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5th International Conference on
**Infectious Diseases:
Control and Prevention**

May 24, 2021 Webinar

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Scientific Program

Infection Control 2021

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07:30-08:00 **Opening Ceremony & Introduction**

Keynote Forum

08:00-08:30 **Title: Anionic polymers and photoactive coatings to prevent pathogen transmission via fomite**
Frank Scholle, North Carolina State University, USA

Session Introduction

Session Introduction

08:30-09:00 **Deceptive urine studies and inappropriate antibiotic use in geriatric psychiatry: The impact of bundled interventions**

Rajdip Barman, Genesis Behavioral Health, USA

09:00-09:30 **Faecal microbial transplantation in the treatment of recurrent *Clostridioides difficile* infection in comorbid patients - high risk of failure**

Peter Sabaka, Comenius University in Bratislava, Slovak Republic

09:30-10:00 **National outbreaks of *Saprochaete clavata* : A multidisciplinary hunt to discover the source of contamination**

Marie Desnos-Ollivier, Institut Pasteur, France

10:00-10:30 **Successful control of the first carbapenem-resistant *Klebsiella pneumoniae* outbreak in a Chinese hospital 2017–2019**

Jiaying Zhu, Shanxi Medical University, China

10:30-11:00 **Improved immunogenicity and memory antibody response from single dose immunization of SARS-CoV-2 RBD entrapped nanoparticles**

Rahul Ahuja, National Institute of Immunology, India

11:00-11:30 **Extremophilic actinomycetes isolated from soil in Kazakhstan: Classification and antimicrobial activities**

Saikal Shamkeeva, Nazarbayev University, Kazakhstan

11:30-12:00 **Molecular characterization and genetic diversity of cutaneous leishmaniasis from North Eastern Pakistan**

Nargis Shaheen, Quaid-i-Azam University, Pakistan

Panel Discussion

Thanks Giving & Closing Ceremony



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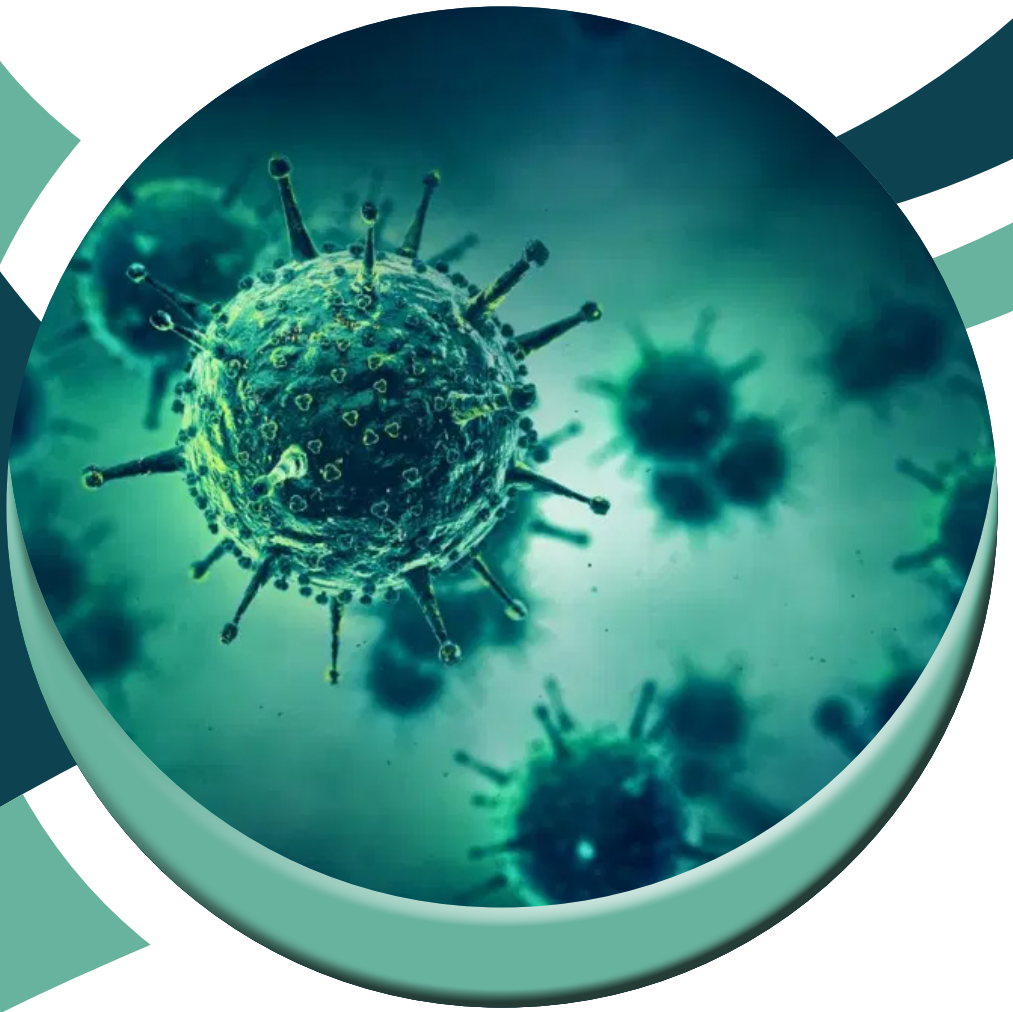
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Keynote
Day 1

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*Frank Scholle**North Carolina State University, USA*

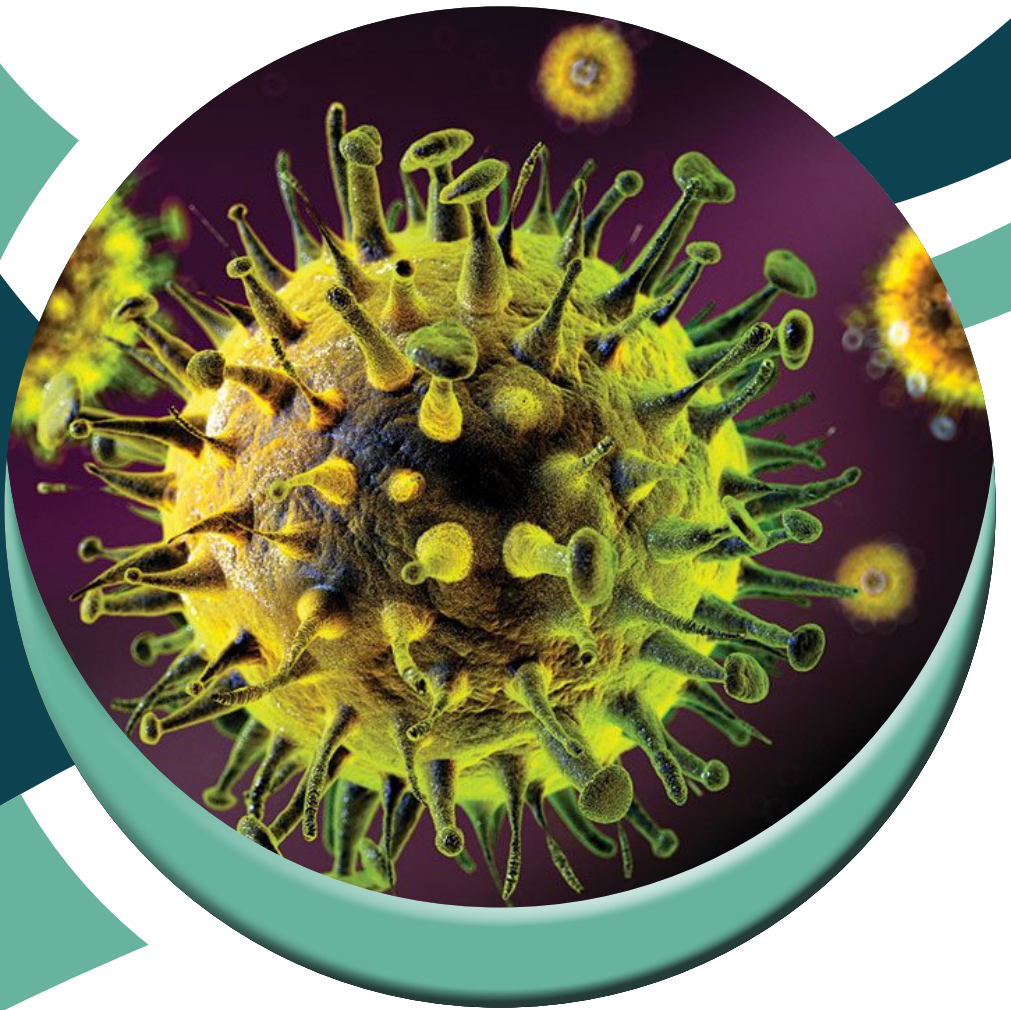
Anionic polymers and photoactive coatings to prevent pathogen transmission via fomite

Survival of pathogens on high-touch surfaces in particular, presents a significant problem in disease transmission via fomites. Despite advances made over the years to develop antimicrobial agents and materials, there is a significant need for the development of innovative approaches with which to prevent microbial infections. As a multidisciplinary team at North Carolina State University, we have developed two different classes of novel antimicrobial materials. Anionic multiblock polymers work by rapidly dropping the pH <1 , causing non-specific damage and rapid inactivation of Gram-positive and -negative bacteria including drug resistant strains, and of a variety of different viruses both enveloped and non-enveloped, including SARS-CoV-2. Anionic polymers that lose their antimicrobial activity over time can be easily recharged via a mild acid wash, restoring their original properties. The second approach focuses on antimicrobial photodynamic inactivation (aPDI). Photoactive compounds called photosensitizers, are applied via a sprayable and UV crosslinkable formulation to a wide variety of different matrices. Upon exposure to visible light, photosensitizers produce a biocidal form of oxygen, singlet oxygen, that causes non-specific damage to a wide spectrum of pathogens. We demonstrate that the biocidal activity on coated materials lasts over a month after continuous illumination and is able to inactivate notoriously hard to kill pathogens, such as feline calicivirus, a surrogate for norovirus. Major advantages of both of these approaches include the unlikelyhood of development of resistance to the biocidal mechanisms, broad-spectrum antimicrobial activity and long lasting efficacy to prevent recontamination of surfaces.

Biography

Frank Scholle received his PhD from the University of North Carolina at Chapel Hill in 2000 and did his postdoctoral training at the University of Texas Medical Branch in Galveston, TX, USA. He joined North Carolina State University in 2005 and currently holds the rank of Associate Professor. He serves as director of the recently founded Center for Advanced Viral Experimentation (CAVE) at NCSU which seeks to develop multidisciplinary approaches to study and combat viral infections.

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Scientific Tracks & Abstracts Day 1

Session Introduction

- Title: Deceptive urine studies and inappropriate antibiotic use in geriatric psychiatry: The impact of bundled interventions**
Rajdip Barman, Genesis Behavioral Health, USA
- Title: Faecal microbial transplantation in the treatment of recurrent *Clostridioides difficile* infection in comorbid patients - high risk of failure**
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Deceptive urine studies and inappropriate antibiotic use in geriatric psychiatry: The impact of bundled interventions

Rajdip Barman*Genesis Behavioral Health, USA*

Background: Antibiotics are commonly used in older adults, especially in inpatient settings. CDC (Center for Disease Control and Prevention) reports 20-50% of antibiotic use is unnecessary or inappropriate in acute care hospitals in the United States. Lack of data regarding the prevalence of and treatment for infections in acute geriatric psychiatric units (GPU) motivated us to initiate this project.

Methods: This study was conducted in a 22-bed GPU in a community-based teaching hospital. Data were collected by retrospective chart review of all admissions from the previous one year. Patients living independently were evaluated using clinical criteria according to guidelines published by the Infectious Diseases Society of America (IDSA).

Results: Near 27% received Abx, primarily for a misdiagnosed urinary tract infection. Only 20% met clinical criteria; 80% were unnecessarily treated for ASB or contaminated cultures. Over two-thirds of the Abx consisted of fluoroquinolones or trimethoprim-sulfamethoxazole, neither of which are recommended due to adverse events and/or resistance. The impact of bundled interventions was marginally effective.

Discussion: A higher risk of infections in older adults, diagnostic challenges, cognitive deficits, and several other factors may bias providers toward overdiagnosing and treating infections in GPU. Delirium is common among this patient population, and urine cultures are often ordered to exclude a UTI despite the absence of established clinical criteria.

Conclusion: Urinalysis and UC are indiscriminately ordered in older adults, resulting in inappropriate Abx with non-recommended agents. Urinalysis should not be a requirement for admission in asymptomatic patients, given the high prevalence of ASB and pyuria in older adults.

Biography

Rajdip Barman, MD, graduated medical school from Medical College & Hospital, Kolkata, India and did residency in psychiatry from Virginia-Tech Carilion School of Medicine, Roanoke, Virginia, USA. He completed a fellowship in geriatric psychiatry from Cambridge Health Alliance, Harvard Medical School, Cambridge, Massachusetts, in 2017. After completing his studies, he joined Berkeley Medical Center, West Virginia University Medicine, Martinsburg, West Virginia, as an assistant professor and served as the clerkship director. Currently, he is working as an attending psychiatrist & Vice-Chair at Genesis Health System, Davenport, Iowa. He has achieved several awards and accolades and published near 15 papers in reputed journals.

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Faecal microbial transplantation in the treatment of recurrent *Clostridioides difficile* infection in comorbid patients - high risk of failure

Peter Sabaka*Comenius University in Bratislava, Slovak Republic*

Clostridioides difficile infection (CDI) the most common casue of nosocomialdiarrhea. Faecal microbial transplantation (FMT) is the most effective treatment of recurrent CDI. However, many patients experience further recurrences after first course of FMT. The raeasons for FMT failure and its risk factors are unclear. Comorbid status is a risk factor for failure of farmacotherapy of the reccurent CDI and it might be associated with the risk of FMT failure as weell. We carried out a prospective observational cohort study in order assess the association of comorbid status and FMT failure. Patients with recurrent CDI underwent FMT via retention enema and were followed up for 12weeks for signs and symptoms of CDI recurrence. FMT failure was defined as recurrence of diarrhoea and a positive stool test for the presence of *C. difficile* antigen or toxin during the follow-up. We assessed the association of single FMT failure with possible manageable and unmanageable risk factors. Charlson Comorbidity Index (CCI) was used to quantify the comorbidity. A total of 60 patients (34 women, 26 men) were included in the study. Overall, 15 patients (25%) experienced single FMT failure. O patients with $CCI \geq 7$, 50% experienced FMT failure compared to 6.67% of those with CCI below 7. Patients who experienced single FMT failure had a significantly higher CCI and significantly lower albumin concentration as compared to patients who experienced single FMT success. There was no difference in age, C-reactive protein concentration, leukocyte count and time from FMT to first defecation. In multivariate analysis, $CCI \geq 7$ was positively associated with the FMT failure. In conclusion, cmorbid status is associated with the high risk of FMT failure in the treatment of reccurent CDI.

Biography

Peter Sabaka has completed his PhD at the age of 29 years from Comenius University in Bratislava, Faculty of Medicine in Bratislava, Slovak Republik. He is the associate profesor and physician at the Department of Infectology and Geographical Medicine, Faculty of Medicine, Comenius University in Bratislava. He has published more than 30 papers in reputed journals.

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National outbreaks of *Saprochaete clavata* : A multidisciplinary hunt to discover the source of contamination

Marie Desnos-Ollivier
 Institut Pasteur, France

As of 2012, *Saprochaete clavata* was known as a yeast-like ascomycetous species rarely involved in human invasive infection. It suddenly became a national problem when 18 cases occurred within 8 weeks in 10 health care facilities. The majority of these cases were fatal and diagnosed in patients with acute myeloid leukemia. Knowing that the current identification methods misidentified *S. clavata*, we reviewed published reports about grouped-cases of *Geotrichum* spp. infections in Europe. We contacted European colleagues and analysed the available isolates and the collection of the French National Reference Center (NRCMA). We started a collaboration with the French CDC (Santé Publique France), as well as clinicians and hygienists to discover the reservoir of *S. clavata*, determine the risk factors and study the population structure of *S. clavata*. Using whole genome sequencing and animal experiments we determined that the outbreak was due to a clonal cluster, and that translocation from gut to blood occurred, making possible an oral source of contamination. During the following six years, using a new real-time PCR, we followed the various clades without finding the clue. Finally, in 2017 and 2019, new grouped cases of *S. clavata* infections in two hospitals allowed us, with the help of the local teams, to find the source of contamination after sampling the hospitals' environment and discovering that deficient dishwashers were in both hospitals the source of those nosocomial infections. Replacement of the dishwashers stopped the spread of *S. clavata*. This work demonstrates the importance of multidisciplinary approach in outbreak investigation.

Biography

Marie Desnos-Ollivier is research assistant at the National Reference Center of invasive Mycoses & Antifungals (NRCMA) at Institut Pasteur, France. She has completed her PhD in 2012 from University Paris 7, about molecular epidemiology of *Cryptococcus neoformans* complex. She is specialized in yeast identification, antifungal susceptibility, molecular epidemiology using genotyping or whole genome sequencing. She is co-curator of the Institut Pasteur-FungiBank sequences database. She is part of the ISHAM working group Genotyping *C. neoformans/C. gattii*. She has published 58 papers in international peer-reviewed journals and has been serving as a reviewer board member of Frontiers in Cellular Infections.

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Successful control of the first carbapenem-resistant *Klebsiella pneumoniae* outbreak in a Chinese hospital 2017–2019

Jiaying Zhu, Jinju Duan

Shanxi Medical University, China

Purpose: Carbapenem-resistant *Klebsiella pneumoniae* (CRKP) increasingly cause high-mortality outbreaks in hospitals globally. Our study aimed to investigate and control the first outbreak of CRKP in our hospital.

Methods We set up a multimodal and multidisciplinary working group on the antimicrobial stewardship (AMS) to control the outbreak. Strict infection control programs were implemented. Medical records of patients were reviewed. Resistance mechanisms, virulence genes, and serotypes were detected by PCR. Whole-genome sequencing of three CRKP isolates was used to identify carbapenem resistance and virulence. In vitro combinations antimicrobial sensitivity testing with tigecycline as the main drug were performed by microdilution checkerboard method.

Result: 31 strains were collected during the outbreak. NDM (64.5%) was the main resistance mechanism and 21 of them were ST11. Only one strain was hypermucoviscous as judged by positive string test. The serotype of the majority strains was KL22KL137 (58.6%). A novel sequence types 4564 was detected co-production of NDM-1, CTX-M-9 and mcr-1. TGC+IPM, TGC+MEM, and TGC+ATM combinations were high synergistic against 96.8 %, 87.1 %, and 90.3 % of CRKPs, respectively. With all precautions taken, the outbreak began to weaken in September 2018, returning to the previous sporadic stage.

Conclusions: The establishment of AMS workers is an effective strategy to successfully control the outbreak. A multimodal and multidisciplinary infection control strategy proved to be crucial. The emergence of this outbreak highlights the importance of continued monitoring of these isolates.

Biography

Jiaying Zhu is a postgraduate student in Shanxi Medical University, China. She won the second prize in national competitions and won scholarships many times. She has published 03 papers in reputed journals and has been serving as an outstanding students in Shanxi Medical University. She will go to China Pharmaceutical University as a PhD student in September this year.

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Improved immunogenicity and memory antibody response from single dose immunization of SARS-CoV-2 RBD entrapped nanoparticles**Rahul Ahuja***National Institute of Immunology, India*

The year 2020 has seen the by far the most widespread pandemic due to SARS-CoV-2 which has led to over 145 million cases globally and 3 million deaths at the time of writing this abstract. Emerging in the small city of Wuhan in China in December 2019 it soon spread across the globe. On 30 January 2020, World Health Organisation (WHO) declared SARS-CoV-2 disease as Public Health Emergency of International Concern (PHEIC) 1). Vaccines have been the cheapest and most important medical intervention of human history which saves millions of lives each year. 2). Global efforts to develop an effective vaccine against SARS-CoV-2 are underway. However, still many middle and low income countries have been eluded of the full benefits of vaccination due to various economic and political reasons like cost, low coverage, requirement of multiple doses and dependence on the developed world for vaccine import. Moreover many vaccines that have entered the human clinical trials today are being used on humans for the very first time with no known long term effects along with limited safety and efficacy data. Amongst various types, subunit vaccines are the safest, involving no hazardous reagents and no risk of genetic integration. We used RBD of SARS-CoV-2 as the antigen for vaccine against COVID-19. However, unlike any pure antigen it was also weakly immunogenic and required the use of multiple doses. As antigens in particulate nature exhibit increase uptake by antigen presenting cells thus potentiating the immune response. 3) We sought to increase the immunogenicity of RBD by entrapping the protein in polymer particulate system. Delivering RBD as polymer particle vaccine not only increased the immunogenicity but also gave an added advantage of conferring long lasting memory from single point immunization.

Biography

Rahul Ahuja has his expertise the area of protein purification and polymer based particulate vaccines. He has been involved in the development of particle based vaccines for various infectious diseases like pneumonia and COVID-19. He has been working at Product Development Cell in National Institute of Immunology, New Delhi where he is enrolled as a PhD scholar under the guidance of Dr. Amulya K Panda.

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Extremophilic actinomycetes isolated from soil in kazakhstan: Classification and antimicrobial activities**Saikal Shamkeeva**

Nazarbayev University, Kazakhstan

Most threatening healthcare problem nowadays is infection caused by antibiotic resistant bacteria, such as ESKAPE pathogens. Actinomycetes are the most known antibiotic producers. However, high potential of extremophilic actinomycetes has not been studied. Our study aims to test inhibitory activity of the extracts produced by extremophilic actinomycetes isolated from soil in Kazakhstan against prevalent antibiotic pathogens in Kazakhstani hospitals and identification of its chemical composition. Soil from extreme environments of Kazakhstan has been collected from different regions and actinomycetes were isolated for further antibiotic synthesis of active components. Special conditions that mimic natural habitat of bacteria have been optimized. Morphological analysis were performed by culturing selected actinomycetes species in different agar media for viewing aerial and substrate mycelium, and characterization by microscopic examinations. Extracts were further tested against hospital strains of resistant pathogens *A. baumannii*, *P. aeruginosa*, and *K. pneumoniae*. Afterwards, potent extracts were analyzed on HPLC for identification of chemical composition. Extracts grown in extreme environments showed inhibitory activity against ESKAPE pathogens. By microscopic examination, the spore chains of actinomycetes were observed to be shaped like hooks, loops, and spirals (designated as "RA"; retinaculum-apertum). Occasionally, long straight chains were also observed ("RF"; rectus-flexibilis). HPLC analysis showed differential composition of the extracts grown in different media conditions. Further analysis of the chemical composition is needed to identify the active component within these potentially novel antibiotic extracts.

Biography

Saikal Shamkeeva has completed her MSc degree in 2018 from Chester University, UK. She has joined Nazarbayev University, Kazakhstan extremophile project and team in 2018, after graduation. During this time one paper was published and one book chapter on methods and protocols for growing extremophilic actinomycetes and antibiotic extraction has been submitted for publication. Currently, she is holding a PhD position at Leipzig University, Germany and continues putting contribution towards extremophile project.

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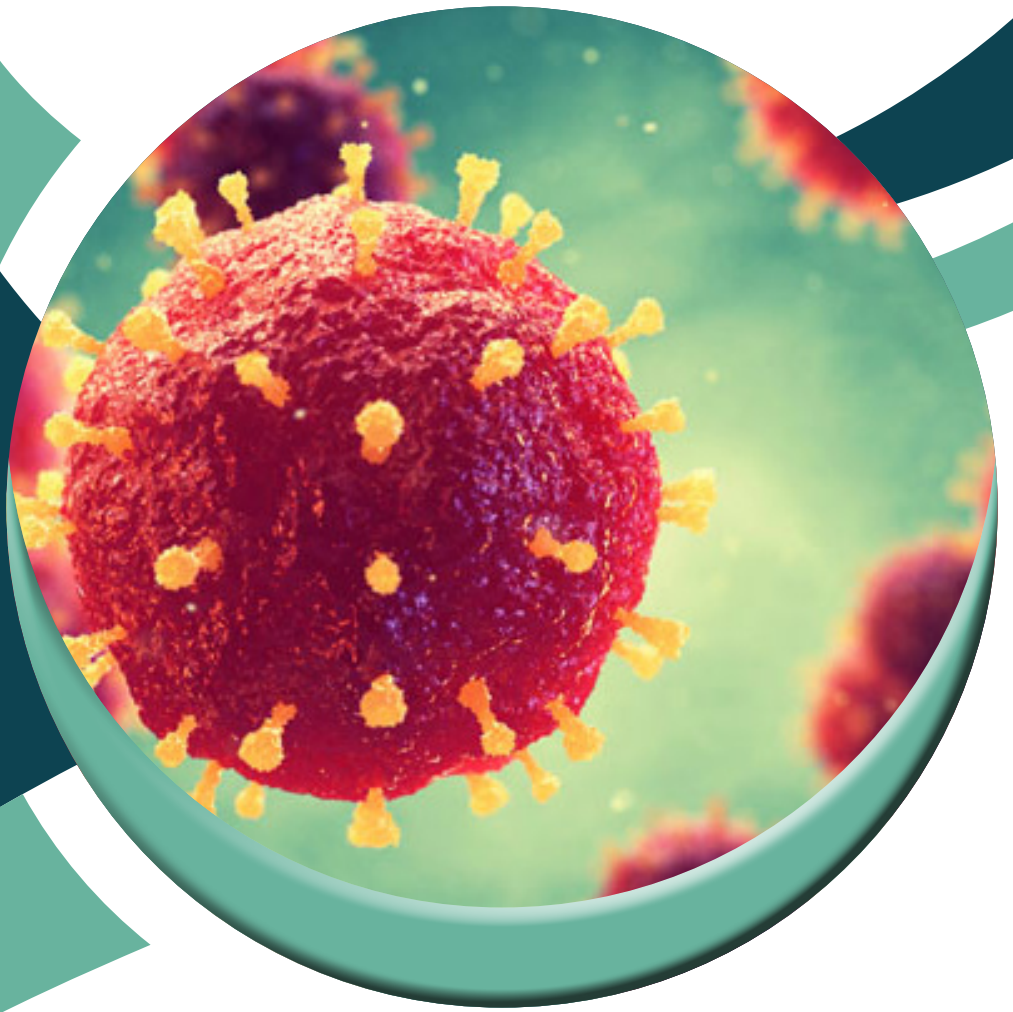
Molecular characterization and genetic diversity of cutaneous leishmaniasis from North Eastern Pakistan**Nargis Shaheen***Quaid-i-Azam University, Pakistan*

The genetic diversity of *Leishmania* spp. in North Eastern Pakistan remains undetermined despite increase cases of Cutaneous leishmaniasis (CL). This study was designed to decipher the molecular characterization and genetic diversity of *Leishmania* spp. in North Eastern Pakistan. Out of 13761 microscopically suspected CL cases, 567 cases were confirmed with *Leishmania* spp. by internal transcribed spacer (ITS) gene amplification through PCR- RFLP technique. Further, isolates were directly sequenced to conduct phylogenetic analysis for genetic diversity. Among suspected CL cases, Mirpur showed the highest proportion of 4.85% (118/2431) CL infection while Neelum district showed the lowest 3.29% (9/273). The slide positivity rate, annual blood examination rate, and annual parasitic incidence rate were 3.84, 0.27, and 0.01% respectively and the incidence of CL in the age group 1-20 was higher in males 50.92% than females 25.75%. The RFLP analysis and sequencing confirmed the occurrence of *L. tropica*, *L. major*, and *L. infantum*. The *L. tropica* ($p=0.02$) confirmed significant nucleotides variation than *L. major* ($p=0.05$). Current findings confirmed the prior assumption that anthroponotic CL is the primary CL present in AJK. Moreover, this is the first report based on molecular identification of *L. major*, and *L. infantum* from North Eastern Pakistan. The *Leishmania* spp. with remarkable heterogeneity is the leading cause of treatment failure and emergence of new haplotypes. Therefore, more extensive investigations are recommended from all geographical regions of North Eastern Pakistan, a using large sample size.

Biography

Nargis Shaheen has completed her M.phil from Quaid-i-Azam University, Islamabad Pakistan in Parasitology. She has submitted her PHD thesis in Quaid-i-Azam University, Islamabad Pakistan in Parasitology. Currently, she is working as a short term visiting scholar in the Department of Pathology and Microbiology of Ohio State University Columbus, USA. She has published more than 10 papers in reputed journals. Her research field is Parasitology and Entomology with focus on vector borne diseases. Her engrossment is on epidemiology, molecular diversity, and drug formulation from plant. She has also experienced in identifying the drugs targets by computational studies and genetic variation in hereditary disease.

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Implementing an electronic hand hygiene system improved compliance in the intensive care unit**Jiapeng Huang***University of Louisville, USA*

Hand hygiene (HH) compliance is low and difficult to improve among healthcare workers. We aim to validate a new electronic HH system (Sanibit system) and assess the impact of this system on HH compliance and quality changes over time at both group and individual levels. The Sanibit system is a sensor-based platform with automated HH compliance and quality monitoring, real-time feedback, and comprehensive HH compliance analysis. The Sanibit system was installed in a 10-bed surgical intensive care unit. The full HH compliance rate increased significantly from 8.4% in week 01 to 20.5% in week 16 with week 10 being the highest (27.4%). The partial compliance rate maintained relative consistency between 13.2% to 20.0%. The combined compliance rate (full compliance rate + partial compliance rate) increased from 23.5% in week 01 to 34.6% in week 16 with week 10 being the highest (41.4%). We found significant variations among providers in terms of HH opportunities per shift, full compliance, partial compliance and combined compliance rates. The average duration of hand rubbing over time in partial compliance occurrences did not change significantly over time. In conclusion, a sensor-based platform with automated HH compliance and quality monitoring, real time feedback and comprehensive individual level analysis, improved providers' HH compliance in an ICU. There were significant variations among individual providers.

Comparison of droplet spread in standard and laminar flow operating theatres: SPRAY study group**Richard Newsom***University of Portsmouth, Germany*

Reducing of COVID-19 transmission relies on controlling droplet and aerosol spread. Fluorescein staining reveals microscopic droplets. We used this technique to compare the droplet spread in a standard theatre (ST) and a laminar air flow theatre (LAF). We used a 'cough-generator' fixed to a theatre trolley at 45-degrees. Fluorescein stained 'secretions' were projected onto a series of calibrated targets. These were photographed under UV light and a 'source detection' software measured droplet splatter size and distance. The smallest droplet detected was 120 µm and the largest 24,000 µm. We detected an average of 25,862 spots in the ST, compared with 11,430 in the LAF (54% reduction). The LAF mainly affected the smaller droplets (<1000 microns). The surface area covered with droplets was: 6% at 50 cm, 1% at 2 m and 0.5% at 3 m in the ST; and 3%, 0.5% and 0.2% in the LAF respectively. Accurate mapping droplet spread in clinical environments is possible using fluorescein staining and image analysis. The laminar flow affected the smaller droplets but had limited effect on larger droplets in our AGP cough model.

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The relevant automated biocide concentration monitor**Shokouh S Farvid***Advanced Sterilization Products (ASP), USA*

Endoscope reprocessing guidelines recommend a testing concentration of biocides for every cycle. Despite the advancements in technology, operators of Automated Endoscope Reprocessors (AERs) are still required to test biocide concentration manually often using test strips. Manual testing biocide concentration increases the risk of staff exposure to biocides as well as increasing the chance of inaccurate reading due to human errors or subjective interpretation. Due to the rapid rise in the number of endoscopy reprocessing, endoscopy centers are leveraging automation to minimize inefficient processes. Automated biocide concentration monitors use chemistry and colorimetry techniques to provide an accurate reading of biocides concentration for every cycle. Compared to manual testing, the novel automated systems improve the efficiency of reprocessing endoscopes and enhance compliance, consistency, and reliability.

Prolonged maternal Zika viremia as a marker of adverse perinatal outcomes**Leo Pomar***Lausanne University Hospital, Switzerland*

There is ongoing controversy as to whether prolonged maternal viremia after Zika infection represents a risk factor for maternal-fetal transmission and subsequent adverse outcomes. In this prospective cohort study, we enrolled ZIKV-infected pregnant women with a positive polymerase chain-reaction at inclusion, and non-infected pregnant women tested by serology in each trimester and at delivery from January to July 2016. Prolonged viremia was defined as ongoing virus detection at least 30 days post infection. Adverse outcomes (fetal loss or neurologic anomalies) were more common in fetuses and neonates from mothers with prolonged viremia (6/15; 40.0%) compared to those from infected mothers without prolonged viremia (1/19; 5.3%, adjusted Relative Risk (aRR) 7.2 [95%CI 0.9-57.6]) or those from non-infected mothers (20/332; 6.6%, aRR 6.7 [95%CI 3.0-15.1]), respectively. Congenital infections were confirmed more often in fetuses and neonates from mothers with prolonged viremia compared to others (60% vs 26.3% vs 0.0%): aRR 2.3 [95%CI 0.9-5.5].

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How to control infection in spine surgery**Sherwan A Hamawandi***Hawler Medical University, Iraq*

Infection after spine surgery represents the most common complication after spine surgery with incidence of 1-4 %. This complication has great impact on morbidity and mortality after spine surgery as well as increasing cost. Surgical site infections can be classified into superficial and deep as well as can be classified as early (within 3 weeks of surgery), late (more than 04 weeks after surgery) and latent (years after surgery). The most common microorganism in infection after spine surgery is staphylococcus aureus. Risk factors for surgical site infection after spine surgery can be categorized into patient's related factors (as age, medical comorbidities, steroid use), surgical related factors (as type of surgery, duration of surgery and blood loss) and post-operative hospital stay. Prevention can be achieved by preoperative, intraoperative and postoperative measures. Preoperative measures involved those risk factors that can be modified as smoking cessation, control of blood sugar, decrease weight, nutritional support, MRSA decolonization, addressing other site of infection, preoperative antiseptic showers and antiseptic dressing, preoperative antibiotics, and preoperative warming. Intraoperative measures involved skin antisepsis, surgical hand antisepsis, intraoperative normothermia and oxygenation, double gloving, topical vancomycin powder, Betadine or saline irrigation, C-arm contamination, antibiotic-impregnated sutures, release of retractors during procedure, debridement of necrotic tissue at end of the procedure, hemostasis, decrease duration of the procedure, decrease blood loss, meticulous dissection and closure, closed suction drains, and staff awareness training. Postoperative measures involved silver impregnated dressing, closed incision negative pressure wound therapy, dressing change, postoperative antibiotics, and drainage duration.

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