In Collaboration with the University of Manitoba
the Health Sciences Centre Winnipeg presents

THE 28th ANNUAL BUG DAY Abstracts

Health Sciences Centre Winnipeg
A Shared Health facility

Overall Program Objectives:

By attending this program, the attendee will be able to:

1. State the names of the key pathogens that have been clinically and socially relevant over the past 27 years.
2. State how the determinants of health influence a person's risk for infection
3. State how to modify risk factors for the acquisition of infection

Thursday, October 17, 2024

Join us digitally by registering before Oct 16, 2024
at: **www.hsc.mb.ca/Bugday.html**

Bug Day Agenda

0800 - 0805	**Land Acknowledgment** Lanette Siragusa, RN, Shared Health
0805 - 0815	**Introduction to Bug Day** John Embil, MD, Winnipeg Regional Health Authority
0815 - 0830	**Complex Battlefield Wound Infections – Lessons Learned from Afghanistan:** Tony Battad, MD, University of Manitoba
0830 - 0845	**Refugee Health: Infectious Disease, Disparities, Challenges, and Opportunities** Christina Greenaway, MD, McGill University
0845 - 0900	***Helicobacter pylori:* The Clinical Story in 2024** Charles Bernstein, MD, University of Manitoba and David Alexander, PhD, Shared Health
0900 - 0915	**Questions and Answers**
0915 - 0930	**Phage Therapy: Ready for Prime Time, or Wishful Thinking?** Greg German, MD, University of Toronto
0930 - 0945	**SARS-CoV-2 Transmission: One if by Air, Two if by Hand – 1978 Revisited** John Conly, MD, University of Calgary
0945 - 1000	**Facilities Management Strategies for Preventing the Transmission of Pathogens: Lessons Learned from the COVID-19 Pandemic** Craig Doerksen, PEng., Shared Health
1000 - 1015	**Questions and Answers**
1015 - 1030	**Break**
1030 - 1045	**Canadian Nosocomial Infection Surveillance Program (CNISP): Canada's Infection Surveillance Program Celebrates 30 Years** Lindsay Nicolle, MD, University of Manitoba and Cassandra Lybeck, MSc, Public Health Agency of Canada
1045 - 1100	**Canadian Nosocomial Infection Surveillance Program (CNISP):State of the Nation** George Golding, PhD, Public Health Agency of Canada
1100 - 1115	**Canadian Nosocomial Infection Surveillance Program (CNISP): *Candida auris* in Canada 2012-2023** Amrita Bharat, PhD, Erin McGill, MSc and Robyn Mitchell, MHSc, Public Health Agency of Canada
1115 - 1130	**Questions and Answers**
1130 - 1200	**Lunch**
1200 - 1300	**Medical Grand Rounds: Pathogens Forgotten but Not Gone: Reviving and Maintaining Interest in Important Microorganisms** Carl Boodman, MD, University of Manitoba
1300 - 1315	**Lessons Learned from a Daycare Centre Foodborne Outbreak** Laura McDougall, MD, Alberta Health Services
1315 - 1330	**Foodborne Disease Outbreaks – Successes and Challenges: 20 Years of PulseNet Canada** Celine Nadon, PhD, Public Health Agency of Canada
1330 - 1345	**Invasive Group A Streptococcus Disease: Cross Canada Checkup** Jared Bullard, MD, Public Health Agency of Canada
1345 - 1400	**Questions and Answers**
1400 - 1415	**The Global Impact of Viral Hemorrhagic Fever Viruses** Heinz Feldmann, MD, National Institute of Allergy and Infectious Diseases
1415 - 1430	**Respiratory Syncytial Virus (RSV) Vaccination: Another Weapon in our Armamentarium?** Davinder Singh, MD, Manitoba Health, Seniors and Long-Term Care
1430 - 1445	**Immunize Yourself from Cyber Threats with this Vaccine** Sean Shore, LLM,Canadian Compliance & Regulatory Law
1445 - 1500	**Questions and Answers**
1500 - 1515	**Break**
1515 - 1530	***Strongyloides stercoralis:* An Important but Unseen Parasite** Paul Van Caeseele, MD, Shared Health
1530 - 1545	**Dengue and Chikungunya Vaccines: Ready for Prime Time** Philippe Lagacé-Wiens, MD, Shared Health
1545 - 1600	**Rabies and Rabies Vaccinations: Less is Way More!** Pierre Plourde, MD, Winnipeg Regional Health Authority
1600 - 1615	**Questions and Answers**

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Complex Battlefield Wound Infections – Lessons Learned from Afghanistan

Anthony Battad MD
Department of Internal Medicine, Max Rady College of Medicine, University of Manitoba

Abstract:
Battlefield wound infections represent a significant challenge in military medicine, directly impacting morbidity, mortality, and the overall outcome of combat trauma care. These infections arise in the harsh, unsterile conditions typical of combat environments, where wounds are often contaminated with foreign material and aggressive, multidrug-resistant organisms. The nature of battlefield injuries, including high-velocity bullet wounds, blast injuries, and shrapnel lacerations, creates complex, devitalized tissues that are particularly susceptible to infection.

The management of such infections involves prompt and effective wound debridement, timely antibiotic administration, and, when necessary, damage control surgery. The choice of antibiotics is critical and must be guided by an understanding of the most prevalent pathogens in the specific conflict region, as well as emerging resistance patterns. Recent advancements in antimicrobial stewardship, rapid diagnostic technologies, and wound care techniques, including negative pressure wound therapy, have contributed to improved outcomes.

Moreover, the development and implementation of infection prevention protocols, vaccination strategies, and the use of prophylactic antibiotics are key components in reducing the incidence of battlefield wound infections. Research into novel antimicrobial agents, including bacteriophage therapy and antimicrobial peptides, holds promise for future interventions. Effective management of battlefield wound infections requires a multidisciplinary approach, integrating surgical, antimicrobial, and supportive therapies to optimize healing and prevent complications.

Objectives
By attending this session, the attendee will be able to:

1. Become familiar with the unique nature of battlefield wound infections.
2. Know how to care for the returning soldier with a complex battlefield wound.
3. Describe the treatments for battlefield wound infections and how these may differ from conventional wound care.

Multiple Choice Questions (Select the best answer)

1. What is unique about battlefield wounds?
   a. They occur in unusual places.
   b. The wounds are complex.
   c. Field care can complicate wounds.
   d. All of the above

2. Why are blast and shrapnel injuries so susceptible to complex infections?
   a. The wounds are typically infected with contaminated foreign bodies.
   b. They are difficult to treat in the field.
   c. There are no established empiric antibiotics for these injuries.
   d. It is not important to cover these wounds with empiric antibiotics as they rarely get infected.

3. When caring for patients that have sustained a battlefield injury, what is the most important aspect of their wound care?
   a. Vigilance for worsening infection.
   b. Appropriate early surgical intervention.
   c. Diligent wound care and adjustment of anti-microbial therapy.
   d. All of the above

Refugee Health: Infectious Disease Disparities, Challenges and Opportunities

Christina Greenaway, MD
Division of Infectious Diseases, Jewish General Hospital, McGill University

Abstract:
International migration is a global phenomenon that is growing in scope, complexity and impact. Forced migration is at the highest recorded number since World War II, driven by growing global inequities, escalating human conflicts and natural disasters. The majority of refugees arriving in high income countries originate from countries with a high prevalence of infectious diseases such tuberculosis, viral hepatitis, and parasitic infections. A complex interaction of factors lead to the burden of infectious diseases and associated poor health outcomes among refugees. The most important drivers are the epidemiology of infectious diseases in their countries of origin, the circumstances and conditions of the migration journey and post arrival barriers accessing health care. These barriers at the patient, provider and health system level lead to delayed diagnosis and treatment of several infectious diseases and associated health disparities. Tailored health promotion and screening approaches and accessible and responsive health systems, regardless of legal status, will be needed to limit the burden and transmission of infectious diseases among the refugee population.

Objectives
By attending this session, the attendee will be able to:

1. Review trends in voluntary and forced migration globally and in Canada
2. Describe the burden of various infectious diseases among refugees
3. Understand the patient, provider and health systems barriers to accessing health care among refugees and best practices of how best to deliver culturally adapted care

Multiple Choice Questions (Select the best answer)

1. How many forced migrants were there globally in 2023?
   a. 50-75 million
   b. 75-100 million
   c. 100-150 million
   d. >150 million

2. Prior to arrival in Canada all refugees undergo a medical exam. What test is not mandatory on this exam?
   a. HIV
   b. CXR
   c. Syphilis serology
   d. Hepatitis C serology

3. What infectious disease has the highest burden of cases among migrants in Canada
   a. Active tuberculosis
   b. Hepatitis B
   c. Chagas Disease
   d. HIV

Helicobacter pylori: The Clinical Story in 2024

Charles Bernstein[1], MD and David Alexander[2], PhD
Section of Gastroenterology, Department of Internal Medicine, Max Rady College of Medicine
University of Manitoba[1] and Cadham Provincial Laboratory[2]

Abstract:
Helicobacter pylori remains an important pathogen worldwide. It is still the most common cause of peptic ulcer disease worldwide and bleeding peptic ulcers can sometimes be fatal. It is an important cause of gastric cancer. Even though gastric cancer is much less common a solid tumor than other organ tumors like lung, colon, or breast, gastric cancer can be prevented if *H. pylori* is diagnosed and eradicated in susceptible populations (ie the Chinese who have among the highest rates worldwide). In Canada, immigrants and Indigenous populations still make up the greatest disease burden of *H. pylori*. Endoscopists should take the opportunity to biopsy the stomach of high risk patients undergoing gastroscopy and treat *H. pylori* when it is found. In every patient with a peptic ulcer, gastric biopsies are mandatory whether they are high risk for *H. pylori* infection or not. Hence, if a patient is a non-steroidal anti-inflammatory agents (NSAID) user and presents with a peptic ulcer, gastric biopsies are warranted to assess for *H. pylori.* The prevalence rates may have fallen in the developed world owing to a higher socioeconomic standards not better treatment. Our treatment paradigms have not changed much in the past 25 years even though antibiotic resistance rates have risen. Clarithromycin resistance rates are so high in North America that it is recommended against using any clarithromycin based triple therapy regimen. The optimal clarithromycin-based regimen is combined with two other drugs such as amoxicillin and metronidazole as well as a PPI. The other favored regimen remains proton pump inhibitor (PPI), bismuth, tetracycline (or amoxicillin) and metronidazole. Eradication regimens are recommended to be 14 days in North America and western Europe although 7 day regimens may still be advised where resistance rates are low (ie Australia, Africa). It is a major clinical gap that antibiotic resistance testing has not been developed and offered in the management of *H. pylori* infections over the last 20 years.

Objectives:
By attending this session, the attendee will be able to:
1. State the rates of *H. pylori* infection around the world
2. State the rates of antibiotic resistance for *H. Pylori*
3. State the best antibiotic combinations to eradicate *H. pyori*

Multiple Choice Questions (select the best answer)
1. Which statement is true?
   a. *H. pylori* infections are falling worldwide
   b. Clarithromycin resistance rates in treatment of H pylori are falling in North America
   c. It is recommended that treatment regimens in North America are 14 days
   d. In Canada and the US triple therapies encapsulated in one pill are available which may enhance adherence?

2. Which statement is true:
   a. Endoscopic gastric biopsies for diagnosis of *H. pylori* are inferior to urea breath testing
   b. Urea breath testing should be done 2 weeks after eradication to optimize sensitivity of test
   c. *H. pylori* serology testing is specific but not sensitive d. PCR for *H. pylori* could provide on the spot testing as well as mutations for antibiotic resistance
   d. PCR for *H. pylori* could provide on the spot testing as well as mutations for antibiotic resistance

Phage Therapy: Ready for Prime Time or Wishful Thinking?

Greg German, MD
Section of Infectious Diseases, Department of Medicine, University of Toronto

Abstract:
The use of viruses otherwise known as phages have targeted bacteria in clinical care for over 100 years. Prior to the antibiotic era, major pharmaceutical companies and academia produced and utilized phage therapy. This Antibiotic era is ending in Canada due to lack of effectiveness and market forces. Phage Therapy has not yet had large randomized control trials on personalized phage therapy cocktails but cases series and systematic reviews place effectiveness at 80%. Phages are used with or without antibiotics and uniquely are able to target biofilms and produce more phages at the source where necessary while offending bacteria are present. Their reported safety profile in previous cases as more recently with the use of IV formulations in multiple countries has been impressive. The debate continues on how to regulate phage therapy from a drug to a food additive. There is also combatting manufacturing perspectives with either personalized compounding therapy (favoured in Belgium for instance) versus good manufacturing practices used for making antibiotics at scale. Systematic reviews, Global Clinical Case discussions, and RCTs are underway to determine if Phage Therapy should be on the main stage with Antibiotics and Vaccines for management of infectious diseases.

Objectives:
By attending this session, the attendee will be able to:

1. Sketch the phage therapeutics landscape in Canada and Globally
2. Discuss the hurdles to providing phage therapy in Canada and Globally
3. Explore the steps occurring within and outside of Canada to improve research and funding on Phage Therapy.

Multiple Choice Questions (Select the best answer)

1. Phage therapy has been established in the following European countries as over the counter?
   a. Belgian and France
   b. Poland and Georgia
   c. Georgia and Germany
   d. Italy and Spain

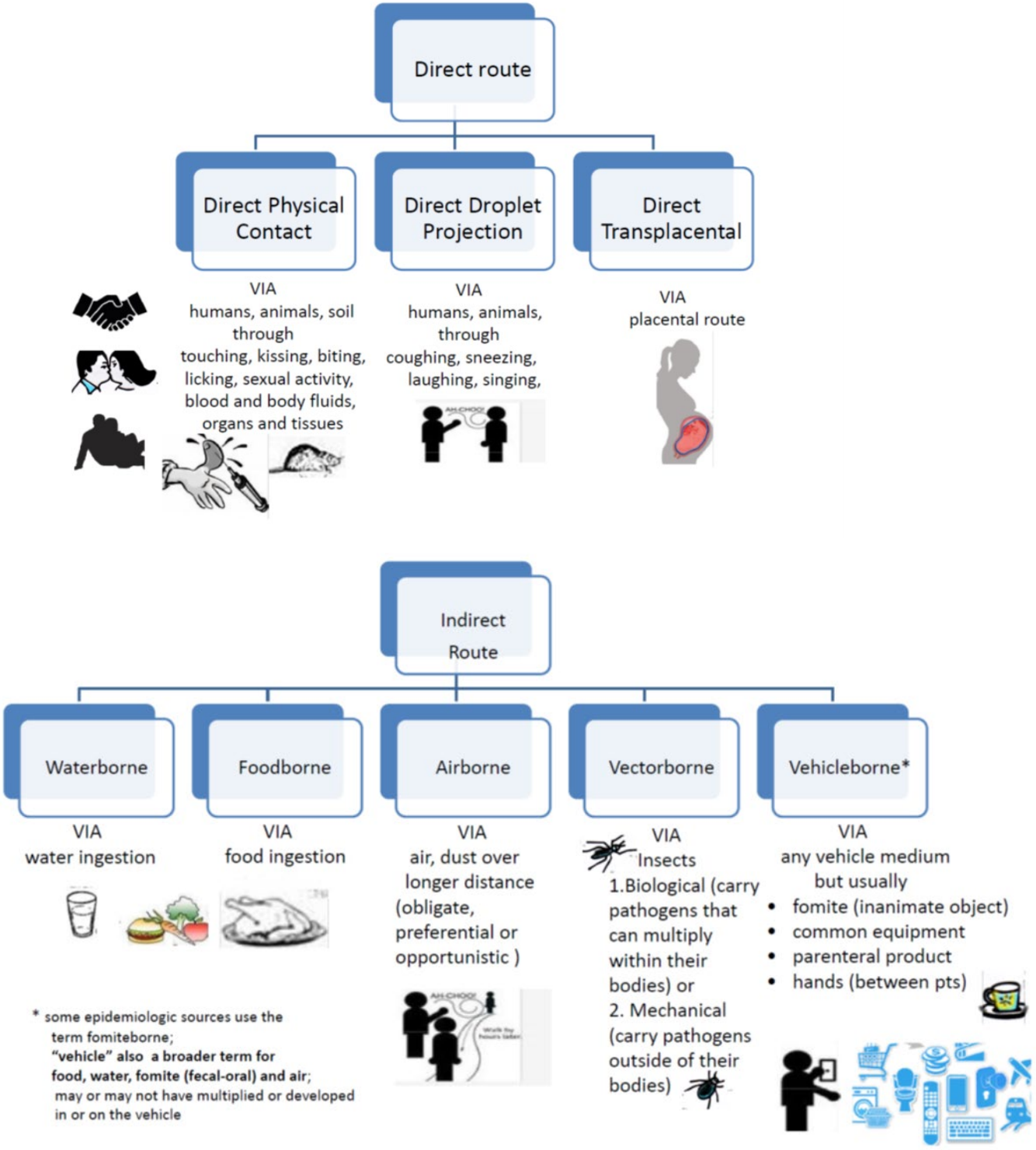
2. Phage therapy show promise in stopping all of the following infections but:
   a. Antibiotic resistant infections
   b. Prosthetic/hardware infections
   c. Meningitis
   d. Yeast infections
   e. a & b
   f. All of the above

3. What “byproduct” of phage production needs to be addressed for phages that target E.coli and other gram negatives?
   a. Endotoxin
   b. Peptidoglycan
   c. Exotoxin
   d. Teichoic acid
   e. Mycolic acid

SARS-CoV-2 Transmission: One if by Air, Two if by Hand - 1978 Revisited

John Conly MD DSc(Hon)
Section of Infectious Diseases, Department of Medicine, University of Calgary

Abstract:
Modes of transmission (MoT) of infectious microbes have been defined epidemiologically for decades, with the basic classification consisting of direct (direct reservoir-to-host) and indirect (reservoir-to-intermediary-to-host) with the various routes further defined diagrammatically below.



The isolation of several of the common cold viruses (rhinovirus and coronavirus family) in the late 1950s/1960s led to seminal human challenge experiments with these viruses in the Common Cold Unit in the UK and sites in the US. Despite providing high quality evidence on the minimal infectious dose, sites of invasion, and demonstrating multiple MoT were in play with determination of their relative frequency (viral transfer hand-to-hand, hand-to-fomite, fomite-to-hand, hand-to-mucosal surface, direct droplet projection, and airborne) through rigourous experimentation, the findings were largely forgotten with the current pandemic. The 1978 Gwaltney and Hendley article (Am J Epidemiology) “Rhinovirus Transmission: One if by Air; Two if by Hand” is worth revisiting in this context. The decades-old human challenge experiments (finger-to-nose, fomites, droplet projection, talking/laughing/singing, aerosolization) resonate with what we hear today with SARS-CoV-2. Current evidence supports direct (physical contact, droplet projection and transplacental) and indirect (vehicleborne, fomite and airborne) routes of transmission of SARS-CoV-2. A major research gap is the relative frequency of one or more MoT(s) and their interplay based on proximity, situational settings and circumstances, which remain to be elucidated.

Objectives:
By attending this session, the attendee will be able to:

1. Review classic modes of transmission of infectious organisms
2. Discuss modes of transmission for SARS-CoV-2 in the context of the hierarchy of high quality evidence
3. Outline research gaps in modes of transmission of human respiratory viruses

Multiple Choice Questions (select the best answer)

1. Modes of transmission of SARS-CoV-2 include which of the following:
   a. physical contact such as kissing, biting and hands with infected persons
   b. transplacental
   c. direct droplet projection through coughing and sneezing
   d. opportunistic airborne
   e. all of the above

2. Cornerstones of IPC practice that have been recognized and re-emphasized since the COVID-19 pandemic include which of the following:
   a. point-of-care risk assessment for each patient encounter
   b. the use of N95 respirators for all encounters with any patients known or suspected to be infected with any respiratory virus
   c. hand hygiene
   d. a and b
   e. a and c

3. In the hierarchy of evidence, which of the following are considered to be of highest quality?
   a. systematic reviews of randomized controlled trials
   b. mechanistic studies
   c. human challenge studies
   d. a and c
   e. all of the above

Reference:

Gwaltney JM Jr, Hendley JO. Rhinovirus transmission: one if by air, two if by hand. Am J Epidemiol. 1978 May;107(5):357-61. doi: 10.1093/oxfordjournals.aje.a112555. PMID: 208415.

Facilities Management Strategies for Preventing the Transmission of Pathogens: Lessons Learned from the COVID-19 Pandemic

Craig Doerksen, PEng
Shared Health Capital and Facilities Management

Abstract:
Engineering and the medical field intersect regularly. Particularly when we look at the transmission of infection which occur through multiple pathways or vectors as an engineer might say. The usual for engineers is to assess these vectors to see how they can be broken, intercepted and redirected or the impact lessened. Focusing on the engineering and design of buildings we essentially come to three elements: clean environments, physical separation and airborne environments. Clean environment really means disinfected environments which will be left for other presenters.

The focus is "what did we learn from our lived experience around physical separation and airborne in healthcare. Healthcare spaces in Canada, and in particular in Manitoba, do not provide physical separations to support infection control and many have ventilation systems which do not meet current standards. While there are a few new Manitoba facilities meeting standards, the vast majority pre-date current standards for private patient spaces, separation of soiled waste handling, accessible dedicated handwashing and proper ventilation rates, air direction and in some cases airborne separation. The need for airborne separation for new and old infectious diseases continues to be a hotly debated matter. So what did our experiences show? What can we apply from this experience or lesson? And how will this direct our future focus for renovation, new construction priorities and engineering design standards.

Objectives
By attending this session, the attendee will be able to:

1. Understand the principles we employ for transmission prevention
2. Assess the engineering controls used to implement those principles
3. Assess the lived experience

Multiple Choice Questions (Select the best answer)

1. Why should an engineering control be considered versus PPE?
   a. PPE is awkward to use and wear and in the long term is costly.
   b. An engineered control solves a problem 100% of the time.
   c. Engineering controls reduce or prevent hazards from coming into contact with workers making a safer workplace all the time.
   d. PPE are more environmentally harmful than engineered controls.

2. How does the physical separation directly affect transmission?
   a. Without direct contact, pathogens are either carried by droplets which fallout within one or two meters, or as aerosols which disperse in the air beyond that.
   b. Pathogens are limited to 30 cm of travel so any further away you don't have to worry at all.
   c. Sneezes only generate droplets, so sneezing in your sleeve guarantee's you don't transmit a pathogen.
   d. Other than direct contact, there is no evidence of airborne transmission of any pathogens.

3. What are the variables to airborne engineering control?
   a. The distance between the source of the hazard and the person affects distribution.
   b. The temperature and humidity in the air can affect the rate at which a pathogen dries out and dies.
   c. The slower the speed of airflow the more pathogens it carries.
   d. a. & b.
   e. a, b, & c.

Canadian Nosocomial Surveillance Program (CNISP): Canada's Infection Surveillance Program Celebrates 30 Years

Lindsay Nicolle, MD[1], Cassandra Lybeck, MSc[2]
Max Rady College of Medicine, University of Manitoba[1], Public Health Agency of Canada[2]

Abstract:
The Canadian Nosocomial Infection Surveillance Program (CNISP) is a collaboration between the Public Health Agency of Canada (PHAC), the Association of Medical Microbiology and Infectious Disease (AMMI) Canada and 106 sentinel hospitals across Canada. CNISP conducts prospective surveillance of healthcare-associated infections (HAIs) and antimicrobial resistant organisms (AROs) important to hospital infection prevention and control. CNISP integrates demographic and clinical data abstracted from patient charts with molecular and microbiological data obtained through laboratory testing. CNISP summarizes trends in national incidence rates, antimicrobial resistance (AMR) and molecular characterization to inform evidence-based policies and control measures against AMR. In addition to monitoring HAIs and AROs, CNISP also collects and analyzes data on antimicrobial use (AMU), infection prevention and control practices, laboratory practices, viral respiratory illnesses (VRI) including COVID-19, and emerging threats such as Candida auris. CNISP has expanded to include the Simplified Dataset, which will capture aggregate AMR data from hospitals outside of the CNISP network, and has conducted a feasibility study to examine HAI surveillance in long-term care facilities. This session aims to inform participants about the scope of CNISP hospital-based surveillance.

Objectives
By attending this session, the attendee will be able to:
1. Describe CNISP
2. Understand the objectives of CNISP
3. Describe the future plans CNISP has to monitor HAI/ARO/VRI/AMU

Multiple Choice Questions (Select the best answer)
1. CNISP conducts surveillance across a representative sample of acute-care hospitals in Canada. Approximately what percentage of all Canadian acute-care hospitals does CNISP capture?
   a. 10%
   b. 15%
   c. 40%
   d. 90%

2. CNISP is a collaboration between different parties. Choose the one that is NOT part of the CNISP collaboration.
   a. National Microbiology Lab (NML)
   b. Association of Medical Microbiology and Infectious Disease (AMMI) Canada
   c. National Healthcare Safety Network (NHSN)
   d. Sentinel hospitals across Canada

3. CNISP has launched new surveillance projects. Choose the one that is NOT one of the planned initiatives
   a. Standard dataset collecting HAI/ARO surveillance data
   b. Point prevalence survey
   c. Long-term care surveillance
   d. Antimicrobial usage surveillance

Canadian Nosocomial Infection Surveillance Program (CNISP): State of the Nation

George Golding, PhD
Public Health Agency of Canada

Abstract:
The Canadian Nosocomial Infection Surveillance Program (CNISP) is an active sentinel surveillance network of 106 sentinel hospitals that integrates information from epidemiological, laboratory (NML), and pharmaceutical sources. The objectives of this presentation are to provide updates on the national surveillance of select top priority antimicrobial resistant organisms (AROs) in CNISP, including rates of infection, antimicrobial resistance, and the molecular characterization. For CNISP this includes surveillance of methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *Enterococcus spp* (VRE), *Clostridioides difficile*, carbapenemase producing organisms (CPOs), and most recently Candida auris. Over the years there have been many changes in the molecular epidemiology of strain types across Canada, which might be contributing to the success (e.g. fitness, virulence, multi-drug resistance) and dissemination of these antimicrobial resistant (AMR) pathogens. Recent advancements and adoption of whole-genome sequencing (WGS) in CNISP should advance our knowledge on the evolution and transmission of these AMR pathogens and contribute to infection prevention and control.

Objectives
By attending this session, the attendee will be able to:

1. The epidemiology of select AMR pathogens in Canada
2. The trends in antimicrobial susceptibility patterns of select AMR pathogens
3. The utility of WGS in surveillance and outbreak investigations?

Multiple Choice Questions (Select the best answer)

1. Which AMR pathogen is causing the highest rates of healthcare-associated infections in CNISP hospitals?
   a. *C. difficile*
   b. MRSA
   c. VRE
   d. CPOs

2. Which typing method provides the highest discriminatory power?
   a. Multi-locus sequence typing (MLST)
   b. Pulsed-field gel electrophoresis
   c. Core-genome MLST
   d. Single nucleotide variant analysis (SNV)

3. Overtime, resistance to fluoroquinolones in *C. difficile* isolates have
   a. Increased
   b. Decreased
   c. Stayed the same

Canadian Nosocomial Infection Surveillance Program (CNISP):
***Candida auris* in Canada 2012-2023**

Amrita Bharat, PhD, Erin McGill, MSc, Robyn Mitchell, MHSc
Public Health Agency of Canada

Abstract:
Candida auris is an emerging fungal pathogen that is associated with antifungal resistance and healthcare-associated outbreaks. Starting in 2017, Canadian provincial public health laboratories forward all known and retrospective *C. auris* isolates to the Public Health Agency of Canada for whole genome sequencing (WGS). Fifty-two isolates of *C. auris* from 53 cases were identified from 2012 –2023. For the subset of cases that were also identified through the Canadian Nosocomial Infection Surveillance Program (CNISP, n=12), enhanced epidemiological and patient data were collected.

Of the 17 cases with known travel status, 13 (76%) reported international travel and receipt of healthcare in India (n=5), the United States (n=5), South Africa (n=1), Greece (n=1) or Hong Kong (n=1) while four cases reported no travel. One third of cases were multidrug resistant (resistant to fluconazole and amphotericin B). WGS was useful for outbreak investigations of *C. auris* by demonstrating genetic linkage of isolates with known epidemiological links. In 2024, CNISP aims to complete a survey of hospitals in order to identify improvements and gaps in practices and preparedness for *C. auris*. Given the rapid emergence of *C. auris* in the neighboring United States, there is a window of opportunity to prepare for a potentially similar emergence in Canada.

Objectives
By attending this session, the attendee will be able to:
1. Understand the epidemiology of *C. auris* cases in Canada
2. Understand the antifungal susceptibility patterns of isolates
3. Understand the utility of WGS for outbreak investigations

Multiple Choice Questions (Select the best answer)
1. Approximately how many cases of infection and colonization did the United States report in 2022?
   a. 300
   b. 900
   c. 8000

2. From 2012-2023, Canadian cases of *C. auris* who indicated travel reported:
   a. Receipt of healthcare in Asia and Africa
   b. Receipt of healthcare in the United States, Asia, Africa and Europe
   c. Primarily reported travel without receipt of healthcare

3. From 2012-2023, multidrug resistant (MDR) *C.auris* were resistant to which types of antifungals?
   a. Fluconazole and amphotericin B
   b. Fluconazole and echinocandins
   c. Echinocandins and amphotericin B

Medical Grand Rounds: Pathogens Forgotten but Not Gone:
Reviving and Maintaining Interest in Important Microorganisms

Carl Boodman, MD
Section of Infectious Diseases, Department of Medicine, University of Manitoba

Abstract:
In this presentation, we will discuss neglected infections/ infestations linked to poverty: *Bartonella quintana* (the louse-borne bacterial cause of trench fever, culture-negative endocarditis, bacillary angiomatosis and chronic bacteremia) and its predominant vector, the human body louse (causing pediculosis corporis). The first description of human disease due to *B. quintana* was reported in 1915 among World War I soldiers, causing a million cases of febrile illness historically known as trench fever. Infection with *B. quintana* is associated with inadequate access to running water and suitable housing with contemporary outbreaks among people experiencing homelessness, refugees from low and middle-income countries and people living in remote indigenous communities. *B. quintana* endocarditis has a global distribution, an elevated mortality (10%) and long delays between symptom onset and diagnosis frequently occur. *B. quintana* endocarditis often presents with heart failure or embolization and only a minority of cases are associated with fever. Recently, clusters of donor-derived *B. quintana* infection have occurred among transplant recipients in Canada and the USA. Body louse infestation (pediculosis corporis) is a global ectoparasite infestation that remains under-diagnosed and may also transmit epidemic typhus (*Rickettsia prowazekii*) and louse-borne relapsing fever (*Borrelia recurrentis*).

Objectives
By attending this session, the attendee will be able to:
1. Describe the different clinical manifestations of *Bartonella quintana*.
2. Describe key populations at elevated risk for body lice infestation and diseases transmitted by body lice.
3. Describe ways of preventing body lice infestation and *Bartonella quintana* disease

Multiple Choice Questions (Select the best answer)
1. Which manifestation of *Bartonella quintana* is associated with the greatest mortality*?*
   a. Bacillary angiomatosis
   b. Peliosis hepatis
   c. Culture-negative infective endocarditis
   d. Trench fever

2. Which of the following statements about *B. quintana* is false?
   a. The majority of cases of *B. quintana* endocarditis present with fever
   b. Most cases of *B. quintana* endocarditis present with heart failure or embolization
   c. *B. quintana* infection may mimic a stroke
   d. Head lice may transmit *B. quintana* in specific socio-economic contexts

3. Which of the following diseases may also be transmitted by body lice.
   a. Epidemic typhus and relapsing fever
   b. Carrion's disease
   c. Leishmaniasis
   d. Dengue

Lessons Learned from a Daycare Centre Foodborne Outbreak

Laura McDougall, MD
Alberta Health Services

Abstract:
On September 4th, 2023, an outbreak of illness caused by a Shiga toxin-producing *Escherichia coli* (STEC) was declared in Calgary, Alberta, affecting multiple childcare facilities and a central kitchen. A total of 448 people were diagnosed, of whom 359 were cases confirmed by polymerase chain reaction (PCR) and/or culture and 89 were probable. Of the confirmed cases, 326 (90.8%) attended or worked at a childcare facility served by the central kitchen or worked in the kitchen itself. Regarding severity, 38 children and one adult were hospitalized, 23 were diagnosed with hemolytic uremic syndrome, and eight received peritoneal dialysis. There were no deaths.

This presentation describes extensive immediate response measures that limited transmission, resulting in a ratio of primary to secondary cases of 11:1. The investigations undertaken to determine the source are explained, including two retrospective cohort studies that convincingly demonstrated the contaminated food item served for lunch on August 29th for children on a Regular Menu (beef meatloaf) and the meal served to children on a Special Menu (dairy free, gluten free, and vegan), despite the children being too young for reliable dietary recall. Activities to identify a link to genetically matched sporadic cases are also detailed, including some with a clear connection to uninspected beef.

Objectives
By attending this session, the attendee will be able to:

1. Explain the critical immediate steps for controlling transmission of STEC in a childcare facility outbreak
2. Describe the role of culture and PCR in managing STEC outbreaks
3. Outline the unique challenges and opportunities for source investigation in childcare settings

Multiple Choice Questions (Select the best answer)

1. The main reason for the large size of the Calgary STEC outbreak in childcare facilities was:
   a. Delayed notification of cases to Medical Officers of Health
   b. Food was provided by a central kitchen
   c. Inability to determine the source in a timely manner

2. Which of the following is true regarding Shiga toxin-producing *E. coli*:
   a. The infective dose is as low as 100 organisms
   b. Culture adds little value to PCR testing
   c. Organisms that produce Shiga toxin 1 are about as likely to cause severe outcomes as those that produce Shiga toxin 2

3. Retrospective cohort studies for foodborne illness in childcare facilities are especially challenging because:
   a. Parents tend to be uncooperative
   b. Leftover food samples are usually not available
   c. Children tend to be too young to reliably recall what they ate

Foodborne Disease Outbreak Successes and Challenge: 20 Years of PulseNet Canada

Celine Nadon, PhD
National Microbiology Laboratory, Public Health Agency of Canada

Abstract:
Romaine lettuce, pet snakes, cream puffs, kim chi, all purpose flour, cantaloupe, ground beef, salad kits, pet hedgehogs, frozen corn, water. What do these items all have in common? They have all been the cause of disease outbreaks! Foodborne disease outbreak detection and response in Canada and around the world has undergone monumental changes in the last twenty years. From the creation of the National Microbiology Laboratory's PulseNet Canada network in 2004, through the labyrinth of the molecular subtyping era, to the implementation of Canada's first pathogen genomic surveillance system, our ability to detect and respond to outbreaks has been revolutionized. This presentation will provide the compelling history of foodborne disease outbreaks in Canada, discuss new and emerging trends in foodborne disease, and provide insight into the challenges and opportunities we will face in the next 20 years.

Objectives
By attending this session, the attendee will be able to:

1. Describe the mechanisms by which Canadians are protected from foodborne illnesses and outbreaks
2. Understand the foundations of genomics-based surveillance
3. Identify new and emerging risks for major outbreaks

Multiple Choice Questions (Select the best answer)

1. What is the purpose of PulseNet Canada?
   a. To provide rapid foodborne disease outbreak detection and response all across Canada using genetic fingerprinting
   b. To provide training courses on pulsed-field gel electrophoresis
   c. To monitor pulse rates of laboratory workers

2. Why did Canada stick with PFGE, an older subtyping method, for as long as it did?
   a. Because we had the equipment anyway
   b. Because any change in method had to be implemented across the entire network at the same time, otherwise outbreak detection could not work; making such extensive changes in all provinces took time.
   c. Because that's what the US did

3. What is one trend in the causes of outbreaks that has emerged in recent years?
   a. Canadians are eating more raw meat than ever before
   b. Most outbreaks are now caused by non-meat food products or are zoonotic
   c. More outbreaks happen at local, community events?

Invasive Group A Streptococcus Disease: Cross Canada Checkup

Jared Bullard, MD
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Abstract:
Most people are aware of *Streptococcus pyogenes* also known as group A streptococcal (GAS) disease in the form of pharyngitis and the ubiquitous throat swabs offered at clinics throughout Manitoba. Sometimes, GAS can become invasive (iGAS), gaining access to tissues or organs resulting in severe disease. iGAS has been increasing across Canada in in Manitoba and has had significant morbidity and mortality associated with it, in particular in the children and young adults. This is a result of both the bacteria itself as well as the toxins it produces. Genomic analysis has allowed us to have more resolution and to follow as different strains become established in Canada. *Streptococcus pyogenes* are classified into more than 275 *emm* types. Typing is based on sequence analysis of part of the M Protein gene (*emm*). *emm* encodes the *emm* virulence protein found on the cell surface. During this talk we will discuss common clinical presentations of iGAS, the epidemiology over the past 10 years and how genomics can be used to direct clinical and public health actions.

Objectives
By attending this session, the attendee will be able to:

1. Describe common clinical presentations and pathophysiology of iGAS infections.
2. Review the evolving epidemiology of iGAS in Manitoba and Canada.
3. Discuss how genomic analysis has enhanced our understanding of iGAS transmission and pathogenesis.

Multiple Choice Questions (Select the best answer)

1. The MOST appropriate antibiotic for the treatment of *Streptococcus pyogenes* (Group A Streptococcus/GAS) is:
   a. Penicillin
   b. Vancomycin
   c. Piperacillin-tazobactam
   d. Clindamycin

2. GAS can be characterized to assist in public health investigations by all of the following EXCEPT:
   a. Toxin typing
   b. Multilocus sequence typing (MLST)
   c. Whole genome sequencing (WGS)
   d. Antibiotic susceptibility profiles

3. The most common *emm* type in children under the age of 15 years in Canada is:
   a. *emm*101
   b. *emm*49
   c. *emm1* (M1UK)
   d. *emm*12

The Global Impact of Viral Hemorrhagic Fever Viruses

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National Institutes of Health, Rocky Mountain Laboratories, Hamilton, Montana, USA

Abstract:
Infectious diseases of zoonotic origin are shaping today's infectious disease field more than ever. Despite better knowledge and success in the development of medical countermeasures, worldwide public health remains particularly vulnerable against emerging viruses that cross the species barrier into humans. As examples, emergence/re-emergence will be discussed for key pathogens that cause viral hemorrhagic fever syndromes. Linking comprehensive pathogen surveillance of arthropod/vector and reservoir populations with public health surveillance at the regional and international level will make an important contribution to human and animal health worldwide and the 'One World One Health' concept in general. Developing rapid diagnostics and strategically placing those capacities is a critical public health response element. Animal modeling is instrumental for studying pathogenesis and host responses to identify concepts for countermeasure development. Animal models are also crucial for the licensing pathway as efficacy testing of therapies and vaccines for many of these pathogens cannot be achieved in humans. Preparedness and response for zoonotic infectious diseases will remain a top priority for infectious disease research and public health.

Objectives
By attending this session, the attendee will be able to:

1. Discuss key factors in viral emergence/re-emergence
2. Highlight the importance of surveillance and diagnostics for the "One health" concept
3. Emphasize the role of preclinical work for public and animal health response capabilities

Multiple Choice Questions (Select the best answer)

1. Which pathogen is not associated with a viral hemorrhagic fever syndrome?
   a. Ebola virus
   b. Lassa virus
   c. Dengue virus
   d. SARS coronavirus 2

2. Bats are identified as the reservoir for:
   a. Human immunodeficiency virus
   b. Marburg virus
   c. Dengue virus
   d. All of the above

3. Which are important elements of public health response?
   a. Surveillance
   b. Diagnostics
   c. Case patient management
   d. Vaccines
   e. All of the above

RSV Vaccination: Another Weapon in our Armamentarium?

Davinder Singh, MD
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Abstract:
Respiratory syncytial virus (RSV) is the most common cause of bronchiolitis and pneumonia among infants and young children and causes significant morbidity and mortality among older adults. Until recently, the only option for prevention of severe disease caused by RSV was the monoclonal antibody palivizumab, used in infants at highest risk of severe disease. With the approval of new products (vaccine and monoclonal antibody) for the prevention of severe disease from RSV, there are new opportunities for prevention in young children and older adults. This presentation will review the burden of disease of RSV, the clinical data for new immunization products, and the National Advisory Committee on Immunization (NACI) recommendations for their use in adult and pediatric populations.

Objectives
By attending this session, the attendee will be able to:
1. Describe the burden of disease caused by RSV in Canada
2. Describe the clinical data for RSV immunization products licensed for use in Canada
3. Review the National Advisory Committee on Immunization recommendations for the use of RSV immunization for the prevention of severe RSV disease in adults and children

Multiple Choice Questions (Select the best answer)
1. Immunization strategies for the prevention of severe RSV disease in infants include:
   a. Passive immunization only
   b. Active immunization only
   c. Passive and active immunization
   d. Currently there are no immunization strategies

2. The optimal RSV immunization schedule for older adults is:
   a. Immunize every year
   b. Immunize every two years
   c. Immunize every three years
   d. The optimal strategy is not known

3. At this time, the most effective strategy to protect infants in the first 6 months from RSV appears to be:
   a. Passive immunization of the infants
   b. Active maternal immunization
   c. Passive immunization of infants and active maternal immunization
   d. Immunize older adults to reduce the prevalence of the virus

Immunize Yourself from Cyber Threats with this Vaccine

Sean Shore, LLM
Canadian Compliance & Regulatory Law

Abstract

Cyber security is a critical issue that impacts all organizations regardless of size, complexity or sector. This includes what we would traditionally consider "unlikely candidates" such as universities, charitable organizations and medical facilities. We can easily add to this list public utilities, government agencies and infrastructure operators.

The common thread among these entities is that they all possess or control something of perceived or real value in society. Information, currency, customer loyalty points, control over a critical service or product – each of these items, if disrupted, can create monetary loss, physical damage, personal injury in addition to the usual concerns relating to identity theft.

Highly publicized breaches at the University of Winnipeg, London Drugs, MGM Resorts and Marriott Hotels mask the true nature of this issue as breaches often go unreported. Today's threat actor will utilize numerous tools to exploit any possible vulnerability including phising/vishing campaigns, credential stuffing, artificial intelligence and other known social engineering fraud techniques.

Objectives

By attending this session, the attendee will be able to:

1. Identify current threats
2. Employ defensive strategies and best practices
3. Understand the importance of breach management
4. Evaluate whether cyber insurance is necessary and what it entails

Multiple Choice Questions: (Select the best answer)

1. Threat actors only target large, for-profit enterprises.
   a. True
   b. False
   c. What is a threat actor?

2. I'm a health care provider, I don't concern myself with cyber security risks as my technology department worries about this.
   a. I pay attention and complete all mandated training exercises
   b. My assistant completes all mandated training exercises for me
   c. Whenever I get emails or text messages with unknown links I click on them and then delete them as I'm very busy
   d. I insist on using my own personal device for all work-related matters and my own private information technology service (my oldest child) sets up all security features

3. What is credential stuffing?
   a. Isn't this like mailing out lots of holiday cards every December?
   b. Personal information stolen from one data breach is used on other services to attempt a log in
   c. The stuff I put in my turkey every October

Strongyloides stercoralis : An Important but Unseen Parasite

Paul Van Caeseele, MD
Cadham Provincial Laboratory, Shared Health

Abstract:
Strongyloides stercoralis is a parasitic nematode infection that is globally prevalent with a much greater presence in tropical and sub-tropical areas. The *Strongyloides* life cycle has some unique features that make it considerably more impactful in medicine than is seen with some other roundworms, particularly among the immunosuppressed. While there are a series of clinical presentations associated with *Strongyloides* infection, the most severe, hyperinfection syndrome, can be life threatening even though it may have been decades since acquisition. This talk will familiarize listeners with the principle clinical presentations, investigation and treatment of the three presentations of *Strongyloides* infection, and discuss some of the peculiarities of *Strongyloide*s in human health.

Objectives
By attending this session, the attendee will be able to:

1. Describe the unusual parts of *Strongyloides* biology that make it a risk to human health.
2. List and describe the different clinical manifestations of *Strongyloides* infection.
3. Describe appropriate investigations and treatments for patients with strongyloidiasis.

Multiple Choice Questions (Select the best answer)

1. The most important characteristic of *Strongyloides* that drives its significance in human disease is:
   a. Its environmental presence and impact on the food chain
   b. Its ability to cause an autoinfectious cycle
   c. Its likelihood to cause large outbreaks
   d. Its ability to evade detection

2. Alternative hosts that may uncommonly harbour and transmit *Strongyloides* to humans include:
   a. Dogs and cats
   b. Cattle and pigs
   c. Fish and reptiles
   d. Waterfowl and domestic fowl

3. Which of the following presentations would be appropriate to consider treatment with an antiparasitic agent?
   a. Stool positive for probable *Strongyloides* following a foot rash and Loeffler syndrome
   b. Chronic eosinophilia with positive *Strongyloides* serology
   c. Positive *Strongyloides* serology in a bone marrow transplant patient with abdominal pain
   d. All of the above

Dengue and Chikungunya Vaccines: Ready for Prime Time?

Philippe Lagacé-Wiens, MD
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Abstract:
Dengue virus and Chikungunya virus (CHKV) are common and potentially serious arbovirus infections transmitted by Aedes mosquitoes in tropical and subtropical environments. They represent a significant burden of diseases in both local populations and travelers to these areas. Dengue virus infection is potentially life-threatening and may result in shock and hemorrhage while Chikungunya virus may cause serious disease that, while not often leading to hospitalization, frequently results in a protracted post-infectious arthritis. Vaccination for both these viruses has been a priority for decades and successful trials suggest that vaccines may well be available soon to people at risk. During this presentation, we will review the evidence behind the newly approved Chikungunya and Dengue vaccine and the results of trials of new Dengue vaccines that may soon be approved. We will review the potential indications in travelers as well as indications in residents of endemic areas.

Objectives:
By attending this session, the attendee will be able to:

1. Know the type, effectiveness and primary side effects and precautions of chikungunya and dengue virus vaccines that are available or in late development.
2. Describe the indications for CHKV immunization in travelers.
3. Predict the indications for dengue vaccination once these vaccines become available.

Multiple Choice Questions (Select the best answer)

1. While not yet available in Canada, The Canadian Committee to Advise on Tropical Medicine and Travel (CATMAT) recommends the following individuals consider the quadrivalent live-attenuated Dengue vaccine (Qdenga™):
   a. All Residents of endemic areas.
   b. Travelers known to have had previous with Dengue infection visiting Dengue endemic countries.
   c. All children living in Dengue endemic areas
   d. All travelers going to Dengue endemic areas
   e. All travelers going to Dengue-endemic areas during an outbreak

2. The newly approved CHKV vaccine is
   a. A live attenuated virus vaccine
   b. A subunit vaccine
   c. An mRNA vaccine
   d. A recombinant subunit vaccine
   e. An adenovirus vector vaccine

3. The primary indication of CHKV vaccination in travelers is:
   a. All travelers to areas where a chikungunya virus is known to occur
   b. Travelers expected to go to rural or underdeveloped areas of CHKV endemic areas
   c. Immunosuppressed travelers to areas where a chikungunya virus is known to occur
   d. Travelers going to an area with an active outbreak
   e. CHKV vaccine is only indicated in individuals residing in an endemic area.

Rabies Vaccine: Less is More!

Pierre Plourde, MD
Winnipeg Regional Health Authority

Abstract
Rabies vaccines are safe and highly effective at preventing fatal infections, but in Canada are only approved for intramuscular use. Intradermal (ID) vaccine administration has been discussed as an effective alternative for pre-exposure rabies prophylaxis. The WRHA Travel Health Clinic has used an ID rabies vaccine pre-exposure schedule for over one decade. A recent retrospective cohort study assessed immediate and long-term (≥2 years) serological responses and boostability of ID rabies vaccine. Of 324 who met eligibility criteria for evaluation, neutralizing antibodies (a surrogate of seroprotection) were observed in 96% after primary immunization. 68 had serology results 1.8-2.5 years later, with seroprotection declining to 44%. However, 100% seroprotection was noted after one ID booster dose at ≥2 years. ID primary pre-exposure rabies vaccination demonstrated a strong serological response. While titres decline over time, the robust response after a single ID booster dose, suggests a strong memory response was maintained. ID rabies immunization can be used safely and is highly effective.

Objectives
By attending this session, the attendee will be able to:

1. Describe rabies immunization options and compare intramuscular with intradermal administration.
2. Describe the immunologic response of intradermal administration of rabies vaccine.
3. Advocate for the utility and potential cost-effectiveness of intradermal rabies immunization.

Multiple Choice Questions (Select the best answer)

1. The intradermal administration of rabies vaccine may be preferred over intramuscular administration because:
   a. It has a longer duration immune response
   b. It has a stronger immune response
   c. It has less side effects
   d. It is less expensive
   e. b and d

2. The intradermal administration of rabies vaccine is remarkable in that:
   a. It produces a long duration immune response lasting at least 2 years
   b. It produces a rapid immune response with neutralizing antibodies detectable within 14 days
   c. It produces a very strong memory (amnestic) booster dose response
   d. Only a and c are correct
   e. All of a, b and c are correct

3. A family of 5 presents to the travel health clinic for pre-travel assessment, wishing to receive rabies protection for everyone in the family. Which of the following would be the most cost effective?
   a. Administration of intradermal rabies vaccine to everyone
   b. Administration of intradermal rabies vaccine to the children and intramuscular rabies vaccine to the parents
   c. Administration of intramuscular rabies vaccine to everyone
   d. Administration of rabies immune globulin to everyone
   e. None of the above are approved in Canada

Answers to Multiple Choice Questions

1. **Complex Battlefield Wound Infections – Lessons Learned from Afghanistan**
    1. d
    2. a
    3. d

2. **Refugee Health: Infectious Disease Disparities, Challenges and Opportunities**
    1. c
    2. d
    3. b

3. ***Helicobacter pylori*: The Clinical Story in 2024**
    1. c
    2. d

4. **Phage Therapy: Ready for Prime Time or Wishful Thinking**
    1. b
    2. e
    3. a

5. **SARS-CoV-2 Transmission: One if by Air, Two if by Hand – 1978 Revisited**
    1. e
    2. e
    3. d (a also acceptable)

6. **Facilities Management Strategies for Preventing the Transmission of Pathogens: Lessons Learned from the COVID-19 Pandemic**
    1. c
    2 a
    3. d

7. **Canadian Nosocomial Infection Surveillance Program (CNISP): Canada's Infection Surveillance Program Celebrates 30 Years**
    1. c
    2. c
    3. d

8. **Canadian Nosocomial Infection Surveillance Program (CNISP): State of the Nation**
    1. a
    2. c
    3. b

9. **Canadian Nosocomial Infection Surveillance Program: Candida auris in Canada 2012-2023**
    1. c
    2. b
    3. a

10. **Medical Grand Rounds: Pathogens Forgotten but Not Gone: Reviving and Maintaining Interest in Important Microorganisms**
    1. c
    2. a
    3. a

11. Lessons Learned from a Daycare Centre Foodborne Outbreak

1. b
2. a
3. c

12. Foodborne Disease Outbreaks – Successes and Challenges: 20 Years of PulseNet Canada

1. a
2. b
3. b

13. Invasive Group A Streptococcus Disease: Cross Canada Checkup

1. a
2. d
3. c

14. The Global Impact of Viral Hemorrhagic Fever Viruses

1. d
2. b
3. e

15. RSV Vaccination: Another Weapon in our Armamentarium?

1. c
2. d
3. c

16. Immunize Yourself from Cyber Threats with this Vaccine

1. b
2. a
3. b

17. Strongyloides stercoralis: An Important but Unseen Parasite

1. b
2. a
3. d

18. Dengue and Chikungunya Vaccines: Ready for Prime Time?

1. b
2. a
3. d

19. Rabies Vaccine: Less is Way More!

1. d
2. e
3. a