indigenous Medicine, Colombo 10
National Focal Point for combating AMR in Sri Lanka

3. 50 - 4.20pm

Plenary 8

Antifungal stewardship

Chairperson – Preethi Perera

Dr. Abhijit M Bal,

Consultant and Clinical Lead, Department of Medical Microbiology, University Hospital Crosshouse, NHS Ayrshire and Arran, Honorary Clinical Senior Lecturer, School of Medicine, University of Glasgow, Scotland, United Kingdom

4.20 - 5.00pm

Plenary 9

Clostridium difficile infections – an emerging menace among elderlies in ICUs

Chairperson – Dr. Dhananja Namalie

Dr. J. Shanmugam

Senior Consultant and Ex-Emeritus Professor of Medical Microbiology. Senior Deputy Director, Central Interdisciplinary Research Facility, Mahatma Gandhi Medical College and Research Institute, President, Indian Association of Medical Microbiologists, Chairman, International Medical Sciences Academy (PDY-Chapter), India.

5.00 pm

Tea

Workshop 2

Antibiotic resistance

Day 1 – 09th August 2018

Chairpersons – Dr. Geethika Patabendige and Ms. Yvonne Iroegbu

8.45 - 9.15am Registration and Tea

9.15 - 10.15am **What is antibiotic resistance, how it develops and spread**
Dr. Anoma Geraldine Fernando
Consultant Microbiologist and Lead clinician for infection control,
University Hospital Lewisham, United Kingdom

10.15 - 11.00am **Current situation – local and global**
Dr. Geethika Patabendige
Consultant Microbiologist, National Hospital of Sri Lanka

11.00 - 11.45am **Antibiotic stewardship**
Ms. Yvonne Iroegbu
Lead pharmacist – antimicrobials at NHSL London, United Kingdom

11.45 - 12.30pm **Pharmacists' and nurses' role**
Ms. Yvonne Iroegbu
Lead pharmacist – antimicrobials at NHSL London, United Kingdom

12.30 - 1.00pm Discussion

1.00pm Lunch and close of programme

1.30 - 2.30pm **Free paper session 1**
Chairperson – Dr. Nadisha Badanasinghe

OP1

The role of ERG 11 gene expression for fluconazole resistance among *Candida albicans* isolates, isolated from candidaemia patients

Sampath MKA¹, Gunasekera TDCP¹, Jayasekera PI², Bulugahapitiya U³, Fernando SSN¹, Weerasekera MM¹.

¹Department of Microbiology, Faculty of Medical Sciences, University of Sri Jayawadhanapura, ²Department of Mycology, Medical Research Institute, ³Endocrinology Unit, Colombo South Teaching Hospital

OP2

Presence and Phenotypic Detection of AmpC Beta-Lactamase Producers Among Clinical Isolates of *Enterobacteriaceae* in National Hospital of Sri Lanka

Ranasinghe RATK¹, Karunanayake L², Patabendige CGUA¹

¹National Hospital of Sri Lanka, Colombo, ²Medical Research Institute, Colombo

OP3

Prevalence, antibiotic sensitivity and resistance genes of extended spectrum beta lactamase producing *Escherichia coli* and *Klebsiella* spp among patients with community acquired urinary tract infection in Galle district, Sri Lanka

Priyadharshana WBU¹, Piyasiri DLB¹, Wijesinghe CJ²

¹Teaching Hospital Karapitiya, Galle, ²Faculty of Medicine, University of Ruhuna, Galle

OP4

Molecular diversity of beta-lactamase genes in uropathogenic Enterobacteriaceae in two hospitals in Sri Lanka

Perera PDVM¹, de SilvaSH², Jayatilleke SK², CoreaEM¹, de Silva N³

¹Department of Microbiology, Faculty of Medicine, University of Colombo,

²Sri Jayewardenapura General Hospital, Nugegoda, ³Neville Fernando Teaching Hospital, Malabe

2.30 – 3.30pm

Free paper session 2

Chairperson – Dr. J.S. Nadeeka

OP5

Preliminary study on VP1 gene based genotyping of BK virus in a cohort of renal transplant patients in Sri Lanka

Ratnayake AKD¹, Jayamaha CJS², Fernando N¹, Gajanayake T³

¹Institute of Biochemistry, Molecular Biology and Biotechnology, University of Colombo, ²Department of Virology, Medical Research Institute, ³Faculty of Science, Horizon Campus

OP6

Japanese encephalitis virus as an aetiology for acute encephalitic syndrome in Sri Lanka

Mahanama AIK, Ahamed FAZ, Nanayakkara SS, Wimalaratne WKGI, Abeynayake JI
Department of Virology, Medical Research Institute, Colombo 08, Sri Lanka

OP7

Susceptibility of pregnant mothers to varicella – Do we need special actions?

Premathilake MIP^{1,2}, Aluthbaduge P¹, Gamage S¹, Jayalatharachchi R¹, Jayamaha CJS², Senanayake CP¹

¹Department of Microbiology and Immunology, Faculty of Medicine, University of Colombo, ²Medical Research Institute, Colombo

OP8

Hantavirus infection with pulmonary symptoms in north central part of Sri Lanka

Muthugala MARV^{1,3,5}, Harischandra N², Wickramasinghe D², Abeykoon MM², Dasanayake WMDK^{1,5}, Senanayake KOMDT³, Manamperi AAPS⁴, Gunasena S⁵, Galagoda GCS⁵

¹Teaching Hospital Kandy, ² District General Hospital Polonnaruwa,

³ Teaching Hospital Anuradhapura,

⁴ Molecular Medicine Unit, Faculty of Medicine, University of Kelaniya,

⁵ Medical Research Institute, Colombo 08

Workshop 3

Infection Prevention and Control

10th August 2018

Chairpersons – Prof. Benedetta Allegranzi, Prof. Shaheen Mehtar and Mrs. Benita Wijesinghe

8.00 - 8.30am	Registration and Tea
8.30 - 9.00am	Practical difficulties in interpreting HAI – definitions Dr. Rohan Chinniah Consultant Clinical Microbiologist / Infection Control, Raja Isteri Pengiran Anak Saleha (RIPAS) Hospital, MoH, Bandar Seri Begawan, Negara Brunei Darussalam
9.00 - 9.30am	Sterilization and disinfection Prof. Shaheen Mehtar Chair Infection Control Africa Network, Head of UIPC, Fac Medicine and Health Sciences, Stellenbosch University, South Africa
9.30 - 10.00am	Risk assessment in infection control Ms. Amy Kolwaite Country Implementation Team Lead, International Infection Control Program, Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention, United States of America
10.00 - 10.30am	Outbreak management Ms. Amy Kolwaite Country Implementation Team Lead, International Infection Control Program, Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention, United States of America
10.30 - 11.00am	Surveillance and audits in IPC Prof. Shaheen Mehtar Chair Infection Control Africa Network, Head of UIPC, Fac Medicine and Health Sciences, Stellenbosch University, South Africa
11.00 - 11.30am	Prevention of spread of antibiotic resistant organisms in healthcare setting Prof. Shaheen Mehtar Chair Infection Control Africa Network, Head of UIPC, Fac Medicine and Health Sciences, Stellenbosch University, South Africa
11.30 - 12.00pm	Multimodal strategies in IPC Prof. Benedetta Allegranzi Coordinator, Infection Prevention and Control Global Unit, World Health Organization, Geneva, Switzerland

12.00 - 12.30pm **Evidence based guidelines and core components guidelines in IPC**
Prof. Benedetta Allegranzi
Coordinator, Infection Prevention and Control Global Unit, World Health
Organization, Geneva, Switzerland

12.30pm **Discussion**

1.30 - 2.30pm **Free paper session 3**
Chairperson – Dr. Muditha Abeykoon

OP9

Species of atypical mycobacteria causing human disease – a laboratory based descriptive study in Sri Lanka

Karunasekara HCI¹, Elwitigala JP², Vidanagama D³

¹Postgraduate Institute of Medicine, University of Colombo

²Central Laboratory for STD/AIDS Control Programme, Colombo 10, ³National Programme for Tuberculosis Control and Chest Diseases National TB Reference Laboratory, Welisara

OP10

Genetic diversity of isoniazid resistant *Mycobacterium tuberculosis* isolates in Sri Lanka

Karunaratne GHRE¹, Wijesundera WS², Vidanagama D³, Adikaram CP⁴, Perera Aj¹

¹Department of Microbiology, Faculty of Medicine, University of Colombo,

²Department of Molecular Biology and Biochemistry, Faculty of Medicine, University of Colombo, ³National Tuberculosis Reference Laboratory, Welisara,

⁴Central Public Health Laboratories, Ministry of Health, Oman

OP11

Evaluation of Microscopic Agglutination Test as a diagnostic tool during acute stage of leptospirosis in high endemic area in Sri Lanka

Fonseka WMCI¹, Karunanayake L²

¹Senior Registrar, Medical Microbiology, Lady Ridgeway Hospital Colombo, ²National Reference Laboratory for Leptospirosis, Medical Research Institute, Colombo.

OP12

Isolation of bacteriophages against *Listeria monocytogenes*

Premarathne JMKJK^{1,2*}, Thung TY¹, Satharasinghe DA^{3,4}, Tang JYH⁵, Basri DF⁶, Rukayadi Y¹, Nakaguchi Y⁷, Nishibuchi M⁷, Radu S^{1,8}

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2.30 - 3.30pm

Free paper session 4

Chairperson – Dr. Madumanee Abeywardena

OP13

Polymicrobial Etiology of Infected Chronic Diabetic Wounds

Dilhari KAA¹, Pathirage S², Gunasekara TDCP¹, Fernando SSN¹, Weerasekera DD³, MacBain AJ⁴, Weerasekera MM¹

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OP14

Genotypic characterization of extended spectrum beta lactamase producing genes blaTEM, blaSHV, bla CTX-M among Uropathogenic *Escherichia coli*

Nachammai SM, Karthika Jayakumar, Anbu N Aravazhi, Preethi Perumalsamy SM Nachammai, Shri Sathya Sai Medical College and Research Institute, Sri Balaji Vidhyapeeth University, Nellikuppam - 603 108, Kanchipuram district, Tamil Nadu, India

Karthika Jayakumar, Shri Sathya Sai Medical College and Research Institute, Sri Balaji Vidhyapeeth University, Nellikuppam - 603 108, Kanchipuram district, Tamil Nadu, India

Anbu N Aravazhi, Karpagam Faculty of Medical Sciences and Research, Dr. M.G.R. Medical University, Othakalmandapam - 641 032, Coimbatore, Tamil Nadu, India
Preethi Perumalsamy, Shri Sathya Sai Medical College and Research Institute, Sri Balaji Vidhyapeeth University, Nellikuppam - 603 108, Kanchipuram district, Tamil Nadu, India

OP15

First point-prevalence study of inpatient antimicrobial use in five public hospitals in southern Sri Lanka

Sheng T¹, Wijayaratne G², Dabrera T³, Bodinayake CK², Kurukulasooriya R², Nagaro K⁴, Sudarshana AT³, Anderson D⁴, Drew R⁴, Ostbye T¹, Woods CW^{1,4}, Nagahawatte A², Tillekeratne LG^{1,4}

¹Duke Global Health Institute, Durham, NC, USA, ²Faculty of Medicine, University of Ruhuna, Karapitiya, Galle, Sri Lanka

³Sri Lanka Ministry of Health, Colombo, Sri Lanka, ⁴Duke University School of Medicine, Durham, NC, USA

OP16

Emergence of non-mecA mediated resistance among methicillin resistance

***Staphylococcus aureus* clinical isolates in Teaching Hospital Kurunegala, Sri Lanka**

Jayaweera JAAS^{1,2}, Abeydeera HP², Ranasinghe G²

¹Faculty of Medicine and Allied Sciences, Rajarata University of Sri Lanka, Saliyapura

²Department of Microbiology Teaching Hospital Kurunegala Sri Lanka

POST-CONGRESS

Workshop 4 – 11th August 2018

AMR surveillance and WHONET

Chairpersons	Dr. Kumudu Karunaratne and Dr. Rohini Wadanamby
8.45 - 9.15am	Registration and tea
9.15 - 10.00am	Importance of AMR surveillance <i>Dr. John Stelling</i> The Brigham & Women's Hospital, Microbiology Department, Boston
10.00 - 10.30am	WHONET introduction <i>Dr. John Stelling</i> The Brigham & Women's Hospital, Microbiology Department, Boston
10.30 - 11.15am	Practical problems of WHONET use and analysis of data <i>Dr. Kumudu Karunaratne</i> Consultant Microbiologist, Lady Ridgeway Hospital for Children, Colombo
	<i>Dr. Kushlani Jayatilleke</i> Consultant Microbiologist, General Hospital, Sri Jayawardhenapura
11.15 - 12.15am	WHONET – alerts, outbreak detection, and real-time surveillance <i>Dr. John Stelling</i> The Brigham & Women's Hospital, Microbiology Department, Boston
12.15 - 12.30pm	Update on WHO global and regional activities in surveillance and containment of antimicrobial resistance <i>Dr. John Stelling</i> The Brigham & Women's Hospital, Microbiology Department, Boston
12.30 - 1.00pm	Discussion
1.00pm	Lunch and close of programme

LIST OF GUEST SPEAKERS

Mr. Andrew Griffin

Sector Manager, Legal and Clinical Services, National Association of Testing Authorities, Australia



Prof. Malik Peiris

Director, Centre of Influenza Research, Professor, Chair in Virology, School of Public Health, The University of Hong Kong, Honorary Consultant Microbiologist, Queen Mary Hospital, Pokfulam, Hong Kong SAR



Prof. Suranjith Seneviratne

Consultant in Clinical Immunology and Allergy, Royal Free Hospital and University College, London



Dr. Rajiva de Silva

Consultant Immunologist, Medical Research Institute, Colombo



Dr. Anoma Geraldine Fernando

Consultant Microbiologist and Lead clinician for infection control, University Hospital Lewisham, United Kingdom



Dr. Ami Neuberger

ID Physician, Rambam Medical Center, Israel



Prof. Paul Anantharajah Tambyah

Professor, Department of Medicine, NUS Yong Loo Lin School of Medicine, Singapore,
Senior Consultant, Division of Infectious Disease, University Medicine Cluster, National
University Health System, Singapore



Prof. Benedetta Allegranzi

Coordinator, Infection Prevention and Control Global Unit, World Health Organization,
Geneva, Switzerland



Dr. Rohan Chinniah

Consultant Clinical Microbiologist / Infection Control, Raja Isteri Pengiran Anak Saleha
(RIPAS) Hospital, MoH, Bandar Seri Begawan, Negara Brunei Darussalam



Ms. Amy Kolwaite

Country Implementation Team Lead, International Infection Control Program
Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention
United States of America



Dr. Ranganathan Iyer

Senior Consultant Clinical Microbiology ID & Infection control, Gleneagles Global Hospital
& Rainbow Hospitals for Children, Hyderabad, India, Lead Country Coordinator India, India



Prof. Shaheen Mehtar

Chair Infection Control Africa Network, Head of UIPC, Fac Medicine & Health Sciences,
Stellenbosch University, South Africa



Prof. Dale Fisher

Infectious disease clinician, National University of Singapore, Singapore



Ms. Yvonne Iroegbu

Antibiotic pharmacist, United Kingdom



Dr. Shalini Perera

Consultant Microbiologist, Western Diagnostic Pathology in Western Australia, Australia



Dr. Jude Jayamaha

Consultant Virologist, Medical Research Institute, Colombo



Dr. Kanthi Nanayakkara

Consultant Virologist and Vaccinologist,
Head Department of Rabies and Vaccine QC, Medical Research Institute, Colombo



Dr. B.V.S.H. Beneragama

Deputy Director General, Laboratory Services, Ministry of Health, Nutrition and Indigenous Medicine, Colombo 10



Dr. John Stelling

The Brigham & Women's Hospital, Microbiology Department, Boston



Dr. Kushlani Jayatilleke

Consultant Microbiologist, General Hospital, Sri Jayawardhenapura



Dr. Lasantha Rajakaruna

Acting Consultant, District General Hospital, Mannar



Dr. Aruna Poojary

Head of Department, Department of Pathology & Microbiology & Secretary of the Hospital Infection Control Committee at Breach Candy Hospital Trust, Mumbai, India.



Dr. J. Shanmugam

Senior Consultant and Ex-Emeritus Professor of Medical Microbiology. Senior Deputy Director, Central Interdisciplinary Research Facility, Mahatma Gandhi Medical College and Research Institute, President, Indian Association of Medical Microbiologists, Chairman, International Medical Sciences Academy (PDY-Chapter), India.



Dr. Kumudu Karunaratne

Consultant Microbiologist, Lady Ridgeway Hospital for Children, Colombo



Dr. Abhijit M Bal

Consultant & Clinical Lead, Department of Medical Microbiology, University Hospital Crosshouse, NHS Ayrshire & Arran, Honorary Clinical Senior Lecturer, School of Medicine, University of Glasgow, Scotland, United Kingdom

**Dr. Geethika Patabendige**

Consultant Microbiologist, National Hospital of Sri Lanka, Colombo

**Dr. Samitha Ginige**

Consultant Epidemiologist, Epidemiology Unit, Ministry of Health, Colombo

**Dr. Deepa Gamage**

Consultant Epidemiologist, Epidemiology Unit, Ministry of Health, Colombo

**Dr. Bhagya Piyasiri**

Consultant Microbiologist, Teaching Hospital, Karapitiya



NATA and ISO 15189 accreditation

Mr. Andrew Griffin

NATA was established in 1947 following a conference attended by representatives of all State and Federal governments in 1945. It is the world's first and most experienced laboratory accreditation body and now spans all technical, industrial and geographical areas of the country. As such, NATA is the authority in the assurance of technical standards in Australia, and a leading authority on the world stage.

It is a founding member of the International Laboratory Accreditation Cooperation (ILAC) and the Asia Pacific Laboratory Accreditation Cooperation (APLAC). APLAC includes many of Australia's principal trading partners in South East Asia, America and the Pacific, and like ILAC, does much to assist with the elimination of trade barriers related to testing in the region.

The NATA accreditation process provides objective, independent attestation that a facility is competent to carry out testing, calibration, inspection or related technical activities in accordance with international and other standards.

Being an accredited facility builds an organisation's credibility.

This credibility gives facilities clients' greater confidence in their ability to produce reliable data from particular tests, inspections, calibrations and related activities. This in turn builds trust in testing services.

NATA accreditation is highly regarded both locally and internationally.

Upon discussion with the Australian Government a voluntary accreditation scheme was established in conjunction and upon request from the Royal College of Pathologists of Australasia (RCPA).

Thus the Australian Medical Testing Accreditation program was established in 1982 as a joint NATA/RCPA endeavour.

The first Medical Testing laboratory was accredited in 1985.

In 1986 NATA/RCPA was chosen by the Federal government as the sole provider of accreditation for pathology.

Then as today NATA/RCPA accreditation is a mandatory scheme linked to Medicare funding through legislation. There are currently greater than 750 laboratories accredited under the NATA/RCPA program.

NATA has a Deed of Agreement (contract) with Commonwealth Government to provide Medical Testing Accreditation.

The objective of the NATA/RCPA accreditation program was to

- Improve standards in pathology
- Recognise those meeting minimum acceptable standards
- Encourage debate and discussion on appropriate standards
- Heighten awareness of need for appropriate education and training for all staff
- Progressively raise standards of laboratory practice and clinical consultation
- Ensure that the public is better protected when a poorly performing laboratory is identified whereby prompt action can be taken

These objectives are still relevant today and to ensure this remains so the NATA/RCPA program assesses against ISO 15189 *Medical laboratories – Requirements for quality and competence* and the applicable suite of National Standards published by the National Pathology Accreditation Advisory Committee (NPAAC).

This session will explore the medical testing program, how the service is delivered in Australia and discuss NATAs engagement with key stakeholders including Federal and State governments and how these engagements might help patient outcomes in Australia.

NATA is continually seeking to ensure the program remains relevant and delivers on its objectives. A briefing on some of the initiatives NATA is trialling will also be provided.

Quality assurance in the Medical laboratory – how equipment assurance can help produce accurate testing results

Mr. Andrew Griffin

As part of a laboratories routine operations a process for the selection, verification and validation of testing is critical in ensuring accurate results are produced.

A system for equipment assurance is also essential in maintaining the ongoing performance of an assay.

Whilst the processes of validation and verification of assays combined with calibration, internal quality control and external quality assurance is common across all medical laboratories they may look quite different depending on the discipline, thus the nature of different medical laboratory disciplines means one size for equipment assurance usually does not fit all scenarios.

It is therefore essential each laboratory discipline implements an equipment assurance process which is fit for their individual purpose.

This session will discuss the various quality assurance requirements laboratories must comply with and how these are implemented.

How can the Quality Management System support testing services?

Mr. Andrew Griffin

ISO 15189 requires laboratory management to develop and implement a Quality Management System which supports the testing activities of the laboratory and continually improves its effectiveness.

The quality review and improvement aspects of a QMS include

- a complaints handling process
- the identification and control of nonconformities
- corrective action
- preventive action
- continual improvement
- evaluation and audit
- management review

This session will discuss the importance of implementing a robust and contemporary QMS to ensure laboratory management are aware of issues and risks which may impact on the output and therefore reputation of the laboratory.

Whilst it is vital that the QMS is monitored on an ongoing basis such that key performance indicators and quality objectives are met, traditional thinking and monitoring processes have been largely compliance based.

National and International Standards are now focussing more on risk based thinking. ISO 15189 includes a requirement for risk management with laboratories expected to assess significant risk points within their organisation as they affect patient safety and to mitigate these risks. Indeed ISO 17025:2017 (a normative reference in ISO 15189) now includes risk based thinking as a key theme and requires laboratories to include risk based thinking throughout its entire organisation.

The accreditation process in Australia is also focusing more on risk based rather than compliance based assessments.

Where serious incidents are identified it is vital that these are identified and reported to the appropriate authority in a timely manner. In Australia IVD regulation requires IVD manufacturers (including Laboratory designed tests) to report significant adverse events to the Therapeutic Goods Administration (TGA).

Under various agreements NATA is also obligated to report significant adverse events or potential public health concerns identified on assessments to the relevant authorities.

Quality management indicator with the positives of a risk based approach discussed.

Plenary Lectures

Plenary presentation 3

Prevention of CA-UTI in era of collaboration

Prof. Paul Anantharajah Tambyah

Catheter associated urinary tract infections (CAUTI) are the most common healthcare associated infections worldwide in both hospitals and intermediate and long term care facilities. Although morbidity and mortality associated with these infections is largely confined to individuals with obstruction or obstructive complications, they are a major reservoir of antimicrobial resistant organisms in particular gram-negative bacilli. The pathogenesis of CAUTI is now better understood and that has allowed us to develop better approaches to prevention of these infections. In addition, there are a number of "bundles" which have been implemented in various settings to try to reduce the infection rate. Part of the problem with CAUTI however has been defining the infection and distinguishing between asymptomatic bacteriuria and significant clinical CAUTI that would lead to urosepsis and complications. There are several innovative studies underway which have attempted to try to practice diagnostic stewardship of urine culturing in an attempt to reduce the over-diagnosis of CAUTI and eliminate the over-treatment of asymptomatic bacteriuria. Other advances have been in the field of novel catheters. Despite several years of unsuccessful attempts, there are many groups working on safer catheters to help prevent these infections in the first place.

Plenary presentations 4

How knowledge on PK/PD can be used for combating antimicrobial resistance

Ms. Yvonne Iroegbu

An understanding of the pharmacokinetics (PK) of antimicrobials and their effects on the patient (PD) is essential in optimising use and increasing the longevity of the usefulness of these agents. This presentation aims to address the PK/PD factors that can be considered and to convey an antimicrobial pharmacist's perspective on the practical use of these factors in determining and suggesting doses and regimes for patients.

Plenary presentations 5

Outpatient antimicrobial therapy

Prof. Dale Fisher

Outpatient parenteral antibiotic therapy (OPAT) is delivered as an organized service in many countries in Europe and the Americas as well as Australia and New Zealand with benefits including standardized care with antimicrobial stewardship, development of service innovation, transparency of utilization data to facilitate appropriate resourcing and outcomes monitoring including safety. The norm for OPAT in Asia is however quite different and while the administration of parenteral antibiotics to outpatients is common, systems are often ad hoc or fragmented.

Local clinician champions are crucial if we are to develop systematised OPAT in Asia and in so doing provide health care systems for our patients with the inherent advantages.

Plenary presentations 6

Drug resistance in *helicobacter pylori*

Dr. Shalini Perera

Helicobacter pylori (*H. pylori*) infects approximately half the world's population and continues to be a major health issue worldwide. The prevalence remains high in most developing countries, while it is declining in the more developed ones. High rates of prevalence are seen in Africa, Central Asia, and Eastern Europe.

H. pylori is known to cause gastritis, peptic ulcer disease, gastric mucosa associated lymphoid tissue lymphoma (MALT) and gastric adenocarcinoma, and more recently recognised as associated with resistant iron deficiency anaemia and idiopathic thrombocytopenic purpura. Recent clinical guidelines recommend treatment of all infected patients, with treatment no longer reserved for patients with clinical manifestations of *H. pylori* infection. Increased antibiotic usage worldwide has led to antibiotic resistance among many bacteria, including *H. pylori*, resulting in falling eradication rates. World Health Organisation has included clarithromycin resistant *H. pylori* as 'high priority' among 12 other bacteria for which antibiotics are urgently needed. Currently, only six

antibiotics are available for use in combined therapies in *H. pylori* eradication regimens—clarithromycin, amoxicillin, rifabutin, levofloxacin, metronidazole and tetracycline. Antibiotic resistance is the most important predictor of eradication failure of *H. pylori*.

Resistance to clarithromycin and metronidazole, and now to levofloxacin are increasing in most high prevalence countries, with concordant reductions in eradication rates. Resistance to amoxicillin, tetracycline and rifabutin have remained low in all regions. Triple therapy with clarithromycin, amoxicillin and proton pump inhibitor (PPI) is recommended as empiric first line therapy in most countries, and resistance to clarithromycin is the most important cause of treatment failure of this regimen. Clarithromycin is not recommended as empiric therapy in areas with primary clarithromycin resistance >15%.

Antibiotic resistance in *H. pylori* can be detected by phenotypic methods involving culture, or by molecular methods. Molecular testing directly on gastric biopsy specimens represents an attractive alternative to culture based methods with the advantages of higher sensitivity, rapidity and the lack of stringent transport conditions. The approach of using stools specimens for detection and detection of antibiotic resistance in *H. pylori* has the added advantage of avoiding an invasive procedure such as endoscopy.

Falling eradication rates globally are prompting new approaches to *H. pylori* diagnostics and treatment. Analysis of antibiotic resistance prior to treatment is likely to become increasingly wide-spread. There is a critical need to determine current rates of local antibiotic resistance to facilitate the selection of most appropriate antibiotic regimens and, to help transition to an approach of tailored treatment guided by antibiotic susceptibility testing.

Plenary presentations 7

Getting buy in to IPC

Prof. Dale Fisher

Understanding the needs of all stakeholders is critical to buy-in. It is natural that infection prevention and control programmes are driven by IPC practitioners as our surveillance puts us at the forefront of understanding hospital epidemiology. However administrators, health workers (outside of IPC), patients, families and are all crucial to the success of any initiative. Stakeholders need varying degrees of an understanding of the current and potential future impact of the issue and it needs to be put in an appropriate context of what has meaning to that individual.

A successful relationship with administrators requires honesty and clarity of the problem, the solution and its impact. Data is crucial at the baseline and also in monitoring after an intervention. Cost benefit analyses are valuable but very difficult in IPC programmes but at least “cost of nosocomial infection” studies go part of the way.

It is easy to regard one's own view as absolute but hospital and national health administrators have a duty to explore the evidence base, the options, the cost effectiveness and any possible negative impacts. Only at this point can a proposal be placed against other competing needs and a decision made.

Plenary presentations 8

Antifungal stewardship

Dr. Abhijit M Bal

Antibiotic stewardship has been the main focus of antimicrobial management. In the last few years, the importance of antifungal stewardship is being increasingly appreciated. The reasons for the increased recognition of antifungal stewardship are emerging resistance amongst fungi of medical importance, cost of treatment, and enhanced awareness of fungal infections amongst clinicians. The availability of antifungal susceptibility testing has provided an opportunity for streamlining antifungal treatment particularly in the context of invasive candidiasis and invasive aspergillosis. Several guidelines published in the last few years have provided an operational framework for antifungal stewardship. This lecture focuses on the utility of antifungal stewardship programs, the strategic direction of antifungal stewardship, the impact on healthcare budget, and the challenges associated with antifungal stewardship.

Clostridium difficile infections – an Emerging menace among elderly patients in ICUS

Dr. Jayaraman Shanmugam

In the beginning of the 21st century, the *Clostridium difficile* (CD) infections emerged as the leading cause of hospital associated diarrhea in developed countries like Canada, USA, United Kingdom and in Europe. Later similar infections were reported in many countries of the

world. The hyper virulent strain Ribo type 027 was found to be causing serious infections within the hospital and in particular among elderly ICU patients. The CD causes mild to serious infections predominantly among those above 65 years due to many risk factors like prolonged antibiotic treatment, immunocompromised status and others. The clinical symptoms ranges from mild to severe diarrhea, enteritis, pseudomembranous colitis (PMC). If not treated appropriately in time, this may lead to severe fulminant colitis, megacolon and even mortality. The treatment include withdrawal of prolonged antibiotic treatment and administration of selective antimicrobials like vancomycin, metronidazole or newer drugs. Besides attempting colonostomy and/or fecal transplantation also revealed improvement in treatment. If appropriate treatment is not attempted in time, very serious clinical symptoms including mortality can be envisaged. Vaccine trials are being attempted by selected investigators to prevent CD infections. Due to lack of initiatives and/or laboratory facilities, the CD infections is underreported in many developing countries. Hence besides timely treatment, stringent preventive measures, vaccination and education of Health Care Workers (HCWs) will lead to markedly decreased incidence of CD infections both within the hospital and in the community.

Symposium 1

Management of immunological conditions – the Sri Lankan situation

Dr. Rajiva de Silva

Primary immune deficiency diseases (PIDD) are due to genetic defects in the immune system, with at least 300 defects been identified so far. The International Union of Immunological Societies (IUIS) has classified PIDD into 9 categories. The European Society of Immune deficiency (ESID) has identified antibody deficiencies as the most common, followed by combined T and B cell deficiencies, syndromic immune deficiency and defects of phagocytes. The situation is similar in Sri Lanka according to the PIDD registry maintained by the Medical Research Institute. Patients with antibody deficiency are managed by providing intra venous immune globulin free of charge, in government hospitals. Most other PIDD are treated appropriately with prophylactic antibiotics. However, patients with severe T cell defects, such as patients with severe combined immune deficiency (SCID), X linked hyper IgM syndrome or leucocyte adhesion deficiency (LAD) type 1 are not provided stem cell transplantation, and succumb to the disease during

infancy. This presentation discusses the PIDD in Sri Lanka, the management provided as well as future prospects.

Symposium 2

Current trends in diagnosing aetiology of PUO

Dr. Anoma Geraldine Fernando

The changing horizon due to advances in diagnostics. The most important diagnostic weapon still remains the same – a comprehensive and thorough history.

Use of diagnostic tools should be particularly targeted towards relevant areas of history and clinical findings. A discussion of diagnostic tools available in resource rich areas. Options for resource poor settings.

Laboratory automation which helps in timely diagnosis. MALDI-TOF, Keistra systems, automated blood cultures, liquid culture for TB and molecular methods for diagnosis and imaging. Advances in diagnostic serology will also be discussed.

Fever of unknown origin – principles of antimicrobial treatment of FUO

Ami Neuberger

The epidemiology of FUO is changing with time. Rather then seen as a single syndrome, undifferentiated fever should be considered differently in patients with no previous illnesses, HIV-positive patients, patients with neutropenia, those with a high probability of acquiring tuberculosis, and in patients hospitalized in intensive care units. In addition, geography dictates, to some extent, the most likely etiology.

Rather then focusing on empiric treatment, management should focus on diagnostics, which are rapidly evolving. We would consider empiric antimicrobial treatment only for certain groups of patients, considered to have an infectious cause of FUO. An unrestricted use of antimicrobials should be discouraged in the era of antimicrobial resistance. In the resource-limited settings, where diagnostics are often lacking, the use of empiric antimicrobials should be used with well defined protocols, and therapy should be stopped if no clear benefit exists. In this short presentation, we would discuss those instances where empiric treatment is justified before a definite diagnosis is reached.

Symposium 3

Attitudes and Practices – how to change application of behavioural science in infection control and antibiotic stewardship – the force awakens

Dr. Terrence Rohan Chinniah

Antibiotic stewardship and infection control not only need to be learned but also should be practiced diligently. Hence both these require behavioural changes among the healthcare personals for their effectiveness.

These behavioural changes should range at all organizational level including and involving all the stakeholders ranging from leadership to the end users.

Guidelines and policies help with decision making, by providing knowledge and awareness, but they may not shift attitude or change practice. It is necessary to understand the factors that influence prescribing behaviours and decisions. This will help in changing patterns in antibiotic prescription and leads to proper antibiotic stewardship.

Similarly understanding the factors influencing behaviours in infection control practices is paramount for their successes. Hence behaviour change or behaviour modification is a key element in optimizing antibiotic prescribing and in infection control.

We need to consider socio-cultural factors affecting behaviour in the design, implementation and reporting of any interventions for their success. Also we should use time tested behavioural modifications methods to achieve this goal. Gamification is one such method that can be used in education and also in behavioural change. These will eventually lead to change in attitudes and practices.

Risk assessment and IPC practices

Ms. Amy Kolwaite

Every healthcare worker has a role to play in ensuring the health, safety and welfare of themselves and others. The ability to characterize the nature and magnitude of health risks from contaminants and other stressors present in the healthcare environment is an essential skill that healthcare workers must exhibit. By the end of this session, the participant will be able to define and recognize risks in the healthcare setting; describe a hierarchy of infection prevention and control measures used to mitigate risks; describe the importance and goals

of a risk assessment, as well as potential challenges and solutions to implementing effective risk management programs.

IPC in ICU setting – practices and evidence ?

Dr. Anoma Geraldine Fernando

Infection control is important in the critical care setting and has a significant impact on morbidity and mortality in these settings. Good infection control in these areas also contribute to lowering the costs of care. Discussion around barrier nursing, physical barriers, side room isolation and alternatives to side rooms .

Exploring common myths around infection prevention and control in critical care settings. Culturally embedded practices and available evidence base.

Controversial issues in the field of infection prevention and control (IPC)

Prof. Dale Fisher

The implementation of evidence arising from research in IPC inevitably requires adaptation to a setting different to that of the initial research. Adapting to differently resourced environments with their own particular infrastructure, acuity, staffing, beliefs and priorities leads to more questions. This is even moreso when the initial evidence was based on observation or quasiexperimental work. Indeed much IPC practice is based on extrapolation and interpretation by local experts. Furthermore there does seem an endless supply of questions ranging from the recent such as the cost effectiveness of no touch environmental hygiene and automated hand hygiene compliance audits through to old unanswered controversies such as beards and appropriate clothing in health workers. It should not be surprising that much of what is done in IPC has controversy surrounding it.

Operation theatre issues in infection control – recent trends

Dr. Ranganathan N Iyer

Commissioning of operating rooms and suites has been adapted as best practice since the turn of this century, when standards were laid down in the form of guidelines published by the HSA UK. Several of these issues have been dealt with in some detail in the early part of this century by various societies the world over. Recent years

have seen many guidelines and publications alluding to good practices to prevent surgical site infections. Few of these have made any reference to the physical conditions under which a surgical procedure takes place.

Recent years have seen an increased interest in the air ventilation systems of the operating room, particularly the ultraclean theatre used for cardiovascular, orthopaedic and neurosurgical procedures. Whilst refined systems have been in place, there have been reports of increased infection rates after orthopaedic surgical procedures especially joint replacement surgery. Considering the expenses incurred by hospital managements and administration the world over, the finding that ultraclean ventilation systems do not help reduce the burden of devastating infections, but may indeed increase the infection rate does leave one perturbed. A number of reasons have been cited as being responsible for this such as eddies created very close to the operating field by the surgical team, too many visitors to the theatre and the opening and closing of doors of the theatre. These have been extensively studied and documented in recent times. Laminar air flow systems in ultraclean theatres do help reduce the SSI rates, however they need regular maintenance. Minor lapses may lead to a detrimental air quality and directly impact patient safety.

Forced air warming is another method used to prevent intraoperative hypothermia in patients, particularly those undergoing colon surgery procedures. It is suggested that forced air warming systems may contribute to airborne contamination of the surgical site. This has been refuted by well designed studies in Japan which have shown that air flow caused by forced air warming is well counteracted by downward laminar airflow from the ceiling, and this would be less likely to cause surgical field contamination in the presence of sufficient laminar air flow.

Cleaning of operating rooms, particularly irregular surfaces is an important part of the daily maintenance of the operating room. Routine monitoring of this cleaning process is required and many assays/ methods. Two such methods have the ATP luminescence and the RODAC plate assays.

Head gear worn by surgeons, surgical attire while in the theatre and outside of the theatre have always been a subject of debate, however this has emerged a topic of intense discussion and debate along with the movement of human traffic in the OR as this is expected to impact the outcome of the surgical wound in many cases.

These and other aspects of recent interest in the operating room may be discussed in the session.

Symposium 4

Outbreak management

Ms. Amy Kolwaite

From Ebola in West Africa to outbreaks of multi-drug resistant organisms in intensive care units, the CDC's International Infection Control Program's mission includes supporting Ministries of Health and healthcare facilities with outbreak investigations. This session will provide an overview of CDC's role in healthcare-associated outbreak investigations by describing characteristics of recent outbreaks, investigation techniques, findings and recommendations, as well as resources available to participants.

Global Outbreak Alert and Response Network (GOARN)

Prof. Dale Fisher

In 2000, the Global Outbreak Alert and Response Network (GOARN) was established to counter the absence of a systematic method for communication and coordination between responding organizations in international outbreaks. The core principles of GOARN were (and still are) to coordinate the epidemiologic, logistics, case management, infection prevention and control, laboratory and communications needs of an outbreak response. It does this with the premise that no single organization can provide all needs but through its more than 200 partners including WHO, US CDC, MSF, UNICEF, IFRC and IP experts are indeed available. Responses must be led by the national government and GOARN experts are provided to support the national response.

To date GOARN has managed almost 3000 deployments to 130 events. Current developments include an emphasis on training, research and improving deployments particularly via rapid and early support strategies.

Symposium 5

Recent trends in detection of patients with MDR GNB

Dr. Ranganathan N Iyer

The emergence of carbapenamases has led to global recognition of a serious problem of antimicrobial resistance in organisms. This has also brought to light another perplexing issue of community origin of antimicrobial resistance among micro-organisms.

Patients from the community who seek medical attention and are either admitted as in-patients to hospitals or are treated as outpatients may be infected or colonized with these multidrug resistant organisms. Moreover these organisms with the MDR genes are capable of moving from one patient to another, impacting the care of immunosuppressed patients and other sick and ill patients in intensive care.

The notable feature of these organisms in addition to all that is aforementioned is the fact that genes coding for multidrug resistance on account of enzyme production are carried on plasmids and transposons and all of these are capable of spreading from one patient to another. In addition, the recent recognition of plasmid borne resistance from one organism genus or species to another compounds the problem. These patients if left undetected and unmanaged could lead to a morbidity and mortality amounting to 70% in some of the ICU's in the world. Given the fact that treatment options for combating these infections are limited, good infection control practices must be in place and implemented as well as monitored to prevent the transmission of these organisms among patients. Outbreaks due to these multidrug resistant organisms could have devastating consequences with several deaths.

There have been studies which have attempted to identify key elements to prevent the spread of MDR organisms such as CRE and MRSA. It is best to have a proactive approach and survey for patients who may be colonized with these organisms. Isolation of identified and / or suspected patients with contact precautions does help prevent the transfer of organisms to other vulnerable patients. Many studies have shown that asymptomatically colonized patients could serve as a reservoir for transmission of pathogens to others. In hospitals and institutes with a low prevalence, initial screening with rectal swabs culture to identify high risk patients and cohort them till culture results are available. On the contrary, patients in endemic zones must be screened in toto to identify all those who are colonized and surveillance cultures be collected from all such patients.

Detecting gastrointestinal colonization could be a challenge and the microbiology laboratory may need to employ robust protocols with a variety of screening media, the use of antibiotic disc screening, MALDI-TPF screen of suspicious cultures to identify resistance patterns as well as molecular assays including Xpert system to identify MDR organisms. It is imperative for the laboratory to have as low a turn around time as is possible. This facilitates rapid institution of infection control measures and decolonization protocols with contact precautions in these patients. Some of the challenges and the methods employed would be a point of discussion in the session

Carbapenem and colistin resistant Gram-negative organisms – treatment options

Dr. Ami Neuberger

In this brief overview we would try to focus on available treatment options for carbapenem-resistant enterobacteriaceae (CRE). In practice, treatment options are limited by the spread of antimicrobial resistance.

There are several controversies with regard to the modes of administration of antibiotics for CRE infections: high versus lower dose, continuous or prolonged versus intermittent administration, duration of antibiotic treatment, and mono versus dual therapy. Some of these issues will be briefly presented.

Older antibiotics such as colistin, aminoglycosides, fosfomycin and tigecycline, are increasingly used together with newly-approved drugs such as ceftazidime-avibactam. The evidence for their use is often lacking. Some new antibiotics in advanced stages of development (phase 2 or 3 trials) will be reviewed. These drugs will include combinations of carbapenems and aztreonam with β -lactamase inhibitors, new combinations of cephalosporins with β -lactamase inhibitors, cefiderocol – a novel cephalosporin, plazomicin – an aminoglycoside, and eravacycline – a new fluorocycline. The advantages and disadvantages of these drugs will be discussed.

Novel approaches to antibiotic development which include the use of antibacterials produced from previously “non-culturable” bacteria, and development of new entry mechanisms of antibiotics into Gram-negative bacilli.

Treatment of CRE infections is likely to undergo rapid changes in the upcoming years. Efforts to limit antibiotic use will be aided by improved diagnostics, and comprehensive programs of infection control and antibiotic stewardship. Newer agents should be used judiciously, as the development of resistance is only a matter of time.

Symposium 6

Local epidemiology of viral respiratory infections

Dr. Jude Jayamaha

Seasonality has been observed as a bi-modal pattern for the last few years, main peak during November to January and lesser peak during April to June. Influenza activity is observed throughout the year. This vital information was generated through active epidemiological and virological surveillance since 2008, under CDC and world bank funds.

This active surveillance is carried out throughout the year as Influenza like illness (ILI) in OPD patients in nineteen hospitals and severe acute respiratory illness (SARI) in in-ward patients in four hospitals.

Seasonal influenza viruses can cause mild to severe illness and even death, particularly in some high-risk individuals. Persons at increased risk for severe disease includes pregnant women, the very young and very old, immune-compromised people, and people with chronic underlying medical conditions such as cancer, diabetes mellitus and heart diseases. Seasonal influenza viruses evolve continuously, which means that people can get infected multiple times throughout their lives. Therefore the components of seasonal influenza vaccines are generally reviewed biannually and updated periodically to ensure continued effectiveness of the vaccines. National influenza Centre, Sri Lanka's WHO designated laboratory sends viral isolates and samples to WHO collaborating center bi-annually for vaccine candidate preparation. Recently, the National Drug Regulatory Authority of Sri Lanka has given license for the use of trivalent seasonal influenza vaccine.

There are three large groupings or types of seasonal influenza viruses, labeled A, B, and C. Type A influenza viruses are further divided into subtypes according to the specific variety and combinations of two proteins that occur on the surface of the virus, the hemagglutinin or "H" protein and the neuraminidase or "N protein". Currently, influenza A (H1N1) is the commonly circulating seasonal influenza A virus subtype in Sri Lanka. During the current season, it has been observed to generally cause severe disease. This seasonal A (H1N1) virus is the same virus that caused the influenza pandemic and it first appeared in Sri Lanka in two waves during 2009/ 10 period. Since then it has caused epidemics in 2013, 2015 and in 2017. Influenza A H3N2 co-circulates with influenza A H1N1 and has been the predominant strain over H1N1 in few occasions.

In addition, there are two type B viruses that are also circulating as seasonal influenza viruses, which are named after the areas where they were first identified, Victoria lineage and Yamagata lineage.

Respiratory syncytial virus activity is observed throughout the year with a single peak from May to July/August by few studies. Majority of the affected patients are children less than one year. RSV type A and type B has been detected by realtime PCR in few surveys.

Epidemiology of other viruses are (parainfluenza, adenovirus, human metapneumovirus, corona virus, rhinovirus) not well defined and very few studies have been conducted. Of these, parainfluenza 1 to 4 has been associated with severe respiratory tract infections in

children. Boca virus has been detected in few children with acute respiratory tract infections in children either alone or with other respiratory viruses recently. It's role as a pathogen need to further elucidated.

Seasonal and Pandemic Influenza

Prof. Malik Peiris

Seasonal influenza epidemics are estimated to infect 10-20% of the global population causing 3-5 million severe cases of influenza disease and 0.3 - 0.67 million deaths (largely in the elderly) every year. Influenza A (H3N2 and H1N1) and B viruses cause these repeated seasonal outbreaks through mutation in the virus surface proteins that allow emergence of variant viruses that evade pre-existing population immunity. Such outbreaks occur almost on an annual basis in most parts of the world, no region being exempt. However, the seasonality of influenza outbreaks vary in different geographic locations. Transmission is by large or small respiratory droplets or by direct or indirect contact with infected respiratory secretions. Groups at risk of increased morbidity and mortality include young children and the elderly, pregnant women, those with underlying heart, lung, kidney, liver or endocrine (e.g. diabetes) diseases. Antiviral (oseltamivir) therapy given early in the course of illness reduces the duration and severity of illness and is recommended in patients at high-risk. Vaccination provides protection against infection and disease, provided the vaccine is well matched against the currently circulating strain of virus. Vaccine takes at least a month to provide protection and the duration of vaccine immunity is limited. Therefore, the timing of vaccine administration needs to be optimised for each region, based on the known seasonal peak of virus activity. Pandemic influenza arises from influenza in animals and occurs at less predictable intervals but spreads very rapidly across the world. It usually causes higher morbidity and mortality. Vaccines generated by conventional approaches will not be available in time to mitigate against the first wave of a pandemic. Given inevitable public anxiety about a pandemic, it is therefore important to have pandemic response plans ready to deal with such an event.

Symposium 7

Experience with antimicrobial stewardship

Ms. Yvonne Iroegbu

A short presentation on the impact of UK antimicrobial stewardship initiatives currently in place and the challenges faced with implementation.

Local experience on antibiotic stewardship

Dr. Kushlani Jayatileke

Reports on antibiotic stewardship programmes in Sri Lanka are extremely limited. In accordance with the National Action Plan for Combating Antimicrobial resistance (AMR), a hospital wide antibiotic stewardship program (ASP) based on the guidelines by the Infectious Diseases Society of America (IDSA) and the Society for Healthcare Epidemiology of America 2016 was commenced in Sri Jayewardenepura General Hospital (SJGH) which is a 1084 bed, tertiary care center in Colombo. The proposed ASP was introduced to all consultants prior to implementation and appropriate changes to the program were made based on received comments and a reply was given to all. Approval for the program obtained from the hospital administration. Head of the Antibiotic Stewardship Team (AST) was the consultant microbiologist. Many educational sessions detailing on documentation of prescriber, indication, collection of cultures before antimicrobials and 48 hour review on newly formed drug chart were conducted for all health care providers to support optimal prescribing. Standard national/local guidelines on empirical and prophylactic use of antimicrobials were distributed as soft copy to all consultants and as a table top chart to all units of the hospital. The program was commenced on 01st of October 2016 with levels of approval for antibiotics prescribing, based on the need for the consultant microbiologist's opinion. The outcome of the program was monitored with six months period before and after the ASP with carbapenem consumption and rates of carbapenem resistance in Enterobacteriaceae, *Pseudomonas* species and *Acinetobacter* species. During the study period mean carbapenem consumption was reduced from 30.7 to 22.3 Defined Daily Doses per 1000 inhabitants per day, by 27.3% ($p=0.218$) despite an increase in patient number by 587 from 30,703 in the latter six months period, with a cost saving of Rs.1,516,800 for the same period of time. Carbapenem non-susceptibility of all Gram negative organisms, as well as Enterobacteriaceae were decreased by 21% ($p=0.0055$) and 27.9% ($p=0.00001$) respectively from the pre to post- intervention period.

However, during the implementation, few problems had to be tackled. Although almost all consultants agreed that resistance in bacterial pathogen is a significant problem, some clinicians were not very happy to introduce the program at the beginning. No clinician volunteered to be in the ASP team, despite all agreeing to have the

program. No specially trained dedicated clinical pharmacist was available in the hospital. Information Technology system was not geared to provide the necessary data efficiently. Though the special antibiotic chart was introduced filling of it was not optimal. The number of referrals to microbiologist increased after the introduction of the programme which may have contributed to the impact.

In this one year long retrospective observational study, we demonstrated reduction of carbapenem consumption, cost and carbapenem resistant Gram negative organisms after the ASP. Therefore the system may be strongly recommended for other hospitals with service of a microbiologist in developing countries.

Rapid diagnosis of AMR – importance and methods

Dr. Ranganathan N Iyer

The fact that resistance bacteria have emerged as a major force to reckon with can no longer be ignored in modern medicine. Multidrug resistant organisms have made a significant impact in the treatment of critically ill patients, particularly in surgery and care of the immunosuppressed population of patients. There are a number of mechanisms and enzymes that mediate resistance in microorganisms. These also include mutations in existing genes and the elaboration of new enzymes. Detection of resistance mechanisms have become complimentary to routine antimicrobial susceptibility testing in clinical microbiology laboratories and this is a need of the day for effective management of our critically ill patients. Moreover a quick determination of a resistance mechanism may also play a role in a correct choice of empiric therapy. Hence clinical microbiology laboratories do need a fast and reliable method to detect resistance mechanisms as this impact both treatment and infection control protocols for patients in a hospital.

Some of the resistance mechanisms that need detection in clinical microbiology laboratories are ESBL, AmpC, Carbapenemases, (OXA- 23, OXA- 48, IMP, VIM, NDM-1 KPC etc) as well defined resistance mechanisms in gram positive organisms such as MRSA, HLA and VRE in enterococci etc. Phenotypic and genotypic methods exist for the detection of these resistance mechanisms.

Newer methods such as MALDI- TOF assay and some of the molecular assays (Multiplex PCR, LAMP assay) etc are rapid and give out useful information to enable institution of treatment and infection control protocols. A set of these phenotypic and molecular assays would be discussed in the session.

Syndromic testing – diagnosis of infectious diseases – impact on patient care and antimicrobial stewardship

Dr. Aruna Poojary

Syndromic approach based management of infectious diseases is not new to medicine. It has been used for more than a decade in the treatment of sexually transmitted infections (STIs) with great success. The same approach has now come to the diagnostic arena for the early diagnosis of infectious diseases. Most infectious diseases present as syndromes with common manifestations which can be nonspecific and yet caused by a multitude of pathogens. A good example is that of meningitis which presents with common symptoms and signs of fever, headache, projectile vomiting, blurring of vision, neck stiffness etc. Viruses (Enterovirus, Herpes Simplex virus, Varicella Zoster virus) bacteria (Hemophilus influenza, Neisseria meningitidis, Listeria etc) and fungi like Cryptococcus can cause meningitis while presenting with the same symptom complex as above. It is extremely important to identify the correct pathogen because the treatment strategies differ. Syndromic approach based testing is therefore useful because with one single specimen and one test it can identify many pathogens that cause similar disease.

We discuss, a film array based syndromic testing method which is available for testing positive blood cultures, CSF samples, stool samples and nasopharyngeal samples. This film array based testing requires minimal sample quantity and can still identify a variety of pathogens from one specimen. The other advantage of this technique is the turnaround time (TAT) which is under 2 hours with minimal hands on time for sample preparation (less than 10 minutes). Sample processing does not require much expertise and technologists can easily be trained in sample preparation. The collateral benefits of early diagnosis of the infecting organism are reduction in length of stay and also the cost of patient management which has been documented by various groups in literature. This modality of testing has also proven useful for infection control issues like isolation practices and antimicrobial stewardship. The respiratory panel and the gastrointestinal panels are helpful in detecting both community and hospital outbreaks (e.g Influenza or Clostridium difficile associated diarrhea) thereby helping with triage and early isolation measures both in Emergency medical services and inpatients with suspected respiratory or gastrointestinal diseases. It also helps appropriate utilization of antimicrobial agents, thereby supporting the antimicrobial stewardship program of the hospital. In all, the film array based syndromic approach testing is useful

tool for appropriate utilization of medical resources and for achieving antibiotic stewardship, Infection control stewardship and diagnostics stewardship (AID).

An update on global and national situation on AMR

Dr. B V S H Beneragama

Antimicrobial resistance (AMR) is recognized as one of the principle threats to public health throughout the world: its impact is felt in all areas of health, and it affects the whole of society. According to WHO, around 10 million people will die of AMR by year 2050 if very strong plans are not implemented to combat this public health threat by all countries. According to the available laboratory surveillance data in Sri Lanka, the situation is no exception. Non-invention of new antibiotics for nearly two decades (except for very few antibiotics recently) has made the situation worse.

Although antimicrobial resistance is a natural phenomenon, it is exacerbated by irrational use of antimicrobial medicines, poor or non-existent IPC programmes, poor-quality medicines, weak laboratory capacity, inadequate surveillance and poor regulation or enforcement of regulations to assure access to high-quality antimicrobial medicines and their appropriate use.

Sri Lanka is very well aware about this grave situation and has initiated combating AMR with multi-sectoral collaboration, under one health concept. The development of the National Strategic Plan (NSP) 2017 - 2022 provides the roadmap to combat AMR. Presently the Ministry of Health with the other stakeholders, specially College of Microbiologists are in the process of implementing many activities listed under five main strategies in the National Strategic Plan. The other sectors namely fisheries, agriculture, veterinary and environment are also engaged in similar activities.

01. The current progress of multiple activities to combat AMR is satisfactory. But there is room for improvement in certain areas. Further strengthening of supply chain management and regulatory process to ensure continuous supply of safe, efficacious, good quality antibiotics, to prevent spurious or substandard antibiotics enter the market. Preservation of quality and efficacy by ensuring maintenance of optimum strong conditions throughout supply chain are few examples. Also more attention should be paid to improve Antibiotic Stewardship Programme.

OP 1

The role of ERG 11 gene expression for fluconazole resistance among *Candida albicans* isolates, isolated from candidaemia patients

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Introduction

Candida is the commonest cause of fungaemia which is often treated with fluconazole. Therefore fluconazole resistance is becoming a problem to clinicians. Several antifungal resistance mechanisms have been suggested including changes in the target enzyme and the up regulation of multidrug resistance protein (MDR) by *Candida* species. Lanosterol 14 α -demethylase enzyme is an essential enzyme in synthesis of ergosterol and is the target of azole group of drugs. This study investigated the role of ERG 11 gene expression in *C. albicans* using a real time PCR.

Objective

To analyze the association between ERG gene expression levels and fluconazole resistance among clinical isolates of *C. albicans*.

Methodology

ERG gene expression analysis was performed using 20 *C. albicans* isolates, isolated from candidaemia patients. These included 10 fluconazole resistant isolates and 10 fluconazole sensitive isolates confirmed by antifungal susceptibility testing using CLSI disk diffusion method. Total RNA were extracted and cDNA was synthesized using high capacity cDNA synthesis kit (Applied Biosystems, USA). After quantification using Nano Drop, cDNA was subjected to real time PCR using 18 S as a control gene using Sybr Green chemistry.

Results

Relative gene expression levels of ERG 11 gene ranged between 0.055 - 2.439 among fluconazole resistant isolates and 0.032 - 2.19 among fluconazole sensitive isolates. Highest value (2.493) of relative expression of ERG 11 gene was observed in one isolate which was also resistant to fluconazole.

Among fluconazole sensitive isolates relative gene expression was higher for strains with <30mm zone diameter against fluconazole compared to those with 40mm. Higher median value of relative gene expression was observed among the fluconazole resistant isolates compared to sensitive isolates.

An average relative ERG 11 gene expression level of 1.014 was observed among the fluconazole resistant isolates while sensitive isolates had an average relative expression of 1.031 compared to *C. albicans* ATCC® 10231 reference strain.

Conclusion

Significant difference of relative ERG expression was not observed among the fluconazole sensitive and resistant groups of *C. albicans*.

OP 2

Presence and phenotypic detection of AmpC Beta-lactamase producers among clinical isolates of Enterobacteriaceae in National Hospital of Sri Lanka

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Introduction

Plasmid-mediated AmpC beta lactamases which are derived from chromosomally encoded genes in *Enterobacteriaceae* have been described in certain bacterial species like *E. coli*, *K. pneumoniae* and *Proteus mirabilis*. They can confer resistance to penicillins, narrow-spectrum cephalosporins, oxymino-beta-lactams, and cephamycin. They lack susceptibility to beta-lactamase inhibitors such as clavulanic acid, sulbactam, and tazobactam.

Objectives

To assess the rate of positivity of AmpC beta-lactamase producers among clinical isolates of *Enterobacteriaceae* in National Hospital of Sri Lanka, to assess the AmpC, ESBL co-existence and to compare the phenotypic methods for AmpC detection.

Methodology

A total of 141 samples of *Escherichia coli*, *Proteus* species, *Klebsiella* species were identified using rapid identification system (Remel RapID ONE). All isolates were tested for two screening tests and four confirmatory tests described in the literature. They were compared with the test which had the highest specificity, ceftioxin-cloxacillin double disc test with 100% specificity and 97.2% sensitivity for confirmation. ESBL was detected according to the CLSI-2016.

Results

30 out of 114 of blood cultures isolates (26.3%) and 4 out of 27 other samples (14.8%) giving a total of 34 out of 141 isolates (24.11%) were positive for ceftioxin-cloxacillin double disc test. The AmpC and ESBL co-existence was found to be 20.6% of the total isolates and 31.87% of the ESBL positives.

The proportions of AmpC positivity were 45.8% for *Klebsiella pneumoniae* (n=59), 50% for *Klebsiella oxytoca* (n=2), 8.8% for *E. coli* (n=68) and 0% for *Proteus mirabilis* (n=12).

Out of the 34 ceftioxin-cloxacillin double disc positive isolates, 34 for ceftioxin and 31 for cefotetan gave positive screening results. There were 5 false positives from both. Out of the 34 AmpC positives, 34 for ceftioxin-boronic acid test, 31 for cefotetan-boronic acid test and 31 for EDTA test gave positive. These three tests gave 1,1 and 0 false positives respectively. MAST disc gave only 5 true positives but no false positives.

Conclusion

High rate of positivity of AmpC beta lactamases is observed in this clinical setting. AmpC co-exists in about one third of ESBL positive isolates. Ceftioxin is a better screening test and EDTA test is a good confirmatory test for AmpC, compared to ceftioxin-cloxacillin double disc test.

OP 3

Prevalence, antibiotic sensitivity and resistance genes of extended spectrum beta lactamase producing *Escherichia coli* and *Klebsiella* spp among patients with community acquired urinary tract infection in Galle district, Sri Lanka

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Introduction

Community acquired urinary tract infections (CA-UTI) are mainly caused by *Escherichia coli* and *Klebsiella* spp which are known extended spectrum beta lactamase (ESBL) producers. Study of ESBL pathogens in such infections leads to establish antibiotic guidelines at the out-patient set-up.

Objectives

To determine, the prevalence of ESBL producing of *E. coli* and *Klebsiella* spp in CA-UTI, characteristics of the ESBL producing organisms including the resistance genes, and the association of risk factors.

Design, setting and methods

Descriptive cross-sectional study done at the out-patient department of a teaching hospital and at 10 selected general practitioners' centers. Following written consent and answers for an interviewer-based questionnaire, urine samples were collected from possible CA-UTI patients and cultured. Antibiotic sensitivity (ABST) was done according to the CLSI standards. ESBL genes were identified by conventional multiplex PCR.

Results

Positive cultures were present from 178 (38%) samples of 465 patients. Most positives were from females (103, 58%). Predominant isolate was *E. coli* (149, 84%) with 68(46%) ESBL producers followed by 16 (9%) *Klebsiella pneumoniae* with 4 (25%) ESBL producers. Majority of patients with ESBL CA-UTI were >50 years (35/72, 49%) and 13 (18%) children <10 years were present. ESBL pathogens had high resistance rates for quinolones (41%) and >80% sensitivity for nitrofurantoin, fosfomycin, mecillinam, aminoglycosides and carbapenems. Presence of ESBL genes were 83% CTX -M, 71% OXA, 24% TEM and 9% SHV with one organism often producing more than one gene in 29 isolates (71%). Only haematuria was significantly associated with ESBL production (p<0.01). Out of risk factors tested, there was significant association of structural abnormalities of urinary tract with increased ESBL CA-UTI (p<0.01).

Conclusions

ESBL prevalence of this community was 40% in CA-UTI with *E. coli* predominance among female majority. More than eighty percent of ESBL organisms show high sensitivity for aminoglycosides, carbapenems, nitrofurantoin, mecillinam and fosfomycin. Frequently isolated ESBL gene was CTX-M. Haematuria and structural abnormalities of urinary tract were significantly associated with ESBL CA-UTI.

OP 4

Molecular diversity of beta-lactamase genes in uropathogenic *Enterobacteriaceae* in two hospitals in Sri Lanka

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Introduction

Resistance in *Enterobacteriaceae* is increasing globally.

Objective

To identify gene types of beta-lactamases produced by uropathogenic *Enterobacteriaceae* in two hospitals in Sri Lanka.

Design setting and methods

A total of 422 isolates of *Enterobacteriaceae* were collected, 71.6% (302/422) from community acquired urinary tract infections (CA-UTI) and 28.4% (120/422) from hospital acquired UTIs (HA-UTI). Beta-lactamase producing isolates were identified by phenotypic tests and subjected to PCR to detect gene types.

Results

Beta-lactamase producing isolates from CA-UTI comprised 41.7% (126/302). Majority were *Escherichia coli* (68%, 86/126); 54.6% (47/86) with only extended spectrum beta lactamase (ESBL) genes, 43% (37/86) with both ESBL and AmpC beta-lactamase genes and 0.02% (2/86) with ESBL, AmpC and carbapenemase gene combinations. Thirteen percent (17/126) of isolates were *Klebsiella pneumoniae*; 35.2% (6/17) with only ESBL genes, 35.2% (6/17) with ESBL, AmpC and carbapenemase gene combinations, 23.5% (4/17) with ESBL and AmpC gene combinations and 5.8% (1/17) with only AmpC genes. CTX-M gene prevalence was (n=126) 84%. Prevalence of Amp C genes CIT, DHA, EBC and FOX were 23%, 7%, 6% and 2% respectively. Prevalence of NDM, IMP, VIM and OXA-48 carbapenemase genes were 6%, 2%, 1% and 1% respectively.

Beta-lactamase producing isolates from HA-UTI comprised 75% (90/120). Majority were *Escherichia coli* (58%, 52/90); 81% (42/52) with only ESBL genes, 17% (9/52) with ESBL, AmpC and carbapenemase gene combinations and 1% (1/52) with both ESBL and carbapenemase genes. *Klebsiella pneumoniae* accounted for 18% of isolates (17/90); 53% (9/17) with only ESBL genes, 23.5% (4/17) with both ESBL and carbapenemase genes and 23.5% (4/17) with ESBL, AmpC and carbapenemase

gene combinations. Prevalence of CTX-M gene was (n=90) 83%. Prevalence of Amp C genes CIT, EBC, DHA, and FOX were 15%, 6%, 4% and 4% respectively. Prevalence of NDM, OXA-48, IMP and VIM carbapenemase genes were 28%, 7%, 6% and 2% respectively.

Conclusions

A broad range of beta-lactamase gene types were seen in both CA-UTI and HA-UTI. Further distinction of ESBL genes (TEM/SHV/CTX-M) by sequence analysis is planned.

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OP 5

Preliminary study on VP1 gene based genotyping of BK virus in a cohort of renal transplant patients in Sri Lanka

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Introduction

BK virus (BKV) is a cause of common viral infection after kidney transplantation, which is associated with high risk of renal disorder called BKV associated nephropathy. BK virus has four main genotypes; I, II, III, and IV. Genotype II and III are rare, whereas genotype I is ubiquitous. However, persisting BKV genotypes and subtypes among Sri Lankan renal transplant patients have not been studied.

Objectives

To investigate the prevailing BKV genotypes and subtypes in a cohort of renal transplant patients in Sri Lanka.

Design, setting, and methods

Experiment was designed as a cross sectional molecular epidemiological study. Urine samples that are routinely sent to MRI with high viral load were obtained. Urine was concentrated by centrifugation at 2800×g for 15 minutes and DNA was extracted from sedimented urine using QIAGEN DNA Mini-kit. Conventional PCR was performed for the amplification of subtyping region of VP1 gene of BKV. DNA sequencing data were subjected to clustal-W alignment in BioEdit and MEGA6 software for the identification of the genotype and for subtyping followed by phylogenetic analysis respectively. Other relevant clinical and demographic data were analyzed using SPSS-20 software.

Results

Forty-one samples were included based on Real Time PCR results. Median age was 43 years and majority was males (76%). Of the 41, 25 samples gave positive results for conventional PCR. Persistent BK viral loads were varied from 1×10^3 to 3×10^8 copies/mL. BKV genotyping detected genotype I in 18 (72%) and genotype II in 7 (28%) of post renal transplant patients. BKV subtypes of Ia, Ib-1, Ib-11 and Ic were identified with the frequencies of 8/18 (44.4%), 5/18 (27.7%), 2/18 (11.11%) and 3/18 (16.67%) respectively. Compared to other BKV subtypes of genotype I, patients who were infected with BKV subtype I - b11 had significantly higher mean BK viral load ($8.5 \times 10^7 \pm 1.03 \times 10^8$; $p < 0.05$).

Conclusion

BK virus genotype I and II were prevailing among this cohort of renal transplant patients. Further studies are needed to investigate the prevalence of BKV genotypes in Sri Lanka.

OP 6

Japanese encephalitis virus as an etiology for acute encephalitic syndrome in Sri Lanka

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Introduction

Japanese encephalitis virus (JEV) is a leading cause for encephalitis in Sri Lanka. It is endemic in certain areas with sporadic cases reported from all over the country. Vector control and immunization (introduced in 1988 targeting high risk areas and changed to live-attenuated JEV vaccine to all children at one year by national immunization program in 2011) are the two major strategies undertaken for controlling the infection.

Objective

To characterize laboratory confirmed acute JE virus infection among patients with acute encephalitic syndrome in Sri Lanka from January 2011 to September 2017.

Methods

A retrospective study was conducted using all samples (CSF and serum) sent to JEV National Reference Laboratory, Medical Research Institute, Colombo (the centre for laboratory diagnosis of JEV infection in Sri Lanka) under acute encephalitic syndrome (AES)

surveillance over a period of seven years. All received samples were tested with a commercially validated anti-JEV IgM capture ELISA and all anti-JEV IgM positives were tested for anti-Dengue IgM to exclude false positives due to cross reactivity. Socio-demographic, seasonality and geographic data were collected using the accompanying request form.

Results

A total of 6087 cases with AES were tested. Case positivity rate was 4%. Highest rate was seen in 2012 (6.78%). Positivity decreased by 2015 (1.87%) but gradually increased over 2016 (2.78%) and 2017 (3.72%). Characterization of positive cases in 2017 depicted that 55.17% were females and mean age was 38.89 (SD 20.471) (age range: 4-71) years. Majority (68.9%) were >20 years with 20.69% in 26-35 years category. Western province (37.9%) and Ratnapura district (27.58%) reported highest case positive rate. In the year 2017 highest positivity rates were reported at the beginning of year (20.68% January, 51.7% February) coinciding with North-Western monsoon.

Conclusion

These data show that despite control measures JEV encephalitis is still a major public health problem in the country especially among the adult population not covered by vaccination and requires strengthening of vector control measures, immunization program, early efficient diagnosis and management together with active surveillance to reduce the case burden.

OP 7

Susceptibility of pregnant mothers to varicella – Do we need special actions?

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Introduction

Chickenpox in pregnancy carries a high risk of complications to the mother and the fetus. Although a highly effective vaccine is available it is not offered in the state sector of Sri Lanka. Post exposure prophylaxis with varicella specific immunoglobulin is costly and not readily available. Hence, immunization of susceptible women in pre-conception or post-partum period may be an effective strategy to prevent varicella in pregnancy. We evaluated a group of pregnant mothers for susceptibility to varicella by evaluating their varicella IgG status.

Objectives

1. To determine seroprevalence of anti-varicella IgG among the study group
2. To describe the role of history of natural infection/ vaccination as surrogate markers for immunity

Materials and methods

A hospital based descriptive cross-sectional study was carried out from August to December 2017 among 363 consenting pregnant mothers attending antenatal clinics of De Soyza Maternity Hospital. Data was collected using a pre-tested interviewer administered questionnaire; vaccination history was only by recall. Samples were tested for anti-varicella IgG by a validated commercial Enzyme Linked Immuno Sorbant Assay with a reported sensitivity of 99.4% and specificity of 97.0%. The assay was verified using pre-tested controls.

Study was approved by Medical Research Institute and National Hospital of Sri Lanka, Ethics Review Committees.

Results

Mean age was 28.5 years (SD 5.6). Majority (79.3%, n=288) was educated beyond GCE Ordinary Level. Varicella IgG was detectable in 239 (65.8%) and undetectable in 122 (33.6%). Two had equivocal results. The positive predictive value of history of natural infection was 90.6% and negative predictive value was 61.4%. Seven mothers gave a history of vaccination but only three of them (42%) were seropositive.

Conclusion

Significant proportion of pregnant women was susceptible for varicella infection, thus special preventive strategies such as pre-conceptional/post-partum vaccination should be considered for this population. Past history of chickenpox is a reliable indicator of immunity; however, absence of such history does not exclude presence of immunity. History of vaccination by recall was not a reliable indicator of immunity.

Acknowledgement

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OP 8

Hantavirus infection with pulmonary symptoms in North Central part of Sri Lanka

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Introduction

Hantavirus infection is an emerging zoonotic infection worldwide. Classical hantavirus infections in Euro-Asia present with haemorrhagic fever with renal syndrome (HFRS) and as hantavirus pulmonary syndrome (HPS) in America. Mixed clinical features have been reported from certain novel hantavirus infections. Clusters of patients with fever and non-cardiogenic pulmonary oedema have been reported from north central part of Sri Lanka in recent years.

Objectives

To detect hantavirus infection among clinically suspected patients and to describe clinical and demographic feature of hantavirus infection in north central Sri Lanka.

Methods

Clinically suspected patients with HFRS and HPS like illness admitted to District General Hospital (DGH) Polonnaruwa and Teaching Hospital (TH) Anuradhapura from December 2013 to November 2015 and from March 2016 to February 2018 were included in to the study. Acute phase blood samples were tested for presence of anti-hantavirus IgM using commercial immuno-fluorescence assay (IFA) and IgM ELISA. Convalescent blood samples were taken from available cases and both acute and convalescent serum were subjected to IgG titre detection by IFA. Patients' clinical and demographic data was obtained and analysed.

Results

Thirty seven patients from Polonnaruwa and 35 from Anuradhapura were included in the study. Twenty nine (40.28%) were positive for hantavirus IgM. Of them, 20 (68.97%) presented with pulmonary symptoms with no or mild nephritis. Five had pulmonary symptoms with prominent nephritis and 04 had classic features of HFRS. Four fold increase of IgG titter was detected in 06 of 08 tested patients. Among positive patients 19 (65.52%) were males. Majority (65.51%) were detected during paddy harvesting season.

Conclusion

In north central part of Sri Lanka, majority of hantavirus infection was associated with pulmonary symptoms complicated with non-cardiogenic pulmonary oedema, which was different from clinical presentation reported previously from other parts of the country. Classical HPS is unique to American continent, but this type of clinical features has been reported with Puumala and Puumala-

like viruses in central Europe. Further studies are needed to identify natural host and to describe virological characteristics of this causative agent.

OP 9

Species of atypical mycobacteria causing human disease – a laboratory based descriptive study in Sri Lanka

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Introduction

The mycobacterial species which do not cause tuberculosis or leprosy have been denoted as atypical, non- tuberculous (NTM) or mycobacteria other than tuberculosis (MOTT). These account for 5-6% of mycobacterial isolates nationally and rapid and accurate speciation of NTMs by a molecular diagnostic method is crucial for early targeted therapy.

Objective

To describe the species distribution of atypical mycobacteria in Sri Lanka including geographical location, patient's age, sex, past history of tuberculosis and disease entity.

Method

Stored 134 NTM isolates from pulmonary and extra pulmonary specimens at National TB Reference Laboratory in 2013 were identified up to species level using commercially available Line Probe Assay. Mycobacterial DNA was extracted from culture isolates and amplified by Polymerase chain reaction, amplified products were detected by enzymatic color reaction based on reverse hybridization technique. The data provided in request forms were extracted and analyzed.

Results

Of 134 culture isolates 132 (98.5%) gave interpretable results and 123 isolates (93%) were identified to the species level. Identified species in order of frequency are *M. fortuitum* (n=38, 31%), *M. intracellulare* (n=3, 27%), *M. abscessus* (n=26, 21%), *M. simiae* (n=11, 9%), *M. goodii* (n=6, 5%), *M. avium* (n=2, 2%), *M. kansasii* (n=3, 2%), *M. scrofulaceum* (n=3, 2%) and *M. lentiflavum* (n=1).

M. fortuitum and *M. abscessus* belong to Rapidly Growing Mycobacteria (RGM) were isolated prominently (52%) when compared to Slow Growing Mycobacteria.

Out of 134 samples, 124 isolates (93%) were from pulmonary sites.

Most isolates of NTMs belong to patients between 51 to 60 years age category followed by 61 to 70 category and 87% (n=109) had given past history of tuberculosis.

Conclusion

NTMs were isolated from pulmonary and extra pulmonary specimens in all districts of Sri Lanka, most frequently *M. fortuitum* (31%) *M. intracellulare* (27%) and *M. abscessus* (21%). Most patients were between 51 to 70 years with past history of tuberculosis. NTM disease on human health with species identification is worthy of further attention.

OP 10

Genetic diversity of isoniazid resistant Mycobacterium tuberculosis isolates in Sri Lanka

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Introduction

MIRU-VNTR (Mycobacterial interspersed repetitive unit-variable number tandem repeats) is a genotyping method that is used to identify the lineage of Mycobacterium tuberculosis (MTb) species. It is considered as the gold standard of MTb typing owing to its acceptable discriminatory power as well as the exchangeable and reproducible format of data generated by the method.

Objective

Genotype isoniazid (INH) resistant MTb isolates using MIRU-VNTR to identify the lineage to understand the genetic diversity among the study population.

Design, setting and methods

MIRU-VNTR typing was carried out using genomic DNA obtained from 30 INH resistant isolates obtained from National Tuberculosis Reference Laboratory (n=24), Central Chest Clinic (n=2) and the Department of Microbiology, Faculty of Medicine, Colombo (n=4). Twenty

four (24) different VNTR regions were amplified by manual PCR using specific primers flanking each VNTR region. Resulted PCR products were subjected to 3% agarose gel electrophoresis and observed under UV illumination. Sizes of PCR fragments were determined by comparison with the position of 100bp DNA ladder. The copy numbers were calculated using the conventions described in the literature. To identify the lineages, the MIRU-VNTR data were analyzed using VNTR plus web application.

Results

Among 30 isolates, a total of 5 distinct lineages: East-African-Indian (EAI) (n=6, 20%), Haarlem (n=2, 6.66%), Beijing (n=1, 3.33%), *M. tuberculosis* TUR (n=2, 6.66%) and *M. tuberculosis* NEW-1 (n=1, 3.33%) were observed. Eighteen isolates did not match with any lineage available in the MIRU-VNTR plus reference database.

Conclusions

East-African-Indian (EAI) is the most common lineage among the studied INH resistant isolates. However, lineage of 60% of isolates was not identified in the present study. It is possible that some of these unidentified isolates may belong to new lineages.

Discussion

It is best to spoligotype the isolates in addition to MIRU-VNTR to identify and to confirm the lineages. Furthermore, automated analysis of MIRU-VNTR using a sequencer would be more sensitive compared to manual method in determining the exact fragment sizes resulting from the PCR.

Acknowledgements

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OP 11

Evaluation of Microscopic Agglutination Test as a diagnostic tool during acute stage of leptospirosis in high endemic area in Sri Lanka

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Introduction

Sri Lanka is a highly endemic country for leptospirosis with an incidence >20/100,000 population. Western,

Sabaragamuwa and Southern provinces reported the highest number of cases. To diagnose leptospirosis by single microscopic agglutination test (MAT) titre is not possible due to the uncertainties of the cut-off titre. This study was carried out to determine the MAT cut-off titre in single acute specimen in early stage of leptospirosis and the endemicity of leptospira serogroups in the MAT panel.

Objective

To determine the diagnostic capacity of leptospirosis patients in acute stage using single sample MAT titre in high endemic area in Sri Lanka.

Method

A total of 297 serum samples were collected from healthy blood donors (n=197) and confirmed leptospirosis patients (n=100) from high endemic areas in Western Province. MAT was performed using live antigens of 12 leptospira serovars according to standard procedure. The Receiver operating characteristic (ROC) curve was used for the analysis.

Results

The sero-prevalence of the study population was 63.95% corresponding to high endemicity in the area. The ROC curves were significant for serogroups Tarrassovi and Semaranga with an area under the curve (AUC) 0.982 and 0.934 respectively. The ROC curve analysis for Tarrassovi revealed, 1/320 as the optimal cut off titre with 90% sensitivity and 99% specificity. Semaranga showed a very low sensitivity of 40.4% with 100% specificity at 1/320. Present cut-off titre in the National Reference Laboratory for a 'significant result' is $\geq 1/320$. The other serogroups did not show any statistically significant outcome.

Conclusion

There is significant endemicity in this study population with Tarrassovi and Semaranga serogroups. Our study concludes that optimal cut-off titre for acute single serum sample as 1/320 in MAT.

This study has been presented as a poster presentation in the 10th International Leptospirosis Meeting in November 2017 which was held in Palmerston North, New Zealand.

OP 12

Isolation of bacteriophages against *Listeria monocytogenes*

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Introduction

The emergence of developing multidrug resistance in microorganisms has become an alarming public health crisis. Bacteriophages can kill pathogenic bacteria and even the multidrug-resistant bacteria without affecting the normal microflora. For this reason, bacteriophages are a potential alternative to conventional antibiotics.

Objectives

This study aimed to isolate and characterise bacteriophages infecting *Listeria monocytogenes* recovered from food and wastewater samples collected from Serdang, Selangor, Malaysia.

Methods

A total of 122 different food samples including chicken, beef, shrimp, cockles, clam, vegetables and wastewater samples were used to isolate bacteriophages using *L. monocytogenes* strains as host. Phages were enriched from the samples and plaques were obtained by double layer agar assay. The titer and host range of the isolated bacteriophages were determined through spot plate method, while morphology of the isolated bacteriophages observed through the transmission electron microscopy (TEM).

Results

A total of six bacteriophages effective against *L. monocytogenes* were isolated. The titers of the isolated bacteriophages were found within the range of 10^2 - 10^8 PFU/mL. Morphological characteristics observed through the TEM revealed that the isolated bacteriophages belonged to family Myoviridae family. One isolated phage demonstrated broad host range with infecting six strains of *L. monocytogenes* while the others were able to infect only one strain.

Conclusion

Bacteriophages have the ability to lyse *L. monocytogenes* and potentially can be used as an alternative for antimicrobials.

OP 13

Polymicrobial etiology of infected chronic diabetic wounds

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Introduction

Majority of chronic diabetic wounds are infected and polymicrobial in etiology. Accurate identification of the pathogens are important for optimal wound care.

Objective(s)

The study aimed to identify aerobic and anaerobic bacterial pathogens in chronic diabetic wounds using culture and 16S-rRNA gene sequencing.

Design, setting and methods

A prospective study was carried out at Department of Microbiology, University of Sri Jayewardenepura. Fifty patients with chronic diabetic wounds were included in the study. Two wound debridement specimens were collected from each patient during surgical debridement and subjected to aerobic and anaerobic culture.

Specimens were processed according to the standard Microbiology Operating Procedure (SOP). Colony morphology, Gram stain and the battery of biochemical tests were used for presumptive identification. Identification of anaerobes was performed using Rapid ANA II panel and confirmed by 16S-rRNA gene sequencing.

Results

The patient age ranged between 30-84 years and wounds were located on their lower limbs. Their C-reactive protein levels ranged from 10-393 mg/L, white blood cells counts were between $9.2-28.1 \times 10^3/\mu\text{L}$, neutrophil counts were $15.1-22.8 \times 10^3/\mu\text{L}$ and haemoglobin levels ranged from 5.3-14g/dL. Direct Gram stain revealed >25 pus cells/LPF (Low Power Field) and presence of organisms which indicated infection. Aerobes and facultative anaerobes were isolated from all fifty specimens. Fourteen (28%; N=50) were positive with obligate anaerobes. *Fingoldia magna* (12%) was the predominant followed by *Peptoniphilus harei* (4%), *Anaerococcus* spp. (4%) *Peptostreptococcus russelli* (2%), *Peptostreptococcus anaerobius* (2%), *Streptococcus intermedius* (2%), *Propionibacterium acnes* (2%), *Veribaculum cambience* (2%), *Bacteroides* spp. (2%), *Prevotella bivia* (2%) and *Prevotella buccalis* (2%). Anaerobes coexisted with common aerobes and/or facultative anaerobes in 14 specimens.

Among aerobes/facultative anaerobes, *P. aeruginosa* (58%) was the commonest followed by beta-hemolytic *Streptococci* (22%) and methicillin-resistant *Staphylococcus aureus* (MRSA) (18%). MRSA were isolated together with one or more other bacterial species including species of *Streptococci*, *Pseudomonas*, *Enterococci*, *Acinetobacter*, *Corynebacteriae*, *Veribaculum* and family *Enterobacteriaceae*.

Out of total fifty specimens 47 had more than one species indicating polymicrobial etiology.

Conclusions

Majority of chronic diabetic ulcers were infected with multiple pathogens. Commonest anaerobe was *Fingoldia magna* followed by aerobes/facultative anaerobes: *Pseudomonas aeruginosa*, beta-hemolytic *Streptococci* and MRSA.

Acknowledgements

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OP 14

Genotypic characterization of extended spectrum beta lactamase producing genes blaTEM, blaSHV, bla CTX-M among Uropathogenic *Escherichia coli*

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Introduction

Escherichia coli accounts up to 80% of urinary tract infection. Extended spectrum beta lactamases (ESBLs) production among UPEC (Uropathogenic *E. coli*) strains are increasing nowadays which reduces the treatment options to limited number of antibiotics making the clinical management of UTI deleterious. Some bacteria may show variations in their phenotypic and genotypic expressions. blaTEM, blaSHV and CTX-M genes are the common β -lactamase producers which were studied with specific oligonucleotide primers using PCR.

Aim

To characterize ESBL producing uropathogenic *Escherichia coli* using Polymerase Chain Reaction.

Materials and Methods

A total of 208 *E. coli* strains isolated from urine samples were confirmed by conventional culture and biochemical methods and antibiotic susceptibility test was done using Kirby Bauer disc diffusion method as per CLSI guidelines. ESBLs were screened for isolates which showed resistance to third generation cephalosporins (Ceftriaxone and Ceftazidime) using Cefazidime and Ceftazidime plus clavulanic acid and further confirmed by Cefotaxime and Cefotaxime plus clavulanic acid. DNA extraction was done by boiling lysis method. Genotypic characterization was done for all 208 isolates to detect the presence of TEM, SHV and CTX-M genes by conventional PCR.

Results

A total number of 208 *E. coli* were isolated of which 38% were screened and confirmed as ESBL producers using double disc approximation test. 40.8% and 37.9% were resistant to Ceftazidime and Ceftriaxone respectively. Genotypically, 39% were ESBLs with CTX-M 60.2%, TEM 54.2% and SHV 10.8%. Association of these three genes

in single bacteria was also noted. Three isolates were phenotypically confirmed for ESBL in the absence of TEM, SHV or CTX-M. Also in five isolates ESBL (4 TEM, 1 CTX) genes were present without phenotypic expression.

Conclusion

CTX-M is the common ESBL gene detected in this study. The presence of combinational genes signifies the rate of increase in β -lactamase production. Presence of ESBL genes without phenotype expression may be due to mutation, varying substrate affinity or inoculum effect. Phenotypic expression in the absence of studied genes may be because of different β -lactamase genes present in the bacteria.

OP 15

First point-prevalence study of inpatient antimicrobial use in five public hospitals in Southern Sri Lanka

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Introduction

Inappropriate antimicrobial use is associated with adverse drug effects and antimicrobial resistance. Understanding prescribing practices is important for optimizing antimicrobial use.

Objective

The objective of this study was to determine the prevalence, types, and indications for systemic antimicrobial use in government hospitals in Sri Lanka.

Design, setting and methods

A point-prevalence study was conducted among inpatients at one tertiary, one secondary, and three primary-level government hospitals in Southern Province, Sri Lanka. From June-Aug 2017, all patients in medical, surgical, pediatric, and intensive care wards were included. Charts were assessed for systemic antibiotic, antifungal, and antiviral use in 1-day point-prevalence studies. Demographics, clinical characteristics, and antimicrobial use data were recorded from charts. Hospital and patient

characteristics associated with antimicrobial therapy were assessed using the Chi-square test and Kruskal-Wallis tests. Potentially inappropriate antimicrobial use was defined as the receipt of two beta-lactam antibiotics or two antibiotics with activity against anaerobes or *Pseudomonas aeruginosa*.

Results

A total of 1,709 patients were included (69.6% tertiary, 21.7% secondary, and 8.7% primary). Patients were in medical (55.2%), surgical, (27.2%), pediatric (12.9%), and intensive care wards (4.7%). Overall, 54.7% of patients were receiving antimicrobials. Antimicrobial use prevalence was similar across hospital type ($p=0.439$), but varied by ward type: 43.1% in medical, 68.0% in surgical, 61.1% in pediatric, and 97.6% in intensive care wards ($p<0.001$). Commonly used antimicrobials were amoxicillin/clavulanate (33.8%), 3rd generation cephalosporins (23.6%), metronidazole (16.6%), narrow and extended-spectrum penicillins (15.8%), clarithromycin (12.3%), 2nd-generation cephalosporins (10.7%), and carbapenems (10.4%). Common antimicrobial indications were lower respiratory tract infections (20.7%), soft tissue infections (9.4%), urinary tract infections (9.7%), and surgical prophylaxis (7.8%). Of patients receiving antimicrobials, potential inappropriate use was seen: 9.2% double anaerobic coverage, 7.6% double beta-lactam coverage, and 1.5% double *P. aeruginosa* coverage.

Conclusions

In this first point-prevalence study of antimicrobial use in public hospitals in southern Sri Lanka, over half of inpatients were found to be receiving antimicrobials. High antimicrobial use and potentially inappropriate antimicrobial use should be addressed by future antimicrobial stewardship efforts.

OP 16

Emergence of non-mecA mediated resistance among Methicillin Resistance *Staphylococcus aureus* clinical isolates in Teaching Hospital Kurunegala, Sri Lanka

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Introduction

Staphylococcus aureus (SA) is a highly virulent pathogen. Many Methicillin resistance SA (MRSA) infections occur

in hospitals and healthcare facilities. Rapid and accurate identification of MRSA is required to initiate appropriate antimicrobials and take infection preventive actions.

Objective/s

To compare ceftioxin disc diffusion (FOX), oxacillin agar dilution (Ox) and PBP2a latex particle agglutination (PA) (3 phenotypic methods) test for detection of MRSA.

Methods

Laboratory based experimental study using a comparative in-vitro assay conducted in Teaching Hospital, Kurunegala from April 2017-September 2017. Clinical isolates with catalase, tube coagulase and DNase positive SA were used. Ox minimum inhibitory concentration (MIC) was calculated ($MIC \geq 4 \mu\text{g/ml}$ - confers MRSA) using agar plate dilution method while ceftioxin 30 μg discs use and zone of inhibition was measured and interpreted according to CLSI guideline ($\leq 22 \text{ mm}$ confers mecA mediated resistance). PBP2a latex agglutination kit (Oxoid™) was used to detect PBP2a. Chi-square test was employed to assess the MRSA detection association between 3 tests.

Results

Out of 148 SA, 71 (57.25%) isolates were MRSA by FOX method. A total of 81 (65.3%) SA isolates were found to be MRSA by Ox. Among them, 52 (64.2%) isolates had MIC of $>128 \mu\text{g/mL}$ (high level oxacillin resistant strains). Out of 148 SA, 72 (58.1%) isolates were positive by PA. Nine out of the 10 isolates that tested resistant to oxacillin and susceptible to ceftioxin were found to be negative by PA. A 7.25% (9/148) rate of non-mecA mediated resistance in SA was measured. The sensitivity of Ox methods for detection of PBP2a mediated methicillin resistance was 87.8%. The specificity of Ox method was lesser (85.25%) than that of FOX method (98.1%).

Conclusion

CLSI gives ceftioxin as the surrogate marker for detection of methicillin resistance among SA. Emergence of non-mecA mediated resistance would lead to false negative methicillin resistance. This would ultimately lead to therapeutic failure. In addition to FOX, implementing non-mecA mediated resistance detection assays would increase the sensitivity of methicillin resistance testing among SA.

PP 1

Epidemiology, risk factors and outcome of bacteraemia associated pyelonephritis in a tertiary care center in Sri Lanka

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Introduction

Pyelonephritis is one of the commonest causes to have a positive blood culture among the patients admitting with infections.

Objective

To study the epidemiology, associated factors and outcome of bacteraemia associated pyelonephritis.

Methodology

Prospective descriptive study of pyelonephritis with bacteraemia was carried out for 15 months from October 2016 to December 2017 in a tertiary care center. Data were collected from laboratory records and clinical notes. Duplicate cultures and single cultures with coagulase negative *Staphylococcus* were excluded.

Results

A total of 209 bacteraemic patients with evidence of pyelonephritis were analysed. Majority were females (55%). Involvement of >60 years and 40-60 years was 54% and 25% respectively. There were 15 (7%) paediatric patients below 12 years.

Most bacteraemic patients (176, 84%) had associated factors such as diabetes (32%), immunosuppression and malignancy (18%), chronic kidney disease (CKD, 8%), urinary calculi and stents (6%), structural anomalies (5%), and others (8%). Multiple factors were identified in 7% cases. Five patients were post kidney transplant.

Escherichia coli was the predominant isolate among the positive blood cultures (56%) which was followed by 11% *Klebsiella* species, 7% *Pseudomonas* spp, 5% *Enterococcus* species and 4% *Candida* species. Overall, 84% isolates were Gram negative bacteria while 10% bacteraemia was due to Gram positive bacteria. Emerging pathogens such as *Burkholderia pseudomallei* (1%) were detected. Among *E. coli* 76% and 61% of *Klebsiella* spp were extended spectrum beta lactamase producers (ESBL).

There was significant association of ESBL *E. coli* bacteraemia with female gender ($p < 0.05$). Association of total ESBL bacteraemia with diabetes was not significant ($p > 0.05$).

Carbapenems were the most frequently (65%) used antibiotic in the treatment. The 14 days mortality rate during the study period was 3%.

Conclusions

In this study bacteraemic pyelonephritis had female and elderly (>60 years) predominance. Diabetes was the most frequently associated risk factor. *E. coli* caused majority of bacteraemia. There was significant association between female gender and bacteraemia by ESBL producing *E. coli*. Frequent use of carbapenem based regimes may be justified due to high rates of ESBL bacteraemia.

PP 2

Microbial flora of high vaginal swabs of pregnant mothers with premature rupture of membranes and their association with neonatal infections at a tertiary care hospital in Sri Lanka

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Background

Premature rupture of membranes (PROM) can occur due to multiple factors including infections. PROM causes both maternal and foetal complications with significant perinatal morbidity and mortality.

Objectives

- To describe the colonizing aerobic bacteria in high vaginal swabs (HVS) from mothers presenting with PROM
- To describe the antibiotic susceptibility pattern of identified bacteria
- To determine the relative risk of infections in neonates of PROM mothers compared to neonates of mothers without PROM

Method

This is a cohort study conducted at a selected teaching hospital over four months. Study group included 144 pregnant mothers with clinically confirmed PROM and randomly selected 148 mothers without PROM. HVS collected from mothers with PROM were processed to identify aerobic bacteria and their antibiotic sensitivity pattern according to the standard methods. All neonates born to both groups were followed up for one month to detect the development of neonatal sepsis and relevant data were collected by using an interviewer administered questionnaire.

Results

A positive culture result was found in 131 (90.97%) specimens. The predominant organism isolated was Coagulase negative *Staphylococcus* (37.15%). Other clinically significant organisms were coliforms (14.67%) with 78% and 93% resistance to ampicillin and co-amoxiclav respectively; Group B *Streptococcus* (13.76%) with 100% sensitivity to penicillin and 94% to erythromycin, *Candida* spp (10%), and *Staphylococcus aureus* (2.75%) with 17% being MRSA. Though mothers with preterm PROM were given antibiotic prophylaxis, neonatal sepsis in the PROM group (n=24, 17.4%) was statistically significant compared to Non PROM group (n=5, 3.5%).

The relative risk of getting an infection in neonates of mothers with PROM was 4.94 (95% CI=1.93 - 12.57; Attributable risk = 0.138; Attributable risk percentage = 79.7%).

Conclusions

The clinically significant vaginal colonising flora of PROM mothers were coliforms and Group B *Streptococcus*. Coliforms had high resistance rates for ampicillin and co-amoxiclav. There is a strong association observed in PROM and neonatal sepsis. If PROM can be prevented, there is 79.7% possibility of preventing neonatal infections.

PP 3

Case report of meningoencephalitis by *Elizabethkingia meningoseptica*; diagnosed by positive blood and CSF cultures

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Introduction

Elizabethkingia meningoseptica is a Gram negative bacillus ubiquitously found in the environment (soil and water, fish and frogs) but increasingly reported as a nosocomial pathogen.

Meningitis is the commonest presentation in neonates whereas respiratory tract infection in adults. The organism has been implicated in a spectrum of infections in severely immunocompromised patients.

Case report

A 65 year old male with late onset epilepsy presented with altered level of consciousness and convulsions. At the local hospital he was treated with IV ceftriaxone with no response. On admission, patient was empirically put on IV meropenem and IV vancomycin and later electively intubated.

His white blood cell count was $30 \times 10^9/L$ and the CRP was 173 mg/L. CT brain revealed left parietal infarction with mild hydrocephalus.

Both his blood and cerebrospinal fluid (CSF) cultures became positive with an oxidase positive, non-fermentative, pale yellow, vancomycin sensitive Gram negative bacillus which was later identified as *Elizabethkingia meningoseptica* by automated ID system. His CSF full report showed a bacterial picture.

Following the cultures, while IV vancomycin was continued, IV ciprofloxacin and oral cotrimoxazole high doses were added. This combination of drugs resulted immediate satisfactory response in fever and the conscious level and was continued for 28 days. Patient recovered with residual weakness.

Discussion

Elizabethkingia meningoseptica (formally called *Flavobacterium*) is a rare cause of meningitis in adults often with immunosuppression or with nosocomial origin. Outbreaks have been reported in United States with 30% mortality rate. However, our patient did not have any evidence of such risk factors. Though the exact source was not identified, fishing in a lake by his house could not be excluded. This report could be one of the rare cases where both CSF and blood cultures became positive for the organism.

The organism produces beta lactamases and is naturally resistant to most beta lactams including carbapenems. It is typically resistant to aminoglycosides and colistin. Fluoroquinolones are usually active in vitro while doxycycline and cotrimoxazole susceptibility is variable. Vancomycin alone or in combination with other agents including rifampicin has been successful.

PP 4

Proportion of carbapenemase production and selected associated factors among *Enterobacteriaceae* clinical isolates in two tertiary care hospitals

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Introduction

Enterobacteriaceae is a large family of Gram negative bacilli causing a range of infections. Carbapenemase producing *Enterobacteriaceae* have been emerged as a global threat in healthcare. Many associated factors have been identified contributing to production of carbapenemases.

Objectives

To detect the carbapenemase production in *Enterobacteriaceae* isolates from clinical specimens and to identify associated factors with carbapenemase production like age and gender of patients and the duration of hospital stay.

Design, setting and methods

A descriptive cross sectional study was carried out using 120 clinical isolates of *Enterobacteriaceae* at Colombo South Teaching Hospital and Sri Jayewardenepura General Hospital from 22nd of November to 30th November 2017. All isolates were identified up to species level by API 20E kits. Resistance to carbapenem was detected using meropenem, imipenem and ertapenem. Modified Hodge Test (MHT) was performed to confirm the production of carbapenemases according to Clinical and Laboratory Standards Institute guidelines.

Results

Out of 120 isolates, 14 (11.7%) were resistant to at least one of the carbapenems tested. Carbapenemase production was confirmed in 10(8.3%) isolates. Majority of the confirmed isolates were *Klebsiella* spp (6, 60.0%) followed by *Escherichia coli* (1,10.0%), *Serratia marcescens* (1, 10.0%) and *Proteus mirabilis* (1, 10.0%). From carbapenemase producing isolates, 6 were from urine specimens (60.0%), 2 were from catheter tips (20.0%), 1 each from wound swab (10.0%) and bronchial aspirate (10.0%). Eight (80.0%) out of the carbapenemase producing *Enterobacteriaceae* harboring patients were

males and 8(80.0%) were aged above 50 years. Mean duration of hospital stay was 5.03 Days ($\pm$ SD 12.287 days).

Being a male and age above 50 years were found to be of no significant association (P value=0.253, CI=95%, P value=0.955, CI=95%).

Conclusion

The proportion of carbapenemase producing *Enterobacteriaceae* was 8.3%, emphasizing the importance of strengthening infection prevention and control strategies. Male gender and age above 50 years did not have significant association with occurrence of carbapenem resistant *Enterobacteriaceae*.

PP 5

BK virus viraemia among the post kidney transplant patients at Nephrology and Transplant Unit, Teaching Hospital, Kandy – A single center experience of pre-emptive measures

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Introduction

BK virus (BKV) is an ubiquitous human polyoma virus with seroprevalence of 60-90% among adult population worldwide. After primary infection it becomes latent in the genitourinary tract and reactivates with immunosuppression, hence become an important infection among the post kidney transplant patients. It causes a variety of clinical conditions ranging from asymptomatic viraemia with or without viruria to ureteral stenosis and obstruction, interstitial nephritis and subsequent graft damage and graft loss due to BKV allograft nephropathy. As there is no specific treatment, early detection and intervention is important.

To detect the prevalence of BK virus viraemia among post kidney transplant patients at Nephrology and Transplant Unit, Teaching Hospital, Kandy and to highlight the importance of BKV screening for early detection and necessary intervention.

Method

All renal transplant patients at Nephrology and Transplant unit, Kandy were screened for BK virus at 1, 2,3,6,9, 12 months and then annually following transplant. Screening

of blood was done by real time quantitative PCR assay using validated commercial kit. A retrospective analysis of clinical and virological data was done from March 2017 to February 2018. Viraemia of $>10^4$ copies/mL was considered as significant and subjected to intervention.

Results

275 patients' data was analysed. 73.82% (n=203) were males and 26.18% (n=72) were females. Nineteen (06.91%) had significant viraemia of $>10^4$ copies/mL and 12 (04.36%) had viraemia of 10^3 - 10^4 copies/mL. BKV viraemia with 10^2 - 10^3 copies/mL was 21 (07.63%). There were 23 (08.36%) with viraemia of $<10^2$ copies/mL and no viraemia detected in 200 (72.73%) patients. Among patients with significant viraemia, 12 (63.16%) were detected within first year of transplant and 06 (31.58%) were within the first three months. Eight patients had evidence of nephropathy with viraemia of $>10^4$ copies/mL and one had with viraemia of 10^3 - 10^4 copies/mL.

Conclusion

The prevalence of BKV viraemia (27.27%) with a 6.91% significant viraemia detected in post kidney transplant patients was significant in this study compared to previous cross sectional studies in Sri Lanka. Hence screening is justifiable for early detection and for appropriate intervention.

PP 6

Seasonality of Respiratory Syncytial Virus from respiratory samples received at National Influenza Centre (NIC), MRI from 2011 to 2014

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Introduction

Respiratory Syncytial Virus (RSV) causes significant morbidity and mortality among children. Seasonality of RSV might be helpful to clinicians, epidemiologists and other stakeholders. A study for a lengthy period of time from both outpatient and inward patients has not been reported.

Objective

To determine the seasonality of RSV and age groups affected, from the samples received at NIC.

Methods

Respiratory samples that were sent from OPD and wards for RSV diagnosis were subjected to immunofluorescent

assay-IFA (Dako-Imagen UK) from May, 2011 to December, 2014. Monthly average positive rates were calculated. Demographic details and clinical data were obtained retrospectively, from completed request forms available at the laboratory.

Results

Out of 3184 samples received from all nine provinces of Sri Lanka during this period, 120 (3.8%, range 2% to 10%) were positive for RSV by IFA. Single peak was observed with the highest mean positive rate in July (11%) followed by August (7.2%), September (6.7%), June (5.8%) while lowest positive rate was seen in December (0.5%). Age group affected were 1 month to 11 months (56%), 1-4 years (33%), 5-9 years (6%), 10-15 years (2.6%), >15 years (1.7%). From the received samples, RSV positive percentages were in-ward 53%, outpatient department 12% and 13% intensive care unit respectively. Of the complete clinical data available (n=65), majority had presented with bronchiolitis features (58%).

Conclusion

Peak activity of RSV was observed from July to September. According to this study 1 month to 11 month group was found as the most affected age group. This data might be helpful for resource allocation and planning.

PP 7

Bacterial and viral aetiology of acute lower respiratory tract infection in a selected group of children admitted to a tertiary care hospital in Sri Lanka

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Introduction

Viral and bacterial agents are the common causes of acute respiratory tract infections. Studies that probe for both groups are rare in Sri Lanka.

Objective

To determine the aetiology of acute lower respiratory tract infection in children admitted to Lady Ridgeway Hospital.

Methods

Patients admitted with severe acute respiratory symptoms during the study period of 4 months from May, 2015 were randomly selected. Nasopharyngeal aspirates/swabs were obtained and eluted RNA was subjected to

real-time commercial PCR assay (IVD/CE approved) for the detection of influenza A/B, para influenza and respiratory syncytial virus (RSV). Bacterial cultures were done by semi-quantitative method using sputalysin. Socio-demographic profile and, radiological findings were gathered.

Results

Out of 75 children (age range 1 month to 11 years), 77% (n=58) were positive for pathogens. Out of that only bacterial pathogens were detected in 20% (n=15) whereas only viruses were detected in 30.7% (n=20). Both categories were detected in 30% (n=23). The most frequent bacteria and viruses were *Moraxella*, *Haemophilus influenzae*, *Pseudomonas*, *Pneumococcus* and RSV, parainfluenza, Influenza A, respectively in descending order.

80% (n=60) of children were already on antibiotics. Of this subgroup pathogenic bacteria, viruses and mixed infections were in 23.3% (14/60), 30% (18/60), 30% (18/60) respectively while a pathogen was not detected in 16% (10). There was no statistical significance in above observation ($p=0.6270$, $p>0.05$).

White blood cell counts were available only for 75% (n=53). Out of 30 patients who had radiological changes 24 had either a bacterial or viral aetiological agent.

Conclusion

An aetiological agent was identified in majority of specimens. *Moraxella*, *Haemophilus influenzae*, *Pseudomonas*, *Pneumococcus* and RSV, parainfluenza, Influenza A were the most frequently identified pathogens.

Age group	Population distribution%	Bacteria Positive %	Virus positive %	Mixed infections%
Less than 1 year	32%	45.8%	79.2%	37.5%
1-4 years	25.3%	52.6%	68.4%	36.8%
>4 -10 years	34.7%	65.3%	53.8%	30.7%
Over 10 years	08%	50%	33.4%	33.4%

	Percentage	Bacteria positive% (culture)	Virus positive% (PCR)
Neutrophil predominance %	77.36%(41/53)	56%(22/41)	46.3% (19/41) $p=0.5408$
Lymphocyte predominance %	22.64%(12/53)	25%(3/12)	75%(9/12) $p=0.0007$

PP 8

A retrospective study to identify seasonal trends of rabies in dogs and cats in Sri Lanka from 2004 to 2017

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Introduction

Seasonality is characteristic of many infectious diseases. Strong correlation between mating of dogs and monsoon seasons has been observed in India. These temporal factors can affect rabies related statistics. Knowledge on the temporal factors for dog and cat rabies, which are considered as the major reservoir for rabies virus in Sri Lanka, is needed to assess risk to public health and develop effective, sustainable disease control measures.

Objectives

1. To identify periods during the year that more specimens of dogs and cats are received for rabies diagnosis; and higher percentage of rabies positives reported at the National Rabies Reference Laboratory (NRRL).
2. To suggest temporal factors that may influence rabies dynamics in dogs and cats.

Method

Records on rabies diagnosis of brain samples of dogs and cats, from 2004 to 2017 were analyzed with time. Chi-square test was used to demonstrate the temporal effects.

Results

Specimen receipt for rabies diagnosis occurred throughout the year, however an increase during January-March for dogs which is end of Northeast (December-February) and beginning of first inter-monsoon (March-April) season was observed (3315/11937; 27.8%). Similarly, for cats, July-September which is end of Southwest monsoon season (May-September) was observed (1174/4131; 28.4%). The lowest receipt of both specimens was reported in April. Monthly receipt of both specimens and incidence of dog rabies positives showed highly significant difference ($P < 0.01$). Monthly incidence of cat rabies showed no significant difference ($P > 0.05$). The highest percentage of positive was reported in August for dogs (64.5%) and in December for cats (24.2%). Cat specimens submitted for rabies diagnosis is significantly increased over the recent years.

Conclusions

Dog and cat rabies is endemic throughout the year. Although there are no pre-defined breeding seasons and records on species densities for Sri Lanka, increased contact rates between dogs during and following their natural mating time, leading to frequent fights could be the reason of recognized temporal peaks. Monsoon season is a temporal factor for dog specimen receipt and incidence in Sri Lanka which has a reported correlation with mating time in India.

PP 9

Waterproof dressings for infection reduction in haemodialysis

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Introduction

Haemodialysis is a treatment modality used in end stage renal disease. Patients undergo dialysis regularly, usually twice or more per week. Access is required to obtain an adequate blood flow throughout the haemodialysis process. Permanent haemodialysis catheters are one method of dialysis access, used in about 25% of haemodialysis patients in our unit. These are inserted through the internal jugular vein, and exit through a tunnel, with a cuff to prevent ascending infections. Following dialysis, these catheters need covered dressings. Regular gauze dressings were used in the past. These had to be kept dry, and imposed lifestyle restrictions. Waterproof dressings are the standard internationally. Such dressings permit the patient to wash and bathe with minimum restrictions. Therefore, these may prevent infections by encouraging personal hygiene. These were obtained through a donor, and used for several months. We studied the incidence of catheter related infections and patient satisfaction before and after use of waterproof dressings.

Objective

To study incidence of catheter related infections and patient satisfaction with waterproof dialysis catheter dressings

Methods

Patient details, lifestyle changes and infection rates were recorded using a predesigned data collection sheet by dialysis nurses, with consent. Catheter related infections were defined as any event needing antibiotic treatment for an infection thought to be associated with the dialysis catheter. Patient satisfaction was assessed using a visual analogue scale.

Results

Twenty nine patients were studied. Average age was 48.0 years and average duration on dialysis was 9.4 months. Average duration of waterproof dressing usage was 2.4 months. Average frequency of full body shower or bath before waterproof plaster use was 0, and after was 6.3 times per week. Infections for two months before was 0.3 per patient, and after was 0. Both results were statistically highly significant. Patient satisfaction with waterproof plasters was 9.7 on a scale of 1 to 10.

Conclusion

Waterproof dressing use was associated with decreased infections and increased patient satisfaction. These may improve morbidity and mortality due to catheter related infections, and be cost effective by reducing the need for expensive antibiotics.

PP 10

Eumycetoma by *Madurella grisea*. Report of a case observed in the Eastern part of Sri Lanka

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Case report

A fifty five year old male reported with history of progressively spreading and recurrent episodes of multiple sinuses discharging purulent material admixed with blood from the sole of his right foot for last 7 years. The onset was following an injury he suffered over his right instep while working in the fields. Dermatological examination of the right foot revealed non tender, hypertrophic cribriform scars over the instep, studded with nodules and sinuses discharging muco-purulent material time to time. There was no regional lymphadenopathy, impairment of mobility of right foot or gait disturbance. X-ray of the right foot revealed no bony involvement.

He was treated with different antibacterials for a long duration (5 years) and Itraconazole 100mg daily and Dapsone 100mg daily for one year duration.

Patient was referred to the microbiology clinic where the treatment was stopped. After 3 weeks patient developed pain and discharge from the foot sinuses again. Punch biopsy was performed and send for fungal and bacteriological studies.

Two weeks later a small conical, grey, folded growth with white powdery surface was noticed on the surface of the medium. The reverse was brown with peripheral diffusion of the pigment. Based on the colony characteristics and typical microscopic picture, the fungus was identified as *Madurella grisea*. The patient was started on oral Itraconazole 200 mg twice daily and responded well.

Conclusion

We re-emphasize proper sampling, correct diagnosis, and correct dosage of chemotherapeutic agents in order to achieve satisfactory results in a condition known to respond poorly to all known modalities of treatment.

PP 11

First ever report of an antibiotic stewardship programme in a Sri Lankan hospital: Reduction of use and cost of carbapenems and resistance in Gram negative organisms to carbapenems

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Introduction

While, antibiotic resistance due to misuse of antibiotic is a significant problem around the world, affluent countries tackle the challenge with antibiotic stewardship programs (ASP), though it may often appear an unrealistic goal in low and middle income countries (LMIC) including Sri Lanka(SL). However, the National Action Plan for Combating Antimicrobial Resistance was developed in line with the WHO Global Action Plan by the Ministry of Health along with the SL College of Microbiologists through multisectoral coordination in 2016 in SL.

A hospital wide ASP was introduced to a tertiary care hospital in 2016 with

- 1) Antibiotic authorization levels
- 2) Guidelines for reviewing of antibiotic prescriptions at 48 hours
- 3) Antibiotic dedicated drug chart
- 4) Monitoring the program with – carbapenem utilization, estimated cost (Sri Lankan Rupees) and incidence of carbapenem resistance in Enterobacteriaceae, Pseudomonas species and Acinetobacter species (Number of patients with carbapenem resistant organisms per 1000 patient-days).

Objective

To assess the outcome of the ASP in a Tertiary care hospital.

Method

This retrospective observational study evaluates the outcome of the first reported ASP from a hospital of SL. Data for the periods six months before and after introduction of ASP was compared and analysed.

Results

During the study period mean carbapenem consumption was reduced from 30.7 to 22.3 Defined Daily Doses per 1000 inhabitants per day, by 27.3% (p=0.218) despite an increase in patient number by 587 from 30,703 in the latter six month period, with an estimated cost saving of Rs.1,516,800 for the same period of time. When the monthly consumption of carbapenems was analysed according to the interrupted time series using ARIMA models the possibility of chance could not be ruled out.

Carbapenem non- susceptibility of all Gram negative organisms and Enterobacteriaceae were decreased by 21% (p=0.0055) and 27.9% (p=0.00001) respectively from the pre to post- intervention period.

Conclusion

Introduction of ASP led to reduction of carbapenem consumption, related cost and carbapenem resistance in Gram negative organisms. The system may be recommended for other hospitals in LMIC.

PP 12

Contribution of preventive dental treatment options to reduce dental infections among children

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Introduction

Antimicrobial resistance (AMR) denotes a global public health threat. Overuse and misuse of antibiotics could be considered as a major driver for development of AMR. Dental caries is one of the most common chronic childhood diseases often being neglected at early stages resulting in dental infections in late stages. Hence, it is important to minimize occurrence of dental infections among children as a prerequisite for minimizing antibiotic overuse or misuse.

Objective

To assess the contribution of preventive dental treatment options to reduce the occurrence of dental infections among children in Sri Lanka.

Design, setting and methods

A retrospective, cross-sectional study was conducted using the performance statistics of the data base for the period of 1st January to 31st December, 2017. The study setting was the Preventive Oral Health Unit (POHU) of the National Dental Hospital (Teaching) Sri Lanka. The POHU provides preventive oral health care to toddlers and children aged 1-9 years referred from the outpatient department of the dental hospital as well from special oral health screening programmes. The data were entered and analysed using SPSS-21 statistical package.

Results

22.7% of children presented with symptomatic late sequel of untreated dental caries. The rest of the children presented with untreated dental caries managed by

preventive oral health advice, fluoride application, simple restorations and referral for pulp therapy. Of total visits of 12872, 2305 (17.9%) comprised of prescribing antibiotics for symptomatic dental infections.

Conclusions

Providing preventive dental treatment for children has resulted in 77.3% of children not developing dento-alveolar infections in 2017. This was obtained by following up of children whom were managed by preventive oral health care. Hence, providing preventive dental treatment for children could be a viable option for minimizing antibiotic over use/misuse.

PP 13

Melioidosis presenting as community acquired pneumonia and complicated with lung abscesses: a case report

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Introduction

Melioidosis is common in Australia, Southeast Asia and is increasingly recognized in Sri Lanka. It presents in various forms which are difficult to identify and often mimics suppurative infections, tuberculosis, fungal infections, malignancy and systemic rheumatic diseases. Presentation may vary from local disease to disseminated abscesses, pneumonia and sepsis. Disease is common and severe in diabetics. We describe a case of non diabetic woman presenting with fever, septic shock, lung opacities and multiple abscesses.

Case report

A 28-year-old previously healthy female presented to medical ward with feeling generally unwell for four days. She complained of fever, productive cough, difficulty of breathing sharp right-sided chest pain and body weakness. Despite of having a course of antibiotics (Co-amoxiclav and clarithromycin), she remained unwell.

On examination, she was pyrexial (38.6 °C), tachycardic (127 bpm). Oxygen saturation on air was 97%. Chest had few crepitations and she had a mild hepatomegaly. There was no lymphadenopathy, jaundice, ascites or oedema. Blood results showed WCC $16.3 \times 10^9/l$, Hb 90 g/l, Na 132 mmol/l, K 3.9 mmol/l, urea 4.4 mmol/l, creatinine 62 $\mu\text{mol/l}$, ALT 9 iu/l, ALP 138 iu/l and CRP

141 mg/l. Her CXR showed consolidations in the right mid-zone and left lung base with an increased density at the right hilum. She was started on IV ceftriaxone, vancomycin and clarithromycin.

During her stay in the ward, she continued to suffer from fluctuating pyrexia. On day 8, she deteriorated and was transferred to tertiary care hospital for ventilator support. After admitting to the intensive care unit she died. Post mortem was done and it revealed the lungs were full of abscesses.

Her serum sample was positive 1/160 titer for Melioidosis. Blood culture was positive after few days for *Burkholderia pseudomallei*.

Conclusion

These infections need to be identified quickly and accurately so that patients can receive timely and appropriate medical care, which will increase their chances for survival. Also national reporting of melioidosis will be required to expedite case recognition and further understanding of the sources and transmission of this pathogen in the country.

PP 14

Permanent pacemaker associated infective endocarditis caused by a HACEK group of organism: a case report

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Introduction

Endocarditis due to HACEK group of organisms, *Haemophilus* spp, *Aggregatibacter* spp, *Cardiobacterium* spp, *Eikenella* spp and *Kingella* spp are reported rarely.

They have fastidious growth requirements and usually present as culture negative endocarditis.

Case report

A 22 year old male was admitted with fever for 2 weeks, with permanent pacemaker (PPM) implantation two years back. Patient did not have any identified risk factors than dental caries.

Transthoracic and Transoesophageal echocardiogram suggested lead endocarditis. Intravenous ceftriaxone and vancomycin were started taking 3 blood cultures.

Blood cultures signaled positive in 56 and 76 hours. Direct Gram stain showed slender Gram negative bacilli, however

did not grow on standard cultures. In anaerobic environment powdery growth was seen in 24 hours and similar growth on aerobic plates after 7-8 days. Growth around V and XV factor discs, not around X was noted.

With anaerobic pack, the isolate grew rapidly possibly due to adequate CO₂ concentration than a candle jar. Isolate was designated as probable *Aggregatibacter aphrophilus* based on Gram stain showing pleomorphic gram negative bacilli and culture characteristics, absence of haemolysis, V factor requirement and CO₂ dependence. Patient was treated with IV ceftriaxone for two weeks and oral cefixime for another 4 weeks with weekly review. Instructed on oral hygiene and remained well after a year of follow up.

Discussion

Former *Haemophilus aphrophilus* plus *Haemophilus paraphrophilus*, re-classified as single species based on multi locus sequence analysis. A commensal of oral cavity and reported in endocarditis and abscesses.

It was a late onset infection (> 6 months since implantation) by a rare pathogen belongs to HACEK group. Management of the patient had few limitations, intravenous antibiotics are recommended for endocarditis therapy, and evidences are insufficient for oral regime. Instead outpatient parenteral antibiotic therapy (OPAT) is recommended to reduce duration of hospital stay. Complete device and lead removal is recommended for definite infection, though it was retained.

This demonstrated the possibility to isolate fastidious organisms in a conventional microbiology laboratory with some attention and the need to establish outpatient parenteral antimicrobial therapy (OPAT).

PP 15

Clinically significant bacterial infections among patients with dengue at National Institute of Infectious Diseases (NIID)

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Introduction

Dengue fever (DF) predisposes the host to secondary bacterial infections (BIs). In DF, febrile phase usually

settles in 5 days. But some patients have a prolonged fever(PF). These patients are routinely given antibiotics for possible secondary BIs on day 6 of fever.

Objectives

To estimate the incidence and correlates of PF and secondary BIs in patients with dengue.

Design, setting and methods

This nested case control study was conducted at National Institute of Infectious Diseases (NIID) from December 2016 to March 2017. All clinically diagnosed patients (n=1452) with DF and Dengue haemorrhagic fever (DHF) were recruited for step-1. Step 2 compared all serologically confirmed dengue patients having PF (n=85) with a randomly selected control group whose fever settled in 5 days (n=58). Interviewer administered questionnaire, structured clinical examination, clinical records and investigations (C reactive protein and blood cultures) were used for data collection.

Results

Incidence of BI in dengue was 1.38% (n=20) and the incidence of BI in patients with PF was 22.4% (n=19). Vomiting, headache and DHF were significantly associated with prolonged fever ($p<0.05$). Patients with BI had more vomiting, C reactive protein (CRP) $>6\text{mg/dl}$ and a higher rise in white blood cell (WBC) count ($>2000/\mu\text{l}$) from day 5 to 6 ($p<0.05$). Absolute WBC, platelet count and highest recorded temperature were not significantly different in patients with and without BIs. Commonest focus was cannula sites and predominant isolate was *Staphylococcus aureus*. One fourth of patients (n=5) had bacteraemia due to coliforms (*Klebsiella*, *E coli* and *Serratia* spp.) with no evident focus.

Conclusions

Incidence of clinically significant BIs in dengue is low. Only patients with PF at high risk of BIs should be prescribed antibiotics. The presence of vomiting, high CRP and a higher rise in WBC from day 5 to 6 can be used to identify them. Cannula site infections should be looked for and treated to cover *Staphylococcus aureus* and *Acinetobacter*. In the absence of a focus, intravenous antibiotics to cover *S. aureus* and coliforms can be recommended as empirical therapy.

PP 16

Maternal colonization with Enterobacteriaceae species at term

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Introduction

Maternal colonization with organisms that are potential pathogens of neonatal sepsis is a reason for concern, particularly in the era of antibiotic resistance.

Objectives

To assess the rates of colonization of pregnant mothers with Enterobacteriaceae species at term and their transfer from mother to baby.

Methods

Two hundred and fifty pregnant women being admitted for delivery at term to Teaching Hospital, Peradeniya were screened with low vaginal swabs taken within 48 hours of admission and 130 of them were also tested on discharge. A peri-rectal swab from the babies born to them was taken at the time of discharge. Swabs were cultured using Microbiological methods, and antibiotic sensitivity testing was conducted as per CLSI guidelines. PCR based methods were done to detect markers of antibiotic resistance and for typing.

Results

The pre-delivery colonization rate for total Enterobacteriaceae species was 18.8%. The colonization rates for *Klebsiella* spp, *E. coli* and *Streptococcus agalactiae* were, 12.4%, 5.6% and 14.8% respectively. Two *Klebsiella* spp. and two *E.coli* isolates were confirmed to be ESBL producers. All four harboured *bla*_{CTX-M}. Post-delivery swabs were collected from 130 participants and the colonization rates were 41.5% for Enterobacteriaceae spp, 10.8% for *E.coli*, 25.4% for *Klebsiella* spp. and 10.8% for *S.agalactiae*. Three *Klebsiella* isolates and one *E.coli* isolate were confirmed to be ESBL producers. Three of the four ESBL producers harboured *bla*_{CTX-M}. Considering the 130 participants with both samples, there was a significant increase in the colonization with any Enterobacteriaceae spp. and *Klebsiella* spp. ($p<0.05$). There were 159 instances where a mother and the baby were both sampled. Same Enterobacteriaceae spp. was found in mother and baby in 15.1% of the pairs. However, with RAPD analysis, potential mother to baby transmission events were seen in only 6.9% of the pairs.

Conclusions

There is a trend towards increasing Gram negative colonization during hospital stay for delivery with potential for transferring maternal Gram negatives to new borne babies.

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PP 17

Point prevalence survey on antibiotic use and hospital acquired infections in a district general hospital

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District General Hospital, Kalutara

Introduction

National antibiotic policy was introduced in 2016 with the aim to reduce and rationalize antibiotic use. Baseline data on antibiotic use was lacking in most hospitals. Therefore, this study shows useful preliminary data on current practices in using antibiotics in a District General Hospital.

Objectives

- Describe the prevalence and pattern of antibiotic use in the hospital
- Identify the prevalence and types of hospital acquired infections among inpatients

Design, settings and method

Point prevalence survey was conducted in all wards at District General Hospital, Kalutara from 30/01/2017 - 07/02/2017 and each ward was visited once by the investigators. Percentage of patients on antibiotics at the time of survey in each ward were calculated. Basic demographic data, types of antibiotics and indications were collected from patient records. Hospital acquired infections (HAI) were defined as infection started after 48 hours of hospital admission and the rates of HAI were calculated per 1000 admissions.

Results

Total number surveyed were 613 and of them 36% (221/613) was on antibiotics. Adult intensive care unit (ICU) and surgical casualty had the highest rates of antibiotic use of 100% and 80.77% respectively. Antibiotic use in neonatal ICU medical, surgical casualty were 60.86%, 20.9% and 45.1% Commonest antibiotic used was coamoxiclav, 25.7% (74/288) and the cabapenem use was 3.1%. Intravenous formulations were used in 68.4% of occasions. Of all patients on antibiotics 53.8%, were given for community acquired infections and 9.5% were given for HAI. In 32.4%, the indication for antibiotic use was not clear or used as prophylaxis. Overall HAI rate

was 31.46 per 1000 admissions and the commonest HAI was wound infection which was 42.9% of all HAIs. Adult and neonatal intensive care units had the highest HAI rate of 333.3 and 173.9 per 1000 admissions.

Conclusion

Antibiotic use is fairly high in the hospital and nearly one third of patients the indication for antibiotic use was not clear or used as prophylaxis. Overall HAI rate was comparatively low in the hospital but more extensive study is needed for confirmation.

PP 18

Knowledge, attitudes and practices related to antibiotic resistance among a cohort of internet users in Sri Lanka

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Introduction

Knowledge and attitudes towards antibiotic resistance among the general public contributes to behaviours that promote the emergence and spread of antimicrobial resistance in the community.

Objectives

To assess the knowledge, attitudes and practices among a cohort of internet users in Sri Lanka on antibiotic resistance.

Methods

A self administered questionnaire was developed in English, translated to Sinhala, Tamil and administered through Google forms on social media. The questionnaire was pre-tested among a group of non health care related internet users. Questions pertaining to knowledge, attitudes and practices in relation to antibiotic resistance were included.

Results

Of a total 224 respondents 20 were doctors and excluded from the analysis. The mean age of the participants considered for analysis was 29.4 years (SD 7) with a range of 56 to 16 years. 58.8% were females. Majority (89.7%) of the participants were either graduates or undergraduates.

Of the study cohort, 93.1% stated that they knew what an antibiotic was while 72.1% stated that they had heard about antibiotic resistance. However, qualitative analysis of their definitions of an antibiotic and antibiotic resistance showed that understanding was not accurate.

Majority (90.7%) of the participants agreed that antibiotics are effective against bacteria even though 22.1% believed that any antibiotic is effective against any bacterial infection. However 22.6% agreed that antibiotics are effective against viruses and 35.3% of the participants agreed that antibiotics could cure a cold while 52.9 % believed that antibiotics can speed up the recovery from a cold.

79.4% believed that inappropriate use of antibiotics could lead to the emergence of resistance. Only 41.7% stated that they always finished a full course of antibiotics. However 37.3% stated that they sometimes use leftover antibiotics, 44.6% stated that they sometimes volunteer to give antibiotics prescribed to them to others and 49% acknowledged that they sometimes ask for antibiotics over the counter.

Conclusions

Our findings highlight the need for awareness programmes to educate the general public about antibiotic resistance and their role in preventing it.

PP 19

Distribution of respiratory syncytial virus subtypes A and B among a selected sample of children presenting with acute respiratory tract infection

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Introduction

Respiratory syncytial virus (RSV) is the most common virus causing severe acute respiratory tract infection (ARTI) in children. RSV consists of two major antigenic types (A and B). We have very limited data about the circulating types of RSV in Sri Lanka and the circulating types are important in the epidemiology of RSV infections including the evolution of RSV in an area.

Objective

To type the RSV strains circulating in a sample of hospitalized children in Sri Lanka with RSV associated ARTI detected by antigen detection using an immuno-

fluorescence assay (IFA) and to identify the disease severity in association with the infecting RSV type.

Design, setting and methods

Demographic and clinical data and nasopharyngeal aspirates (NPA) were collected from 274 children less than 5 years and with ≤ 4 days history of ARTI. The children were admitted to the General Hospital, Kegalle from July 2016 to November 2017. IFA (D3 Ultra™, USA) was performed on the NPA to detect seven to eight respiratory viruses including RSV. Of the IFA positive NPA, 76 were identified to be only RSV positive (27.7%). Viral RNA was extracted (Qiagen, Germany) from NPA to perform a real-time RT-PCR (Altona-Diagnostics EN) for typing.

Results

Of the 76 RSV positive children, 15 were infected with RSV A, 48 were infected with RSV B and 13 were co-infected with RSV A and B. RSV B was observed throughout the study period with a peak incidence in March to June 2017. RSV A was detected from March to August 2017. Overall a male predominance was evident in that 13/15 RSV A, 28/48 RSV B and 9/13 RSV A and B positive patients were males. RSV type did not appear to associate with any specific age group and respiratory disease severity, bronchopneumonia and mild, moderate and severe bronchiolitis in children < 5 years.

Conclusions

RSVB was the predominant RSV type circulating in children with ARTI in the study sample. Co-infections with RSV A and B existed in 13 children.

Acknowledgement

Financial support was from NSF/SCH/2017/01 - NSF, Sri Lanka.

PP 20

Knowledge, attitudes and practices related to rabies among the students at the Faculty of Allied Health Sciences at a Defence University in Sri Lanka

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Introduction

Rabies is a dangerous disease and it is most commonly caused by bites of rabid dogs. There are many gaps in

the knowledge, attitudes and practices with regards to animal bites and rabies in health care workers.

Objectives

To assess the level of knowledge, attitudes and practices related to rabies among the students in a health care setting at the Faculty of Allied Health Sciences, General Sir John Kotelawala Defence University (KDU).

Design, setting and methods

A cross sectional descriptive study was carried out among the students at the Faculty of Allied Health Sciences, KDU using a pre-tested, self-administered questionnaire as the data collection tool. Questionnaires consist of 3 parts, which are knowledge, attitudes and practices. The knowledge section included 12 questions and allocated 18 marks for those questions. Eighteen marks categorized into 3 levels such as, poor (0-10), average (11-14) and good (15-18).

Results

Six hundred and seventeen (89.42%) participated in the study and 455 (73.7%) were females. Majority of the participants were from BSc nursing degree program 251 (40.7%). Three hundred and seventy nine (60%) participants of the sample were pet owners. Of the total participants, 610 (98.9%) had previously heard about rabies and 558 (90.4%) participants knew that rabies is a fatal disease. Majority (575; 93.2%) has stated that the causative agent of rabies is a virus. Of the students, 321 (52.02%) included to the average knowledge category. knowledge score from answers to 12 questions were significantly associated with age ($p < 0.05$), academic year ($p < 0.05$) and the degree program ($p = 0.002$).

Although participants had positive attitude regarding immediate action following an animal bite, 591 (95.8%) of them were not aware about the institution, responsible for controlling stray dogs. Five hundred and forty seven (88%) had a good knowledge regarding immediate action following an animal bite and 520 (84.0%) were willing to get anti-rabies vaccine immediately after an animal bite. Younger undergraduates from the MLS and nursing departments had a significantly better knowledge.

Conclusions

The level of knowledge about rabies is average among the undergraduates and participants had positive attitude regarding immediate action after an animal bite. Further educational programs are needed to improve the knowledge, attitudes and practices regarding rabies among the undergraduates.

Key words: rabies, knowledge, attitudes, practices

PP 21

Retrospective analysis of laboratory confirmed measles and rubella cases in Sri Lanka, 2013-2017

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Introduction

Measles is a highly infectious viral pathogen responsible for severe morbidity and mortality in children. Despite the fact that a safe and effective vaccine is available for measles and included in the expanded immunization programme periodic outbreaks encountered in the past. Both rubella and congenital rubella syndrome incidence has been remained at record-low levels in Sri Lanka.

Objective

To characterize laboratory confirmed measles and rubella cases in Sri Lanka.

Design, setting and methods

Blood samples of patients with fever and maculopapular rash sent to National Virology Reference Laboratory adhering to sample collection and transport guidelines, were tested for measles IgM and negative samples tested for rubella IgM using ELISA. Data were obtained from laboratory records and analyzed using MS Excel.

Results

From 2013 -2017 total of 6868 samples received and 4797 (69.8%) were positive for measles while 1887 (27.5%) found to be negative and 125 (1.8%) equivocal. Highest number of laboratory confirmed measles cases were detected during 2013 ($n=1817$, 75.9%) closely followed by 2014 ($n=1593$, 73.7%) and 2015 ($n=1308$, 72.2%). However in 2016 ($n=74$, 23.9%) and 2017 ($n=5$, 2.6%) a drastic fall in number of measles cases were observed. Male preponderance (53.7%) was observed among positive measles cases. Majority of positive measles cases were less than 1 year (47.6%) and in further analysis 6-9 months were predominant. Out of the 23 districts in Sri Lanka majority of cases were from Colombo, Gampaha, Galle, Kalutara and Puttalam.

Total of 2071 samples were tested for rubella and 45 positive (2.2%), 1242 (59.9%) negative and 25 (1.2%) equivocal. Number of positive samples during 2013 to 2017 were 11 (1.9%), 11 (1.9%), 6 (1.2%), 5 (2.1%) and 12 (6.4%) respectively. Males were affected mostly ($n=27$, 60%). Most were belong to age category of 20-35 years ($n=17$, 37.8%).

Conclusion

Measles continues to be a significant public health problem despite vaccination. Number of rubella incidence remains low but the rates are sustained in a constant level. The need of continuous active surveillance for both measles and rubella cases are emphasized by this study.

PP 22

Distribution of influenza and parainfluenza viruses in a selected sample of hospitalized children with acute respiratory tract infection

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Background

Influenza and parainfluenza viruses (PIVs) are among the most common respiratory pathogens affecting children.

Objective

This study investigated the distribution and the spectrum of illness caused by influenza viruses and PIVs in a sample of hospitalized children.

Design, setting and methods

From May 2016 to December 2017, 374 nasopharyngeal aspirates (NPA) and clinical data were collected from children <5 years of age with ≤4 days' history of acute respiratory tract infections (ARTI) from General Hospital, Kegalle. NPA were tested using an immunofluorescence assay (D3 UltraTM, USA).

Results

Of the 374 NPA tested, influenza virus was detected in 47/374 (12.56%), of these 21/47 (44.68%) were influenza A and 26/47 (55.31%) were influenza B viruses. PIVs were detected in 43/374 (11.49%) children. Of these, 2/43 (4.65%) were PIV-1, 7/43 (16.27%) were PIV-2 and 34/43 (79.06%) were PIV-3 infections. PIV-4 was not tested due to the unavailability of reagents. Influenza A & B and PIV infections were predominantly detected in 6-20 months and 1-10 months age categories, respectively. Of the 21 children infected with influenza A, 9 were diagnosed with lower respiratory tract infection (LRTI) and 12 had bronchiolitis. Of the 26 infected with influenza B, 22 had bronchiolitis and 4 had bronchopneumonia. Of the 34 children infected with PIV-3, 25 had mild to moderate bronchiolitis, 7 had LRTI and 2 had bronchopneumonia. The child infected with PIV-1 and PIV-

2 had mild to moderate bronchiolitis. Of the 21 influenza A infected children, 4 had co-infection with RSV and one each with PIV-3 and Influenza B. Of the 26 influenza B infected children, 6 had co-infection with RSV and one each with PIV-3 and influenza A. Of the 34 PIV-3 infected children, 12 had co-infection with RSV and one each with influenza A and B. Of the 7 PIV-2 infected children, 1 had co-infection with PIV-1.

Conclusion

Influenza A and B and PIV infections occurred throughout the study period. PIV infections caused mild to moderate bronchiolitis whereas influenza caused LRTI to bronchopneumonia in children. Co-infection is common between PIV-3 and RSV.

Acknowledgement

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PP 23

Combination antifungal therapy for invasive candidiasis in patient with haematological malignancy

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Introduction

Invasive candidiasis appears to have increased among neutropenic population and have become a major cause of morbidity and mortality. Despite, timely diagnosis and management with appropriate antifungals according to sensitivity; clinical outcome might be unsatisfactory and necessitating treatment with combination of antifungal agents. Our case discussion is on management of invasive candidiasis with combination of antifungal agents.

Case history

A 7 years girl with Acute Lymphocytic Leukemia relapse admitted to National Cancer Institute for chemotherapy. She developed neutropenic sepsis following chemotherapy. Her blood culture was positive for *Candida* spp. while on IV Meropenem and IV Teicoplanin. Subsequently, IV liposomal Amphotericin B was added. The isolate was identified as *Candida tropicalis* sensitive to fluconazole and Amphotericin B, by the mycology reference laboratory at MRI.

As she developed respiratory distress, ICU care was given. On 8th day of IV liposomal Amphotericin B, 2nd blood

culture also became positive for same organism. Fever continued and patient developed generalized skin rash. Same organism was isolated from skin lesions. IV fluconazole was started instead of liposomal Amphotericin B due to poor treatment response.

The third blood culture was positive on 7th day of IV fluconazole along with deteriorating clinical condition. She developed spontaneous pneumothorax and IC tubes were inserted. Her HRCT chest and abdomen revealed multiple microabscess in lungs, liver and spleen. Endocarditis was excluded by 2DECHO.

IV voriconazole and high dose IV amphotericin B were started. As, the clinical condition was not improved with this combination, IV anidulafungin was added instead of voriconazole. The repeat blood culture became sterile after 5 days of combination therapy.

Patient clinically improved and antifungal treatment was continued. Repeat HRCT and CT scan was planned to assess the radiological response. Unfortunately, patient left against medical advice 8 weeks after starting antifungal treatment.

Discussion

Poor drug penetration due to multiple abscesses in liver, spleen and lungs and inadequate source control might have caused treatment failure. Even though, combination therapy is not recommended routinely for candidaemia, it can be practiced in difficult to treat cases as our patient. The recent trend has been to add an azole, flucytosine or polyene to echinocandin therapy.

PP 24

First-glance diagnosis of *Strongyloides stercoralis* hyper infection by stool microscopy

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Introduction

Strongyloides stercoralis known to cause hyperinfections in immunosuppressed individuals with potentially fatal manifestations.

Case report

A 65-year old known bronchial asthmatic female presented with complaints of wheezing, chest tightness, and fever for 5 days. She had defaulted treatment for an uncertain

period of time preceding this presentation. It was suspected that she may have used over-the-counter non-prescription medication during exacerbations of bronchial asthma.

On examination, the patient was dyspnoeic, with an SPO2 of 84% on room air. There were bilateral crepitations and rhonchi in the lungs on auscultation. Routine laboratory investigations revealed a neutrophil predominance with no eosinophilia. Her abdomen was soft and non tender, with no discernible organomegaly. Management commenced as per an exacerbation of bronchial asthma, with oral prednisolone 30mg mane and IV hydrocortisone 100mg 6 hourly.

In just over 12 hours, the patient deteriorated (with a drop in saturation, tachycardia and severe dyspnoea) in spite of ongoing treatment, and was transferred to the Intensive Care Unit. She was intubated soon after. A chest x-ray was suggestive of features of heart failure. On the third day of admission, the patient developed a watery diarrhea, with no visible blood, mucus, worms or proglottids. A stool sample was sent for examination. HIV test was negative. The stool workup revealed large numbers of larvae per high power field, with appearances highly suggestive of *Strongyloides stercoralis*. Treatment was commenced with oral albendazole 400mg once a day. Oral prednisolone and IV hydrocortisone were withheld. A second stool sample was obtained after administration of albendazole two doses and it showed only dead larvae.

Discussion and conclusion

Patients from *Strongyloides* endemic areas taking corticosteroids must be considered high risk for hyperinfection syndrome and newer diagnostic tests and broader screening of immunocompromised patients from *Strongyloides*-endemic areas is of paramount importance, particularly if prevention of life-threatening dissemination is the goal.

PP 25

Concurrent bacteraemia in adult patients with prolonged and severe dengue fever

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Introduction

Unrecognized concurrent bacteraemia in severe dengue infection associated with dual infection or super-infection may lead to increased morbidity and mortality, probably related to increased vascular permeability.

Objectives

To assess the incidence of concurrent bacteraemia (positive blood cultures taken within 72 hours of admission) in adult patients with prolonged and severe dengue fever.

To describe the clinical characteristics of patients with dual infection; concurrent bacteraemia in patients diagnosed with prolonged dengue.

Methods

A prospective study was conducted recruiting adult patients with diagnosed acute dengue infection who manifested prolonged fever (>5 days) admitted to Army Hospital, Colombo from January to December 2017. All clinically diagnosed acute dengue cases were confirmed by Dengue Non-Structural protein 1+ Dengue IgM/IgG Combo immuno-chromatographic assay. Two simultaneous aerobic-blood cultures from different sites were taken from such patients prior to initiation of antibiotic therapy and those who were on prior antibiotics were excluded. Demographic, clinical, haematological and biochemical parameters were recorded. Ascites and pleural effusions were detected using ultrasonography.

Results

Among 1517 patients with diagnosed acute dengue fever, 158 patients with prolonged fever were included in this study. Thirty-four (21.5%) of them revealed secondary bacteraemia. Eighteen of these cases (11.4%) had concurrent bacteraemia detected within 72 hours of hospitalization (78% males with mean age of 36 ± 11.7 years). Sixteen patients (10.1%) detected nosocomially acquired secondary bacteraemia (positive bacterial blood cultures taken >72 hours after admission), mostly related to peripheral cannula site infections.

Patients with concurrent bacteraemia had positive blood cultures; coliforms (n=7), *Staphylococcus aureus* (n=6, two of which were methicillin-resistant strains), *Acinetobacter* spp. (n=4), *Pseudomonas* spp (n=1) and one had mixed growth. Thirteen patients (72%) with concurrent bacteraemia were complicated with dengue haemorrhagic fever (DHF) / dengue shock syndrome (DSS) and 78% developed third space fluid accumulation. Apart from high grade fever and thrombocytopenia, severe arthralgia/myalgia (89%) and headache (83%) were frequently observed manifestations on admission. Among patients with dual infections, average duration of fever was 7.5 days (SD 1.68) and mean hospital stay was 9.8 days (SD4.67).

Conclusion

Although concurrent bacteraemia in adult patients with prolonged dengue fever is not common, they are

complicated with DHF/DSS resulting in longer hospital stay and morbidity. Septic screening including blood cultures may be considered prior to initiation of empiric antibiotic therapy in patients who are critically ill on admission or diagnosed with DHF/DSS.

PP 26

Prevalence of methicillin resistant *Staphylococcus aureus* (MRSA) in a tertiary care Hospital in Sri Lanka

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Introduction

MRSA has become a worldwide problem. The epidemiology of MRSA is now changing; infections are no longer confined to the hospital setting, but also appear in healthy community-dwelling individuals without established risk factors for the acquisition of MRSA.

Objectives

This study was aimed to determine the prevalence and antibiotic susceptibility pattern of MRSA at a tertiary hospital setting in Sri Lanka.

Design, setting and methods

Culture-positive results for *S. aureus* from the laboratory records at the General Hospital Ampara, from January to December 2017, were examined retrospectively for this study. Identification of *S. aureus* and antimicrobial susceptibility testing were performed according to Clinical and Laboratory Standards Institute guidelines. Community acquired MRSA is defined as, the MRSA-positive specimen was obtained within 2 days of hospital admission, and if it was from a person who had not been hospitalized within a year before the date of MRSA isolation.

Results

Of 385 *S. aureus* cases recorded during the 12 months period, 210 (54.5%) were found to be MRSA and 115 (54.75%) were reported from males. Majority, 123 (58.5%) were from the age group of 12 to 65 years and 9 (4.2%) were from age group of less than one month. While skin and soft tissue infections were responsible for 91.3%, relatively fewer cases were reported from blood cultures (8.5%) and no cases were from endotracheal secretions. Hundred and thirty five (64.2%) from surgical unit and four (1.9%) from intensive care unit. Sensitivity to Gentamicin, Ciprofloxacin, and Clindamycin were 80.9%,

78.0%, and 53.8% respectively. Of all antibiotics tested, highest resistance was shown against Erythromycin (70%).

Conclusion

In our study, the majority were skin and soft tissue infections with high susceptibility to non β -lactams which suggests high prevalence of community acquired MRSA infection. So, the need of strict infection control practices to control this situation is very important. Furthermore, antibiotic guidelines may also need modifications especially for the on admission management of patients with possible community acquired MRSA infection.

PP 27

Causative organisms, antimicrobial therapy and clinical outcome of patients with infective endocarditis at the National Hospital of Sri Lanka

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Introduction

Infective endocarditis (IE) is a potentially lethal disease that has undergone major changes in both host and pathogen. The epidemiology of IE has become more complex with today's myriad healthcare associated factors that predispose to infection.

Objective

To describe causative organisms, antimicrobial therapy and clinical outcome of patients with IE

Design, setting and method

Patients with IE who met the modified Duke's criteria and the follow ups referred for the microbiology opinion were included in the study. The study period was two years from 01.01.2016 to 31.12.2017. Relevant demographic, laboratory and clinical data were documented.

Results

Out of the fifty-eight patients, 54 (93%) were males. Age varied from 26 to 75 years, mean being 49.5. Fever was the presenting feature in 57 (98.3%) patients and eleven (18.9%) had complications. Nine (15.5%) had late onset prosthetic valve IE (PVE), 2(3.4%) had permanent pacemaker related endocarditis. Mitral was the most commonly affected native valve, 37/49 (75.5%) and 7/49 (14.2%) patients had more than one valve involvement. Thirty seven out of 49 native valve IE (NVE) patients had (75.5%) positive blood cultures.

Streptococcus spp. Viridans Group isolated from nine patients (24.3%), MSSA from seven (18.9 %), MRSA from four (10.8%), *Streptococcus anginosus*, *Streptococcus sanguis*, *Enterococci* and *Gemella morbillorum* isolated from two (5.4%), % each and one (2.7%) each were infected with CNS and coliform and one (2.7%) had mixed growth with *Enterococcus* and *Candida* species.

Six out of nine (66.6%) PVE blood cultures were positive for *Enterococcus* species, one (11.1%) *Streptococcus* spp. Viridans Group, one (11.1%) CNS, one (11.1%) *Candida* spp. and one (11.1%) MRSA.

Out of 14 *Streptococcus* and *Enterococcus* spp, 11 were tested for penicillin susceptibility. Out of that, eight (72.7%) were highly sensitive to penicillin but only one patient was treated with penicillin while the others were treated with ceftriaxone and vancomycin.

Four patients with PVE (44.4%) and 9 with NVE (18.3%) died of infection.

Conclusions

Streptococcus spp Viridans Group is predominant among IE patients and still shows good susceptibility to penicillin. PVE shows high mortality.

PP 28

Prevalence of *Campylobacter* species and their antibiotic sensitivity pattern among patients with diarrhoea in a paediatric Tertiary Care Hospital in Sri Lanka

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Introduction

Campylobacter is a major diarrhoeal pathogen. It is a zoonosis. Main pathogenic spp are *C. jejuni* and *C. coli*. Diarrhoea caused by *Campylobacter* is mostly self-limiting. Extra-intestinal infections like meningitis and endocarditis are rare. Guillain Barre Syndrome, reactive arthritis and irritable bowel syndrome are the post infection sequelae. Data on *Campylobacteriosis* is limited in Sri Lanka as only few laboratories process stool samples for *Campylobacter* detection.

Objectives

To determine the prevalence of *Campylobacter* spp among diarrheal patients in a paediatric tertiary care hospital and to determine their antibiotic sensitivity pattern

Method

Descriptive cross sectional study carried out on diarrhoeal patients at Lady Ridgeway Children's Hospital. Sample size was 204. Samples were collected from 1st October to 31st December 2017. After obtaining the informed consent, stool samples were collected into Cary Blair transport medium and sent immediately to MRI. Samples received after 24 hrs of collection were excluded. Samples were inoculated on *Campylobacter* selective medium and incubated micro-aerophilically at 42°C for 48 hours. Typical grayish flat irregular non hemolytic colonies were selected. *Campylobacter* was presumptively identified with characteristic sea gull wing appearance on Gram stain and the positive oxidase and catalase tests. Speciation was done using hippurate hydrolysis and indoxyl acetate tests. Phenotypic identification was confirmed by latex particle agglutination test. Antibiotic Susceptibility Test was done by disk diffusion method (CLSI M-44 3rd edition 2016) for erythromycin, ciprofloxacin and tetracycline.

Results analysis

Isolation rate of *Campylobacter* species was 8.82% (n=18). Only *C. coli* and *C. jejuni* were isolated. Proportion of *C. jejuni* was 66.6% and that of *C. coli* was 33.33%. Overall *Campylobacter* resistance to erythromycin, tetracycline and ciprofloxacin were 22.22%, 66.66% and 83.33% respectively. Ninety one point sixty six percent (91.66%) of *C. jejuni* showed sensitivity to erythromycin but 58.33% were resistance to tetracycline and 75.00% were resistance to ciprofloxacin. *C. coli* showed comparatively higher resistance to each antibiotic. Resistance rates were 50% to erythromycin, 83.33% to tetracycline and 100% to ciprofloxacin.

Conclusion

Surveillance data on *Campylobacter* species and antibiotic sensitivity pattern are essential for selection of treatment options.

PP 29

Gardnerella vaginalis bacteraemia in a critically ill patient: a case report

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Introduction

Gardnerella vaginalis (GV) in women causes bacterial vaginosis commonly but is a rare cause of bacteraemia. In men, it is even rarer but there are reported cases typically associated with immunocompromised states. We present a report of GV bacteraemia in a man with hemiparesis, prostatomegaly and probable urosepsis.

Case report

An 86 year old male patient who was diagnosed to have left sided cerebro-vascular accident, hypertension, chronic kidney disease, prostatomegaly and previous history of recurrent culture positive UTI was presented to a medical ward with loss of appetite for 3 weeks and lack of responsiveness for 1 day. On admission he had fever of 101°F and low blood pressure (80/50 mmHg) and unconsciousness. Initial investigations revealed high blood urea, serum creatinine, Na⁺, K⁺, CRP and WBC with neutrophilia. He was managed as having septic shock with concurrent hypernatraemia and uraemic encephalopathy. After taking blood for cultures, IV meropenem was started empirically. The patient succumbed to his critical condition on the day following admission. However, 4 days after admission, his blood culture flagged positive in the automated system. Direct smear was not quite distinctive. The following day, culture plates revealed no growth. On further incubation for another 24 hours, there was a powdery growth of grayish non-haemolytic (on sheep blood agar) colonies. Gram stain revealed Gram variable short bacilli. Isolate was negative for oxidase and catalase tests. Identification by Vitek-2® identification system identified the isolate as *Gardnerella vaginalis*. The antibiotic susceptibility test was not performed due to the unavailability of required cards.

Discussion

GV is a common cause of bacterial vaginosis in females and rarely causes bacteraemia in them. GV bacteraemia is even more scarcely reported among men. The reported cases of bacteraemia in the past had identifiable risk factors such as immunosuppression, anatomical genitourinary abnormalities and alcoholism. The former two could be attributed to this patient too. If not for the identification given by Vitek-2®, identification was not very straight forward in the conventional manner. This highlights the importance of further processing blood cultures that signal positive but reveal no growth after 24 hours.

PP 30

Suppurative cervical lymphadenopathy caused by *Klebsiella pneumoniae*

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Cervical lymphadenopathy in adults is uncommon without underlying immune-deficiencies. Bacterial infections can cause cervical adenopathy due to the draining of oropharyngeal infections or by the local infection within the node as a lymphadenitis.

Staphylococcus aureus, *Streptococcus pyogenes* and *Mycobacterium tuberculosis* being the most common causative organisms, it's very rare to get Gram negative organisms including *Klebsiella pneumoniae* as the aetiology.

Case report

A 34 yrs old previously healthy male admitted to the hospital with high fever of 104°F and right sided neck swelling for one day. Ultra sound scan of neck revealed multiple enlarged right cervical lymphnodes, largest of 2.6cm/1.5cm in size and with evidence of early abscess formation. On admission CRP was 105.9 mg/L and WBC 13.0 with 75% of neutrophils.

Ceftriaxone and levofloxacin were started by the Chest Physician and lymph node aspiration taken for microbiology and cytology.

Culture yielded pure growth of *Klebsiella pneumoniae*, sensitive to co-amoxiclav, cefuroxime, ceftriaxone, ciprofloxacin, gentamicin and meropenem and was resistant to ampicillin and levofloxacin. Treatment was changed to IV co-amoxiclav after 2 weeks of ceftriaxone. Chest X-ray showed normal lung fields and chest involvement excluded, Mantoux test was negative.

Fine needle aspiration of the cervical lymphnode showed features of acute suppurative inflammation.

Fever settled by 6th day of antibiotic treatment and CRP reached below 6mg/L in 20 days.

Although patient clinically felt better, the reduction of the size of lymphnode was slow even after 25 days of treatment, where repeat aspiration done and biopsy taken for histology.

Repeat aspiration did not have a growth; biopsy report was similar to the previous.

Discussion

Cervical lymphadenopathy caused by *Klebsiella pneumoniae* is very rare in healthy people with normal serum glucose levels, and causes doubts about the significance of the organism among clinicians. *Klebsiella pneumoniae*

with similar antibiogram has been reported in a patient in Taiwan with pyomyositis, brain abscesses and deep neck abscesses. *Klebsiella pneumoniae* causing Lemierre syndrome and deep neck abscesses have been reported, but similar mild cases were rare, where further investigation on the organism may be important in the management of similar patients.

PP 31

Sero-prevalence of type-specific Herpes Simplex virus infection: retrospective analysis among clinically suspected patients

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Introduction

Herpes Simplex Virus types 1 and 2 (HSV1/2) are common sexually transmitted infections with serious sequelae. Complications in later life are also a probability due to the characteristic nature of latency and reactivation of the virus. The sero-prevalence of HSV 1/2 will highlight the risk of primary infection and risk of transmission in a defined population.

Objective

To analyze the sero-prevalence of type-specific antibodies to HSV-1 and HSV-2 among clinically suspected patients with HSV infection.

Methodology

This retrospective study analyzed 892 blood samples from patients with clinically suspected HSV infection and its probable complications, received at Medical Research Institute, for testing of HSV antibodies, from November 2016-March 2017. Testing was performed using a commercially validated type-specific antibody ELISA kit for HSV1/2 glycoproteins. The IgM/IgG results were analyzed using descriptive statistics, with clinical profiles and socio-epidemiological data obtained from request forms.

Results

Of 892 samples, HSV-IgM was positive in 5% (46/892) and HSV-IgG was positive in 56% (498/892).

Of samples positive for IgM, 3% (7/281), 4% (8/186), 18% (15/82), 5% (16/318), 0% were detected and IgG was detected in 86% (243/281), 36% (66/186), 30% (25/82), 44% (141/318), 92% (23/25) of samples belonging to

age groups <28 days, 28 days to 1 year, 1-14 years, 15-50 years, and >50 years, respectively. HSV-IgG positive rate among males was 48% (238/498).

Among same age groups, HSV-1 IgG positive rates were 75% (211/281), 32% (59/186), 27% (22/82), 37% (118/318), 60% (15/25), HSV-2 IgG, 4% (12/281), 2% (4/186), 1% (1/82), 4% (13/318), 12% (3/25), and HSV-1,2 IgG, 7% (20/281), 2% (3/186), 2% (2/82), 3% (10/318), 20% (5/25) respectively.

In the study population, suspected clinical profiles noted were neonatal infection (281), genital lesions in pregnancy (5), genital lesions alone (7), uveitis (15) and encephalitis (30). Their positive rates were 3% (7/281), 20% (1/5), 57% (4/7), 20% (3/15), 43% (13/30) respectively, with HSV-2 predominance (57.14% [16/28]).

Conclusions

The mean HSV-IgG sero-prevalence was 56% whereas HSV-1 sero-prevalence was higher than HSV-2. Also HSV-1 has higher prevalence in all age groups than HSV-2.

Further, HSV-IgG sero-positivity is increased with age, and noticed highest among adults >50 years.

The fact that considerably low prevalence was observed in the study population, including young adults, indicates the risk for neonatal herpes infection, if a pregnant female develops infection.

Interestingly HSV-2 infection was identified in patients with uveitis, with possibility of either primary or reactivation of HSV infection.

PP 32

Acute respiratory viral infections: an important cause of admissions for febrile illness in the Southern Province, Sri Lanka

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Introduction

The contribution of respiratory viruses to acute febrile illness varies widely throughout the world.

Objective

The objective of this study was to determine the prevalence and etiology of acute respiratory viral illnesses among patients hospitalized with fever in southern Sri Lanka.

Design, setting and methods

Consecutive patients admitted with fever to the adult and pediatric wards of the largest tertiary care hospital in the Southern Province were enrolled from June 2012- October 2014. Epidemiologic and clinical data and a nasal/nasopharyngeal sample were obtained. Alternate samples were tested using multiplex polymerase chain reaction (Luminex 100 NxTAG Respiratory Pathogen Panel which detects 19 respiratory viruses and 3 bacteria). Demographic and clinical characteristics associated with a positive respiratory test were identified using the Fisher exact test.

Results

A total of 964 patients were enrolled during the study period; median age was 26.2 years (IQR 14.6- 39.9 years) and 646 (67.0%) were male. Approximately one-fifth (205, 21.3%) of patients tested positive for a respiratory pathogen. The most common pathogen detected was influenza (134, 13.9% of all patients), with 9.1% having influenza A. Other common etiologies included human enterovirus/ rhinovirus (13, 1.4% of all patients), parainfluenza virus (13, 1.4%), respiratory syncytial virus (11, 1.1%), human metapneumovirus (11, 1.1%), and bocavirus (0.7%). Two patients had a bacterial respiratory pathogen identified (1 *Mycoplasma pneumoniae*, 1 *Chlamydophila pneumoniae*) and 7 (0.7%) had respiratory co-infections. Children <5 years of age were more likely to have a respiratory pathogen identified (52.3% versus 16.4%, p<.001) compared to patients ≥5 years. Half of patients (112, 55.2%) with a respiratory virus were treated with antibiotic therapy at enrollment, with common antibiotics being erythromycin (18.2%), second-generation cephalosporins (13.3%), and penicillins (11.1%). Two patients reported a history of influenza vaccination.

Conclusions

Respiratory viruses were an important cause of admission for acute febrile illness in southern Sri Lanka, and over half of patients with respiratory viruses received antibiotic therapy. Measures to reduce respiratory viral burden and associated unnecessary antibiotic therapy are needed.

Financial assistance by the National Institutes of Allergy and Infectious Diseases in the US (K23AI125677) and the Office of Naval Research to the Emerging Infectious Diseases Programme, Duke-NUS Graduate Medical School, Singapore is acknowledged.

PP 33

Viral aetiology in adult pneumonia at two Tertiary Care hospitals in Colombo District

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Introduction

Viral aetiology in adult pneumonia is underestimated and with the development of molecular methods the importance of viral aetiology in pneumonia is increasingly being recognized worldwide. In Sri Lanka, studies on adult pneumonia are scarce and no study has been published in respiratory viral detection by multiplex polymerase chain reaction (PCR).

Objective

To characterize viral aetiology in adult pneumonia patients

Design, setting and method

Descriptive cross sectional study was conducted in Colombo South Teaching Hospital and National Hospital of Colombo from December, 2016 to April, 2017. Adult patients admitted with acute respiratory symptoms within five days and imaging evidence of pneumonia was included. Nasopharyngeal swabs were collected and nucleic acids were extracted. Elutes were subjected to an in-house, validated multiplex real-time PCR (NIC, Pune, India) for 13 viruses/subtypes. Socio-demographic profile, risk factors, radiological findings and other relevant information were analyzed using SPSS software.

Results

From total of 99 patients, mean age was 56 years (range 18-84, SD-15.6) Common co-morbidities were respiratory abnormalities (40.3%), hypertension (34.3%) and diabetes (27.5%), whereas multiple co-morbidities were common (83.9%). Majority presented with purulent sputum and dyspnea. Intensive care unit admissions were 06% and mortality among the study group was 03%. CURB-65 pneumonia severity score, ranged from 0-3 and the prevailing score was 1 (n=61). Antibiotics and oseltamivir were prescribed in 96.9% and 12.1% of respectively. In Fifty three (53.5%) samples at least one virus was detected. Commonly encountered viruses were influenza A (27.2%), rhinovirus (18.2%), bocavirus (14.1%) adenovirus (11.1%) and parainfluenza (5.1%). Influenza B and RSV were not detected. Multiple viruses identified in 17.1% (n=17) and frequent combinations were adenoboca (52.9%, n=9) and influenza A-rhino (29.4%, n=5). Multiple viral identification was associated with 01% of mortality. Out of 27 influenza A positive patients, only five (18.5%) were prescribed oseltamivir.

Conclusion

Viral identification was common in this cohort. Performing multiplex RT-PCR enables to detect many respiratory viruses. Further studies with a larger number of patients for lengthy time are recommended to elucidate epidemiology of pneumonia due to viruses.

PP 34

Analytical sensitivity of a qualitative reverse transcriptase real time polymerase chain reaction assay for detection of enteroviruses

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Introduction

Cell culture isolation is the conventional method used in poliovirus (PV) and other enterovirus (NPEV) detection in WHO Polio Laboratory Network. Maintenance of cells needs skills and time, while reduced cell sensitivity can lead to false negative results. Regular checking of cell sensitivity for optimized poliovirus isolation is a very laborious procedure. It is known that real time polymerase chain reaction assay (rt-PCR) have increased sensitivity with minimal requirement of staff, skills and time in detecting viral nucleic acids in clinical samples.

Objective

To determine the analytical sensitivity of a commercial Reverse Transcriptase rt-PCR assay for the detection of PV and NPEV in stool samples.

Method

Analytical sensitivity of a commercial enterovirus Reverse Transcriptase rt-PCR assay was determined in three steps with negative controls.

First, poliovirus types 1 (PV-1), poliovirus type 3 (PV-3) or NPEV positive six processed faeces (PF) specimens, received as the external proficiency test (PT) panel were included in the rt-PCR assay.

Secondly, PV-1 or NPEV positive PF (positive from cell culture isolation at MRI) prepared from three faeces samples received at MRI were also tested in the rt-PCR assay.

Lab quality controls (LQCs) for PV-1 & PV-3 prepared from authenticated Sabin Poliovirus Reference Strains procured from NIBSC were diluted in ten-folds and tested in cell sensitivity test (CST) to observe cytopathic effects.

Same viral dilutions ranging from 10^{-5} - 10^{-8} were tested by rt-PCR assay and compared with CST results.

Results

All PF both from PT panel and clinical faeces samples showed positive results in rt-PCR assay. LQC virus dilutions showed cytopathic effects for both poliovirus types only in the dilutions of 10^{-5} - 10^{-6} in CST, but not for 10^{-7} - 10^{-8} dilutions. PCR assay showed positive results in all dilutions for PV-1 and PV-3, except for PV-3 in 10^{-8} .

Conclusions

Reverse Transcriptase rt-PCR assay is capable of detecting PV-1, PV-3 and NPEV from PF and it is also more sensitive in detecting LQC for PV-1 & 3 than conventional cell culture assay.

PP 35

Diagnostic, therapeutic monitoring of tuberculosis patients of silk city by telemedicine

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Introduction

In this era of telecommunication, the number of mobiles in a family outnumber the members living in the same household. It simply explains the importance of this device and its inevitable role in an individual's routine. It can be used not only for personal and official communication but also for medical purposes such as bringing telemedicine in diagnostic and therapeutic management of TB patients in rural area.

Objective

To study diagnostic and therapeutic monitoring of Tuberculosis patients attending our pulmonology department.

Study design, setting and methods

The study was carried out on clinically suspected cases at the Department of Pulmonology and the patient's houses during Oct to Dec 2015. It was done in three different phases.

Phase I: The faculties and patients were informed separately about this Telemedicine project by a sensitization program.

Phase II: The selected, willing participants were divided into two categories as those who had mobile phones with talking facility only and those with mobile phones with video and Skype facilities.

Phase III: Collection and analysis is of the video chats were done for the completion of the project. SPSS 20 was used for statistical analysis.

Results

Of the 75 participants 51 (68%) were found to be AFB positive for TB acid fast stain and culture, Thirty seven patients who needed direct follow up had mobile phones with video and Skype. Among them 32 were highly interactive, communicating with the treating pulmonologist at the given time for therapeutic monitoring.

Conclusions

Telemedicine is very effective in the diagnostic and therapeutic management of TB patients in rural tertiary care centers. Can be a useful tool to prevent the occurrence of resistance development in TB causing bacteria, and the follow up of multidrug resistant disease.

PP 36

Prevalence and characteristics of self-reported antibiotic allergy among adult patients who presented at the outpatient department (OPD), North Colombo Teaching Hospital (NCTH), Ragama

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Introduction

Although the reported prevalence of antibiotic allergy is high (10%) in Western countries, the characteristics and prevalence of antibiotic allergy in Sri Lankan population is not known.

Objectives

To determine the prevalence of self-reported antibiotic allergy among adult patients who presented at OPD, NCTH and to describe the characteristics of their reaction.

Methods

A cross sectional descriptive study was conducted among 1500 randomly selected patients >12 years of age who presented at the OPD, NCTH, from August-November 2017. The data were collected using an interviewer-administered questionnaire.

Results

Of 1,500, only 53 patients (3.5%) reported an allergic reaction to any antibiotic during their lifetime. The commonest culprit antibiotic group was beta-lactams, for which 37 patients had a reaction (70%). Only six patients had reactions to non-beta-lactams. Fifteen patients did not know the name of the culprit antibiotic while six patients had reactions to multiple antibiotics. Most (87%) had reactions following oral administration and only 31 patients (58%) had the reaction within 1 hour of drug administration. Urticaria was present in 43 patients (81%), while 22 had angioedema, 10 patients and 19 patients developed respiratory and gastro-intestinal symptoms respectively. Twelve patients (22%) had symptoms of anaphylaxis. The reaction was diagnosed by a physician in 43 patients, however only 33 patients had it documented. Of the 53 patients, 19 patients had been exposed to the same culprit antibiotic subsequently prescribed by a physician out of whom 14 patients developed a similar reaction following exposure. Of the allergic population, 13 patients were afraid of taking any kind of antibiotic, while 15 and 14 patients respectively think that their treatments were compromised by the allergic history and that they will outgrow their allergy in future.

Conclusion

Prevalence of self-reported antibiotic allergy among OPD patients in NCTH was lower than that is reported in Western countries.

PP 37

Molecular characterization of *Mycobacterium tuberculosis* isolate from a Sri Lankan wild elephant

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Introduction

Tuberculosis caused by *Mycobacterium tuberculosis* is an emerging zoonotic disease among captive and wild elephants worldwide and a known reverse zoonosis among captive elephants. Descriptive molecular analyses help to predict spatial localization and identification of the phylogenetic relationships of *M. tuberculosis* isolates.

Case report

The objective of the current study was molecular typing of a *M. tuberculosis* isolate previously obtained from an approximately 35 years old female wild elephant succumbed to tuberculosis. The animal was found in a moribund state in the corridor between Udawalawe and Lunugamwehera National Parks in Sri Lanka. The affected elephant had no known previous human contacts (translocations, treatment etc.) however, wild elephants at road boundary of Udawalawe National Park are routinely fed by travelers despite warnings. There are no known wildlife reservoirs for tuberculosis in Sri Lanka. Mycobacterial Interspersed Repetitive Unit – Variable Number Tandem Repeat (MIRU-VNTR) typing was performed to identify the molecular fingerprinting pattern of the *M. tuberculosis* isolate using 15 MIRU loci (MIRU 4, MIRU 10, MIRU 16, MIRU 26, MIRU 31, MIRU 40, ETRA, ETR C, Qub 11b, Qub 26, Qub 4156, VNTR 47, VNTR 52, VNTR 53, VNTR 1955). Triplex PCR was carried out for simultaneous amplification of three distinct loci and size of the amplicons was analyzed manually using the Gene tools software. Reference strain H37Rv was used as a positive control to verify the results for a particular locus. The MIRU copy number per locus was determined according to the previously described conventions and the data was analyzed using the MIRU-VNTRplus web application.

Discussion

According to the MIRU-VNTR pattern, the isolate belongs to the East African-Indian (EAI) lineage which has been reported as a predominant ancestral genotypic lineage in India and this is considered as one of the worldwide epidemic strains, and the most common genotype in Sri Lanka. Similarly, a recent study on *M. tuberculosis* isolates from three captive elephants died of tuberculosis in Nepal was also belonging to the EAI lineage. Therefore, molecular characterization of *M. tuberculosis* isolates is vital for the identification of disease transmission patterns especially in areas with low prevalence of the disease and involvement of wildlife.

PP 38

Adherence to standards of care in the management of *Staphylococcus aureus* bacteraemia: A re-audit

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Introduction

Staphylococcus aureus bacteraemia (SAB) is associated with a mortality of 20-30% and suboptimal management can significantly impact on the associated morbidity. An audit on management of SAB in 2014 identified several areas to be improved and a standardized blood culture documentation sticker containing advice on the management standards was introduced to use at bacteraemia ward reviews.

Objective

To assess the improvement of adherence to the standards and to compare the results of a previous audit through a re-audit.

Methods

Retrospective case note analysis done on all patient with SAB from September to December 2016. Compliance of adherence to SAB management standards of performance of echocardiogram, and identification of source, removal of central venous catheters (CVCs), follow up blood cultures sent 2-4 days after the first positive blood culture, proper duration of antibiotic therapy (minimum of 14 days in uncomplicated bacteraemia and 4-6 weeks in complicated bacteraemia) and Microbiology bacteraemia ward reviews were assessed.

Results

Re-audit was done on notes of 13 patients with SAB. Compliance with echocardiography improved from 79% to 100%. Ninety percent of patients were fully investigated including echocardiogram and other imaging studies for a source of infection.

Rates of source identification was good in both studies with 86% and 80%. Compliance of removal of CVCs was 100% in the re-audit and it was not determined in the previous audit.

Collection of follow up blood cultures 2-4 days after positive blood culture showed marked improvement from 43% to 90%.

Overall compliance with proper duration of antibiotic therapy was around 80% in both studies. Reviewing of the patients with SAB at wards by Microbiology team improved significantly from 50% to 80%. Blood culture documentation sticker was used in 70% of cases.

Conclusions

Use of blood culture documentation sticker with pre-printed advice at bacteraemia ward reviews improved documentation, standardizes advice and led to better compliance with management standards in SAB.

It is recommended to continue Microbiology bacteraemia ward reviews with blood culture documentation stickers.

PP 39

Prevalence and sensitivity profile of bacteria in urine cultures of pregnant mothers at a tertiary care maternity hospital

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Introduction

Urinary tract infections (UTI) are the most common bacterial infections during pregnancy. The susceptibility is increased during gestation due to the hormonal and anatomical changes that contribute to the urinary stasis and vesico-ureteric reflux. There is an association between UTI with preterm labour and low birth weight.

Objectives

To identify the common etiologic agents of symptomatic UTI and asymptomatic bacteriuria of pregnant mothers and to determine their antibiotic sensitivity pattern.

Methods

Retrospective analysis was done on all urine cultures of antenatal mothers processed from September 2017 to January 2018. Basic biochemical tests and UTI chromogenic agar was used for the identification of organisms. Antibiotic sensitivity testing was performed using CLSI method.

Results

During the study period, a total of 512 urine cultures from antenatal wards and clinics were processed.

Out of them, 40% were culture negative and 24% had no significant growth. Twenty percent of urine cultures revealed mixed growth. Significant positive bacterial culture results were detected in 15.8% (81/512).

Of all the bacterial isolates, Gram-negative bacteria were more prevalent (67.9%) than Gram-positive bacteria (32.1%).

E. coli was the most common pathogen isolated (39.5%). Prevalence of other bacterial pathogens was probable Group B streptococcus 16.0%, *Klebsiella pneumoniae* 14.8%, other Coliforms 13.6%, Coagulase Negative *Staphylococcus species* 8.6%, Enterococcus species 4.9% and *Staphylococcus aureus* 2.5%.

Among Coliforms 25% were ESBL producers. Only 54% of Coliforms showed sensitivity to cephalexin and 58% and 69% of them were sensitive to coamoxiclav and cefotaxime/ceftriaxone respectively. Higher percentage of sensitivity was observed for nitrofurantoin (87%), gentamicin (94%), amikacin and imipenem (96%) and netilmicin (100%).

Of *Staphylococcus species*, 55.6% were cefoxitin sensitive reflecting cephelexin, cefuroxime and coamoxiclav and sensitivity to nitrofurantoin was 100%.

Enterococcus species and probable Group B Streptococci showed 100% sensitivity to ampicillin and nitrofurantoin.

Conclusions

E.coli is the most common pathogen of UTI in pregnant mothers.

ESBL producing Coliforms causing UTI among pregnant mothers is a challenge, with limited antibiotic options during pregnancy.

Proportion of mixed growth emphasizes the need of proper advice on specimen collection.

PP 40

Multidrug-resistant *Enterobacteriaceae*: high colonization prevalence in peripartum women and their neonates in southern Sri Lanka

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Introduction

Infections from multidrug-resistant *Enterobacteriaceae* (MDRE), such as extended-spectrum β -lactamase-producing (ESBL) and carbapenem-resistant *Enterobacteriaceae* (CRE), are difficult to treat. MDRE colonization is a risk factor for subsequent infection. Prevalence and risk factors for MDRE colonization are unknown among peripartum women and neonates in southern Sri Lanka.

Objectives

To determine the prevalence and risk factors for MDRE gut colonization among the given population.

Methods

Rectal/stool swabs were collected from women and neonates at the largest maternity hospital in Southern Province within 24 hours of delivery and 2 weeks after hospital discharge from August 2016 - January 2017. Swabs were streaked on MacConkey with 2 μ g/mL cefotaxime. Isolates were identified using matrix-assisted laser desorption/ionization-time of flight mass spectrometry. Antibiotic susceptibilities were determined using Microscan.

Results

A total of 200 women and 202 neonates (2 twins) were enrolled; 149 women (74.5%) had follow-up visits. Women's median age was 29.0 years. Sixty-two (31.2%) neonates were delivered by Caesarean section and 17 (8.5%) had low birth weight. During hospitalization, antibiotic therapy was given to 63 (31.5%) women and 3 (1.5%) neonates. Prevalence of MDRE colonization was 12.0% in women and 1.5% in neonates at admission and 17.5% in women and 15.9% in neonates at follow-up. Of 90 total MDRE isolates, 79 (87.8%) were *Escherichia coli* and 11 (12.2%) were *Klebsiella pneumoniae*. Most (86, 95.6%) isolates were ESBL positive; 4 were CREs and from neonates. At birth, neonates were more likely to be MDRE colonized if they were admitted to the NICU ($p=0.045$), received antibiotics ($p=0.045$), had low birth weight ($p=0.043$), or had a MDRE-colonized mother ($p=0.039$). At follow up, neonates were more likely to be MDRE colonized if delivered by C-section ($p=0.031$), had mothers who received antibiotics during hospitalization ($p=0.037$), or had mothers colonized with MDRE at admission ($p=0.012$) or follow-up ($p=0.006$).

Conclusions

The prevalence of MDRE colonization was high in women and neonates in the hospital setting and increased following discharge. Having a colonized mother, delivery by Caesarean section, admission to the NICU, antibiotic intake by neonate or mother, and low birth weight were

associated with MDRE colonization in neonates. Targeting these risk factors may be important in reducing colonization and subsequent infection.

Note: A part of the work has been accepted for an poster presentation at ASM Microbe 2018 in Atlanta, GA, June 7 - 11, 2018

PP 41

Carbapenem resistant (CR) and Extended Spectrum Beta-Lactamase (ESBL) producing, clinically significant *Enterobacteriaceae* in a tertiary care hospital in Sri Lanka

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Introduction

ESBL producing and CR enterobacteria (CRE) can lead to ineffective treatment, which is a grave threat in the healthcare system. Hence, rational antibiotic use guided by an existing antibiotic sensitivity (ABST) pattern is essential to cut down unnecessary antibiotic usage and to minimize the development of resistance.

Objectives

To evaluate ABST patterns of clinically significant *Enterobacteriaceae* and to determine the prevalence of ESBL producers and CRE.

Methodology

A prospective, cross-sectional study was conducted to analyse the ABST (Joan Stokes method) pattern of clinically significant enterobacteria isolated from different clinical samples from patients at North Colombo Teaching Hospital from December 2017 to February 2018. ESBL producers and CRE were identified by keyhole method and via resistance to either meropenem or imipenem respectively. Statistical analysis was done using R programming language (level of significance $P < 0.05$).

Results

Of 643 isolates of enterobacteria, 28.62% ($n=184$) were ESBL producers and 11.35% ($n=73$) were CRE and 0.15% ($n=1$) both. Of ESBL producers, 78.92% and, of CRE 100% were isolated from inward patients. In both groups of patients, age spectrum ranged from 9 days to 89 years and 49.38% were males. ESBL producers were prominent in urine samples (60.54%) while CRE were prominent in both urine samples (36.48%) and pus/ wound swabs (36.48%). In ESBL producers, carbapenem

sensitivity was almost 100%, whereas aminoglycoside sensitivity was above 60% (gentamicin-63.0%, netilmicin-66.7%, amikacin-93.1%), fluoroquinolone sensitivity was below 50% (ciprofloxacin-19.2%, levofloxacin-40.0%) and nitrofurantoin sensitivity was 69.4%. However, sensitivity of CRE to all tested antibiotics was below 35% except amikacin (58.6%). A statistically significant difference in antibiotic sensitivity between ESBL producers and CRE was noted against amikacin, gentamicin, levofloxacin, ciprofloxacin, netilmicin and nitrofurantoin.

Conclusion

Of the studied enterobacteria, about 30% were ESBL producers and 11% were CRE. Carbapenems and amikacin were the most effective antibiotics against ESBL producers. However, none of the tested antibiotics except amikacin had satisfactory sensitivity against CRE. These data would guide the rational and effective empirical antibiotic therapy in hospitalized patients.

Acknowledgement

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PP 42

A rare presentation of a *Streptococcus intermedius* in a young patient

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Introduction

Members of the “*Streptococcus milleri* group” (SMG) are separated into 3 distinct species – *Streptococcus intermedius*, *Streptococcus constellatus*, and *Streptococcus anginosus*.

Streptococcus intermedius is found as part of the normal flora of the oropharynx, genitourinary tract, and gastrointestinal tract and implicated in a variety of pyogenic infections in many body sites but exceptionally rare with abscess formation in muscles.

Case presentation

Previously healthy 20 year old boy presented with progressive pain of the left buttock for 2 weeks and fever with chills and rigors for 1 day duration. He did not have injuries or traumatic events in the recent past.

On examination he appeared ill with temperature of 38°C. The left gluteal region was erythematous, warm and tender and later it extended over to left thigh. His movements

were restricted due to severe pain and was confined to the bed.

Ultrasound scan and Computed tomography scan of the gluteal region revealed an internal abscess within the gluteus maximus muscle extending to perianal and pararectal regions.

Blood culture became positive after 6 days of incubation and presumptive identification was SMG and was further speciated as *Streptococcus intermedius* by Phoenix Automated System and the isolate was susceptible to penicillin, clindamycin and erythromycin.

After draining the abscess, fever subsided and co-amoxiclav and clindamycin were started.

Discussion

S.intermedius is the most pathogenic but least commonly isolated species within the SMG, causing abscesses as a solitary pathogen in most patients while abscesses caused by *S.constellatus* or *S.anginosus* are more likely to be polymicrobial infections.

S.intermedius is associated with hematogenous spread and isolated from blood culture in more than one-third of instances. The abscesses caused by these organisms are usually extensive and deep-seated, whereas those due to *S.constellatus* are more often superficial.

This case highlights the importance of prolonged incubation of aerobic blood cultures to isolate this group specially in the setting of the unavailability of the anaerobic blood cultures.

PP 43

An outbreak investigation of bacteraemia due to *Burkholderia cepacia* complex at the National Hospital of Sri Lanka

Vathshalan^{S1}, Abeydeera WPH¹, Perera WPDP¹, Liyanage N¹, Caldera TSKRD¹, Patabendige CGUA¹

¹National Hospital of Sri Lanka

Introduction

Burkholderia cepacia complex (BCC) is an opportunistic pathogen in immunocompromised patients and well distributed in the natural environment. Nosocomial outbreaks of BCC were due to contaminated solutions and medical devices. During the period of 14th August 2017 to 13th September 2017, we observed a steep increase in isolation of BCC from the blood cultures and it has led to an extensive investigation for a possible common source.

Objective

To investigate an outbreak of BCC bacteraemia at National Hospital of Sri Lanka (NHSL) from 14th August 2017 to 13th September 2017

Design, setting and methods

There was an increase in isolation of BCC observed during the period and it initiated an outbreak investigation to find the possible common source. Medical devices such as syringes, IV cannulae and burette sets, and solutions such as nebulizer solutions, disinfectants, 5% dextrose solutions and Normal saline solutions were tested for the bacterial contamination by culturing on agar plates.

Results

Total isolates of BCC from 2218 blood cultures were 27 during the period of 14th August 2017 to 13th September 2017. All the blood culture isolates were identified as BCC with same AST. All of the opened and unopened 15ml ipratropium bromide nebulizer solutions of a particular brand tested were found to be positive for BCC with same AST. Cultures from other solutions and devices were negative. All the available stocks of different batches of the nebulizer solution revealed the very same. Eventually, we found that the BCC isolates of the blood cultures and the nebulizer solution were identical in AST. It indicates that the 15 ml ipratropium bromide nebulizer solution of a particular brand is the common source for the outbreak. Though, other hospitals also experienced the same outbreak, their investigation failed to find the common source. The incident was reported officially to the relevant authorities and other hospitals, and an alternative nebulizer solution was strongly recommended.

Conclusion

Finding the common source of an outbreak is essential for a successful control.

It was published previously as a short report in the *Sri Lankan Journal of Infectious Diseases* in 2017.

PP 44

Bacterial isolates from blood cultures in a tertiary care hospital in Sri Lanka

Jayatileke K¹, Rajanthi R¹

¹Sri Jayewardenapura General Hospital, Nugegoda, Sri Lanka

Introduction

Monitoring resistance profile of isolates from blood cultures is useful for interventions done in a hospital and help in preparing guidelines.

Objective

Analyzing the antimicrobial susceptibility pattern of significant blood cultures isolates at Sri Jayewardenapura General Hospital (SJGH) and compare it with 2013 data of same institution.

Design, setting and methods

Retrospective analysis of blood culture isolates in year 2017 using WHONET 5.6 software and to compare with data of 2013 (last published data).

Results

Among the patients with significant gram negative bacteraemia, *Escherichia coli* was predominant (n=99), followed by *Klebsiella pneumoniae* (n=62) and *Acinetobacter* spp (n=37).

E.coli were predominantly isolated from medical wards (60%). Increased resistance to cefotaxime (69.9%) was noted when compared with the data of the same institute in 2013 (60%). This may be due to increased use of oral 3rd generation cephalosporins in the community. Carbapenem resistance was decreased from 7.5% to 2.2%. Gentamicin resistance was higher compared to amikacin (28.9% vs 4.4%). Overall aminoglycoside resistance was decreased compared to 2013. Resistance to ciprofloxacin was high (72.4%), but there is a small reduction in resistance rate compared to 2013 data (75.9%).

Most of the *K.pneumoniae*, were from medical wards (42%) followed by intensive care units (ICU) (31%). *K. pneumoniae* isolates exhibited more resistance to meropenem compared to *E.coli* (42.6% vs 2.2%). Increased cefotaxime resistance rate was noted (65.4% to 72.4%) but carbapenem resistance remained same (40% to 42.6%) compared to 2013 data.

Acinetobacter spp. isolated from ICU (16/37) had 71% resistance to meropenem which showed marked drop compared to 2013 (85.8%).

Significant predominant gram positive isolate was *Staphylococcus aureus* (n=78). More than 50% *S. aureus* isolates were from the renal unit and nearly half of them (48.4%) were MRSA. There was a slight increase in MRSA rates compared to 2013 (44.9% vs 41.8%).

Conclusion

Antibiotic stewardship programme implemented in the year 2016 at SJGH may have contributed to this reduction

in meropenem resistance in *E.coli* and *Acinetobacter* spp. Continuous monitoring of changing trends in antibiotic sensitivity pattern will reflect the outcome of stewardship programme and indicate the necessities of amending guidelines.

PP 45

Case report of endocarditis due to *Streptococcus pneumoniae*; could it be Austrian syndrome?

Ulwishewa GM, Piyasiri DLB, Sathanandan S, Ranasinghe B, Harishchandra T, Jayasundera MCT, Sapukotana PM, Gamage TSH, Samarawickrama TKS, Jayasekara JVGM, Vithanage DC

Teaching Hospital Karapitiya, Galle

Introduction

Austrian syndrome or the Osler's triad is a clinical condition where pneumococcal endocarditis, pneumonia and meningitis coexists in a patient.

Case report

A 45 year old asthmatic male presented to a medical ward with fever and loss of appetite for 5 days. There was no history of a valvular heart disease.

On examination the patient was febrile and ill looking. His white cell count was $12 \times 10^9/L$, with a neutrophil predominance (83%) and CRP was 130 mg/L. The 2D echocardiogram revealed acute valve vegetation of 0.4 cm $\times$ 0.5 cm in size over the aortic valve, with aortic and mitral regurgitation (AR & MR).

Blood culture was positive for *Streptococcus pneumoniae* with sensitivity to optochin, ceftriaxone, vancomycin, clindamycin, erythromycin and co-trimoxazole. Penicillin MIC was not done.

He was treated with IV ceftriaxone 2g daily and IV vancomycin 1g 12 hourly. With treatment, the patient's fever responded but gradually started to develop a pneumonia. As the pneumonia worsened with heart failure and reduced urine output, he was treated with IV linezolid 600mg twice daily, rifampicin and ceftriaxone and was admitted to the intensive care unit. He underwent urgent surgery following severe acute AR due to total valve destruction with very poor prognosis and died a week later. Lumbar puncture was not done.

Discussion

Pneumococcal native valve endocarditis is rare (< 1%) with predominant aortic valve involvement and 28 - 60% mortality rate. About 3% of pneumococcal endocarditis can present with the Austrian syndrome. Known risk factors for Austrian syndrome are alcoholism, advanced age, malnutrition, immunosuppression and previous valvular disease. Though we could not establish the exact

diagnosis of the syndrome, male gender and aortic valve involvement with subsequent pneumonia were very suggestive.

Successful treatment involves third generation cephalosporins, vancomycin and rifampicin for about 6 weeks. Often valvular replacement is needed to avoid cardiogenic shock, especially in aortic valve disease.

FELLOWSHIP OF THE SRI LANKA COLLEGE OF MICROBIOLOGISTS 2017

Fellowships of the Sri Lanka College of Microbiologists were awarded to Dr. Sujatha Mananwaththa, Dr. Ranjith Perera and Professor N. P. Sunil-Chandra on 30th August 2017 at the Cinnamon Lakeside Hotel Colombo.



Dr Sujatha Mananwaththa

MBBS, Diploma, MD in Microbiology

It is my great honor and pleasure to introduce Dr Sujatha Mananwaththa nee Wijemanna the outstanding microbiologist of Sri Lanka who immensely contributed to uplift the HIV virology services in this country.

Having had her primary education at Visaka Vidyalaya Colombo, she entered the People's Friendship University in USSR to obtain her medical undergraduate training and returned to Sri Lanka in 1978. She served in General Hospital Ratnapura and General Hospital Kurunegala until she took up the post of Medical Officer in the Central VD clinic of the Anti VD Campaign in Colombo In 1983.

In 1985, she was appointed as the Medical Officer of the Laboratory, of the Central VD clinic. The work experience there stimulated her of developing the desire to embark on her long carrier as a microbiologist.

She obtained the Diploma in Microbiology In 1989 being in the first batch of Diploma in Microbiology of Postgraduate Institute of Medicine, University of Colombo. She completed her MD in Microbiology in 1994.

In the year 1990 , With the unfortunate sudden illness of Dr. Nihal Perera who was the Consultant Microbiologist of the STD AIDS programme at that time, Dr Sujatha had to lead, and manage the laboratory single handedly, which was already a national reference laboratory. In the absence of qualified microbiologists in the country to fill the vaccum created unexpectedly she took up the task with dedication and courage on behalf of the STI and AIDS control programme of Sri Lanka, though she was only a diploma holder in microbiology at that time.

She was appointed as the Consultant Microbiologist of National STD AIDS Control programme in 1995 and continued her services until her retirement in 2012.

Her services to the field of HIV and AIDS at a time when it was new to the world and to Sri Lanka, is appreciable. Back in 1986, with her predecessor Dr Nihal Perera she pioneered establishing HIV diagnosis in Sri Lanka. Their hard work in initiating screening of blood for HIV in the National Blood Transfusion Service at a very early stage of the epidemic greatly contributed to the extremely low level of transfusion transmitted HIV infection in the country.

With the introduction of ante retroviral treatment for HIV infections there was a dire need in the country for monitoring of the infection to assess the efficacy of treatment. To meet with that requirement with no hesitation she initiated the Viral Load Assay for HIV and the enumeration of CD4 cell counts in the National Reference Laboratory.

During her period at the National Reference Laboratory of the STD/AIDS Control Programme many new tests, programs and schemes were introduced to the laboratory network for detecting STIs. She was the driving force behind establishing the National External Quality Assessment Scheme for HIV and STI testing in Sri Lanka.

Although HIV was in the forefront of her work, her special interest was on emerging multidrug resistance of *Neisseria gonorrhoeae* on which she delivered the Siri Wikramasinghe Memorial Oration in 2012. This interest led her to engage the country in the world net of gonococcal antimicrobial surveillance programme GASP.

Her expertise in the field of STD/HIV microbiology and her untiring efforts and dedication to work has greatly contributed to control STDs and HIV at national level.

During her illustrious career, she deeply involved herself in teaching and training of undergraduates postgraduates and para clinical staff. As many present tonight would testify, she is an enthusiastic and committed teacher.

Her enormous contribution for teaching in STI was simply unparalleled.

Dr Sujatha is a member of many professional associations. She has served the Sri Lanka College of Microbiologists as an editor and was the President of the College in 2004.

She contributed to both disciplines, microbiology and venerology at a balance and was a founder member of the Sri Lanka College of Venereologists and the Vice President of the same College for several years. Later she was awarded the Fellowship of the Sri Lanka College of Venereologists.

She was a member of the BOS in Microbiology and the BOS in Venereology of the Postgraduate Institute of Medicine in Colombo.

With the introduction of the laboratory accreditation to Sri Lanka she served as a member of the Accreditation Committee for medical and clinical testing laboratories of the Sri Lanka Accreditation Board.

Madam President, it is my privilege to present Dr Sujatha Mananwaththa for award of the Honorary Fellowship of the Sri Lanka College of Microbiologists.

Citation read by Dr. Jayanthi Elwitigala
Consultant Microbiologist



Dr. Ranjith Perera

BVSc (Cey), Dip. Med. Micro (Colombo), M. Phil (Colombo), FSLCM (n.c)

Raigamage Ranjith Damsiri Premathilaka Perera had his primary education at Isipathana Vidyalaya, and entered Royal College, Colombo in 1963.

While at Royal College, he excelled in studies as well as in many extra-curricular activities. He was the editor of the Royal College Magazine in 1968, won the Library Readers Prize and the Best Speakers Prize in 1968, wrote and produced a sinhala drama for the inter-school drama competition in 1968, led the Sinhala debating team in 1970 and was awarded colours for Basket Ball in 1970. In recognition of his contribution, he was appointed a school prefect in 1971.

After an illustrious career at Royal College, he entered the University of Peradeniya in 1972, and obtained his Bachelor of Veterinary Science degree from the Faculty of Medical, Dental and Veterinary Sciences in 1976. At Peradeniya, he was the editor of the Medical, Dental and Veterinary Students Union and a member of the Peradeniya Student Council.

After graduation, he served as a Veterinary Surgeon in several parts of the country and was appointed as the Animal Quarantine Officer, Sri Lanka, in 1990.

Dr. Ranjith Perera obtained his Diploma in Medical Microbiology from the Post-graduate Institute of Medicine, University of Colombo in 1989 and his Master of Philosophy degree in Microbiology from the Faculty of Medicine, University of Colombo in 2005. He is the only veterinary graduate in Sri Lanka to obtain a post-graduate qualification from the PGIM.

In 2006, Dr. Ranjith Perera joined the Department of Medical Microbiology, Faculty of Medicine, University of Kelaniya, Ragama, as a Senior Lecturer, and was appointed as the Head of the Department in 2007, which post he held up to 2014.

He has worked as a member of several committees in the Ministry of Health including Task Force in Microbiology in 2005, Committee on Re-organization and strengthening of Laboratories in 2005, and the Technical Committee of the National Laboratory Based Surveillance on Antimicrobial Resistance from 2011.

Dr. Ranjith Perera has attended several international and national conferences, workshops and symposia and has many presentations and research publications to his

credit. Currently, he is a member of the WHO Advisory Group on Integrated Surveillance of Antimicrobial Resistance.

He was involved with the activities of Sri Lanka Association for the Advancement of Science (SLAAS) for several years and in 2002 became the President of the Section A of that organisation.

He was a member of the Board of study in Microbiology of the PGIM and a member of the senate and the appeals committee of the University of Kelaniya. At present, he is the chairman of the Expert Committee on Communicable Diseases of the SLMA.

He delivered the Siri Wickremesinha Memorial Oration in 2014.

Dr. Ranjith Perera was a council member of the Sri Lanka College of Microbiologists from 1993 to 2007 and the Joint Secretary in 1996 and 2001/2002. On behalf of the council, he drafted the present constitution of the College which was adopted in 1999 during the presidency of Dr. Nalini Withana.

In recognition of his invaluable and dedicated services to the College, Dr. Ranjith Perera was elected as the President of the Sri Lanka College of Microbiologists for the year 2004/05.

Madam President, it is with great pleasure I present Dr. Raigamage Ranjith Damsiri Premathilaka Perera for Honorary Fellowship of the Sri Lanka College of Microbiologists.

Citation read by Dr. Nadisha Badanasinghe
Senior Lecturer



Professor N. P. Sunil-Chandra

BVSc (Sri Lanka), M.Phil (Perad'ya), Ph.D (Cambridge), FSLCVS, FSLCM (h.c)

- Professor N. P. Sunil-Chandra is no stranger to the scientific and academic communities in the fields of virology and immunology both nationally and internationally.
- His career in microbiology spanning over three decades has been spent in research and teaching of microbiology in Cambridge University, University of Kelaniya and Rajatara University.
- Currently, he serves as the Chair Professor of the Department of Medical Microbiology, Faculty of Medicine and the Chairman of Research Council of University of Kelaniya.
- He started his school education at Sandalanka Central College
- In 1976, he entered the Faculty of Medical, Dental and Veterinary Sciences of the University of Peradeniya and graduated with BVSc having distinctions in Biochemistry, Anatomy, Parasitology and Microbiology in 1980.
- In 1981, he joined the Government Veterinary Service and gained experience in clinical veterinary medicine, epidemiology and control of zoonotic infections.
- In 1985, he was awarded with a Colombo Plan Scholarship for postgraduate training in Virology at the WHO – Rotavirus Reference Centre in East Birmingham Hospital, Birmingham and in University of Cambridge, UK. His MPhil research was on “viral aetiology of diarrhoeas” which led to the isolation of a novel rotavirus from buffalo calves.
- In 1988, he won a Cambridge Commonwealth Trust Scholarship to pursue PhD studies in Virology at the Dept. of Pathology, University of Cambridge, UK. He was a graduate student of the Wolfson College, Cambridge.
- In 1991, he was awarded with PhD from the University of Cambridge and thereafter he worked as a post-doctoral research associate for 3 years in the Immunology division of the University of Cambridge.
- In September 1994, he returned to Sri Lanka and in 1995 joined the Department of Medical Microbiology, Faculty of Medicine, University of Kelaniya as a Senior Lecturer. He served as the Head of Department for 10 years.
- Since then, he contributed to teaching and research in medical microbiology in Sri Lanka for over 2 decades. He is a life member of the Sri Lanka College of Microbiologists since 1995 and served in various capacities for the betterment of College and its membership.

- In 1997, he was appointed to the post of Chair professor of Microbiology of the Department of Microbiology, Faculty of Medicine, University of Kelaniya and subsequently promoted to the post of Senior Professor in 2005.
- His contribution as a teacher in the Faculty of Medicine, Ragama is immense. He has taught microbiology to medical students in Kelaniya, PGIM trainees in Diploma and MD in Medical Microbiology and other post graduate students. He is also the visiting Professor in Microbiology of the Faculty of Medicine and Allied Sciences of the Rajarata University since 2011.
- He developed a well-equipped virology research laboratory with cell culture and immunoassays in the Department of Medical Microbiology at Ragama.
- He provided diagnostic Microbiology service to Professorial units of the North Colombo Teaching Hospital from 1996 to 2005 resulting the recognition of the Department as a PGIM Training Centre.
- He served as a member of the Board of study in Microbiology of the PGIM, for 10 years since 1995 and actively involved in postgraduate training in virology.
- He has supervised many research projects of local and overseas undergraduate and postgraduate students.
- He was a resource person, supervisor and an examiner for PGIM trainees in Microbiology.
- At national level, he served as a member of the National Science Foundation committees for Medicine and Veterinary medicine from 1997 to 2005. He also actively contributed to Herpes, Hepatitis, Communicable diseases study groups and the Expert committee on rabies in Sri Lanka from 2001 to 2005.
- He has served the College in the capacity of a Council member for 4 years, Vice President in 2004, President Elect in 2005 and held the Post of the President in 2006/2007.
- He is a life member of the Sri Lanka Association for the Advancement of Science (SLAAS) since 1996, Member of the Sri Lanka Veterinary Association (SLVA) since 1981 and Vice president of SLVA in 2013.
- He is also a founder member and council member of the Sri Lankan Society for Microbiology (SSM) since 2009.
- He is a founder member and a council member of the Allergy and Immunology Society of Sri Lanka (AISSL) for 3 years from 2001-2003.
- He is also a founder Fellow and Vice president of the Sri Lanka College of Veterinary Surgeons (SLCVS) since 2014.
- Internationally, he was a
 - ✓ member of Society for General Microbiology (SGM), United Kingdom from 1989-1999.
 - ✓ member of British Society for Immunology (BSI), United Kingdom from 1991-1994.
 - ✓ member of the International Advisory Committee for the International Virology congress 1999-2005
 - ✓ fellow of Cambridge Commonwealth Society (FCCS) in 1991.
 - ✓ member and the Country representative of the Asia Pacific Society for Medical Virology (APSMV) since 2003.
- He has published his scientific research in both National and International peer reviewed journals in the fields of Virology, Immunology and Medical Microbiology with 69 publications of which 29 are in peer reviewed journals. His publications have received 1517 Google scholar citations with an h-index of 12.
- He has received several prestigious awards including Commonwealth Academic Fellowship 2014 and President's Awards for scientific research in 2014 and 2015 and the R & D Wyler award in 2002 for excellence in herpes virus research.
- He has been a Keynote speaker or Guest speaker at various National and International conferences.
- His current research include a range of virus infections with public health importance to Sri Lanka namely; viral gastroenteritis, vector-borne viral infections and emerging and re-emerging zoonotic infections in Sri Lanka.
- Professor Sunil-Chandra has faced many formidable challenges with utmost determination and courage. He is truly a dedicated academic, researcher, and a microbiologist. I have had the privilege of being a student and a colleague to him.
- Madam President, it is my pleasure and privilege to present Professor Sunil-Chandra for the award of Honorary Fellowship of the Sri Lanka College of Microbiologists.

Citation read by Dr. Lakmini Wijesooriya
Senior Lecturer



Dr. C. Palasuntheram



Professor Malik Peiris



Dr. G. S. S. K. Colombage

PRIZE WINNERS AT THE 26TH ANNUAL SCIENTIFIC SESSIONS 2017

Following oral presentations were awarded first places at the 26th Annual Scientific Sessions of the Sri Lanka College of Microbiologists held on 31st August and 01st September 2017.

Oral presentations

Free Paper Session 1

OP 3

Typing of gram negative bacteria obtained from respiratory specimens in an intensive care unit

Tissera K¹, Tennakoon M¹, Adasooriya D¹, Pinto V², Dissanayake N¹, Ekanayake A¹, Nanayakkara D¹, Liyanapathirana V¹

¹Department of Microbiology, Faculty of Medicine, University of Peradeniya, ² Department of Anaesthesiology and Critical Care, Faculty of Medicine, University of Peradeniya

Free Paper Session 2

OP 7

A multicenter study to determine the prevalence and the associated factors of New Delhi Metallo- β lactamase-1 (NDM-1) strains among gram negative bacilli in clinical isolates

Sajeevan TR¹, Karunanayake L¹, Patabendige CGUA², Mubarak N³, Ravikumar R

¹Medical Research Institute, Colombo 8, ²National Hospital of Sri Lanka, Colombo, ³Teaching Hospital, Jaffna, ⁴Department of Neuromicrobiology, National Institute of Mental Health and Neuro Sciences (NIMHANS), Hosur Road, Bangalore, 560029, India.

Free Paper Session 3

OP 10

Genomic analysis of Sri Lankan cutaneous *Leishmania donovani* isolates from poor responders to sodium stibogluconate

Samarasinghe SR¹, Samaranyake TN¹, Karunaweera ND¹

¹Department of Parasitology, Faculty of Medicine, University of Colombo

Free Paper Session 4

OP 14

Prospective study to ascertain the relationship between rabies infection and anti-rabies immunization status of dogs and cats in Sri Lanka

Kumarasinghe KADM, Nanayakkara S, Balasubramaniam R, Jayasinghe AU, Udara GKJN, Perera KADN

Department of Rabies and Vaccine QC, Medical Research Institute, Colombo 8

Free Paper Session 5

OP 18

Comparison of real time PCR with the culture method for detecting *Salmonella* spp in raw chicken

Wickramasuriya UAGH, Pathirage MVSC, Jayamaha CJS

Medical Research Institute, Colombo

PRIZE WINNERS AT THE 26TH ANNUAL SCIENTIFIC SESSIONS 2017

Following poster presentations were awarded first, second and third places at the 26th Annual Scientific Sessions of the Sri Lanka College of Microbiologists held on 31st August and 01st September 2017.

Poster presentations

1st prize

PP 2

Chromoblastomycosis: a five year retrospective analysis of clinical and mycological data from the national mycological reference laboratory, Sri Lanka

Jayawardena MN, Sigera LSM, Perera PD, Jayasekera PI

Department of Mycology, Medical Research Institute, Colombo

2nd prize

PP 3

Filarial parasites in selected cats and dogs in Madampe, Sri Lanka, and their public health implications

Mallawarachchi CH¹, Chandrasena TGAN², Wickramasinghe S³, Samarasekara SD⁴, Mallawarachchi SMNSM¹, de Silva NR²

¹Post Graduate Institute of Medicine, University of Colombo, Sri Lanka, ²Department of Parasitology, Faculty of Medicine, University of Kelaniya, Sri Lanka, ³Department of Parasitology, Faculty of Medicine, University of Peradeniya, Sri Lanka, ⁴Quarantine Unit, Ministry of Health, Sri Lanka

3rd prize

PP 9

A study on waste management in a tertiary care hospital in Sri Lanka

Premaratne KKM, Karunaratne GKD, Sunethra PA

Lady Ridgeway Hospital for Children, Colombo

Presidential Address delivered at the Inauguration of the 26th Annual Scientific Sessions of the Sri Lanka College of Microbiologists on 30th August 2017



Unearthing A Subterranean Infection

Dr. Enoka Corea

*Consultant Microbiologist and Senior Lecturer, Department of Microbiology,
Faculty of Medicine, University of Colombo*

Good evening, ladies and gentlemen. Our Chief Guest, Professor Tim Inglis, Past Presidents of the College, members of the Council, invited speakers from overseas and Sri Lanka, College fellows and members, distinguished invitees, ladies and gentlemen. Thank you for your presence at the Inauguration of the 26th Annual Scientific Sessions of the Sri Lanka College of Microbiologists.

In this brief talk I would like to inform you of the activities of the College, the focus of these Annual Scientific Sessions and share some personal reflections.

Activities of the College

The Sri Lanka College of Microbiologists began as the Ceylon Association of Microbiologists in 1969. With the change of the country's name from Ceylon to Sri Lanka it became The Sri Lanka Association of Microbiologists and in 1979 it evolved into the Sri Lanka College of Microbiologists.

The objectives of the College as embodied in its constitution are:

1. To initiate instruction in and be responsible for the study of microbiology.
2. To organise lectures, seminars, demonstrations, etc. in order to disseminate knowledge in microbiology among the members and other groups.
3. To establish the importance of microbiology in Sri Lanka in relation to the development needs and requirements of the country.
4. To initiate action regarding microbiological problems affecting the general public and advise the relevant authorities on such matters.
5. To publish original works in microbiology.
6. To discuss matters of scientific and professional interest pertaining to microbiology.
7. To promote research and actively assist in such work.

I believe that the Scientific Sessions we inaugurate this evening and the Pre-Congress that took place yesterday and today amply fulfil these objectives.

The highlights of the College calendar include the Siri Wickremesinghe Oration, in memory of a much loved member and teacher. This year the Oration, delivered by Professor Faseeha Noordeen, was on a very timely topic “Dengue in Sri Lanka – Past and the Present Trends”, as Sri Lanka battles the largest epidemic of dengue seen to date.

The College plays a major role in the postgraduate training of specialists in Clinical Microbiology. Monthly continuous medical education (CME) lectures are held every first Friday and feature lectures and/or case presentation followed by lively discussions.

The Task Force in Microbiology, a regular meeting between the members of the College and the Ministry of Health, serves as the focal point for discussion of issues facing Microbiologists and Microbiology services in the country. Members of the College provide valuable off-site consultancy for hospitals without Consultant Microbiologists.

The Antimicrobial Resistance Core Group serves as the unofficial secretariat of the “National Action Plan for Combating Antimicrobial Resistance” and recently launched a strategic action plan for Sri Lanka, outlining the five main areas which need to be addressed if this plan is to be effective. The “Sri Lanka Antimicrobial Resistance Surveillance Project” monitors trends in antimicrobial resistance.

Publications of the College such as the Laboratory Manual in Microbiology, Biosafety Manual, Infection Control Manual and the Guidelines on Empirical and Prophylactic Use of Antimicrobials serve as reference texts for Sri Lanka and copies are downloadable from our website. We recently submitted an algorithm for HIV diagnosis to the National STD AIDS control programme and guidelines for antibiotic use in stem cell and solid organ transplant patients and for antibiotic prophylaxis and vaccination in primary immunodeficiency disease are in the pipeline.

The College website and regular newsletter keeps members abreast of current activities of the College. The Bulletin, published concurrently with the Annual Sessions, serves to disseminate research conducted by members and record the major events in the College calendar.

Focus of the Annual Scientific Sessions

Although great strides have been made in many areas of clinical microbiology and infectious diseases (for example,

in the prevention of many infectious diseases by vaccination) a number of challenges remain to be addressed. Sepsis is one of the leading causes of death, globally, and continues to pose a diagnostic and therapeutic challenge. The fourth revision of the “Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock” was published earlier this year. The theme of the 26th Annual Scientific Sessions is “Combating sepsis”.

The Pre-Congress, concluding today, which took the form of the 2nd South Asian Melioidosis Congress (2nd SAMC) with participants from the region and further afield, focused our attention on one cause of sepsis, that remained hidden for many decades, namely melioidosis. Melioidosis remains a ‘neglected’ disease, so neglected that it is not even recognized as a neglected tropical disease or NTD by the WHO! In a recent publication that estimated the global burden of melioidosis, it was predicted that there were probably 165000 cases and 85000 deaths due to melioidosis annually. South Asia is predicted to have the largest burden of disease but much of this burden remains hidden and unrecognized. Hence, the theme of the 2nd SAMC, “Unearthing a subterranean infection”. We hope that the 2nd SAMC will raise awareness among clinicians, public health personnel, policy makers and the public of the burden of disease caused by melioidosis in South Asia and will be a launching pad for many fruitful collaborations between clinicians and researchers in Sri Lanka and the region.

Personal reflections

Those of you who attended the Pre-congress will be aware of the decade long journey to establish melioidosis as a disease endemic and prevalent in Sri Lanka. This journey would not have been possible without inspiration, collaboration, cooperation and communication and I would like to share some insights I have gained along the way.

Firstly, **inspiration**. The melioidosis journey would not have begun if not for the guidance provided by Professor Vasanthi Thevanesam who made the initial two diagnoses that sparked off the study. Her conviction that the infection must be present in this tropical country and enthusiasm to gather more data about its epidemiology was the inspiration that launched the journey.

We microbiologists are privileged to be at the cutting edge of medicine with microorganisms shown to be the cause not just of sepsis and febrile illness but cancers, metabolic diseases and even psychiatric illness. Adjusting the balance of our commensal flora by faecal transplant to prevent or reverse disease is emerging as a therapeutic intervention. Interventional cardiology and interventional radiology are well established specialties

and we may be seeing the first glimpse of what I like to term 'interventional microbiology'.

I invite the young microbiologists here to be excited about your chosen field. Be inspired.

Collaboration. The search for information regarding the optimum antibiotic management of these first two patients serendipitously connected Professor Thevanesam with Prof Tim Inglis, setting the stage for the decade-long collaboration between his laboratory at PathWest, Western Australia and laboratories in Sri Lanka. Training in the indirect haemagglutination method for antibody testing, confirmation of isolates by real time PCR and genotyping using multilocus sequence typing initially took place under his supervision but were subsequently established in Sri Lanka. Currently Sri Lanka has the largest number of *B. pseudomallei* strains from South Asia that are typed and submitted to the public database.

Collaboration with international centres of excellence, along with capability building of local technical staff and technology transfer, is the key to fulfilling our goal of a network of local reference centres that will serve as the public health laboratory service providers to the country, similar to the PHLS system in the UK.

Co-operation. The work on melioidosis in Sri Lanka is the sum of the efforts of many people, chiefly the Consultant Microbiologists, registrars, trainees and laboratory technicians of the state and private hospitals throughout the country. Connecting the dots or filling in the gaps in the map would not have happened if not for the wholehearted interest and dedication of the Clinical Microbiologists of the country. It was amazing to see whole new areas of endemicity emerge as a microbiologist was appointed to an underserved area. While clinicians dismissed the idea that melioidosis was found in Sri Lanka and refused to believe that it could have escaped their notice, microbiologists had faith and took on active surveillance with a personal zeal, with the sole aim of providing the best outcome for their patients with sepsis.

I believe that the co-operation shown by the members of this College, in this and in the many other activities and responsibilities of the College, stands out as a model to other professional colleges in the country.

Communication. Convincing clinicians, public health officials and policy makers regarding endemicity of melioidosis in Sri Lanka has been an uphill task. I am

heartened by feedback from clinical trainees who tell me that melioidosis is now one of the expected differential diagnoses in any patient admitted to hospital with fever. But the high case fatality rate in patients transferred to tertiary hospitals from other parts of the country shows that there is much work to do to disseminate this awareness to more distant centres. Perhaps the younger microbiologists, more knowledgeable in the use of social media, could be encouraged to spread the word through more user friendly channels. We may have to learn lessons from the advertising industry on how to package our messages to make them more appealing. This applies not just to the field of melioidosis but to antibiotic stewardship, the practice of handwashing and rapid screening for sepsis. We should communicate our message in a way that attracts the recipient and changes his/her behaviour.

The story of melioidosis has taught us that there is much out there about which we still know very little. If a bacterial infection like melioidosis can remain hidden for so long, what of the myriad viral and fungal infections? We need to keep reading and studying, subscribe to online sites such as ProMed and keep alert in our wards and on the laboratory bench. I would urge the young microbiologists out there to keep their eyes and ears open and think 'out of the box', always remembering that "chance favours only the prepared mind" (Louis Pasteur).

This work is the result of years of effort by many people. I would particularly like to acknowledge the contribution of Professor Vasanthi Thevanesam, University of Peradeniya, Professor Tim Inglis of PathWest, Western Australia and Dr Dharshan de Silva of the Kothalawala Defence University, the Laboratory staff of the Faculty of Medicine, Colombo and Genetech Research Institute, the many pre-interns who worked as Research Assistants in this project over the years and the Microbiologists of state and private hospitals who identified likely cases, contributing clinicians and patients. I would like to thank my husband and two children, parents, sisters and brothers-in-law for their support.

Let me invite you all to the Annual Scientific Sessions with its smorgasbord of plenary lectures, symposia and free papers. I hope there will be something in it for every one of you.

Thank You

**Presidential Address delivered at the Induction of President 2018
of the Sri Lanka College of Microbiologists on 13th February 2018**



Communication and Collaboration for Clinical Excellence

Dr. Kushlani Jayatilleke

*President, Sri Lanka College of Microbiologists, Consultant Microbiologist,
Sri Jayewardenapura General Hospital, Nugegoda*

The Sri Lanka College of Microbiologists is a professional body established with the goal of promoting the advancement of Medical Microbiology in Sri Lanka. It was started as the Ceylon Association of Microbiologists in 1969 with 15 founder members. In 1974, the name of the Association was changed to the Sri Lanka Association of Microbiologists. Further in 1979 the name was changed to the Sri Lanka College of Microbiologists. In December 2009, the College was registered as a company limited by guarantee. The bud which started in 1969 has bloomed today into a beautiful flower spreading fragrance to the whole island and beyond.

Today we have 39 members of the college serving as clinical microbiologists in hospitals all over the country covering all Provinces, 2 Consultant Microbiologists at the Medical Research Institute the (MRI) and 14 other specialists attached to medical faculties. Also there are 8 consultant virologists attached to the MRI and hospitals. A consultant mycologist and a consultant parasitologist work in the MRI. There are eleven specialist parasito-

logists attached to the medical faculties and also there are 3 immunologists who are attached to the MRI and hospitals.

When we qualified as doctors more than 2 decades ago, at the “**Career Guidance Seminar**” conducted by the Sri Lanka Medical Association a Consultant Microbiologist spoke on clinical microbiology as a career opportunity. He stated “There is only one hospital based microbiologist for the Ministry of Health (MoH) and he is standing in front of you. If he drops dead there won't be a single clinical microbiologist working for the MoH”. This was none other than Dr S. D. Athukorala. During that period Dr Athukorala was serving as the Consultant Microbiologist at the National Hospital of Sri Lanka and Dr Palasundaram was working as the Consultant Microbiologist at Sri Jayewardenapura General Hospital (SJGH), where I work today. Professor Vasanthi Thevanesam was providing a great service to teaching hospitals Peradeniya and Kandy as the offsite consultant microbiologist while serving as the Professor of Micro-

biology at the Medical Faculty, University of Peradeniya. These were the only clinical microbiology services available in the country and thus clinical microbiology services are relatively new to the country.

Duties of a Clinical Microbiologist:

- Accurate and timely report from the microbiology laboratory
- Clinical advice on management of infections
- Antimicrobial Stewardship
- Infection Prevention and Control
- As a trainer and a teacher
- Researcher
- National/International responsibilities – Developing guidelines etc

Ensuring an **accurate and timely report** from the microbiology laboratory is our prime responsibility as Clinical Microbiologists. I will give a case history to understand the issues related to accurate reporting (the case histories I discuss here are from different hospitals in the public and the private sector and not only from SJGH). A patient was referred to the microbiologist with multiple discharging sinuses on the forearm and elbow. The wound swab culture was reported as “No growth”. With the clinical picture, mycetoma was suspected. With prolonged incubation we managed to isolate an *Actinomyces* sp. The treatment was optimised and the patient responded. Communication and collaboration, paved the way to proper diagnosis. The previous wound swab was reported as “No growth” after 24 hour incubation as per normal procedure for processing wound swabs, since the history was not known. Proper history on the request form would have helped. How can we improve history writing of medical officers? At SJGH during a request form audit we realised that history writing on request forms by medical officers was poor. The request form was modified with separate fields for probable diagnosis, relevant clinical details and antibiotics given/to be given. With this we noticed a marked improvement in history writing during the re-audit. This is an example to show that system change helps to improve quality of care and services. ISO 15189 which is the standard for medical laboratories, describes the quality management system. Sri Lanka Accreditation Board (SLAB) is the organization which accredits laboratories in Sri Lanka based on ISO 15189. Most of the microbiologists received assessor training on ISO 15189 through SLAB. This was a good symbiotic relationship where we microbiologists got a training on ISO 15189 standard and the SLAB got a trained pool of assessors. Even after receiving such training why can't we get our laboratories accredited? There are several problems. Deficiencies in the system, negative attitudes of healthcare personnel as well as the limitations in the resources are the main three reasons

that I can think of. For example in an organization chart of an Indian laboratory has a person with the designation “Quality manager” whose sole responsibility would be to maintain quality. This cadre position with special training is not yet identified in the Ministry of Health, Sri Lanka. The technical and other staff should get continuous education and training on quality management system, ethics, laboratory safety, data management and documentation etc. Having a well maintained password protected Laboratory Information System will also help to produce a timely and accurate report.

Clinical advice on management of infections is our second responsibility. Again I will take you through a case report of a patient. This was a neonate who had a positive blood culture with a methicillin resistant *Staphylococcus aureus* (MRSA). Laboratory reported only the 1st line Antibiotic Susceptibility Test results and the isolate was reported as only sensitive to gentamicin. Patient was started on gentamicin though not the best option for MRSA bacteraemia. Patient did not improve but got septic arthritis in multiple joints. At that point this baby was referred to the microbiologist and the treatment was changed to vancomycin. With serum level monitoring and optimisation of therapy the baby recovered without further complications. In this case two issues are highlighted. Firstly performing and reporting only the 1st line antibiotics can be misleading. The second issue is the importance of clinicians having updated knowledge on management of infections, following guidelines and multidisciplinary approach in managing patients. Training of clinicians on anti-microbial resistance (AMR) and rational use of antibiotics with continuous education to update on new knowledge is important. Multi-disciplinary team approach is also helpful. Proper training for the microbiologists on clinical decision making is another important need. With this in mind a revision of the prospectus for MD Medical Microbiology at the Post Graduate Institute of Medicine has been done with a medical appointment added to the Medical Microbiology MD training programme. Clinical staff should appreciate the importance of collaboration with other specialities. They should also get training on issues such as AMR and how to tackle them.

In this era of high level of antibiotic resistance, microbiologists should play a pivotal role in **antibiotic stewardship**. Antibiotic resistance is when antibiotics given in the normal dosage, become ineffective for treatment of infections caused by these bacteria. By 2050 it is predicted that the number of deaths due to AMR will overtake even the number of deaths due to cancer in the world [1]. Also in the same report it is predicted that the highest number of deaths due to AMR will be in Asia where we live. This is apparent even in current AMR data where Sri Lanka has nearly 100 times higher resistance percentage for carbapenems in *Escherichia coli* compared to United Kingdom [2,3]. Rational use of

antibiotics is one of the key interventions recommended by World Health Organisation (WHO) for reducing antibiotic resistance. Antibiotic stewardship is recommended in healthcare settings for this purpose. According to the Infectious Disease Society of America, Antimicrobial stewardship refers to coordinated interventions designed to improve and measure the appropriate use of antimicrobials by promoting the selection of the optimal antimicrobial drug regimen, dose, duration of therapy, and route of administration. To carry out an effective Antibiotic Stewardship Programme a team is recommended for an institution. Usually the team comprises of Infectious Disease (ID) physicians, Clinical pharmacists with ID training, Clinical Microbiologists, Information Technology (IT) specialists, IPC professional and Hospital Epidemiologists. In Sri Lanka most of these professionals such as ID physicians, Clinical pharmacists with ID training and Hospital Epidemiologists are non-existing. Even with the limited resources, at SJGH we started an Antibiotic Stewardship Programme in 2016. After implementing the programme the mean carbapenem consumption reduced from 30.7 to 22.3 DDD per 1000 patients per day by 27.3% though, not statistically significant ($p=0.218$). Carbapenem non-susceptibility of enterobacteriaceae was significantly decreased by 21% from 1.19 per 1000 patient days to 0.94 per 1000 patient days from the pre intervention to post-intervention period ($p=0.0055$).

Infection Prevention and Control is the other most important responsibility of a microbiologist in a hospital. Infection control and prevention in health care settings aims to reduce the transmission and acquisition of healthcare associated infections (HAI). Healthcare associated infections are infections that are acquired in the hospital by the patients, usually 48 hours after admission, and by health care workers. The common HAIs include surgical site infections (SSI), respiratory tract infections, urinary tract infections, blood stream infections, diarrhoea, device associated infections such as ventilator associated pneumonia and central line associated blood stream infections. In 2011, there were an estimated 722,000 HAIs in United States of America acute care hospitals. Additionally, about 75,000 patients with HAIs died during their hospitalizations. According to Regional Strategy for Patient Safety in the WHO South-East Asia Region (2016-2025), HAI complicate between 5% and 10% of admissions in acute care hospitals in industrialized countries. At any given time, 1.4 million people worldwide suffer from HAI (WHO estimates) and at least 50% of HAIs are preventable [4]. In certain states of United States of America public reporting of HAI is mandatory but the long term impact of mandatory public reporting of hospital acquired infections on infection prevention measures and outcomes remains undefined [5]. In Sri Lanka we do not know the exact burden of HAI. Recently surveillance on 3 quality indicators related to

IPC were identified by the Ministry of Health and they are monitored through the Quality and Safety Directorate of the Ministry of Health. *Staphylococcus aureus* bacteraemia rate per 10,000 patient days and MRSA bacteraemia rate per 10,000 patient days as well as percentage of SSI following lower segment caesarean sections (LSCS) from number of LSCS performed and Hand hygiene compliance rate – taken through audits are the indicators identified for monitoring by the Ministry of Health. According to the data collected by this surveillance, Post LSCS infection rate was 1.26%, *Staphylococcus aureus* bacteraemia rate per 10,000 patient days was 2.71, MRSA bacteraemia rate per 10,000 patient days was 0.81 and hand hygiene compliance rate was 60% in 2015. Several publications from different hospitals give HAI rates with different denominators such as per 100 admissions and per 1000 patient days. Prevention of HAI is the responsibility of all individuals and services providing healthcare. IPC activities are carried out by an IPC team and a committee with the participation of the Director / In-charge Medical Officer of the hospital. The Consultant Microbiologist should be the technical head, when available. Medical officers in IPC units (available in few centres in Sri Lanka), nurses specially trained on IPC, liaison or link nurses in each unit with special training in IPC carry out the main duties related to IPC. The number of IPC doctors and nurses are currently inadequate in the country. IPC units carry out surveillance of HAI, introduction of guidelines, audits, monitoring exposure to blood and body fluids, education and training, vaccination, risk assessment and introduction of new tools and practices to minimise risk, management of outbreaks, induction programme for newly appointed staff as well as notifiable disease surveillance. Though the IPC team and the committee take the lead, IPC is everybody's responsibility.

All these stories pave the way to the theme for the year 2018 'Communicate and collaborate for clinical excellence'. With this in mind, we have planned an 'International Conference on Infectious Diseases and Antimicrobial Resistance' in August 2018 in collaboration with the Sri Lanka Medical Association (SLMA), the Ministry of Health (MoH), the Ceylon College of Physicians (CCP), the Sri Lankan Society of Internal Medicine (SLSIM), the College of General Practitioners of Sri Lanka (CGPSL), the Sri Lanka Accreditation Board (SLAB), the Sri Lanka Association of Clinical Pharmacology and Therapeutics and the Independent Medical Practitioners Association (IMPA). There will be a pre-congress workshop on Medical Laboratory Accreditation organized in collaboration with the Sri Lanka Accreditation Board. Two other parallel workshops as well as a workshop on WHONET will be conducted for other categories of staff such as nurses, medical laboratory technologists and pharmacists in addition to the doctors. Two more workshops on IPC will be

conducted by foreign resource persons in collaboration with the MoH. The collaboration with the MoH will continue with members of Sri Lanka College of Microbiologists (SLCM) actively participating in activities such as the National Advisory Committee for combating AMR, in implementing the activities of National Strategic Plan for combating AMR and in development of National Guidelines on Infection Prevention and Control. The collaboration with SLMA and IMPA will continue by members of SLCM participating in awareness programmes of these associations as resource persons.

SLCM will also collaborate with international partners. Currently it is participating in a research on 'Antimicrobial resistance as a social dilemma: approaches to reducing broad spectrum antibiotic use in acute medical patients internationally' in collaboration with the University of Leicester, United Kingdom (UK). Also SLCM is a partner in a research which is planned by the University of York on 'Drivers of Human Exposure to Antibacterial Resistance in the Sri Lankan Environment' which will be applying for funds from Medical Research Council of UK soon. (Applied but not granted).

I wish to thank everyone who supported me in many ways throughout my life and career at this important juncture of my life.

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One Health approach to studies on plagues in Sri Lanka – Past and Present

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Thank you, Madam President, for your kind words of introduction.

Dr. Kushlani Jayatilleke, President of the Sri Lanka College of Microbiologists (SLCM), Past Presidents, Members of the SLCM council, Madam Ranganie Wickremasinghe and other members of the late Dr. Siri Wickremesinghe's family, distinguished guests, colleagues, friends, ladies and gentlemen.

I feel honoured and privileged to stand here today in front of this distinguished audience to deliver the Siri Wickremasinghe Oration 2018 to remember and honour a colleague, friend, and an outstanding medical microbiologist of Sri Lanka. I consider that remembering the life and work of Dr Rakkhita Sirimal Bandara Wickremesinghe who was a distinguished medical microbiologist in his time in Sri Lanka and also a true nature lover is an inspiration to all the colleagues and also this is an occasion to pay our respect to him.

Dr Rakkhita Sirimal Bandara Wickremesinghe was born on 28th November 1937. He received his school education from Royal College Colombo obtained his MBBS degree in 1963 from the Faculty of Medicine, University of Colombo and subsequently Diploma and Masters in Microbiology from the University of Manchester, United Kingdom and MD in Medical Microbiology from the University of Colombo.

He served as a Consultant Microbiologist at the Medical Research Institute, Colombo, Hastings General Hospital, UK, Flint Physicians Laboratory Michigan, USA and Fairfield Hospital, Melbourne. He also held the post of Director at MRI from 1996-1998. After his retirement, he was the Resident Pathologist and Laboratory Manager at the Durdans Hospital, Colombo.

I was fortunate to associate with him closely, initially as a member of the Council of the Sri Lanka College of Microbiologists in 1995, until his demise in the year 2003. He was an external examiner and visiting consultant for Medical Microbiology of the Faculty of Medicine, Ragama,

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University of Kelaniya and at that time I was the only senior academic of that Department. Therefore, I was fortunate to have associated with him and I appreciate his guidance and assistance given to me at that time.

Dr Wickremesinghe has been admired by many of his trainees, juniors and colleagues. He was an excellent teacher and trainer in Medical Microbiology and he was happy to share his wealth of knowledge and expertise with his trainees, juniors and colleagues. His contribution to Sri Lanka College of Microbiologists was immense. He was elected President of the Sri Lanka College of Microbiologists in 1994.

In addition to his contribution to activities of the Sri Lanka College of Microbiologists and to the field of Medical Microbiology he devoted much of his time for literature, history, geography, wild life, and in particular for the turtle conservation project at Kosgoda.

He passed away at a rather unexpected moment for the family, colleagues, students and friends but his legacy, our respect and admiration for Dr. Siri Wickremasinghe, will continue.

Dr. Siri Wickremasinghe, who was a true nature lover of our time, would undoubtedly endorse Conservation Medicine which comprises Ecosystem Health, Animal Health and Human Health addressed in the One Health concept which is the subject chosen by me for this oration.

Introduction

Dr Siri Wickremesinghe Oration 2018 is dedicated to **“One Health approach to studies on plagues in Sri Lanka – Past and Present”** which highlight the work carried out by me across two decades on human viruses of public health importance to Sri Lanka and of zoonotic concern.

In order to understand the aetiology, disease burden, immune response and also to establish laboratory diagnosis of these human plagues, I present findings from my own research conducted in Sri Lanka. I will also use information from research carried out by others where necessary in order to update the current situation.

Plagues are manifestations of nature's checks and balances in light of human population growth and our impact on climate change. Plagues originated by infectious agents sometimes produce devastating effects on society, are a continuing threat, will never be overtaken by medical skill, spread by global travel and, nourished by antibacterial resistance, may prove to be humanity's ultimate rival.

Plague of Athens occurred in 430-427 BC due to an outbreak of the bubonic plague, typhus, smallpox, measles or toxic shock syndrome; Antonine plague during 165-180 AD was an ancient pandemic due to either smallpox or measles, brought back to the Roman Empire by troops returning from battles in the Near East and the Black Death occurred in 1347-1351 in Europe.

One Health concept

“The One Health concept is a worldwide strategy for expanding interdisciplinary collaborations and communications in all aspects of health care for humans, animals and the environment /... / When properly implemented, it will help protect and save untold millions of lives in our present and future generations” [1].

Conservation Medicine and One Health

Health relationships at the interface of humans, animals, and ecosystems are addressed in the interdisciplinary fields of Conservation Medicine and One Health (Figure 1). Globalization and global alterations in climate have intensified transmission of diseases between wildlife, humans, and domestic animals hence there is specific concern in high biodiversity regions such as Sri Lanka (Figure 2).

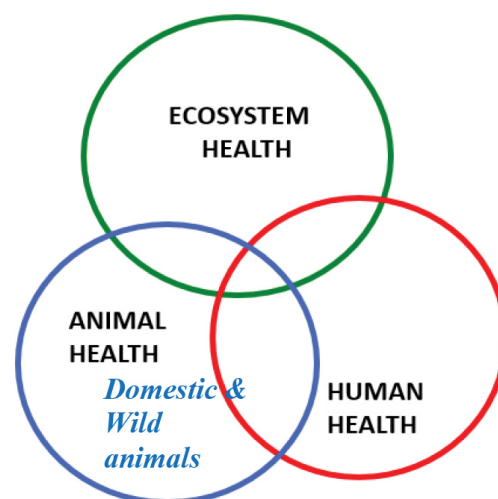


Figure 1. The health relationships at the interface of humans, animals, and ecosystems.

I start with human infections of HSV 1 & HSV-2, followed briefly by VZV, respiratory infections due to influenza viruses and *Mycoplasma pneumoniae*.

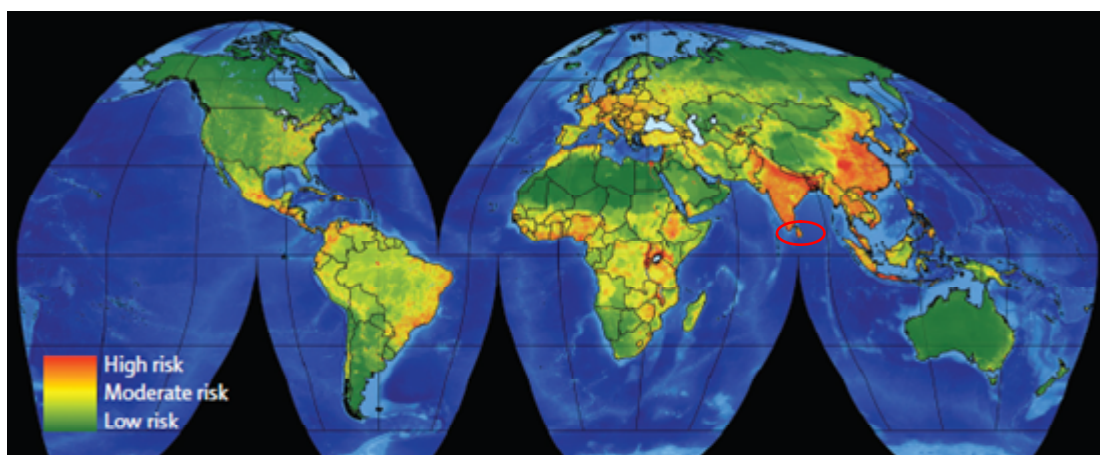


Figure 2. Global hotspots for EIDs of wildlife origin (Morse et al, Lancet 2012).

I will also speak about my research on rabies and dengue followed by ongoing studies – hantavirus infections, leptospirosis and emerging zoonotic infections of Sri Lankan wildlife.

Herpes simplex virus (HSV) infections

Herpes virus infections have been prevalent as early as ancient Greek times. Hippocrates (460-377 BC) is known to have described herpes simplex lesions used the Greek word “herpes” to mean “to creep or crawl” in reference to the spreading nature of the herpetic skin lesions. Even Shakespeare (1564-1616) is thought to have been familiar with recurrent herpes simplex lesions and their transmission and he name them as blister plagues in *Romeo and Juliet*, where he writes Queen Mab to say “*O’er ladies lips, who straight on kisses dream, which oft the angry Mab with blisters plagues, because their breaths with sweetmeats tainted are*”.

However, evolutionary history of herpes (HSV-1 and HSV-2) goes back to an evolutionary depth of 7 million years. This was revealed in a recent discovery by a group of researchers from Cambridge and Oxford Brookes universities which was published in “*Virus Evolution*” Journal in 2017 [2]. Their study involved analysis of hominin origin of HSV-2 DNA from fossil data to predict which species acted as an intermediary between our ancestors and those of chimpanzees to carry HSV2 – the genital herpes virus – across the species barrier.

Herpes simplex virus 1 and 2 Infected humans before they were human. Unlike HSV1, the earliest proto-humans (hominids) did not take HSV2 with them at the time of their evolutionary split from chimpanzees that occurred 7 million years ago. Therefore, humanity dodged the genital herpes bullet for almost 5 million years but about 3 to 1.4 million years ago, HSV2 jumped the species

barrier from African apes back into ancestors of modern humans (*Homo erectus*) through an intermediate hominin species unrelated to humans identified as *Paranthropus boisei* [2].

The search for origin of HIV pandemic in a colony of chimpanzees in Cameroon revealed that butchered chimp blood may have infected hunters. Similarly, it is hunting and butchering of ancestral chimps that made HSV-2 to leak into *P. boisei*. Then again the close contact between *P. boisei* and our ancestor *Homo erectus* provided the opportunity for HSV2 to bounce back into our bloodline with this time *P. boisei* being consumed [2].

This study strongly supports the one health concept for acquisition of modern human viruses or other pathogens at the time of evolutionary split from ancestral species or jumping the species barrier once exposed in the right place at the right time.

Global burden of HSV-1 and HSV-2 in Sri Lanka

The herpes simplex virus, or herpes, is categorized into 2 types: herpes simplex virus type 1 (HSV-1) and herpes simplex virus type 2 (HSV-2). Both HSV-1 and HSV-2 infections are lifelong. HSV-1 is mainly transmitted by oral-to-oral contact to cause oral herpes and “cold sores”, but can also cause genital herpes. HSV-2 is a sexually transmitted infection that causes genital herpes and therefore is a marker of sexual behavior. HSV-2 is a common cause of genital ulceration that facilitate HIV transmission. HSV-2 infection in pregnancy can lead to neonatal herpes.

An estimated 3.7 billion people under age 50 (67%) have HSV-1 infection globally. With respect to genital HSV-1 infection, 140 million people aged 15-49-years were

estimated to have genital HSV-1 infection worldwide in 2012 [3]. Genital herpes caused by HSV-2 is a global issue, and an estimated 417 million people worldwide were living with the infection in 2012. Prevalence of HSV-2 infection was estimated to be highest in Africa (31.5%), followed by the Americas (14.4%) [4].

Burden of Herpes simplex virus – type 1 and 2 – Sri Lankan study

70% HSV infections are clinically unrecognized worldwide. There was no information on the sero-prevalence of HSV-1 and HSV-2 amongst Sri Lankans. Herpes simplex – type 1 and 2 distribution in selected Sri Lankan target populations was studied in my laboratory during 2000-2001 and compared Sri Lankan data with 4 other countries namely India, Morocco, Brazil and Estonia in collaboration with the HSV sero-epidemiology International Multi-Centre Study group, UK.

The outcome of the research study on sero-epidemiology and age and gender stratified acquisition of HSV-1 and 2 among selected target populations in Sri Lanka namely non-high risk adult hospital inpatients (n=1347), children (n=433), blood donors (n=929), antenatal women (n=757)

and STD clinic attendees (n=676) have been presented [5,7] and published [6]. This study has shed light to understand the disease burden and age stratified acquisition of the HSV type 1 and 2, the risk of neonatal herpes, sexual behavior, and risk of acquiring other sexually transmitted infections (STIs) among Sri Lankans.

Ethical clearance was obtained from Faculty of Medicine, University of Kelaniya. Children, adult in-patients, blood donors and STD attendees were tested un-linked anonymous fashion. Informed consent was obtained from blood donors and antenatal mothers. A single sample of blood was obtained from each individual. Sera were tested FDA approved MRL- type specific HSV-1 (gG1) and HSV-2 (gG2) ELISA and data entry and analysis was performed using Epi-Info 6 programme.

Quality assurance of the ELISA testing was carried out using a panel of sera received from Central Public Health Laboratory (CPHL), London, UK, which were tested blind at Dept. of Medical Microbiology, Faculty of Medicine, Ragama, University of Kelaniya. All equivocal and double negative samples and 2% total samples were re-tested at PHLS Lab, UK. The results are shown in Table 2 and Figure 3.

Table 1. Setting and study population for HSV1 and HSV2 seroepidemiology

Target population	Age group (Years)	Number of patients/samples (Status)	Location
Children	1-12	433 (in-patients)	NCTH, Ragama
Non-high risk adults	13-89	1347 (in-patients)	NCTH, Ragama
Blood donors	15-54	929 (volunteer blood donors)	NCTH, Ragama
Antenatal mothers	14-44	757 (expectant mothers)	MOH area, Kelaniya
STD clinic attendees	4-79	676 (referred patients)	Central STD clinic Colombo

Table 2. Overall sero-prevalence (%) by target group

Target population	% HSV-1 Seropositive	% HSV-2 Seropositive
Children	50	5
Anti-natal women	76	8
Blood donors	79	11
Adult in-patients	77	21
STD attendees	78	39

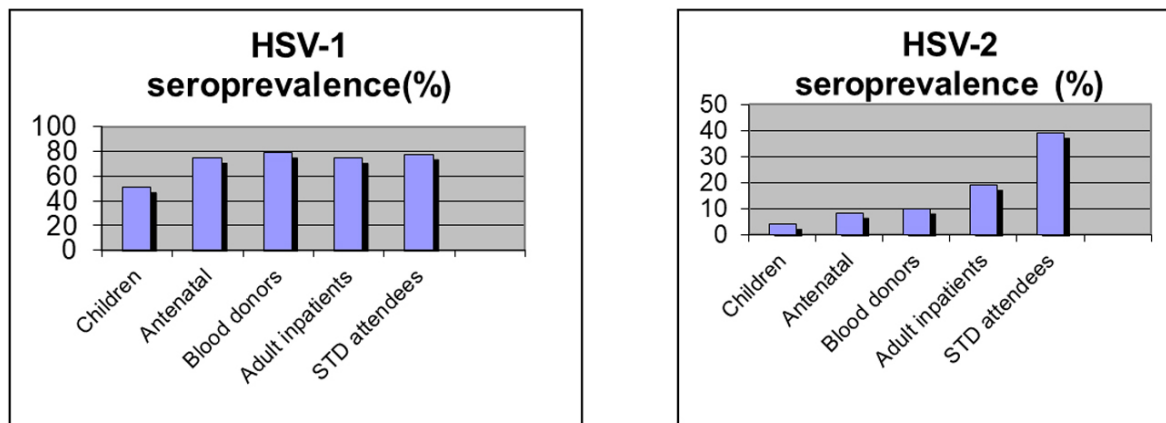


Figure 3.

Acquisition of HSV 1 & HSV-2 among Sri Lankans

34% and 9% day 1 to 1 year of age children were positive for antibodies to HSV-1 and HSV-2 respectively indicating maternal transfer of antibodies at this age. Seroprevalence to HSV-1 increases with age but for HSV-2 decline from 9% to 4% by the age of 10-12 years (Figure 4).

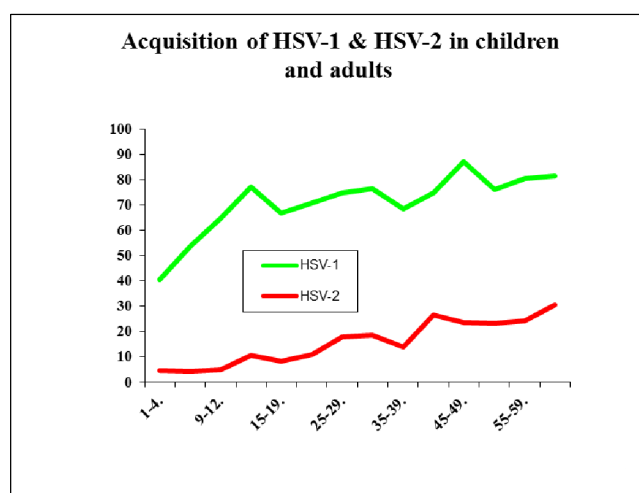


Figure 4. Acquisition of HSV 1 & HSV-2 among Sri Lankans.

Overall HSV-1 sero-prevalence is high in both children (50%) and adults (76-79%). Acquisition of occurs during the childhood which is 35% at 1-2 years age to 68% by 12 years of age and reach the adults levels (>70%) by 15-20 years age. Overall sero-prevalence of HSV-2 was lowest (5%) among children (0-12yrs) and highest (39%) in STD clinic attendees. HSV-2 acquisition occurs during

teenage years and increases with age, reaching 8% by the age of 15-19 years, 26% by the age of 60-64 years.

Male non-high risk adults (hospital in-patients) > 40yrs of age had equal sero-prevalence to male STD attendees of 20-29 years of age. Antenatal women – showed the lowest HSV-2 sero-prevalence (8.6%) among non-high risk adults in Sri Lanka. Among STD clinic attendee's, females have a higher rate of HSV-2 acquisition compared to males (Figure 5).

HSV-2 sero-positivity is a marker of sexual behavior

Male blood donors showed the highest HSV-2 sero-prevalence (20%) at the age of 40 years or more. Blood donors over 40 years of age have a higher chance of transmitting other STDs such as HIV. Therefore, this study showed that HSV-2 IgG sero-positivity can be used screen blood donors to minimize the risk of HIV transmission to recipients (Figure 5).

Varicella zoster virus (VZV) infections in Sri Lanka

Varicella zoster virus (VZV) causes varicella due to primary infection, herpes zoster due to reactivation of latent infection. Varicella causes a great disease burden to the Sri Lankan Army in particular on initial entry trainees. A hospital based descriptive study was conducted prospectively over a period of three months, to study the epidemiology of a varicella outbreak of a subset of active Army duty population, the initial entry trainees and to determine the usefulness of taking past history of varicella for screening of susceptible individuals, and to analyze the cost effectiveness of VZV vaccination of initial entry trainees for the Sri Lankan Army.

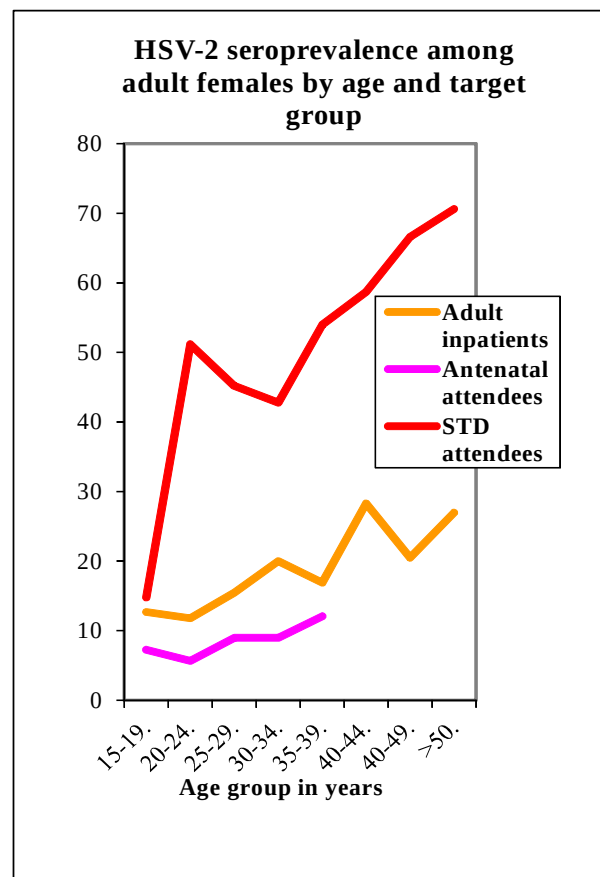
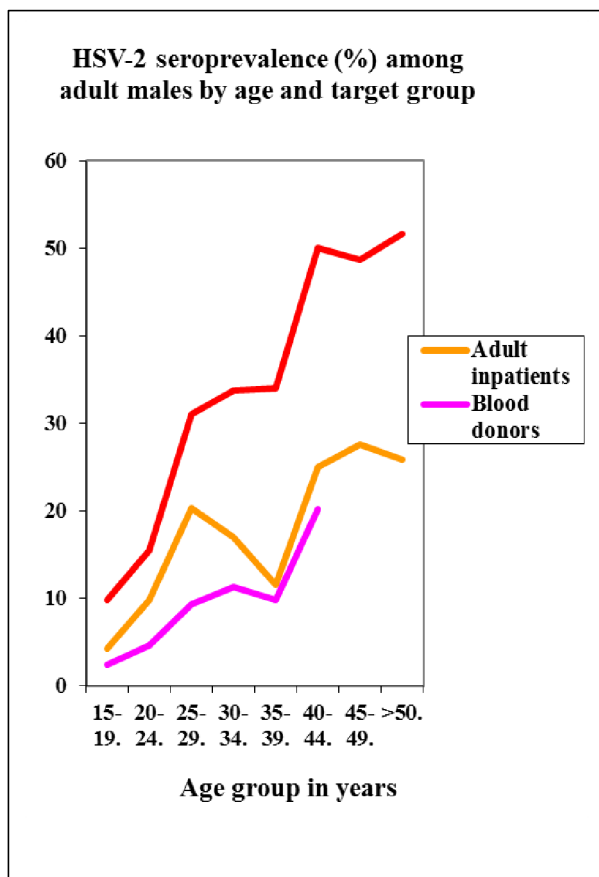


Figure 5. HSV-2 sero-prevalence (%) of adults of different target groups.

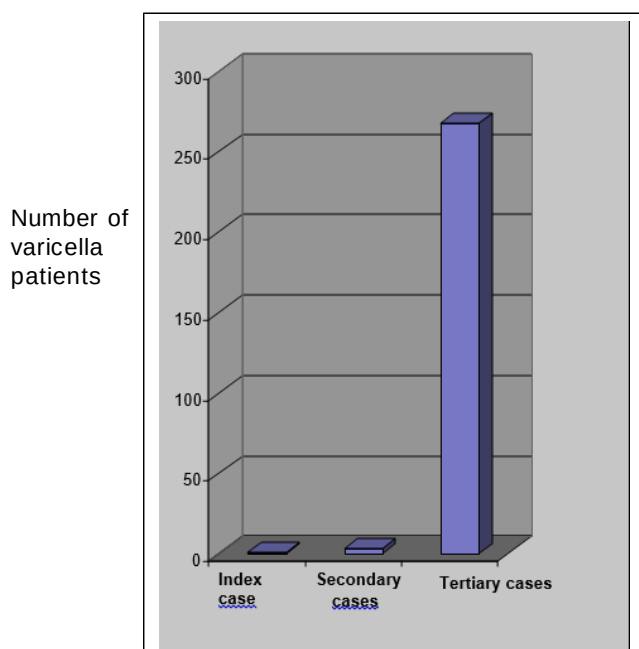


Figure 6. Spread of varicella.

This study revealed that the failure to segregate susceptible from immune individuals based on past history of varicella, inadequate isolation facilities, over-

crowding in billets, short distance between billets and sharing of bathing, washing and toilet facilities were factors responsible for rapid spread of varicella from the index case to 3 secondary cases within 13 days (Crude secondary attack rate = 2.2%) and finally to a total of 268 tertiary cases (Crude tertiary attack rate = 66.2%). This is a clear indication for the role of environment in the spread of varicella. A total of 271 recruits were hospitalized for chicken pox during the outbreak and 262/271 (96.7%) did not have a past history. Further, 9/271 (3.4%) hospitalized patients found to be re-infected.

Past history of varicella is a useful method to screen immune and susceptible new recruits with 96.6% and 64% accuracy respectively (8).

Respiratory infections

Influenza viruses in humans and animals circulating in Sri Lanka

Influenza viruses cause abrupt and dramatic illness with severe headache, sore throat, dry cough, fever, runny nose, muscle and joint pain. It can also cause asymptomatic, severe manifestation or death and the illness distinctly different from common cold.

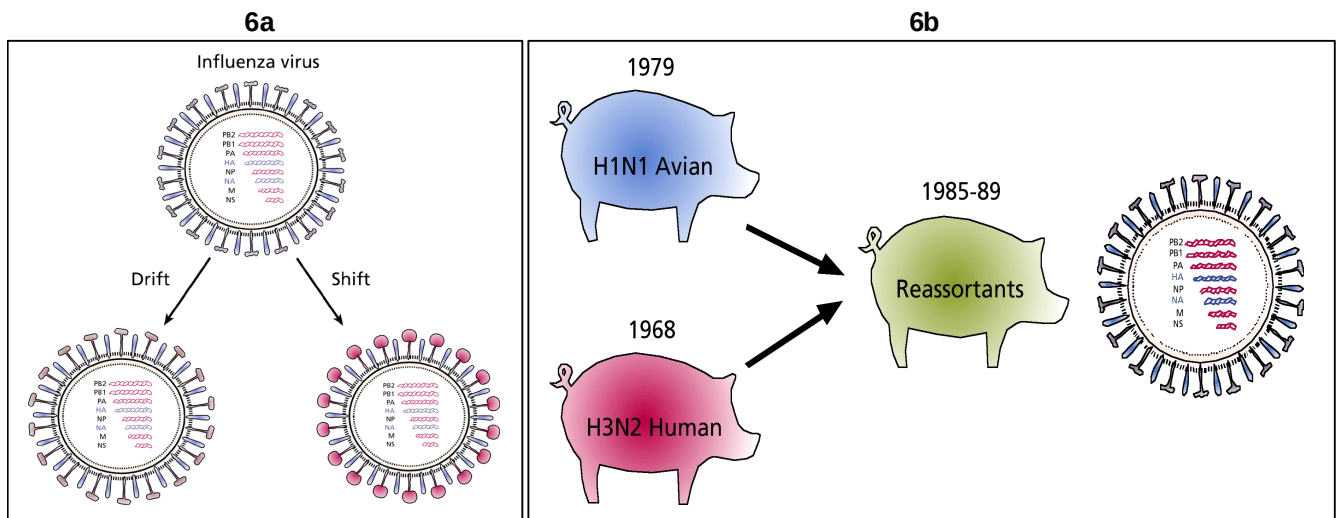


Figure 6a & 6b. Antigenic variations and genetic re-assortment between avian and human Influenza A viruses.

Three types of influenza viruses include Flu-A, Flu-B and Flu-C. Flu-A has been isolated in humans, avians, pigs, horses and sea mammals whilst Flu-B and Flu-C is found only in humans.

Flu A is a zoonotic virus and has the highest antigenic variation in HA and NA antigens [9]. Human disease is acquired from or transmitted to animals. All HA and NA combinations are found in wild water birds. Emerging Flu strains arise by genetic re-assortment during infection of a cell with two Flu A strains may yield a virus with a stable re-assortment of the genomes [10]. Influenza A viruses should be studied and strategies for control and prevention should be best implemented by the One Health approach as it is a classic example for health relationships at the interface of humans, wild animals, domestic animals and ecosystems are addressed. Therefore, I was interested to study the nature of circulating influenza viruses in humans and animals in Sri Lanka and received a National Science Foundation grant in 2003 and this study was carried out by a graduate student recruited to the project [11].

***Mycoplasma pneumoniae* infections**

One fifth of the community acquired pneumonia cases are atypical in which, *M. pneumoniae* is the commonest aetiology – accounting for 50% of atypical cases [12]. There are number of limitations in the laboratory diagnosis of *M. pneumoniae*, and no prevalence data of *M. pneumoniae* available in Sri Lanka. Therefore, I was interested to study the occurrence of *M. pneumoniae* infections in patients with respiratory tract infections in two selected hospitals in Western Province of Sri Lanka and I received a National Science Foundation grant in 2003 and this study was carried out by a graduate student recruited to the project [13, 14].

Rabies in Sri Lanka

Rabies is almost always fatal an acute viral disease of the central nervous system still prevailing in more than 150 countries of the world, caused by rabies virus classified into genus *Lyssavirus* of the family *Rhabdoviridae*.

Rabies is an “old” ancient disease considered as the most severe of all communicable diseases, recognized for over 4,000 years and approximately 50,000 and 70,000 people worldwide die annually in dreadful conditions. The majority of rabies deaths occur in children. The most of the human rabies deaths (99%) occur in the developing world in Africa and Asia (Figure 7). Approximately 45% of them belong to South and South East Asia (SEA), 30%-50% of human rabies deaths occur in children aged under 15 years and 14 million people worldwide receive post-exposure prophylaxis.

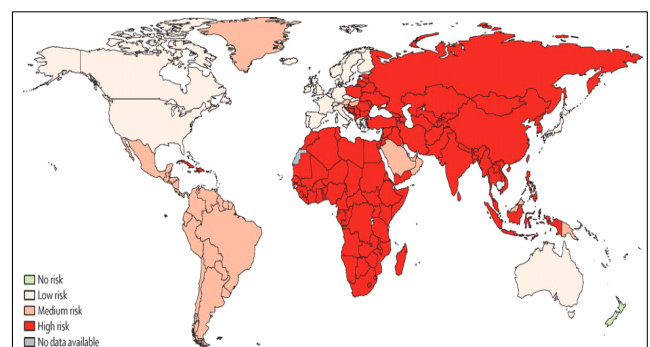


Figure 7. Rabies risk countries.

Despite the fact that it is a 100% deadly zoonotic viral disease, it is 100% preventable but still a very much

neglected disease due to its predominance among the poorest communities and least developing countries in the world. Domestic dogs are the source of the vast majority of human and animal cases in Asia. Human deaths are mainly by bites from rabid dogs representing 93% to 96% of all animal bites. There is also possibility of virus transmission from wildlife to dogs and vice versa. There are 10 South East Asian member countries (ASEAN) Cambodia, Indonesia, Indonesia, Lao PDR, Myanmar, Philippines, Thailand, Vietnam presently endemically infected with rabies but Brunei, Darussalam, Malaysia, Singapore are ASEAN countries that are free of rabies.

Among 8 South Asia member countries (SA) of which India, Bangladesh, Pakistan are highly endemic, Sri Lanka, Nepal and Bhutan are with medium endemicity but Maldives is free of rabies.

Rabies is endemic in all provinces of Sri Lanka. There were 28 human deaths in the year 2013 and the cost of rabies post exposure treatment in Sri Lanka in 2013 was LKR 350 million. Rabies deaths has been reduced to 24 in 2015. I was interested to study the appropriateness of rabies post-exposure therapy in Government hospitals in Sri Lanka some years ago by monitoring 500 dog bite victims receiving rabies post-exposure therapy in a Government hospital of Sri Lanka [15]. My observation was that there were 84% cases were exposed to dog bites, 77% offended animals were observable beyond 14 days, 50% dog bites were due to provocation. The conclusions are that the use of RPEP is often inappropriate in Government hospital, determination of antibody level in vaccinated animals would be useful in the risk assessment for RPEP and in-house tests are needed to monitoring antibody response of canines following anti-rabies vaccination [15]. I received a National Science Foundation grant in 2004 to determine and characterise rabies virus from cases of animal rabies and to evaluate ELISA as a method for monitoring antibody response to canine anti-rabies vaccine but this grant could not be utilised due to interruption of my research in 2005.

Lyssa virus in Indian Flying Foxes, Sri Lanka 2015

A novel Lyssa virus was isolated from brains of Indian flying foxes (*Pteropus medius*) in Sri Lanka [16]. Phylogenetic analysis of complete virus genome sequences, and geographic location and host species, provides strong evidence that this virus is a putative new Lyssa virus species, designated as Gannoruwa Bat Lyssa virus (GBLV). Therefore, in the light of the detection of Gannoruwa bat Lyssa virus and other wildlife species such as mongoose and jackal, one health approach is important for elimination rabies in Sri Lanka.

Dengue – Meeting the need for dengue diagnosis

Dengue is the most significant mosquito borne viral disease affecting nations from Asia to the Americas including Sri Lanka. One Health Concept is applicable for prevention of dengue because man made environmental changes influence vector density and dengue transmission in Sri Lanka.

Clinical presentation of primary dengue is characterised with mild to high fever, severe headache, muscle pain and rash whilst secondary dengue presents with high fever leading to haemorrhagic events (DHF) and circulatory failure (DSS).

Challenges in dengue diagnosis and Point of Care (POC) dengue diagnosis

Differentiation of primary and secondary dengue infection is particularly important in situations such as outbreaks where the allocation of resources needs to be directed to those at greatest risk. Diagnosis of dengue is challenging in remote areas or clinics of general practitioners where the amenities of collecting samples and transporting to an appropriate testing centre are lacking.

To meet these unmet demands, a multi centre study was carried out in 2004 dengue suspected patients in the Gampaha district of Sri Lanka.

In this study, a novel rapid assay was evaluated for the point of care (POC) diagnosis of dengue fever. A finger prick drop of blood was used as the analyte of the Dengue Duo cassette for which whole blood, serum or plasma may be used. The kit contains all that is needed to run a test therefore ideal for POC use and wide storage temperature range (2-30°C).

Results can be observed in 15 minutes. Differentiation between primary and secondary dengue can help predict disease severity. Using 209 sera collected from in-patients at a hospital setting in Sri Lanka, the Dengue Duo cassette was assessed for its capacity to detect and differentiate presumptive primary and secondary dengue fever. Cassette was evaluated against the Panbio Dengue capture IgM and IgG ELISA. Results showed that 93 out of 209 patient's sera were negatives and 116 patients were positives with 33 primary infections and 83 secondary infections [17, 18].

The Dengue Duo cassette is therefore, a valuable field based assay to support the clinical evaluation of patients and its high clinical utility as a field device which has the ability to rapidly and accurately detect and differentiate dengue infections. This study was presented at the 2nd International Congress on Dengue and Yellow Fever held in Havana, Cuba [17].

Table 3. Sensitivity and specificity with serum from hospital settings

Diagnosis by Panbio	Dengue Duo Cassette result			Sensitivity (%)	Specificity (%)	95%CI*
	Negative	Primary dengue	Secondary dengue			
Negative (93)	87	4	2		93.5	90.2-96
All dengue infections (116)	7	35	74	94		90.7-97
Primary dengue (33)	5	27	1	81.8		76.6-87
Secondary dengue (83)	2	8	73	88		83.5-92

*CI = Confidence Interval

Leptospirosis and Hantavirus infections in Sri Lanka

Two global (re-) emerging zoonoses – leptospirosis and hantavirus infections – with similar epidemiology, are clinically indistinguishable.

Thirty-one patients, hospitalized in Sri Lanka in 2003 for acute severe leptospirosis, were (after exclusion of other potentially involved pathogens), prospectively screened with IgM ELISA for both pathogens.

Of these, nine (29.0%) were positive for leptospirosis only, one (3.2%) for Hantavirus only, seven (22.5%) for both pathogens concomitantly, whereas 13 (41.9%) remained negative for both [19, 20].

Moreover, in a retrospective study of 23 former patients, serologically confirmed for past leptospirosis, six (26.0%) were also positive in two different IgG ELISA Hantavirus formats.

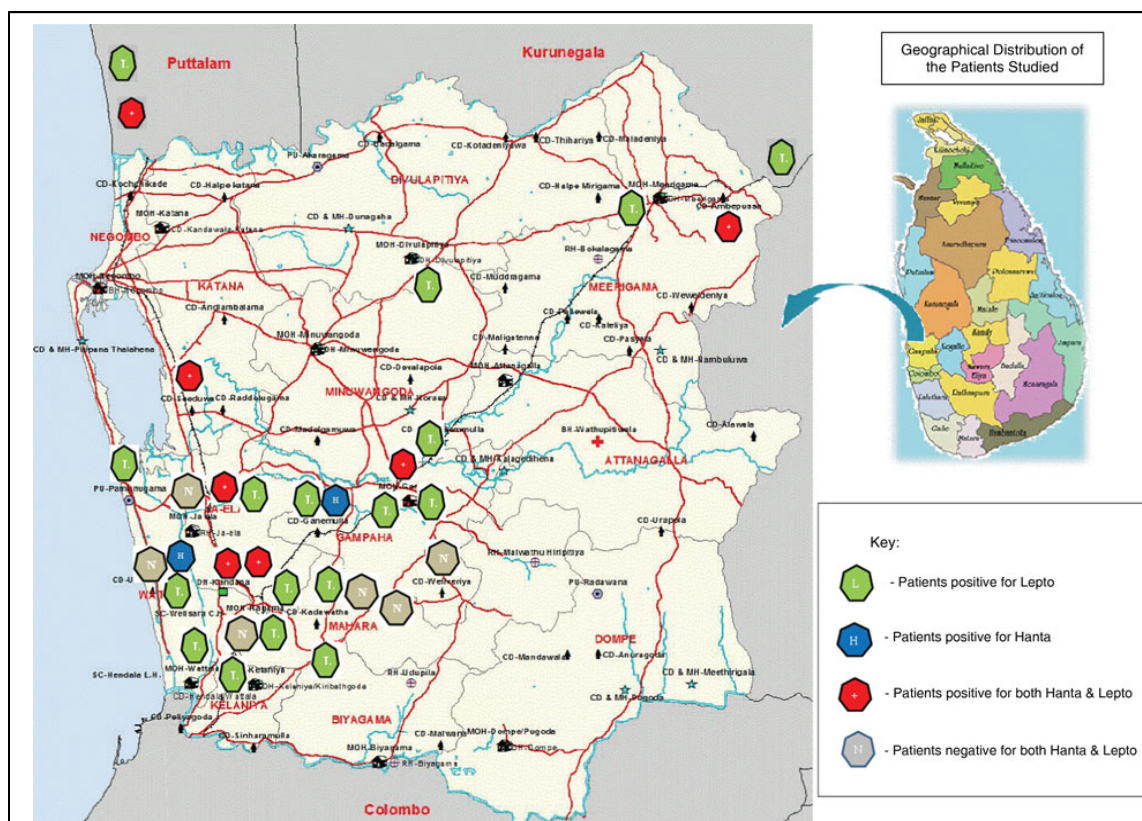


Figure 8. Map of Sri Lanka and location of patients with leptospirosis and hantavirus infections.

Surprisingly, European Puumala Hantavirus (PUUV) results were constantly higher, although statistically not significantly different, than Asian Hantaan virus (HTNV), suggesting an unexplained cross-reaction, since PUUV is considered absent throughout Asia [19]. Moreover, RT-PCR on all Hantavirus IgM ELISA positives was negative. Concomitant leptospirosis-hantavirus infections are probably heavily underestimated worldwide, compromising epidemiological data, therapeutical decisions, and clinical outcome [20].

Current research

I have several ongoing research projects which include; "Studies on the aetiology of viral gastro-enteritis in children and adults funded by the National Research Council, Sri Lanka, "Sero-epidemiology of human cytomegalovirus (HCMV) infection in selected target populations" funded by the University of Kelaniya Research grant, Hantavirus and emerging zoonotic infections from wildlife of Sri Lanka" funded by the Swedish Research Council, Sweden.

I take this opportunity to speak briefly in particular the project in line with One Health approach which is initiated as a research collaboration between universities of Uppsala (SLU) and Kelaniya to investigate Hantavirus infections, leptospirosis and tuberculosis in wild elephants in Sri Lanka. Capacity building through workshops, exchange visits, in-field training, and immobilization of wildlife for clinical sample collection for research studies are being carried out in Juvenile wild elephants at Elephant Transit Home, Udawalawa, and free ranging rodents in different districts of Sri Lanka

Studies on emerging zoonotic infections from wildlife of Sri Lanka

Importance of animal reservoirs

Over 75% of all emerging viruses of past two decades are of zoonotic origin: bats, birds, rodents. Application of "One Health approach" with multidisciplinary research collaborations is critical to understand, prevention and control of emerging infections occurring in the animal – human interface.

Studies on animal disease reservoirs are extremely important in the global public health to understand where our viruses come and for preventing future viruses from making the jump into humans.

In order to determine emerging and re-emerging viruses from the Sri Lankan wildlife – incidence of elephant calf diarrhea, papilloma like lesions in juvenile wild elephants, herpes viruses in wild elephants and native

primates will be studied. Tuberculosis in wild elephants is currently under investigation for zoonotic significance.

Gastroenteritis – Bacterial causes

Zoonotic agents such as *E. coli* O157: H7 or *Campylobacter* spp. are not necessarily pathogenic to animals, are not recognized because the "link" to humans is unclear. Therefore, the role of humans and Sri Lankan free ranging primates for the transmission of enteric pathogens were studied in urban and rural settings. *Campylobacter* spp and *Salmonella* spp. were detected, isolated and tested for antibiotic resistance indicating that primates are a source of infection at the animal - human interface.

Mycobacterium tuberculosis in elephants

M. tuberculosis has been detected in captive Asian elephants in Sri Lanka, Sweden, USA, Nepal, India, Laos, Malaysia and Thailand. It was a significant finding that I could detect and isolate *Mycobacterium tuberculosis* from a captive elephant with severe respiratory illness in the Colombo Zoo as far back as 2003 (Sunilchandra unpublished data). The elephant had died of the respiratory disease subsequently and postmortem specimens were further tested using acid fast staining and isolation in TB culture (LJ medium) and found positive for *Mycobacterium tuberculosis*. There are over 10 million new cases and approximately 480,000 new cases of multi-drug resistant TB (MTB) in humans.

There are 6,000 wild Asian elephants in Sri Lanka covering 60% of the island and ~20% of the global population and it is the highest density in the world. MTB is recognised as an emerging disease in elephants. MTB cases in wild Asian elephants in Sri Lanka in 2014 [21] and India in 2017 [22] is a major concern and one health approach is needed for the prevention and control of TB in elephants and wildlife workers. Furthermore, observing wild elephants and cattle eating garbage in Sri Lanka, is a clear indication for possible MTB transmission during feeding on garbage contaminated with infected waste.

Acknowledgements

I thank members of my research group and collaborators – Drs. Lakmini Wijesooriya, Jeevani Kumara, Amali Jayasinghe, Dept. of Medical Microbiology, Faculty of Medicine, University of Kelaniya and Prof. David Brown from CPHL, UK for research on HSV infections, Dr. K.P.K. Dias, Army Hospital, Diyatalawa for research on VZV and rabies, Drs. Sankapana Karunasekera, D.A.D.H. Somasiri, S.M.R.M. Samarakoon, Thushari Jayawardena, Muditha Fernando, Lakmini Wijesooriya and Karuna, Dept. of Medical Microbiology, Faculty of Medicine, University of Kelaniya, Carl Stubbings - USA, Les Watson and Mary Garcia - Australia for research on dengue field

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Thank you for your attention.

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SUCCESS STORY OF HEPATITIS B INFECTION IN NATIONAL CANCER INSTITUTE, SRI LANKA

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Hepatitis B viral (HBV) infection has a worldwide distribution. It is estimated that >2 billion people worldwide have been infected with HBV. Of these, approximately 360 million individuals are chronically infected and at risk of serious illnesses and death, mainly from liver cirrhosis and hepatocellular carcinoma. HBV is transmitted through mother to child (perinatal), by contact with infected person (horizontal), by sexual contact and parenteral contact with infected blood and body fluids. All unvaccinated people at risk for hepatitis B infection should be vaccinated. This includes, sex partners of people infected with hepatitis B, men who have sex with men, people who inject intravenous drugs, people with more than one sex partner, people with chronic liver or kidney diseases, people at risk of exposure to human blood or other body fluids (eg: health care workers), patients with immunosuppressive states and for international travelers to HBV endemic countries.

The course of hepatitis B infections may be extremely variable. Most adult patients recover completely from Hepatitis B infections. About 5-10% will progress to become asymptomatic carrier or develop chronic hepatitis possibly end up in cirrhosis or hepatocellular carcinoma. Vaccination is the only prophylactic measure to prevent Hepatitis B infection. Even though vaccination is a preventive method for hepatitis B infection, there are 5-10% of the vaccinated populations who are not protected from the disease called "Non responders". Therefore other preventive measures are important to be practiced.

In National Cancer Institute of Sri Lanka (NCIM), there are lot of handling of blood and blood products, and involving in invasive procedures like performing bone marrow aspiration and biopsy and other surgical procedures. Apart from that, intravenous drug usage is comparatively high in NCIM and there is also high chance of spreading of infection as horizontal transmission, due to long hospital stay of patients. Hence, the tendency of spreading of blood borne infections is high.

History of hepatitis B infection burden in NCIM

Hepatitis B infection was a real burden to the hospital administration in 1980's when both patients and health care workers were infected. At that time, since high dose of methotrexate was given as a main treatment, most believed that the jaundice was due to chemicals. Several staff members with confirmed Hepatitis B infection had been reported in that period, since there were no preventive measures such as vaccination or guided infection control activities available in the hospital. Afterwards, patients with hepatitis B infection were detected frequently. There were several distinct outbreaks reported throughout this period, in both paediatric and adult wards in 2003, 2009 and 2011. However, family screening, vaccination, antiviral treatments and follow up system were not operated properly due to unavailability of resources as well as lack of expert opinion. In that era, other than their cancer diseases, patients died due to Hepatitis B infection and its complications such as hepatocellular carcinoma or liver failure.

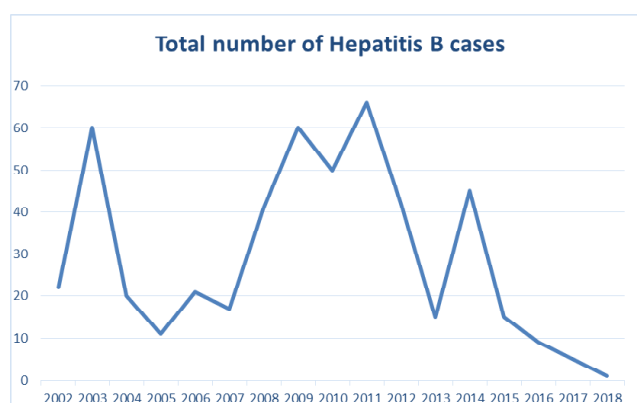


Figure 1. Reported number of Hepatitis B cases in National Cancer Institute.

History of Hepatitis B vaccination in NCIM

Following confirmed cases of Hepatitis B infection, in 1993, Hepatitis B vaccination to the health care workers was

started, and vaccinations were given in wards. In 2002, Hepatitis B vaccination policy for patients was implemented by the first consultant Microbiologist in NCIM and vaccination for the patients was commenced by the Infection control unit.

During the time period of 1993 to 2006, there were remarkable increment in paediatric Hepatitis B patients and some mothers also got Hepatitis B. As a result of that, in 2006 immunization of mothers or close care takers of the children was established.

In 2005, revision of Hepatitis B vaccination policy was done and vaccination of family members of infected patients was introduced.

In 2014, review of vaccination of policy was done and Hepatitis B vaccination for the patients was started without delaying for surface antigen report and patients with all cancers were vaccinated and doctors were encouraged to refer patients to infection control unit in their first clinic visit.

At present this vaccination policy is operated with enormous contribution by infection control nursing officers. Furthermore, as we get high numbers of vaccine non responders due to the compromised immune status of cancer patients, booster vaccines and second course of vaccines are practiced. In addition, intradermal vaccination also started in 2016 for the non responder patients and health care workers which showed better seroconversion.

Establishment and improvement of laboratory diagnosis of Hepatitis B patients

Up to 2002, diagnosis facilities were not available in NCIM and confirmation of suspected cases of jaundice and elevated liver function were done in Medical Research Institute (MRI) and National Blood Bank. The Basic diagnostic methods of antigen detection and antibody detection, PHA and RPHA were established in 2002, in microbiology laboratory under the supervision of the Consultant Microbiologist in NCIM and for further conformation, blood samples were sent to MRI.

In 2005, ELISA method for Hepatitis B surface Antigen detection and quantitative ELISA method to detect Hepatitis B surface Antibody were implemented. At the moment, microbiology department provides a massive service to patients as well as to health care workers to diagnose the disease and to assess the level of immunity following vaccination.

In case of urgent dialysis or any invasive procedure in suspected patients, rapid immunochromatographic test is available for Ag detection.

Awareness programs for health care workers and patients

Microbiology unit carried out workshops, inward training sessions, poster displays and audits regarding infection control and standard precautions with the help of Second Health Sector Development Program (SHSDP) in the Ministry of Health.

Strategies aided to remarkable reduction in number of new Hepatitis B cases

In early 1990s, infection control activities were at primitive level, due to unavailability of Consultant Microbiologists and lack of an infection control unit. Lots of malpractices had been done such as sharing of syringes among patients to administer drugs, using same intravenous sets for several times, reuse of gloves etc. With the establishment of infection control unit and the recruitment of Consultant Microbiologists, following strategies have contributed to dramatic reduction in Hepatitis B in NCIM.

- Improvements in infrastructure facilities
- Expansion of serological diagnostic facilities and antibody detection following vaccination
- Periodical awareness programs for patients and health care workers
- Improvement in vaccine coverage
- Mass vaccination of patients in outbreak situations
- Conducting of workshops series for all health care workers on Hepatitis B infection, displaying posters, distribution of leaflets in 2017 which are funded by Second Health Sector Development Program (SHSDP) in the Ministry of Health
- Valuable contribution by nursing officers of the infection control unit and other liaison nurses
- Introduction of Hepatitis B vaccine to EPI program

Future goals to be achieved

When compared to the past, the number of Hepatitis B patients have drastically reduced during last two decades. However, in some wards there are Hepatitis B carriers who are still coming for treatment as well as for clinic follow up. Therefore, there is a potential risk of spreading infection and outbreaks as well. Thus, it is the responsibility of all health care workers to take strict infection control measures to maintain zero prevalence of new Hepatitis B patients in NCIM.

Acknowledgement

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PYTHIOSIS: A PSEUDO FUNGAL INFECTION

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Human pythiosis has been reported in many regions of the world; however it is endemic in Thailand, tropical and subtropical area of the world (Krajaejun et al 2006). It has also been described in Australia, Brazil, Haiti, Malaysia, New Zealand and the USA (Gaastra et al 2010).

Pythium belongs to Kingdom Stramenopila, Phylum Oomycota (Santos et al 2016). Among the other species, *Pythium insidiosum* is the most commonly isolated *Pythium* species in human and animal disease (Itaqui et al 2016). Although *Pythium* species are frequently misidentified as fungi due their morphological similarity, they are not a true fungus and it is explained by the following features: It does not contain chitin in its cell walls, its cytoplasmic membrane lacks ergosterol, its thallus is diploid and coenocytic, it produce biflagellate zoospores by oogamy (Alexopoulos et al 1996).

These organisms are frequently found in aquatic area and release zoospores which are the infective propagules, to the aquatic environment (Krajaejun et al 2006). These zoospores have marked chemotaxis towards damaged skin, wounds and animal hair where they attach to the skin and penetrate to deeper layer (Gaastra et al 2010), (Krajaejun et al 2006). It is believed that traumatic inoculation of the zoospores in aquatic environment is followed by the disease acquisition (Richardson et al 2012). Invasive form of the disease could result from local, lymphatic or vascular spread (Kauffman et al 2011). Recreational activities and occupational exposure to aquatic environments make the people more susceptible to the disease (Krajaejun et al 2006).

Most *Pythium* species can cause infections in plants and few species have been reported among animals and humans (Richardson et al 2012). However pythiosis is more frequently seen among animals than humans (Hummel et al 2011). It is reported that high degree of morbidity and mortality is associated with human pythiosis compared with animal pythiosis (Krajaejun et al 2006).

Pythiosis has been reported among different animal species including, horses, dogs, cat, cattle, sheep, birds and camels (Gaastra et al 2010). Cutaneous or intestinal forms of disease are observed among the animals however cases of localized bone or pulmonary infection and

disseminated cases through lymph nodes have also been reported (Gaastra et al 2010). The cutaneous lesions are characterized by large, granulomatous nodular ulcerative lesions and may contain necrotic tissue (Headley et al 2002). The gastrointestinal form can present as on and off diarrhea, vomiting, weight loss and palpable abdominal masses (Gaastra et al 2010).

Pythiosis is usually seen among apparently healthy individuals (Gaastra et al 2010). However vascular and disseminated forms of the disease have been observed in patients with underlying diseases such as thalassemia and hemoglobinopathy syndrome (Itaqui et al 2016). Adults are more frequently affected than the children and it is more frequently seen among men of 20 to 60 years of age (Richardson et al 2012).

Human pythiosis can present as ocular, vascular, cutaneous or subcutaneous and disseminated diseases (Chanprasert et al 2015). According to a report which describes more than 100 human cases of pythiosis in Thailand, majority of the cases were vascular type (59%) and it was followed by the ocular and orbital form (33%), the cutaneous form (5%), and disseminated pythiosis and infection of internal organs (3%) (Krajaejun et al. 2006). The cutaneous form could present as granulomatous and ulcerating lesion of the face, periorbital area or limbs (Gaastra et al 2010). These lesions may present as painful pustules, nodules, ulcers or cellulitis (Kauffman et al 2011). The vascular type, which is more common among thalassemic patients affect arteries causing arterial occlusion and aneurysms (Gaastra et al 2010). It may appear as arterial insufficiency syndrome of lower extremities with the symptoms of leg or groin swelling, claudication, fever, painful masses (Kauffman et al 2011). The ocular and orbital form could present as corneal ulcers or keratitis (Gaastra et al 2010). The disseminated form, which is rarely observed, usually occurs among patients with malignancies or thalassemia (Kauffman et al 2011).

As mentioned before *Pythium* species are frequently misidentified as a fungus because they closely resemble fungi morphologically (Itaqui et al 2016). *Pythium* species produce (figure 1) white to colorless, irregular radiate, submerged colonies on Sabouraud Dextrose Agar (Mendoza et al. 1996) (Kauffman et al 2011). The tease mount of the colony with Lactophenol cotton blue shows

hyaline, sparsely septae, broad filaments with occasional right angled lateral branches (He et al 2016) (figure 2). This appearance of hyaline hyphae mimics those of the *Mucorales* for which it is frequently misidentified (Richardson et al 2012). There are numerous vehicles inside the filaments and an “end-plate” – like structure was discovered at the end of some filaments (He et al 2016). The production of motile biflagellate zoospore is stimulated by the presence of K⁺, Ca²⁺, Mg²⁺, and plant material in the aquatic environments (Mendoza et al 1996).



Figure 1. White to colorless, irregular radiate, submerged colonies on sabouraud dextrose agar.

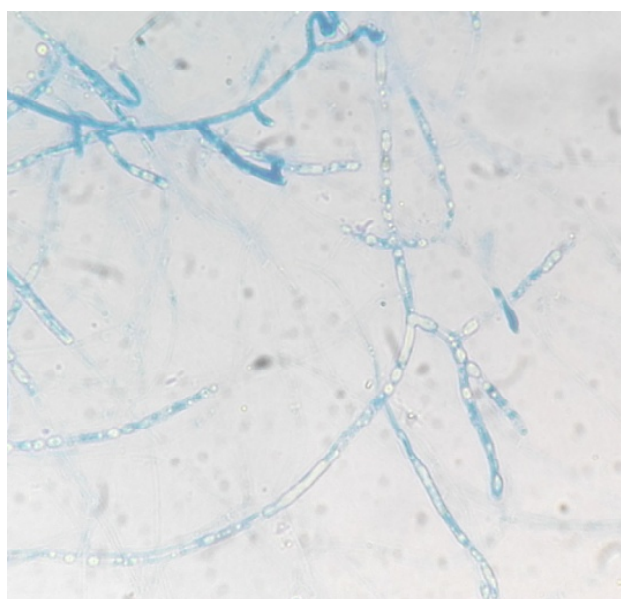


Figure 2. The tease mounts of colony showing hyaline, sparsely septate, broad filaments with occasional right angled lateral branches similar to Zygomycetes.

In contrast to agents of *zygomycetes* these agents stain weakly with Gomori-methenamine silver and other fungal stains (Kauffman et al 2011). Molecular assays and immunofluorescence techniques have been used for rapid diagnosis (Kauffman et al. 2011).

Different therapeutic strategies have been applied for the management of this disease and they include antimicrobials (antibiotics, antifungals), surgical treatment and immunotherapy (Chanprasert et al 2015). Since this organism is unable to synthesize ergosterol, most antifungals which target the ergosterol are not effective in treatment (Itaqui et al 2016). However there are reports of effective treatment of combination of antifungals such as amphotericin B, itraconazole and terbinafine, in human pythiosis in literature (Richardson et al 2012). Ocular lesions have been successfully treated with topical antifungals miconazole, amphotericin B, natamycin and ketoconazole (Kauffman et al 2011). According to in-vitro susceptibility data reported by a recent study, azithromycin, terbinafine and benzalkonium, cetrimide, cetylpyridinium and mupirocin show potential as new supplementary topical therapeutic options for the treatment of pythiosis (Itaqui et al 2016). In addition to that, supersaturated potassium iodide may be effective for cutaneous and subcutaneous lesions (Kauffman et al 2011). Compared with cutaneous and subcutaneous infections, corneal pythiosis is reported to refractory to medical treatment and it usually required surgical enucleation or evisceration (Richardson, et al. 2012). On the other hand, in cases of arterial disease, prompt recognition, early surgical intervention and systemic antifungals are paramount important because of the high morbidity and mortality (Kauffman et al 2011).

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ESSENCE OF TOXOPLASMOSIS FOR DIAGNOSIS AND MANAGEMENT

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Introduction

Toxoplasma gondii is a cosmopolitan parasite infecting mammals, including humans, and birds etc. Family Felidae (eg: cats) are the only definitive hosts and they shed oocysts in their faeces. Oocyst shedding takes place only for a brief period of one to two weeks yet the number may be very high. However, freshly passed oocysts are not infective to humans or other intermediates hosts and it takes about another one to five days in the environment for the process of transforming them into the infective form (sporulated oocysts).

Humans acquire infection via several methods such as

- Ingestion of underdone meat (containing tissue cysts)
- Consuming food or water contaminated with infective oocysts in the environment (indirect infection)
- Direct ingestion of infective stages via contaminated hands (oocysts in soil, tissue cysts/ tachyzoites in infective meat etc).
- Cockroaches and flies acting as mechanical vectors (carrying infective oocysts)
- Blood transfusion (containing tachyzoites)
- Organ transplantation (containing tachyzoites / bradyzoites)
- Transplacentally from mother to foetus (through tachyzoites)
- Inhalation of oocysts in aerosols (rarely)

New evidence suggests that *T. gondii* may be capable of altering the behaviour of the intermediate host to favour transmission to its feline primary host [1].

Seroprevalence data for different geographical locations are as follows [2].

- Americas: 78% in Brazil to 6.1% in Mexico
- Europe: 63% in Germany to 8.2% in Switzerland

- Africa: 75% in Sao Tome and Principe to 25% in Burkina Faso
- Asia: 64% in Iran to 5.3% in Thailand

Reason for high prevalence in different geographical locations varies based on habits such as high meat consumption in Europe and abundance of stray cats in Central Americas.

There are many studies giving sero-prevalance of toxoplasmosis among animals (cats-30% in Colombo and chicken-39%, goats-22-25%, dogs-74%, elephants-32% in Kandy and macaque-12% in Polonnaruwa). Tests used are MAT, IHA or IFAT [3]. Sero-prevalence data from several selected studies carried out among humans from Sri Lanka are summarized in Table 1.

Clinical aspect

Clinical picture of acquired toxoplasmosis in immuno-competent otherwise healthy persons varies. Majority of infections are asymptomatic as the organism exists in a latent phase and does not cause any apparent symptoms. About 10-20% develop simple cervical lymphadenopathy and/or flu like symptoms (fever, muscle pain) [8]. In some lymphadenopathy co-exists with involvement of another organ such as brain, heart, lung, liver or skeletal muscle. Even after recovery from symptomatic illness and also in asymptomatic infections the parasite remains in the body in an inactive state. It can become reactivated if the person becomes immuno-suppressed. In rare instances toxoplasma may invade the eyes causing chorio-retinitis. Toxoplasmosis is also linked to various neuropsychiatric disorders such as schizophrenia [9, 10].

If a woman has been infected with toxoplasmosis before becoming pregnant, the unborn child will be protected because of mother's immunity. If a woman is pregnant

Table 1. Several toxoplasmosis prevalence data from Sri Lanka

Study type	Participants	Sample size	Test and results	Reference
Cross sectional study	Pregnant women attending antenatal clinic at Teaching Hospital Peradeniya	536	Anti-Toxoplasma IgG-29.9% (two were IgM positive) using a commercial ELISA kit	Iddawala et al. 2017 [4]
Cross sectional study	Pregnant females attending Colombo North Teaching Hospital clinic	293	Anti-Toxoplasma IgG: 12.3% Anti-Toxoplasma Ig M: 0% (Test-OnSite Toxo IgG/IgM Rapid Test-Dip Strip®)	Chandrasena et al. 2016 [5]
Case control study	Women having undergone a spontaneous miscarriage in the past 6 months (cases) and healthy pregnant women within 28 weeks of pregnancy (controls), at De Soyza Maternity Hospital for women in Colombo	100	Anti-Toxoplasma IgG: 22.5% (37.8% cases & 62.2% Control) Anti-Toxoplasma IgM:0% (Test-OnSite Toxo IgG/IgM Rapid Test-Dip Strip®)	Subasinghe et al. 2011[6]
Cross sectional study	Healthy populations in Kandy and Kegalle districts	201	Prevalence of 27.86% using direct Modified Agglutination Test (MAT)	Kurukulasuriya et al. 2009 [7]

and becomes newly infected with *Toxoplasma* during or just before pregnancy, she can pass the infection to her unborn baby (congenital transmission). The damage to the unborn child is often more severe during early part of pregnancy (first trimester) but the risk of transmission increases with the advancing gestational age. Clinical effects of congenital toxoplasmosis could be mild to severe. Subclinical infection at birth may subsequently lead to congenital manifestations later in life. Mild forms may present with features such as hepatosplenomegaly, jaundice, rash and oedema etc while severe congenital toxoplasmosis causes hydrocephalus, mental retardation, brain calcification. The commonest ocular manifestation is microphthalmia. Early diagnosis and treatment of the mother may lessen the incidence of

congenital infection and sequelae in the infant thus timely and accurate diagnosis is important.

Toxoplasmosis is one of the most common opportunistic infections in patients with acquired immuno deficiency syndrome (AIDS). In them the infections are mostly due to reactivation of chronic infection while toxoplasmosis in patients on immunosuppressive medication may be caused by newly acquired or reactivated latent infection [11].

In immunosuppressed individuals it often causes central nervous infection (intracerebral mass lesions) and rarely leads to retinochoroiditis, pneumonitis, or other systemic manifestations.

Diagnosis

Toxoplasmosis does not cause much diagnostic anxieties in a treating clinician until it is suspected in a pregnant woman or an immunocompromised. Available diagnostic facilities and experts in hospital laboratories, interpretations of serological reports, doubts about the best treatment option for each individual patient and unavailability of certain medicines are some of the causes for these anxieties.

Serology is the main stay of diagnosis and unlike many other infections immunoglobulin G (IgG) plays the main role with immunoglobulin M (IgM) having a supporting role to play. Indirect fluorescent antibody test (IFA) and enzyme immunoassays (ELISA, immunoblots) are used for serological assays. Serological tests are sometimes erratic in immunocompromised patients. Polymerase Chain Reaction (PCR) is helpful in such instances. The results of PCR and serological tests should be interpreted in relation to clinical manifestations of acute infection, bearing in mind that antibodies persist in chronic latent infections in asymptomatic individuals. However a negative PCR does not rule out active infection. PCR can be most useful in determining congenital infection and is performed on amniotic fluid.

Direct observation of the parasite is used only in special circumstances in stained tissue sections or biopsy materials, cerebro-spinal fluid (CSF), blood or other body fluids. However isolation of the parasite in blood and other body fluids is time consuming and cumbersome. Observation of parasites in specimens such as broncho-alveolar lavage material or lymph node biopsy can be used for patients with immunosuppression. Observation of parasites in the animals by inoculating them is not practiced in diagnostic laboratories. When it is done parasites are inoculated into the peritoneum and then tested for the presence of *Toxoplasma* in the peritoneal fluid after 6 to 10 days. If no parasites are found, serology can be performed after 4 to 6 weeks.

In a suspected case or during antenatal screening, individual should be initially tested for the presence of *Toxoplasma*-specific IgG antibodies to determine their immune status. A positive IgG titer indicates infection with the parasite at some time. When distinction between acute from chronic infections is required, then an IgM test should be performed. A negative IgM result excludes the possibility of a recent infection. However a positive IgM result is difficult to interpret in relation to toxoplasmosis because *Toxoplasma*-specific IgM antibodies may be detected even as long as 18 months after acute infection. If the patient is pregnant and both IgG and IgM

are positive, an IgG avidity test should be performed. A high avidity test result within the first 12 to 16 weeks of gestation (time varies depending on the manufacturer) excludes an infection acquired during pregnancy. Conversely a low IgG avidity test result should not be interpreted as indicating recent infection as there are individuals who have persistent low IgG avidity for many months after infection. If the patient is suspected of toxoplasmosis but the IgG titer is low, then a follow-up titer should be done two to three weeks after the first sample. If that shows an increase in IgG titer then the infection is due to acute toxoplasmosis.

New-borns suspected of congenital toxoplasmosis should be tested for IgM and if available for IgA too. In congenital infection, detection of *Toxoplasma*-specific IgA antibodies is more sensitive than presence of IgM.

Usefulness of serology is limited in immunocompromised patients with severe disease such as toxoplasma encephalitis/ mass lesions. *Toxoplasma*-specific IgG antibody levels among AIDS patients are often low to moderate, or not present at all. In immunocompromised patients IgM antibodies are generally negative.

Treatment

Combination of pyrimethamine and sulphadiazine is used for treatment. Alternatively trimethoprim-sulfamethoxazole or clindamycin or clarithromycin or azithromycin can also be used. This combination of pyrimethamine with sulphadiazine and folinic acid is the most commonly used and probably the most effective therapeutic regimen (12).

Prevention

Prevention is difficult to achieve yet can be attempted by following precautions like thorough washing of fresh fruits and vegetables, using gloves when gardening, eating well cooked meat, washing hands after preparation of meat and screening during antenatal period etc. With frequent floods in the recent past in Sri Lanka the high risk of contamination of water sources and vegetables may lead to a higher incidence, thus vigilance is essential.

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ADENOVIRUS PNEUMONIA IN IMMUNOCOMPETENT CHILDREN

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Introduction

Adenovirus infection is usually a self-limiting infection in immunocompetent children. Recently outbreaks of adenovirus respiratory infections in immune competent children who needed intubation and ventilator support with ICU care leading to increased health expenditure are reported in several countries. In addition lack of guidelines on standard diagnostic methods and management of these patients has further increased morbidity and mortality of affected children.

We focus this literature review to elaborate current modalities of diagnosis and management in immunocompetent children presenting with adenoviral pneumonia and its prevention and control measures.

General description of human adenoviruses

Human adenoviruses are double-stranded non enveloped DNA viruses belonging to the Adenoviridae family [1]. The human adenoviruses classified into Mastadenovirus genus and are divided according to their immunological and biological properties into 7 species, named from species A to species G [1]. Within the same species adenovirus serotypes are classified based on neutralization by specific antisera and up to the present time 52 sero-types and more than 60 adenovirus types based on genomic sequencing are described [1]. Genotypes which share the same serotype can be identified by molecular techniques such as restriction enzyme fragment length polymorphism and genetic sequencing [1].

Epidemiology

Adenovirus is known to cause infections involving respiratory tract, conjunctiva and gastrointestinal tract. The high risk group is the paediatric population, particularly under 5 years of age group. Absence of antibodies against adenovirus due to lack of previous exposure contributes to it [2]. Nevertheless most of the infections are self-limiting with acquiring serotype-specific immunity on recovery.

In view of lower respiratory tract infections (LRTI), adenovirus is a less frequent cause than respiratory syncytial virus (RSV) and parainfluenza virus and

accounts for 5%-10% of lower respiratory tract infections in children [2]. Severity of the infections varies and may culminate in ventilatory insufficiency needing ICU care and even death from ventilatory failure.

In most cases it is difficult to identify the particular serotype due to lack of serotyping facilities available in local laboratories. Serotypes 1,2,3,5 and 7 are well known aetiological agents of LRTI causing endemic and epidemic infections [2]. Adenovirus types 3,7 and 21 account for majority of the epidemics and outbreaks in immunocompetent children [2]. It is more likely that the severe diseases caused by a variant of adenovirus type 7 [3]. There are several case series of severe adenovirus disease among immunocompetent children documented in China, Korea, Taiwan, Argentina, New Zealand and Canada [2, 4-7].

Pathogenesis

Adenoviruses are hard viruses withstanding adverse physical and chemical conditions; since they are non-enveloped viruses. Their ability to remain infectious for up to 3 weeks at room temperature and in fomites gives them more room to spread. Direct transmission from person to person and indirect transmission through fomites and instruments used in medical care are well identified modes of transmission of adenovirus.

Cytokine production and host inflammatory response initiates when the adenovirus enters into the human epithelial cells as it induces a lytic infection. Serum taken from fatal cases with adenovirus disease has shown TNF-alpha, IL6 and IL8, but these were not detected in moderate cases [8]. For recovery following acute infection, T-cell mediated immunity is primarily responsible with as important supporting role provided by humoral immunity as well [2].

Clinical diagnosis

On examination children with viral pneumonia show diffuse of rhonchi and auscultatory abnormalities. Unresponsiveness to antibiotics would suggest viral aetiology. FBC results which reveal low WBC and neutrophil count may put forward the diagnosis of viral

pneumonia, even though they are not diagnostic by themselves. CRP is less sensitive than procalcitonin in which the level of less than 1 mcg/dl gives clue to a viral aetiology, whereas a level more than 2.5 mcg/dl favours bacterial infection [9].

The Infectious Disease Society of America and American Thoracic Society stated in their guidelines on community acquired pneumonia to get a chest X-Ray in all patients with suspected pneumonia and look for the presence of pulmonary infiltrates. Bilateral interstitial infiltrates are highly suggestive of a viral pneumonia, but alveolar infiltrates are seen in about half of infected children. It is quite interesting to find radiographic features of consolidation and pleural effusion, when the implicating agents are adenovirus type 3 and type 7 which are rare in other viral infections [2].

Virology laboratory diagnosis

Direct methods are the primary means of definitive virological diagnosis of adenovirus diseases. Virus isolation using cell culture method, viral antigen detection and viral genome detection are the main laboratory direct diagnostic procedures. Virus detection without clinical features only denotes adenovirus infection and cannot essentially attribute findings to a medical disease.

Higher yields are obtained if the specimen obtained as nasopharyngeal aspirates. Other suitable samples are nasopharyngeal swabs, throat swabs, tracheal aspirates, and sputum cultures. Since there is low level of adenovirus shedding occur in the peripheral lung, bronchoalveolar lavage yields low detection rate in addition to their disadvantage of difficulty in obtaining.

Indirect diagnosis methods are of limited value as serological assays have low sensitivity and low specificity due to heterotypic antibody responses.

1. Virus isolation

Adenovirus produces cytopathic changes of clumping, rounding of cells and intranuclear inclusion bodies on A549, Hep-2, and HeLa human cell line cultures [10]. Even though cell culture is the gold standard diagnostic method, it produces slow results being sometimes taking up to two to four weeks' time and many clinical samples may be non-viable and inhibitory and even difficult to interpret due to bacterial or fungal contamination.

2. Direct antigen detection

Respiratory viral panels that utilize direct fluorescent antigen detection assays to diagnose common viral pathogens are the common approach of antigen detection and in addition it

gives quick results. Immunofluorescence assay has a reasonable sensitivity of about 40 to 60% [11].

3. Histopathology

Bronchial epithelial cell necrosis, bronchiolitis, interstitial pneumonitis and hyaline membranes are characteristic histopathology findings. Adenovirus infected cells have basophilic inclusion bodies in their nuclei and thin cytoplasm surrounding the enlarged nuclei [12]. Confirmation of adenovirus in fixed tissue can be done with immunohistochemistry, in situ hybridization or PCR.

4. Molecular Methods

PCR techniques with less than a 24-hour turnaround time have revolutionized the diagnosis of viral infections by rapidly identifying the pathogen and becoming the test of choice. The major drawback of its use is that respiratory viruses can be present in the nasopharynx without causing disease, giving erroneous aetiological attribution to the disease.

PCR primers targeting genes encoding hexon and fibre proteins are commercially available to detect adenovirus genus and species [13]. Great degree of diversity observed between serotypes is the major obstacle to develop sensitive PCR assay to detect all strains.

5. Serotyping and genome typing

This is chiefly used for demonstrating epidemiological pattern, for understanding of viral pathogenesis and for research on various treatment modalities.

Serotyping is traditionally performed with assays which were laborious such as neutralization or haemagglutination inhibition assays using the specific antisera obtained from animals exposed to a particular adenovirus serotype [14]. Nowadays genotyping is accomplished by molecular approaches such as amplification of viral genome with PCR and then cleavage of molecular products with restriction enzymes and genetic sequencing. This method is increasingly adopted into virology laboratory because of its rapid nature and availability of modern molecular equipment and expertise.

Management

Most of the guidelines for triage of patients on admission and management of pneumonia are developed for bacterial pneumonia for adults. In 2015 Yumiko et al. introduced Pediatric Respiratory Severity Score (PRESS) assessment based on increased respiratory rate, presence of accessory muscle use in respiration, wheezing, difficulties in feeding and decreased SpO₂. Total score is calculated by allocating 1 mark for

presence of each component observed in the patient and then categorized in to mild (0-1), moderate (2-3), or severe (4-5) to triage patients [15].

The management of severe viral pneumonia is mainly supportive oxygen therapy with or without ventilation as required and adjuvant antibiotics to treat possible bacterial co-infection and super infection if these are difficult to exclude. Patients with acute respiratory distress syndrome require lung protective ventilation strategies and meticulous fluid management.

Currently for adenovirus pneumonia no specific antiviral treatment is available. Ribavirin and cidofovir have been given for patients with both success and failures but with no efficacy data by prospective randomized controlled trials.

Ribavirin, nucleoside analogue acts against both DNA and RNA viruses. Its antiviral action is due to viral polymerase inhibition, mutagenesis and RNA capping inhibition. But there is limited data on mechanism of antiviral activity against adenovirus. Early treatment with nebulized and IV forms for certain serotypes from species C such as serotypes 1,2,5 and 6 are associated with treatment success [16]. The problem with ribavirin nebulization is it can induce bronchospasm which leads to further compromising respiration. Mild haemolytic anaemia has been reported with IV ribavirin treatment.

Cidofovir, a broad spectrum antiviral, is an acyclic nucleoside analogue and causes DNA chain termination. The advantage of its use is that all adenovirus serotypes are susceptible but with the expense of severe side effects such as nephrotoxicity and myelosuppression.

Viral clearance and disease resolution has been observed in several patients treated with immunotherapy but with limited data, which necessitates further research to assess its usefulness.

Prevention and control

As an initial step of prevention, identification of adenovirus outbreaks by surveillance is of utmost importance. Therefore during periods of increased symptoms of viral respiratory illness or influenza activity in a health care facility or the community, prompt diagnosis of respiratory infections caused by all probable respiratory viruses should be attempted [17].

Prevention from adenovirus is primarily based on health education for the general population as well as the health care staff. Staff should be educated on the epidemiology of the disease, modes of transmission and how to prevent the spread within the health care facility [17].

Prevention of person to person transmission could be done by adhering to standard contact and droplet precautions. Gloves, a gown and surgical mask and eye protection should be worn before starting patient care on confirmed or suspected adenovirus infection or on handling their respiratory secretions or fomites with potential respiratory contamination [17]. Practice of a proper hand washing technique between two patients is a must. Patients with diagnosed adenovirus infection should be isolated or grouped together and separated from other patients [17]. In transporting patients within the ward or institution, patients must wear a face mask to reduce contamination of the environment [17].

Number of healthcare personnel as well as visitors who treat and visit patients should be restricted and people with respiratory tract infection should not be allowed to visit paediatric units [17].

No vaccine is currently available for general public. Vaccine containing live adenovirus Type 4 and Type 7 is approved for 17 to 50 year aged US military personnel [18].

Prognosis

Most patients with Adenovirus LRTIs recover without any residual morbidity. But some patients get severe infections which can result in persistently collapsed lung, bronchiolitis obliterans, bronchiectasis and unilateral hyperlucent lung syndrome leading to abnormal lung function tests. Residual pulmonary sequel associated with severe infection have identified in up to 60% of children [19, 20].

Conclusions and perspectives

Adenoviruses which constitute 52 known serotypes further subdivided into genotypes and genomic clusters may give rise to wide variety of infections. The huge genetic diversity must be considered in diagnosis, typing and treatments. Implementing technical advances in diagnosis such as molecular methods, PCR lead to early diagnosis and treatment with adenovirus pneumonia. Most patients recover from the infection although serotype specific treatments are yet to be discovered.

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LABORATORY HANDLING AND REPORTING OF BLOOD CULTURES

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Abstract

This is a local audit in a district hospital in the UK designed to provide operational solutions to the challenge of rapid reliable processing of blood cultures (BC) in order to optimise outcomes of patients, including reducing length of stay, while providing procedural opportunities to improve antimicrobial stewardship and facilitate seven day working by monitoring the turnaround time of the BC from collection to report. The aim of this audit is to find out what the laboratory can do to improve the turnaround time by better utilisation of existing facilities.

In 2013, Public Health England published a new standard for blood culture microbiology investigation, introducing target times for the processing of samples.

Method: Data was collected prospectively over three-month period from blood culture request forms, blood culture analyser database, laboratory information system and the hospital information system.

Results: 146 positive BC samples were audited for pre-analytical, analytical and post-analytical procedures.

Only 45.52% of samples achieved the recommendation for the time from sample collection to incubation.

It is important to note that more than 80% of blood culture samples were incubated within 30 minutes of receipt to the laboratory. The rate is 98% within an hour. Gram stains were performed in 46.51% of positive samples within less than 2 hours.

More than 80% of positive blood sample results were issued within 5 days of flagging positive as final results.

Nearly 70% of final results were issued within 5 days of reception to the laboratory.

Average blood culture turnaround time of this audit was less than 5 days because more than 65% of

positive samples were processed within 5 days of inoculating blood culture broth.

Conclusion: The identified delaying points of blood culture pathway are the time between collection to incubation and providing Gram-staining result from the time BC flagged up positive in the automatic incubator because of the non-availability of 24 hour working shift in the microbiology laboratory.

Key words: blood cultures, turnaround time, pre-analytical, analytical, post-analytical

Introduction

Clinical Pathology Accreditation (CPA) sets standards for pathology laboratories. The standard for turnaround times is set through local discussions between clinicians and laboratory, allowing standards to vary across the UK. In 2013 Public Health England (PHE) published a new standard (UK standards for Microbiology Investigations/SMI) for blood cultures, introducing target times for the processing of samples.

The results of three surveys (local, regional, national) blood culture practice suggest that most laboratories are inadequately informed to judge an acceptable standard. Without national standards and audit of practice, neither laboratory nor ward-based clinicians are in a position to ascertain whether best practice has been attained in managing patient. The development of clinical effectiveness in pathology should aid in addressing such issues and facilitate incorporation into CPA ISO standards.

Recommended audit standards

By mapping the blood culture process, it is possible to identify critical control points where delays may occur (The compliance to achieve in brackets).

A1. Sample collection date and time (100%)

- A2. Date and time of receipt in the laboratory (100%)
- A3. Date and time of incubation (loading) (100%)
- A4. Date and time of sample flagging positive (100%)
- A5. Completion date and time for each identification (ID) and sensitivity methodology employed (100%)
- Gram stain
 - Antigenic ID
 - Molecular ID
 - Biochemical ID
 - Sensitivity test resulting
- A6. Date and time of preliminary positive reporting (100%)
- A7. Date and time of preliminary negative reporting (100%)
- A8. Date and time of reporting of own laboratory's completed findings (100%)
- A9. Date and time of final reporting of external lab findings (100%)

These standards are designed to emphasise the role of the blood culture specimen in sepsis management.

The greatest gains in speed of turnaround of blood cultures/impact on patient management are likely to come from:

- Minimising delays from collection to loading on the blood culture machine
- Rapid processing once a blood culture flags positive
- Performing direct antibiotic sensitivity tests
- Selective use of rapid identification/sensitivity tests

Recommended national standards for blood culture processing according to the SMI PHE

Table 1. Pre-Analytical Standards

Inoculated bottles should be incubated as soon as possible, and within a maximum of four hours.

Investigative Stage	Standard
Pre-Analytical Collection to Incubation	Time Period <4 hr

Table 2. Analytical Standards

Results of the following identifications and sensitivity tests (if performed) should be completed within following time frames from flagging positive.

Investigative Stage	Criteria	Standards
Analytical Flagging positive to Microscopy Identification and Sensitivities	Test if performed	Time Period to result
	Gram Stain	<2 hr <2 hr 24 - 48 hr < 24 hr
	Rapid Antigen testing	
	Molecular Assays	
	Isolate Identification (Direct/Automated)	
	Isolate Identification (Conventional Methods)	
	Isolate Sensitivities (Direct/Automated)	
	Isolate Sensitivities (Conventional Methods)	24 hr (initial results)
Negative at 36 hours incubation	Preliminary 'negative after 36 hours incubation' report issued	All labs should have this as an automated LIMS facility

Table 3. Post-analytical standards

Standards have also been set for turnaround time (the time between receipt in the laboratory and reporting)

Investigative stage	Criteria	Standards
Post-Analytical	Preliminary Positive Report	Immediate within 2 hrs
Positive Report (from receipt in laboratory to positive reporting)	Final Positive Report	<5 days

Objectives

- To audit the turnaround time (TAT) of blood cultures from collection to reporting (A8-A1)
- To audit the time from blood culture collection to incubation at the laboratory (A3-A1)
- To audit the time from receipt to incubation at the laboratory (A3-A2)
- To audit the time from blood cultures flagging positive to report Gram stain (A5-A4)
- To audit the time from flagging positive to final report (A8-A4)
- To audit the time from reception to final report (A8-A2)

Methodology

Sample size

All the positive blood cultures received at the Microbiology laboratory at Royal Lancaster Infirmary (RLI), Lancaster, United Kingdom from 01.07.2016 to 30.09.2016 were included in this audit.

Study design

Data was collected prospectively over three-month period. Blood culture request forms were obtained for the corresponding specimen numbers, date and time of collection and reception to the laboratory.

Information regarding culture bottle uploading time and date, time and date of positivity and positive blood culture bottles unloading time and date were integrated from blood culture analyser database (where both bottles flagged positive in a set, the time of the first bottle signalling was used).

The laboratory information system (TD synergy) and the hospital information systems (Lorenzo) were used to record time and date of Gram stain report and time and date of final report respectively.

The study was categorized as a laboratory-based audit by the hospital. Therefore, ethical approval was not required. The study was registered with the North West Regional Microbiologists Audit Meeting.

Results

Table 4. Recording of sample collection date and time

	Number	Percentage
Date	128	87.67%
Time	123	84.24%

Table 5. Recording of sample reception date and time to the laboratory

	Number	Percentage
Date	138	94.52%
Time	138	94.52%

Table 6. Sample collection to incubation time

Duration	Percentage
Less than 4 hours	45.52%
4 - 8 hours	16.26%
8 - 12 hours	14.63%
12 - 16 hours	16.26%
16 - 20 hours	4.06%
20 - 24 hours	00.81%
24 - 48 hours	1.62%
More than 48 hours	00.81%

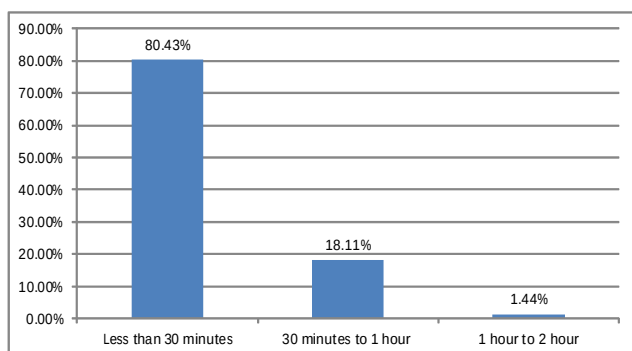


Figure 1. Sample reception to incubation time.

Table 7. Time between flagging positive to Gram positive result

Duration	Percentage
Less than 2 hours	46.51%
2 - 4 hours	10.27%
4 - 6 hours	10.27%
6 - 8 hours	11.64%
8 - 10 hours	4.10%
10 - 12 hours	6.84%
More than 12 hours	10.27%

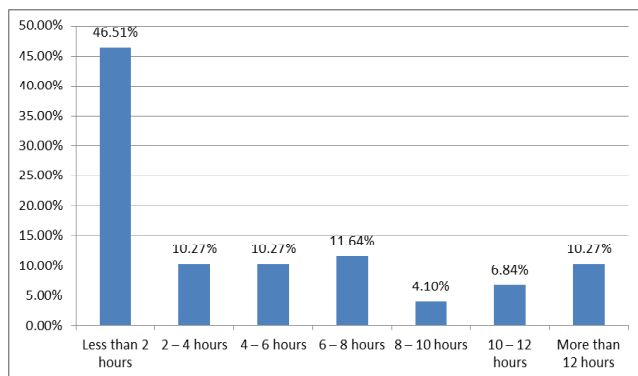


Figure 2. Time between flagging positive to Gram Positive result

Table 8. Time between Gram stain to final report

Duration	Percentage
Less than 1 day	3.42%
1 - 2 days	26.02%
2 - 3 days	29.45%
3 - 4 days	13.01%
4 - 5 days	10.27%
5 - 6 days	11.64%
More than 6 days	6.16%

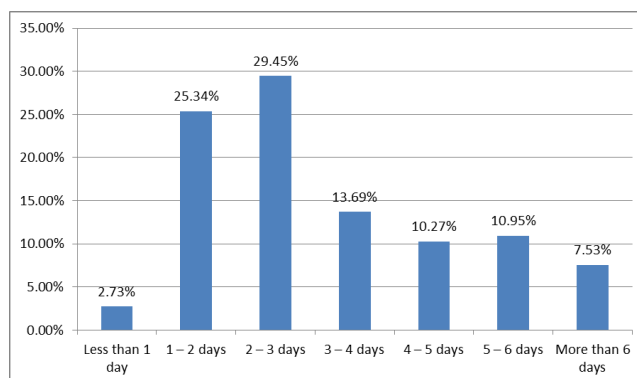


Figure 3. Time between flagging positive to final result

Table 9. Blood sample turnaround time

Duration	Percentage
Less than 2 days	5.69%
2 - 3 days	28.45%
3 - 4 days	24.39%
4 - 5 days	8.94%
5 - 6 days	13.00%
6 - 7 days	8.94%
7 - 8 days	6.56%
8 - 9 days	1.62%
9 - 10 days	0.81%
More than 10 days	1.62%

Discussion and conclusions

This audit has been undertaken in a district hospital in the North West region of the United Kingdom. There were 152 positive blood cultures over 3 month period from 01.07.2016 to 30.09.2016. However, six positives were rejected due to the misplacement of request forms and unavailability of relevant data from the request forms. Therefore, 146 blood culture positives were audited for blood culture pathway.

According to audit standards, documentation of sample collection date and time is 100%.

However, sample collection date and time was recorded only in 87.67% (128/146) and 84.24% (123/146) of the request forms respectively.

An audit standard for sample reception time and date is 100%. Reception time and date stamp was included only

in 94.52% (138/146) of request forms because original request forms were not available and day stamp was not visible in photocopies.

Blood culture incubation time and date as well as flagging positive time and date was automatically recorded in the blood culture analyser. Therefore, 100% recordings are available according to the audit standards.

All positive Gram film results and final results after authorization were available in the laboratory information system and hospital information system with time and date. So, 100% recording time and date to fulfil audit standards of Gram-stain result time and date as well as final result time and date.

Recommended national standards for pre-analytical phase from blood culture bottle inoculation to meet the recommendation. However, nearly 98% of them were incubated within 24 hours.

It is important to note that more than 80% of blood culture samples were incubated within 30 minutes of receipting to the laboratory. It rises up to 98% considering less than 1 hour.

With regard to national standards, Gram-stain result should be informed to the clinician within 2 hours of flagging positive. Gram-stain was performed in 46.51% of positive samples less than 2 hours. However, more than 10% of specimens were processed for Gram-stain more than 12 hours.

In RLI Microbiology laboratory, more than 80% of positive blood samples results were issued within 5 days of flagging positive on the analyser as final results. According to national standards, final results should be issued less than 5 days.

Average blood culture turnaround time of this audit was less than 5 days because more than 65% of positive samples were processed within 5 days from the time of inoculation of blood culture broth.

Benefits of optimising the blood culture pathway

1. Earlier correction of deficiencies in empirical antibiotic therapy.
2. Earlier de-escalation of antibiotic therapy.
3. Early cessation of antibiotic treatment in neonates, allowing the baby and mother to be reunited.
4. Time to detection provides information on the likely identity of the organism.
5. Potentially improved outcomes and reduced length of stay.

6. Reducing the rate of false negative BC results.
7. Acting on contagious, notifiable infections earlier (i.e. chemoprophylaxis for meningococcal contacts).

Problems/issues in the study

1. Data is incomplete in the request forms like collection time and date, reception time and date.
2. Some request forms are not available to collect relevant data.
3. Blood culture samples are not loaded to the machine in 24 hour basis therefore samples loading could be delayed.
4. There is no 24 hour rotating shift among the staff to detect positive samples immediately.

Suggested options for improving times to incubation

1. Blood culture machine is placed in a centralised specimen reception or blood science laboratory.
2. Main blood culture machine is sited within the Microbiology laboratory with a smaller unit within specimen reception.
3. Location of smaller 'satellite' blood culture machines at peripheral hospitals without a Microbiology laboratory communicate with the larger blood culture machine in the centralised lab.

Suggested options for improving individual completion date and time

1. Multidisciplinary staff who adequately trained in performing the test.
2. Perform blind subculture and sensitivity testing on positive samples even though if pathogen has not been seen in Gram-film.
3. Rapid tests for the identification of organisms.

Recommendations

1. Laboratories should optimise the blood culture pathway not only to meet the National standards but for the benefits to patients listed above.
2. As a preliminary step it is suggested laboratories minimise the load delays. This should be achieved mostly through better use of existing resources as outlined above.
3. Re-audit the blood culture pathway in 2018.

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SUSCEPTIBILITY PATTERN OF ORGANISMS CAUSING CHRONIC SUPPURATIVE OTITIS MEDIA (CSOM) IN A DISTRICT GENERAL HOSPITAL IN SRI LANKA

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Abstract

This study was carried out to determine the aerobic micro-organisms involved in chronic suppurative otitis media (CSOM) and their antibiotic susceptibility patterns and to formulate empirical antibiotic guidelines for CSOM patients.

Over a period of 1 year, ear swabs from patients with CSOM were submitted to the microbiology laboratory. Patients who had not received antibiotics for the past three days were recruited. All organisms were identified using the standard operating procedures given in the Microbiology Laboratory Manual. Antibiotic sensitivity testing was done using the Stokes disc diffusion method.

Ear swabs were taken from 273 patients, of which 257 (94%) yielded positive cultures. *Pseudomonas aeruginosa* (52%) was the commonest isolate, followed by methicillin sensitive *Staphylococcus aureus* (MSSA) (15.7%) and *Klebsiella* spp (10.6%).

Pseudomonas aeruginosa showed 95% sensitivity to ceftazidime and around 74% sensitivity to ciprofloxacin and gentamicin. MSSA was 100% susceptible to cloxa-cillin with sensitivities of 95% and 85% to cotrimoxazole and gentamicin respectively but sensitivity to ciprofloxacin was low (35%).

We recommend gentamicin as the topical antibiotic of choice for empirical treatment of CSOM while ciprofloxacin and cloxacillin are recommended for systemic therapy. Co-amoxiclav should not be used for empirical treatment of CSOM. Performing bacterial culture prior to antibiotics is necessary to decide on specific treatment.

tympanic type), or with a cholesteatoma – also known as unsafe (attico-antral) type. Both types can have active and inactive phases. Active CSOM is when there is an active ear discharge visible to the naked eye. In the inactive form, there is no visible discharge but only the persistent TM perforation or a retraction pocket.

CSOM is a significant health problem for both children and adults. It is capable of causing a range of complications from mastoiditis and labyrinthitis to deafness, facial nerve palsies and intracranial abscesses.

Treatment for CSOM usually involves antibiotic therapy, regular aural toilet and control of granulations in the active phase. Surgery involving mastoid exploration is usually planned for cholesteatoma confirmed CSOM cases or un-resolving middle ear discharge in spite of appropriate and adequate antibiotics; while myringoplasties are offered for central or subtotal perforation (safe type) cases. Failure to perform bacterial cultures prior to commencing therapy may lead to inappropriate selection of antibiotics which can lead to treatment failure and complications. Recurrent activation of CSOM may lead to frequent use of ineffective antibiotics contributing to antibiotic resistance.

To the best of our knowledge, there are no reports on susceptibility patterns of bacterial pathogens causing CSOM in Sri Lanka. Furthermore, there are no empiric or specific antibiotic guidelines for CSOM in the “National Guidelines on use of Antimicrobials” [1]. Knowledge of the local susceptibility pattern of bacterial pathogens causing CSOM would help in formulating empiric antibiotic guidelines.

Methodology

1) Study design

This was a descriptive cross sectional study carried out for one year from 1st June 2017 at the District General Hospital (DGH) Negombo.

Introduction

Chronic suppurative otitis media (CSOM) is defined as a persistent or chronically (more than 6 weeks) discharging middle ear with a perforated tympanic membrane (TM). This could be without cholesteatoma – safe (tubo

2) Sample Size

All patients who presented to the ENT clinic of DGH Negombo, fulfilling the criteria for this study, were included.

– *Inclusion criteria:* Patients who were diagnosed as CSOM in the active phase, with or without cholesteatoma, from any age group.

– *Exclusion criteria:* Patients with diagnosed CSOM in inactive phase / Patients given antibiotics within the last three days / Patients who did not give consent.

3) Method

Sterile ear swabs were used to collect samples from patients based on the clinical decision of the ENT team. As this was a routine component in the management of CSOM, verbal consent was taken. Willingness to participate in the study was taken from the patient or parents (if patient was a child) by the Microbiology team by obtaining written consent.

Socio-demographic data and other required information was obtained from each patient using questionnaires. Results of ear swab cultures were taken from the microbiology laboratory records.

In the microbiology lab, each ear swab sample was processed for aerobic bacteria using three media (Blood / Chocolate / Macconkey agar). Organisms isolated from the samples were identified according to standard microbiological methods using the Microbiology Standard Operating Procedure (SOP) [2]. Antibiotic susceptibility testing was carried out using the Stoke's disk diffusion method.

4) Data analysis

All data was analyzed using the Statistical Package for Social Sciences (SPSS) version 20. Percentages were calculated and results shown in tables or charts.

5) Ethical aspect

Ethics approval was received from the Ethics Review Committee of the Sri Lanka Medical Association.

Results

During the year, we received samples from 273 patients. The mean age of the patients was 42 years (age range: 11 months - 89 years; standard deviation: 19.6), with the peak age group being 51-60 years consisting of 56 patients (20.5%) (Table 1). There was a predominance of females (male: 103, 38% and female: 170, 62%) (Figure 1).

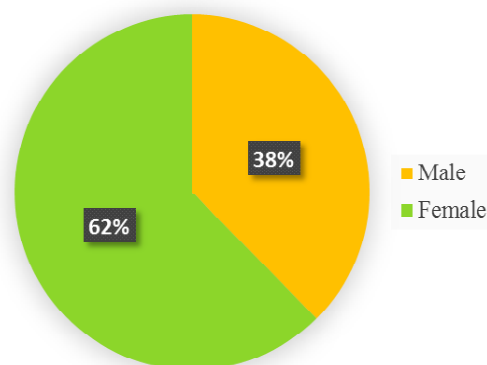


Figure 1. Gender distribution

Table 1. Age range of patients

Age range in years	Number of patients
0 -10	20
11-20	31
21-30	25
31-40	47
41-50	45
51-60	56
61-70	36
71-80	11
81-90	2

Table 2. Number of isolates

Number of Isolates	Number of patients (%)
No bacterial growth	16 (5.9)
Mono-microbial	197 (72.1)
Poly-microbial	60 (22)

From the samples received (n=273), 197 patients (72.1%) had mono-microbial growth while 60 patients (22%) had poly-microbial growth. 16 patients (5.9%) had no bacterial growth on culture (Table 2).

The most common organism causing CSOM was *Pseudomonas aeruginosa* (52%) followed by Methicillin sensitive *Staphylococcus aureus* (MSSA) (15.7%), *Klebsiella* spp (10.6%) and *Proteus* spp (9.5%) (Table 3).

Table 3. Microbiological profile of CSOM

Types of organisms	Frequency of isolates	% of patients infected
Aerobic bacteria		
Gram positive bacteria:		
- MSSA	43	15.7
- Coagulase negative Staphylococcus (CONS)	20	7.3
- MRSA	14	5.1
- <i>Streptococcus</i> spp	7	2.6
Gram negative bacteria:		
- <i>Pseudomonas aeruginosa</i>	142	52
- <i>Proteus</i> spp	26	9.5
- <i>Klebsiella</i> spp	29	10.6
- <i>Escherichia coli</i>	08	2.9
- <i>Acinetobacter</i> spp	15	5.5
- <i>Serratia</i> spp	1	0.4

The antimicrobial sensitivity pattern of the three most common isolates, *Pseudomonas aeruginosa*, MSSA and *Klebsiella* spp are depicted in Figure 2 a, 2 b, and 2 c respectively.

Pseudomonas aeruginosa displayed high susceptibility to ceftazidime (95%) while demonstrating susceptibilities of 74% and 73% for ciprofloxacin and gentamicin respectively. Sensitivity to meropenem was 99%.

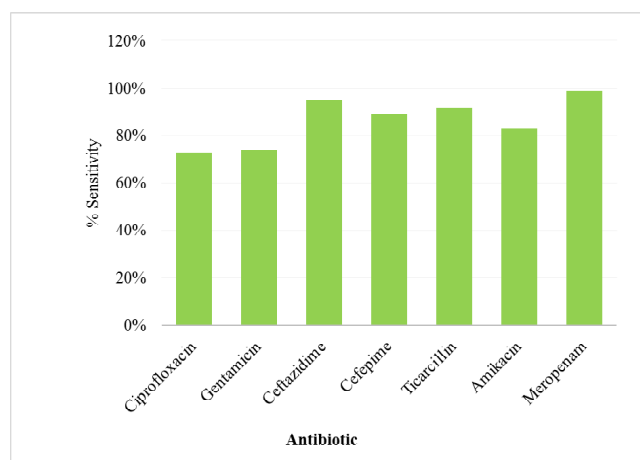


Figure 2a. Antibigram of *Pseudomonas aeruginosa*.

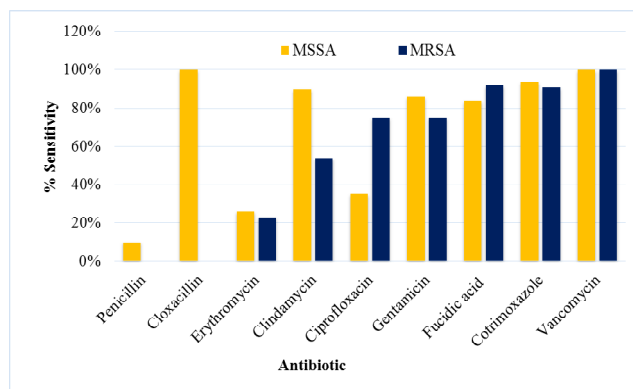


Figure 2b. Antibigram of MSSA / MRSA.

Figure 2b depicts the antibiotic sensitivities of both MSSA and MRSA to provide a better comparison. MSSA was 100% susceptible to cloxacillin and vancomycin, followed by sensitivities of 95%, 90% and 86% to cotrimoxazole, clindamycin and gentamicin respectively. Ciprofloxacin sensitivity of MSSA (35%) was low compared to MRSA (75%).

Klebsiella spp exhibited comparable susceptibility to ciprofloxacin (90%), cefuroxime (89%), and cotrimoxazole (92%). Sensitivity to ceftazidime and cefotaxime was

similar (93%). 100% sensitivity was noted to gentamicin and amikacin.

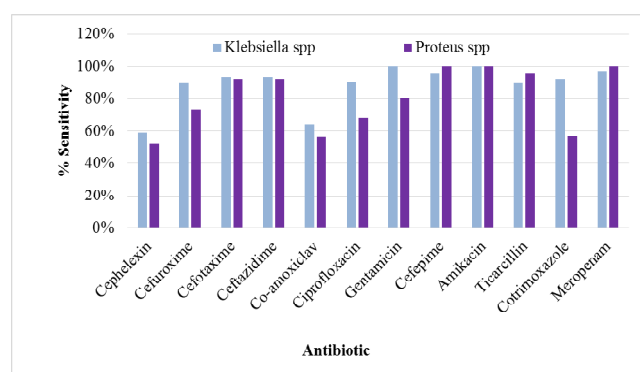


Figure 2c. Antibigram of *Klebsiella* spp and *Proteus* spp.

Discussion

Chronic suppurative otitis media is a common health problem with approximately 5% incidence globally [3]. CSOM is characterised by chronic inflammation of the middle ear due to the presence of bacteria causing recurrent or persistent ear discharge through a perforated tympanic membrane. It is a persistent disease with risk of irreversible complications. CSOM is an important cause of preventable hearing loss.

Our study revealed a higher proportion of females (62%) diagnosed with CSOM in comparison to males (38%) whereas in a previous Sri Lankan study [4], males were predominant (55%). While our study demonstrated the 51-60 years age group as the most frequently affected by CSOM, the 31-40 years group was the most affected in the other Sri Lankan study [4]. This indicates that CSOM is prevalent in all age groups though at varying frequencies and no age is immune to this disease.

Treatment for CSOM involves meticulous aural toilet and antibiotic therapy. Both systemic as well as topical antibiotics are used in the treatment of CSOM especially when there is a profuse ear discharge.

The susceptibility of organisms causing CSOM, to antibiotics changes considerably with increasing antibiotic resistance. Inappropriate selection of antibiotics leads to treatment failure, leading to complications and contributing to higher antibiotic resistance. Local susceptibility based empirical antibiotics play a major role in the management of CSOM because majority are treated as out-patients.

Knowledge of the microorganisms involved and their local antibiotic sensitivity pattern is essential to formulate a guideline for empirical antibiotic therapy.

The results of our study showed that *Pseudomonas aeruginosa* (52%) was the most frequent aerobic isolate in active CSOM followed by MSSA (15.7%), which is comparable to findings in other studies [4,5,6]. In contrast, a study done in India [7] isolated MSSA (48.7%) as the most common organism followed by *Pseudomonas aeruginosa* (19.9%). The frequencies of the causative bacteria also differs from a previous Sri Lankan study [4] in which the isolation rates for *Pseudomonas aeruginosa* and MSSA were 29.5% and 20.5% respectively. This demonstrates the significant difference in causative bacteria even within the same country. The other organisms isolated were *Klebsiella* spp (10.6%) followed by *Proteus* spp (9.5%). *Klebsiella* spp and *Proteus* spp have shown variable isolation rates in different studies [5,7]. However according to one Indian study [8], *Proteus* spp (38%) was the second most common organism isolated. Coagulase negative staphylococci were isolated in 7% of our patients, but this could represent colonisation.

In our study, the frequency of organisms isolated in children was similar to that in adults. This contrasts with an Indian study [9] where *Pseudomonas aeruginosa* was the commonest aerobic isolate in adult CSOM but *Staphylococcus aureus* was the most common in paediatric CSOM.

Commonly prescribed antibiotics for CSOM include ciprofloxacin, gentamicin, cefuroxime co-amoxiclav and ceftazidime. Ciprofloxacin sensitivities of *Pseudomonas aeruginosa*, MSSA and *Klebsiella* spp were 73%, 35% and 90% respectively and gentamicin sensitivities of *Pseudomonas aeruginosa*, MSSA and *Klebsiella* spp were 74%, 86% and 100% respectively. *Pseudomonas aeruginosa* and *Klebsiella* spp showed high susceptibility rates of 95% and 93% respectively to ceftazidime. (Table 4).

According to our findings, gentamicin can be recommended as an empirical antibiotic against CSOM. Ciprofloxacin can be recommended for *Pseudomonas aeruginosa* and *Klebsiella* spp but not for MSSA.

During the study period, 19 mastoidectomies and 68 myringoplasties were planned for CSOM cases. However, only five mastoidectomies and 17 myringoplasties were done by the ENT department. This was probably due to significant improvement in symptoms (once the ear was dry) leading to most patients defaulting follow-up and foregoing surgeries.

A limitation of our study was that fungal and anaerobic cultures were not done due to limited facilities.

Table 4. Susceptibilities of commonly used antibiotics in CSOM

Organism	Ciprofloxacin	Gentamicin	Ceftazidime	Co-amoxiclav	Cefuroxime	Cloxacillin
<i>P. aeruginosa</i>	73%	74%	95%	-	-	-
MSSA	35%	86%	-	-	-	100%
<i>Klebsiella</i> spp	90%	100%	93%	64%	89%	-
<i>Proteus</i> spp	68%	80%	92%	56%	73%	-

Conclusion

Pseudomonas aeruginosa was the most common isolate in CSOM followed by MSSA. Most of the commonly isolated organisms showed good susceptibility to gentamicin. Therefore we would like to recommend gentamicin as the topical antibiotic of choice for empirical treatment of CSOM. Ciprofloxacin and cloxacillin can be recommended as antibiotics of choice for systemic use. Co-amoxiclav is one of the antibiotics that the isolates were least sensitive to and so should not be used as an empirical antibiotic. Performing bacterial cultures prior to antibiotic usage is necessary to decide on specific treatment. Periodic surveillance is necessary to identify variation in the pattern of organisms causing CSOM and their antibiotic sensitivity patterns.

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IMMIGRANT SIBLINGS WITH TYPHOID FEVER: CASE SERIES AND REVIEW

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Introduction

Typhoid fever (typhoid) is a serious systemic infection caused by an enteric pathogen, *Salmonella* Typhi (serovar of *Salmonella enterica*). It is transmitted by the ingestion of food or water contaminated with faeces from an infected person/carrier.

Typhoid has become a substantial global health problem with a wide geographic distribution (mainly in Southern and Southeast Asia) and a worldwide distribution of over 21 million cases per year and 200,000 deaths [1]. This disease is usually endemic in areas which are densely populated with poor access to clean water and where sanitary conditions are limited. Pakistan and India being two well established hotspots of the disease [1]. One of the difficulties that Sri Lanka faces is a steady input of immigrants from countries like Pakistan.

The National Epidemiology Unit published a consensus report in 2010 which noted that the incidence rate of typhoid in Sri Lanka is 11.48 per 100,000 populations in 2009 [2]. Almost 60% of reported cases of typhoid in Sri Lanka occurred in the 1-14 year age group [2]. The annual incidence of typhoid fever in children aged 5 -15 years, in Pakistan, ranged from 412 to 493 per 100,000 per year [2], displaying a low incidence in Sri Lanka in comparison to Pakistan.

Patient Information

We present 3 cases of children of Pakistani origin within the same family who were diagnosed with typhoid fever in Sri Lanka. The family of 5 which included the mother and 4 children (aged 10, 9, 7 and 4 years old) had travelled to Sri Lanka as refugees from Pakistan just 8 days prior to the admission of the 1st case. Since the patients or the mother did not speak English it was difficult to take a proper history.

Case 1

A 10 year old female was admitted to the paediatric ward at the District General Hospital (DGH) Negombo,

complaining of fever for one week duration with few episodes of vomiting, abdominal pain and myalgia.

On examination, the child was febrile with mild tachycardia of 110 beats per minute (bpm) and blood pressure within normal range. Abdominal examination revealed mild generalized abdominal tenderness.

Investigations revealed a white blood cell (WBC) of $6.6 \times 10^9/L$ with 65% neutrophils, hemoglobin (Hb) of 9.3g/dl, urine full report (UFR) with 10-15 pus cells, and C-reactive protein (CRP) of 154mg/L. Liver enzymes were elevated with aspartate aminotransferase (AST) of 85U/L and alanine aminotransferase (ALT) of 184U/L. The clinical team suspected sepsis or urinary tract infection. She was started on fluid support along with intravenous (IV) cefotaxime and amikacin.

Urine culture showed no growth. Ultrasound abdomen was unremarkable. Chest X ray and 2D echocardiogram were normal. Blood picture showed mild iron deficiency anemia. Surgical referral excluded any abdominal pathology.

After 24 hours of incubation, blood culture yielded a non-lactose fermenting Gram negative bacillus on all 3 plates (blood / chocolate / MacConkey agar). Oxidase was negative and kligler iron agar (KIA) showed K/A with no gas and a small amount of hydrogen sulphide. The isolate was identified as *Salmonella* Typhi (S. Typhi) using RapID system. The isolate was sensitive to all antibiotics used for the S. Typhi panel with no resistance shown to nalidixic acid.

On identification of the blood culture isolate, she was started on intravenous (IV) ceftriaxone (50 mg/kg/day once daily dosing) which was increased to 80mg/kg daily dosing on the 5th day. She completely recovered after 7 days of treatment and was discharged with oral amoxicillin for 7 days.

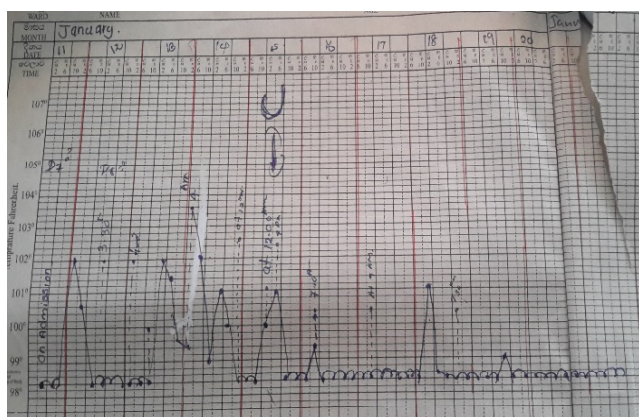


Figure 1. Temperature chart of Case 1.

Case 2

Her 7 year old sister was also admitted to DGH Negombo, while Case 1 was being treated inward; with a history of fever for 7 days duration along with abdominal pain, episodes of vomiting and sore throat.

She was mildly dehydrated, febrile and tachycardic with a heart rate of 154 bpm. On examination, she exhibited a papular rash on her left forearm and tender hepatomegaly on palpation.

Investigations revealed WBC of $12 \times 10^9/L$ with 56% neutrophils, Hb of 9.4g/dl and CRP of 17.8mg/L. Liver enzymes were grossly elevated with AST of 832 U/L and ALT of 2036 U/L. Abdominal ultrasound showed a 2.6 cm peri-cholecystic fluid collection, minimal ascites with mild hepatomegaly and mild splenomegaly. Gall bladder was distended with sludge. Blood picture revealed features of iron deficiency anemia.

She was started on intravenous fluid support and due to possible contact history of Case 1 with typhoid; IV ceftriaxone (50mg/kg twice daily dosing) was started. Oral metronidazole was started, as there was possibility of liver failure.

Blood culture revealed no growth. The Widal test was negative on day 1 and day 7 of admission. While in the ward, patient's clinical condition worsened with progressive abdominal distension although she was passing stools. Abdominal X ray which was done on day 4 of admission revealed features of intestinal obstruction. Facial swelling and bilateral mild ankle edema was also noted.

Blood and urine cultures were repeated but were negative. Influenza antigen testing and stool for occult blood were negative as well. Bone marrow culture was considered but was not done. While patient was on ceftriaxone, fever continued (Refer Figure 2).

On day 7 of admission, melioidosis antibody became positive with a titer of 1:320 and antibiotics were changed to IV co-amoxiclav and oral co-trimoxazole. She was discharged on oral co-amoxiclav.

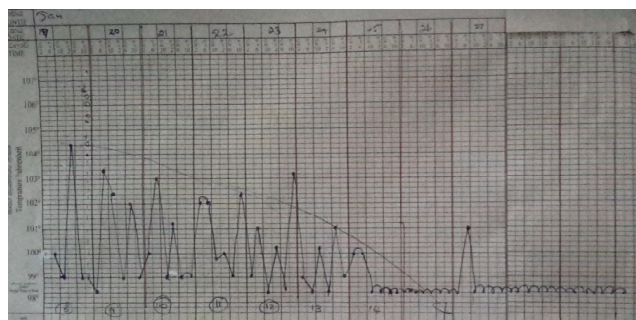


Figure 2. Temperature chart of Case 2.

Case 3

The 4 year old brother of the same family was admitted with a history of fever and myalgia for 1 day duration, approximately 6 days after Case 2 was admitted.

On examination, child was ill looking, febrile and tachycardic at 150 bpm and was found to have right sided abdominal tenderness on abdominal examination.

Investigations revealed WBC of $10 \times 10^9/L$ with 59% neutrophils with the highest CRP of 68 mg/L recorded on day 5 after admission. His blood picture revealed neutrophils with toxic changes and reactive lymphocytes.

Urine culture revealed no growth. Blood films for malarial parasite were negative. Abdominal ultrasound was unremarkable. AST and ALT were 97U/L and 55U/L respectively.

Two blood cultures taken on consecutive days, yielded growths of non-lactose fermenting Gram negative bacilli with characteristic KIA pattern similar to Case 1. Identification of *S. Typhi* was confirmed by RapID system. These isolates were similar to case 1 and were sensitive to all antibiotics with no resistance shown to nalidixic acid.

IV ceftriaxone (50mg/kg twice daily dosing) was started after the positive blood culture and was continued. Blood culture collected on Day 8 was negative. Even though patient improved clinically, fever continued to progress and ceftriaxone was changed to IV meropenem and oral co-trimoxazole on Day 10 of fever. By Day 13, fever had settled (Refer Figure 3). Patient was discharged on oral co-trimoxazole for a further 5 days.

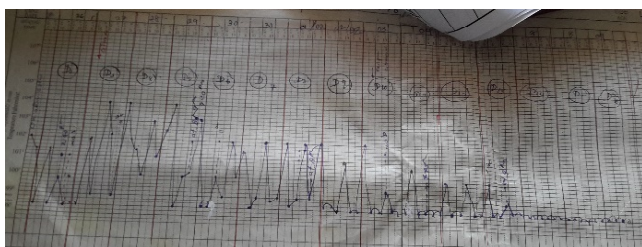


Figure 3. Temperature chart of Case 3.

Discussion

The 3 cases presented above were siblings who lived in Faisalabad, Pakistan, which is considered an urban metropolis. Typhoid fever is a common affliction in Pakistan. Poor hygiene, poor sanitation and overcrowding, are key contributing factors leading to the acquisition of typhoid fever. Incidence of typhoid in Pakistan when compared to Sri Lanka is exceptionally high.

Case 1 had contracted typhoid in Pakistan and arrived in Sri Lanka during the incubation period. Her blood culture was positive for *S. Typhi* and she was treated with ceftriaxone and discharged on oral amoxicillin to complete 14 days of antibiotics. Her recovery was unremarkable.

With regard to the diagnosis of Case 2, the blood cultures were negative. It is possible that there could have been prior antibiotic usage for sore throat before admission to hospital which resulted in negative blood cultures. Though a positive blood culture is considered the gold standard for diagnosis of typhoid fever, according to some studies [3], ultrasonography features such as hepatosplenomegaly, bowel wall thickening, and acalculus cholecystitis strongly favor the diagnosis of typhoid in the absence of positive blood cultures and positive agglutination tests. Abdominal scan findings and high liver enzymes in case 2 along with close contacts with the two siblings strongly favored a diagnosis of typhoid fever.

Negative Widal test in case 2 could be due to its low sensitivity and specificity, which has been proven in various studies even with blood culture confirmed typhoid cases [4,5].

A study in Thailand has shown the melioidosis indirect haemagglutination test to have a sensitivity of 95% but specificity of only 59% and persistence of high antibody titre after the infection subsides [6]. Even though the melioidosis antibodies showed a positive titer, that report could be disregarded in view of the stronger argument for typhoid fever as well as settlement of fever on the following day after the antibiotic change.

Although bone marrow culture plays an important role, when blood culture was negative, it was not carried out as it is an invasive test and the patient was improving.

Case 2 was given ceftriaxone but changed to co-amoxiclav and co-trimoxazole to cover both typhoid and melioidosis. In case 3, both blood cultures were positive for *S. Typhi* and patient was started on ceftriaxone but due to non-settling of fever, antibiotics were changed to meropenem and co-trimoxazole. Fever settled after 13 days of admission. Delayed settling of fever in case 3 could have been due to either, heavy inoculum of bacteria or low immunity of the younger age.

It is to be noted that meropenem is usually prescribed only in multi drug resistant (MDR) strains of *S. Typhi*, not for sensitive strains. Although the clinical teams gave different antibiotics, the isolated *S. Typhi* strains were sensitive to all antibiotics.

With the recent increase in the immigrant population in Sri Lanka, it is possible to get imported infections such as typhoid fever. As recently as February 2018, an outbreak caused by an extensively drug resistant "superbug" strain of *S. Typhi* has been reported from Pakistan [7]. There is a risk of getting other resistant organisms like extremely resistant *Mycobacterium tuberculosis* or multi drug resistant *Salmonella* or *Shigella* which could give rise to local outbreaks.

According to information given by UNHCR, there are about 620 refugees in Negombo and 78% of them are Pakistanis. This raises the question of whether a suitable mechanism is in place to control the spread of such infections contracted due to increase in immigrant populations from highly endemic areas. An adequate screening mechanism is required for refugees entering Sri Lanka to minimize transmission of resistant pathogens.

We would like to conclude the discussion by reiterating the best way in combating typhoid fever is by improved education on hygienic measures with regard to food handling, sanitation and hand washing. Travelers visiting endemic areas need to be cautioned on the risk of contracting typhoid fever and offered typhoid vaccination.

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EXPERIENCE IN THE EARLY USE OF ECMO (EXTRA CORPOREAL MEMBRANE OXYGENATION) IN SEVERE HAEMORRHAGIC LUNG DISEASE OF LEPTOSPIROSIS IN SRI LANKA: A CASE SERIES

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Introduction

Leptospirosis causes severe illness with multi-organ involvement leading to pulmonary haemorrhage, acute renal failure, myocarditis and liver failure. One of the most important complications, pulmonary haemorrhages, occurs among 20-70% of patients leading to a mortality of 30-60%. To support the current treatment modalities available, ECMO plays a pivotal role.

ECMO is a form of extracorporeal life support where an external artificial circuit carries venous blood from the patient to a gas exchange device (oxygenator) where blood becomes enriched with oxygen and has carbon dioxide removed. This blood then is pumped back to the patient's circulation.

Case series

The first patient was a 27 year-old male presenting with leptospirosis complicated with pulmonary haemorrhages. He was started on veno-venous (VV) ECMO within 48 hours of admission and continued for 254 hours, and even with secondary infection and bleeding of the cannula site which were successfully managed, the patient survived. The second patient, a 48 year old male with complicated leptospirosis, underwent VV ECMO within 48 hours and survived without major complications.

The third patient, a 54 year old male with leptospirosis with pulmonary haemorrhage was referred for ECMO. However, subsequently the treating physicians decided that he could be managed on ventilation and plasmapheresis. One week later, he was re-referred for ECMO, this time with acute kidney injury and high doses of inotropes. ECMO was instituted at this stage but he

had total anuria and CRRT and institution of CRRT was delayed due to non-availability of dialysis fluid. He died while on ECMO due to hyperkalemic cardiac arrest after 98 hours of ECMO.

The 4th patient was a 38 year old manual labourer who had the same clinical picture of leptospirosis complicated with pulmonary haemorrhage and acute kidney injury for which CRRT was initiated. He developed a respiratory arrest during CRRT and was intubated and was on high ventilator settings with deteriorating blood gases. His Murray score was 3.5. VV ECMO was initiated after 3 days and continued for 148 hours. His clinical condition resolved and he successfully came off ECMO and was extubated 48 hours later.

Discussion

During the year 2017, among the 3601 leptospirosis cases notified to the Epidemiology Unit of Sri Lanka, 516 cases with 26 deaths were reported from the District of Galle, making it the second only to Ratnapura District.

Death in leptospirosis can often happen due to severe pulmonary haemorrhages, renal insufficiency, or secondary infections. Though the mechanism of lung haemorrhages is unclear, according to some studies, it may be immune-mediated. Renal and respiratory support with broad spectrum antibiotics plays an important role in severe leptospirosis cases with multi-organ involvement. Patients with severe pulmonary haemorrhage suffer from life-threatening hypoxia which sometimes cannot be supported by mechanical ventilation alone. Using ECMO in severe lung injury ensures oxygenation and the ability to rest the lung, thereby allowing cardiac functions to be optimised enabling the reduction of inotropes. Barotrauma

and volutrauma is minimised on rest settings allowing the lung to heal. Furthermore, good oxygenation and perfusion allows the other organs to recover.

These patients were very sick and the ability to keep them alive for specific treatment such as antibiotics, and supportive treatment such as CRRT was an important consideration when they were unable to manage with mechanical ventilation. All patients had been confirmed as leptospirosis by the microscopic agglutination test (MAT). Among numerous referrals for ECMO, the priority was given for the severity of the lung injury and younger age. It was evident that earlier the start of ECMO, the better was the prognosis.

As the Teaching Hospital Karapitiya is the only station with the facility of ECMO at present, and is likely to be limited to only a few centres in the near future, early discussion with the ECMO team is essential to decide on early transfer.

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CME in April 2017

CORYNEBACTERIUM DIPHTHERIAE BACTERAEMIA IN A PATIENT UNDERGOING REGULAR HAEMODIALYSIS

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Introduction

Corynebacterium diphtheriae is a well known agent of localized respiratory tract disease. It is considered as an agent of "pestilence sore throat" in the past. Infection, potentially, can be complicated by systemic effects of exotoxin. It is also able to cause cutaneous and wound infections. There are sporadic cases of *C. diphtheriae* reported in the past in Sri Lanka especially in adults [4,5].

Case report

A 40yr old male, diagnosed with diabetes mellitus, hypertension and renal failure on haemodialysis was admitted to Colombo South Teaching Hospital complaining of fever with chills and rigors, watery loose stools and difficulty in raising neck for 2 days duration. He had a neckline through which the last haemodialysis was done 2 weeks prior to admission. On admission, he was febrile, ill looking, pale with B/L lower limb swelling. His pulse rate, blood pressure were 80bpm and 100/70mmHg. There were crepts in both lungs and had hepatomegaly.

Laboratory evaluation revealed elevated WBC ($23.67 \times 10^3/\mu\text{l}$), CRP-89, and elevated creatinine concentration. Two blood samples were drawn from neckline and periphery for microbiological evaluation and empirical therapy started with vancomycin and cefotaxime. Both blood cultures became positive for *Corynebacterium* spp and the isolate was sent to the Medical Research Institute for further identification.

On day 10 of illness, he developed progressive multiple skin and oral ulcers. He went into leukopenia; WBC-2420 to 400. The antibiotics were changed to IV Meropenem. But patient passed away on day 17.

The final identification of the isolate came once the patient expired as *Corynebacterium diphtheriae* sensitive to cefotaxime, and penicillin and resistant to ampicillin, erythromycin, clindamycin. Tests for toxigenicity was not done due to unavailability of antitoxin. The clinician who gave respective care to the patient was informed regarding the findings and notification was done to the Epidemiology Unit.

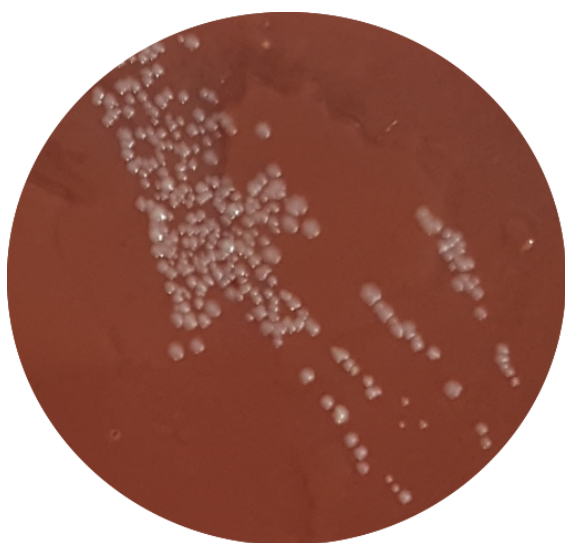


Figure 1. *Corynebacterium diphtheriae* colonies on blood agar.

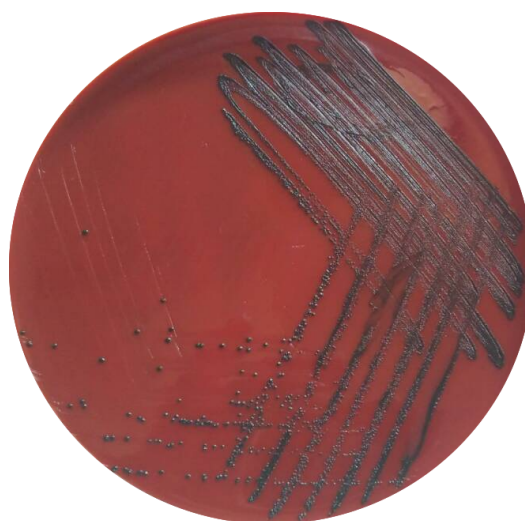


Figure 2. *Corynebacterium diphtheriae* colonies on Loeffler - Tellurite agar.

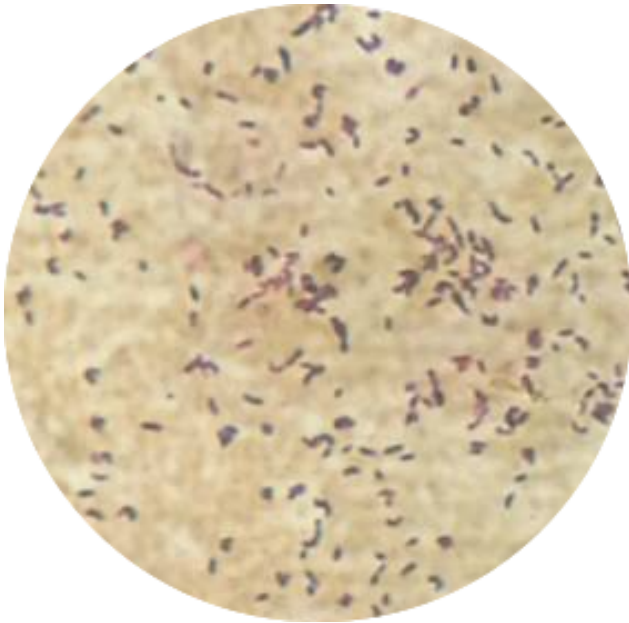


Figure 3. Gram stain showing Gram positive bacilli (Gram variable appearance) having swollen ends with Chinese letter pattern or palisade arrangement (x 100).

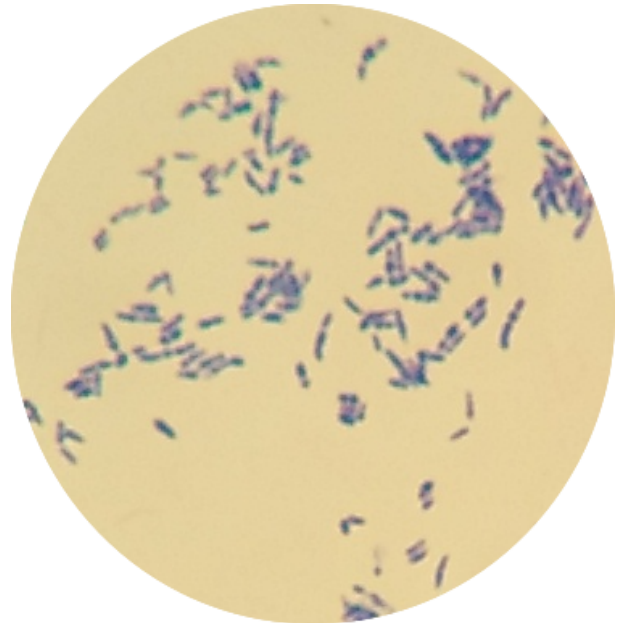


Figure 4. Methylene blue stain showing beaded or barred appearance (x 100).

Discussion

Diphtheria was only considered as one of the deadly diseases. Childhood diphtheria has not been reported for two decades in Sri Lanka, probably due to broad coverage of the immunization programme. But sporadic cases of adult diphtheria have been reported among elderly due to lack of immunity.

C. diphtheriae is a Gram positive bacillus which can produce a potent exotoxin, colonise the upper respiratory tract and spread by droplets, secretions, or direct contact. The incubation period is 2-5 days. The bacteria usually infects the upper respiratory tract causing respiratory diphtheria resulting in a characteristic pseudomembrane which is firm, fleshy, grey, and adherent. Fatal airway obstruction can result if the pseudo membrane extends into the larynx or trachea. Once infected *C. diphtheriae* produces toxin that disseminates via the blood stream to affect heart, kidneys and peripheral nerves, which can be fatal.

The bacteria can infect skin causing cutaneous diphtheria. Bacteraemia with *C. diphtheriae* is rare and usually caused by nontoxigenic strains. Most vulnerable are low socioeconomic group. Dialysis patients are more susceptible to the infection due to the low immune status even with regular immunisation [2].

In Sri Lanka immunization for diphtheria was introduced in 1978 and this patient might not be fully vaccinated. The vaccination is done with diphtheria toxoid given at 2, 4, 6, 18 months and 5 years. The toxoid induced immunity gradually wanes if booster doses are not given. As we do not practice regular immunization of haemodialysis patients for diphtheria, they are more susceptible to acquire infection.

Clinical diagnosis of diphtheria requires bacteriologic laboratory confirmation of toxigenic *C. diphtheriae* in throat or lesion cultures. The lack of diagnostic facilities for toxin production is a major challenge that we face.

It is essential to notify as it is important in national surveillance programmes. In 1955 there were 1,179 reported diphtheria cases and after the introduction of EPI the incidence dropped dramatically and last case was reported in 1996 [3].

The broad vaccine coverage in Sri Lanka has led to the lower incidence of diphtheria cases. Therefore, it is essential to maintain vaccination with at least of two booster doses after infancy to maintain the immunity. Early suspicion, treatment and notification are essential in high risk populations to prevent spread of this bacteria.

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CME done in October 2017

ENVIRONMENT CLEANING BEYOND CHEMICALS

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Healthcare-associated infections (HCAs) are a problem worldwide and pathogens responsible for them such as *Clostridium difficile*, methicillin resistant *Staphylococcus aureus* (MRSA), vancomycin resistant enterococci (VRE), and *Acinetobacter* spp could contaminate the hospital environmental surfaces and survive in them for prolonged period of time [1]. Therefore, hospital environment cleaning, routinely or at time of patient discharge, is a fundamental principle of reducing of HCAs. Current practice of cleaning includes physical removal of surface dirt using a general purpose detergent and use of disinfectant to remove the microbial burden of the surfaces [2]. However, the combination of detergent and disinfectant could be suboptimal, time consuming and costly. Moreover, there are safety issues involved with wet floors and chemical irritants [3].

Today, several hospitals worldwide have adapted to novel chemical free environmental cleaning methods like integrated cleaning using microfiber and steam cleaning which have proven to achieve microbiological cleanliness [3,4].

Microfiber is a material manufactured with densely constructed polyester and polyamide (nylon) fibres, which are about 1/16 of the thickness of a human hair. However, the fibre can hold six times its weight in water creating

cloths more absorbent than normal. The material works by static attraction, and its positively charged fibres attract and hold dust and microorganisms like a magnet. With combination of steam cleaning which uses dry (97% dry) high temperature (140°C) steam under pressure from a portable steam generator, microfiber is effective in cleaning every surface in hospital environment. The procedure does not require detergent or disinfectants and removes stains effectively without scrubbing.

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CME done in October 2017

AN OUNCE OF PREVENTION IS WORTH A POUND OF CURE

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Burkholderia cepacia complex (BCC), is an ubiquitous organism capable of causing various types of infections, including catheter-associated infections, respiratory tract infections and blood stream infections in hospitalized patients. It is intrinsically resistant to multiple antibiotics. It causes nosocomial infections through contaminated disinfectants, nebulizer solutions, mouthwash, medical devices, local applications and intravenous solutions. Outbreaks of BCC bacteraemia were first reported in three major hospitals between July and August 2017 while it was noted in NHSL only after mid-August.

Direct and enriched samples of medical devices, common possible IV solutions and antiseptics were tested for bacterial contamination and they remained sterile. Intense literature review led to testing of nebulization solutions and the testing revealed a growth of BCC from a particular brand of ipratropium bromide nebulizer solution available in the hospital. Identification and antibiotic susceptibility were done using BD Phoenix™ and the findings of the clinical isolates and the isolates from nebulizer solutions were similar. Later, it was decided to send the clinical and nonbiological samples to Department of Microbiology, Faculty of Medicine, University of Peradeniya for analysis using Random Amplification of Polymorphic DNA.

According to the USP standard, ipratropium nebulizer solution should be sterile. The contamination of the solution would have occurred during the manufacturing process. Benzyldimethylalkylammonium chloride (BZK) is a preservative used in this nebulization solution and BCC shows intrinsic resistance to this substance through efflux activity and metabolic inactivation via biodegradation.

Quick actions were taken to prevent further spread of outbreak by informing the relevant authorities including chairman of National Medicines Regulatory Authority

(NMRA), Director of Medical Supplies Division (MSD) and Director of NHSL. We also alerted Consultant Clinical Microbiologists of other hospitals regarding the problem. Removal of the particular brand of ipratropium bromide led to the clearance of the outbreak.

Source identification is very important to control further spread of outbreaks as well as to minimize such outbreaks in future.

Acknowledgement

Medical laboratory technologists of the microbiology laboratory and the nursing staff of the wards and ICUs at NHSL.

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CME in December 2017

UNCOMMON PRESENTATION OF A COMMON ORGANISM

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A four year old boy, who had undergone correction of Tetralogy of Fallots three years back was admitted with 102°F fever spikes for one week. Child was tachycardic and had a systolic murmur best heard in mitral area. The transthoracic echocardiogram showed thickening of septal tricuspid valve leaflet with no evidence of vegetations. CRP was 145mg/dL. Blood cultures remained sterile. Blood picture showed evidence of bacterial infection. A decision was taken for early surgery due to no response to empirical oral co-amoxiclav.

Surgery revealed infected material in and around the RVOT patch. Enriched intraoperative samples of granulation tissue and possible vegetation had pure growths of *Pseudomonas* species. Fever subsided within 4 days of IV ceftazidime and gentamicin. Inflammatory markers reduced. On the 27th day patient developed fever with negative blood cultures and 2D ECHO. IV ciprofloxacin was added and fever subsided. Patient was discharged after 42 days antibiotic therapy. Two weeks later child was readmitted with high fever. He was started on IV amikacin and imipenem. Blood cultures grew *Pseudomonas aeruginosa* similar to previous isolate. In view of the failure of antibiotic therapy, surgery was performed which revealed vegetations over the RVOT patch and previously inserted pulmonary valve. RVOT patch and pulmonary valve were completely excised and new valve inserted. Patient went home well after treatment for 10 weeks with IV imipenem and amikacin.

Pseudomonas aeruginosa is an uncommon causative agent of infective endocarditis (IE) and accounts for 3% of the disease [1,2]. Intravenous drug abuse, prosthetic heart valves/pacemakers and burns are predisposing

factors for *Pseudomonas*. In this child, there were a biological mitral valve and a transannular RVOT patch which predisposed the child to IE. In *Pseudomonas* IE, right side is mostly affected while prognosis is poor with left sided involvement [3]. In this case, left side was involved.

Antibiotics remain the mainstay for treatment of endocarditis. The first line therapy is a beta-lactam antibiotic in combination with an aminoglycoside. This patient was first treated with ceftazidime and gentamicin. Surgical intervention is usually done when medical therapy fails or with complications. However, combination therapy seems to improve outcome of left sided *Pseudomonas* IE.

Acknowledgement

Medical laboratory technologists of the microbiology laboratory and the nursing staff of the LRH.

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The Bulletin of the Sri Lanka College of Microbiologists

The Bulletin of the Sri Lanka College of Microbiologists is the annual publication of the Sri Lanka College of Microbiologists issued along with the Annual Scientific Sessions of the College. The Bulletin includes the summaries of the speeches/lectures/symposia and abstracts of oral/ poster presentations to be made during the Annual Scientific Sessions in addition to reviews research articles and case reports relevant to microbiology and infectious diseases sent by the membership. The aims of the bulletin are to encourage the membership to conduct and publish good quality research to support and improve the practice of microbiology in Sri Lanka and to share experiences to enrich and upgrade the professional standards.

All manuscripts will be subjected to review before acceptance and will be accepted with the understanding that the work is not being submitted simultaneously to another journal and has not been already published / accepted for publication elsewhere.

TYPES OF CONTRIBUTIONS

Review articles

Editorial board selects one or more from the articles submitted as review articles. This should contain less than 2000 words and address a microbiologically significant topic of current interest. This article should be supported by no more than 20 key references.

Research (original) articles

These should be in the format of introduction/background including the purpose of the study, materials and methods, results, discussion and conclusions. Each manuscript must have a structured abstract of 200 words giving the background, materials and methods, results and conclusions. The text should be limited to less than 2000 words and 15 references. Discussion should be clear and limited to matters arising directly from the results.

Articles

These articles should be limited to 1500 words and 12 references. Journal will give priority to articles dealing with topics of interest and importance in microbiology and infectious diseases in Sri Lanka.

Case reports

These should not exceed 750 words and 5 references and should be structured as Introduction, Case report and Discussion. Abstract is not required. Editorial board will be paying attention to the significance of the case report to the practice of microbiology in Sri Lanka.

Abstracts of presentations to be made at Annual Scientific Sessions

These should be limited to 250 words. May be accompanied by no more than five references or suggested further reading.

Photo quiz

This should be accompanied by a clear photograph and text. Limit your references to three for the answer. (Those submitted without references may be accepted if editors decide as suitable for publication).

Abstracts of research presentations (oral / poster) at Annual Scientific Sessions

Please see separate guidelines issued with the notice calling for abstracts.

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Manuscripts should be submitted with a **cover letter** stating:

- that the contents have not been published or accepted for publication elsewhere.
- that the paper has not been submitted simultaneously to another journal.
- the originality of the article and that each author has made a significant contribution to the work.
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Previous publication of some content of a paper does not necessarily mean that the paper will not be considered for publication in the Bulletin, but the Editorial Board should be made aware of this in the cover letter that accompanies the manuscript.

Authors should include all those who have contributed to the work described, including supervisors and if applicable, those interpreting and analysing data used in the study to be presented. Only persons who contributed to the intellectual content of the paper should be listed as authors. Authors should meet all of the following criteria, and be able to take public responsibility for the content of the paper:

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PREPARATION OF MANUSCRIPTS

All parts of the manuscript, including references, tables and figure legends should be typed with double-spacing and formatted in Times New Roman font (size 14 for the title and 12 for the rest of the article) for A4 sized paper. All pages of the manuscript should be numbered consecutively, starting with the title page.

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Units/ abbreviations

Authors should follow the SI system of units (except for blood pressure which will continue to be expressed in mmHg). Abbreviations if used should be consistent throughout the text.

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Photographs will be published in black and white. If author wishes to publish a colour photograph he / she should bear the cost of publication. All photographs of the patients will be published with covered eyes. Photo-micrographs should have scale markers that indicate the degree of magnification.

Tables

All tables must be double-spaced and numbered with Arabic numerals in the order in which they are cited in the text. The title should describe the contents of the

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Acknowledgements

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These should conform to the Vancouver style. The reference in the text should be numbered consecutively in Arabic numerals in parenthesis in the same line of the text in the order in which they appear in the text. The first five authors should be listed. If there are more than five then the first three should be listed followed by *et al.* An example is given below.

1. Dellit TH, Owens RC, McGowan JE et al. Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America guidelines for developing an institutional program to enhance antimicrobial stewardship. *Clinical Infectious Diseases* 2007; **44**: 159-77.

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Manuscripts should be submitted as two **hard copies**, along with the cover letter, to

The Editor, Sri Lanka College of Microbiologists,
No. 6, "Wijerama House", Wijerama Mawatha,
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An **electronic version** must be also submitted by email to slcmicrobio@gmail.com or slcmicrobio@sltnet.lk. Your email should be marked for the attention of the Editor, SLCM, and the manuscript should be attached to the email as a Microsoft Word document.

Guidelines for preparing abstracts

(A) Authors

- At least one of the authors of the paper should be a member of the SLCM.
- Authors should include all those who have contributed to the work described, including supervisors and if applicable, those interpreting and analyzing data used in the study to be presented. Only persons who contributed to the intellectual content of the paper should be listed as authors. Authors should meet all of the following criteria, and be able to take public responsibility for the content of the paper:
 - Conceived and planned the work that led to the paper, or interpreted the evidence it presents, or both.
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 - Each author should have contributed sufficiently to the work to take public responsibility for the content.

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- **Name(s)** of the author(s) and place(s) where research has been carried out with the title of the abstract should be given in the title page. Authors surname should be preceded by the initial(s) but not by prefixes such as Mr. or Dr. or Prof.
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- The abstract must report the results of original research. If the work has been presented or published previously in whole or in part, form and the year of presentation or publication and the forum or journal should be stated in the abstract. This does not disqualify a paper. Work already presented/ published in Sri Lanka will only be considered for poster presentations.
- Abstract page should carry only the **title** and the **text**. *(It should not contain Name(s) of the author(s) and place(s) where research has been carried out)*
- The abstract (including the title) should not exceed 350 words.
- It should be structured as far as possible into the following
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Prospective authors are requested to see the abstracts of research papers in a recent issue of the *CMJ* for further guidance on writing abstracts.

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- Tables: should be included only if absolutely essential.
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ACKNOWLEDGEMENTS

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