The IMPACT (Immunization Monitoring Program ActTive) surveillance network is among the most outstanding activities managed by the CPS, having provided unique and important information on the safety and efficacy of vaccine-preventable infections in the past and on into the future.

Dr. David Scheifele, Professor of Pediatrics, University of British Columbia, and Director, Vaccine Evaluation, B.C. Children’s Hospital, Vancouver, will be discussing the effect of IMPACT during his Royal College of Physicians and Surgeons of Canada lecture entitled “Vaccines: The Past, Present and Future” on Friday afternoon. “The lecture is meant to be a review of our progress in immunization through the lens of the IMPACT surveillance network,” Dr. Scheifele told CPS Today. Created in 1991, the purpose of establishing the surveillance network was to enhance vaccine safety surveillance capabilities across Canada and to provide feedback on what was happening after children received vaccinations.

The complementary task of IMPACT was to provide sentinel surveillance that tracked vaccine-preventable infections, including some infections that would become vaccine-preventable in the relatively near future. The most profound contribution to vaccine safety was the demonstration of how few serious reactions there were following vaccination and how well most of these turn out. “Few children suffer everlasting harm as a result of vaccination,” Dr. Scheifele emphasized.

IMPACT was able to identify serious complications early on following BCG vaccination against tuberculosis in the Aboriginal population. As a result of this information, “the federal government stopped using the BCG vaccine routinely,” Dr. Scheifele told CPS Today, “and this information probably had an effect on the frequency of those events if a vaccine actually causes certain neurological adverse events after vaccination.” He added that Canada has been witness to some of the “most significant improvements” in child health as a result of immunization. IMPACT was the first to demonstrate that the new Haemophilus influenzae type b (Hib) vaccine, introduced in the mid-1990s, led to a rapid and substantial reduction in Hib cases among Canadian children.

“In our baseline year, IMPACT centres admitted nearly 500 children with Hib infection,” Dr. Scheifele reported. “In the last 10 years, the case numbers are typically below 10 a year so the vaccine has been phenomenally effective.”

IMPACT also demonstrated a rationale for pneumococcal vaccination by describing the disease burden prior to the introduction of the vaccine and then documenting a rapid fall in disease rates following widespread vaccine uptake. Similarly, surveillance data obtained after the introduction of the varicella vaccine showed a “very nice decline” in disease burden as vaccine use increased. “We are doing the same thing for meningococcal infections as well as with rotavirus (RV),” Dr. Scheifele remarked. IMPACT has already gathered “beautiful baseline data” on the burden of RV disease in Canada at the hospitalization level.

With such data, “we can certainly make a compelling case for routine immunization [with the RV vaccine] as we know the disease burden will be substantially reduced just by looking at what happened [in the US]. So there is no longer any risk in implementing this program here, we know it is going to work.”

As reported by CDC epidemiologist Daniel Payne, PhD, Atlanta, Georgia, at the 2010 Canadian Immunization Conference, there was an 84% to 95% reduction in RV cases in 2008 compared with the previous year. American authorities estimate that vaccination for routine immunization [with the RV vaccine] has decreased the disease burden as vaccine use increased. “We are doing the same thing for meningococcal infections as well as with rotavirus (RV),” Dr. Scheifele said.

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Consequences of global conflict, natural disasters more severe on children than on combatants

The consequences of conflict are greater on children than even on the combatants themselves as the nature of global conflict now involves civilians to a far greater extent than ever before. Currently, there are over 30 armed conflicts going on in the world and they largely involve civilians.

“If you look at statistics from World War I, the vast majority of morbidity and mortality was amongst the armed combatants,” Dr. Brett Nelson, Director, Children in Conflict and Crisis, Harvard Humanitarian Initiative, Boston, Massachusetts, told CPS Today. Today, over 75% of those who die in the conflict setting are civilians, the majority of them women and children. Because children require special attention and protection, “children are amongst the most vulnerable individuals in our population,” he added, “and they are among the first and most severely affected by the consequences of conflict and crisis.”

The direct health consequences of complex humanitarian emergencies—natural disasters, conflict and political unrest—include morbidity and mortality. (It is estimated 200,000 children are killed each year as a direct result of armed conflict.) But for every violent death in the Democratic Republic of Congo (DRC), for example, Dr. Nelson calculated that there were 28 children killed in deaths from the conflict, 28 of them in children under the age of 5. Children, especially females, are also at risk for gender-based violence, now wielded as a weapon of war. Consequently, there is a high prevalence of sexually transmitted diseases (STDs), including HIV, among travelling armies which include child soldiers. Children who are victims of sexual violence are at very high risk of contracting STDs.

“When settings of conflict and crisis, children become increasingly vulnerable through the loss of adult care providers, disruption of social structure and protections and an environment of violence and exploitation,” Dr. Nelson emphasized. “It is essential for the international community to understand children’s unique needs in order to address detrimental health consequences on children.”

First-hand experience

Like Dr. Nelson, Dr. Joanne Liu, CHU Sainte-Justine Hospital, Université de Montréal, has experienced first-hand the ravages that disaster can unleash on the vulnerable young. As has Dr. Nelson, Dr. Liu went to Haiti to help survivors following that country’s devastating earthquake. “A lot of people died,” Dr. Liu told CPS Today. “In fact, the official death toll following the earthquake was 316,000, another 300,000 were injured and >1 million were left homeless.”

But the proportion of children among the patients she cared for in her mobile clinic was much lower than usual. “Our hypothesis is, it’s the children and the elderly who die in these natural disasters, because they can’t escape,” Dr. Liu remarked. Of those children who survived, many thousands were orphaned. Indeed, even before the earthquake, over 350,000 children in Haiti were listed as orphans and living in institutional care.

Dr. Liu also found that children would tell her that they had a headache or an stomach ache but they would not mention the earthquake. “In fact, it was real psychological trauma—children could not sleep, they could not eat—and it was all related to posttraumatic stress disorder or at least psychological stress,” Dr. Liu noted. A study of the earthquake was not enough for people to endure. Haiti experience the largest cholera epidemic the world has seen in the last century, fuelled by the massive slums that existed in the country before the earthquake.

Apnea and other respiratory health issues

Breadth issues relating to respiratory health are highlighted during several sessions throughout the meeting with one session in particular focusing on apnea treatment options.

Dr. Patrick Daigneault, Clinical Professor and Head, Paediatric Respiratory, Centre Mère-Enfant du CHUQ-Université Laval, Quebec City, told CPS Today that the type of apnea occurring in children varies depending on the child’s age. “In the newborn period, there is more central apnea so a baby forgets to breathe,” he explained. This type of apnea occurs mostly in premature infants, added. Depending on the centre, some paediatricians treat young infants with caffeine supplements to stimulate the brain to breathe. Other centres recommend parents use apnea monitors that ring when the baby is not breathing.

Young infants may also develop obstructive apnea largely due to malformation of the face or airway. For example, the tongue in a Down’s syndrome baby is often too big for their mouth and can obstruct the airway. The same infants also are prone to hypotonia which affects muscle tone in the neck, predisposing them to apnea.

Preschool or toddler children may also develop obstructive apnea but it is largely because of enlarged tonsils or adenoids. “Some of these children need an ENT surgeon,” Dr. Daigneault observed; however, it is not yet clear which children should undergo surgery and who should be prioritized for it.

Older children and adolescents who are obese can develop obstructive apnea as well and their apnea is similar to that in adults. “Every year we see young children who have adult obstructive apnea because they are obese,” Dr. Daigneault confirmed. As in adults, neck muscles relax in deep sleep, causing the airway to collapse and apnea to occur. The logical course would be for the child or adolescent to lose weight, as many patients cannot, “removing the tonsils can help a bit in some children,” he noted.

Otherwise, treatment consists of either continuous positive airway pressure (CPAP) or bilevel positive airway pressure (BPAP), where pressure pushes the air in many times a minute and helps the patient breathe in the air.

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Geoffrey C. Robinson Award: Reginald Sazure, MD
Michel Weber Education Award: Jonathan Konnick, MD
Young Investigator Award: Geoff Ball, PhD
Distinguished Community Paediatrician Award: Dennis Ledoc, MD
Distinguished Neonatologist Award: Reginald Sazure, MD
Noni MacDonald Award: Joel Stad, MD
Resident Advocacy Grant: Stefanie Harvey, MD

Youth Investigator Award recipients: Geoff Ball, PhD (winning with Dr. Robert Brouillette (left) and president Dr. Robert McKinnon (right))
Clinical Case Competition winner: Dr. Jackie Chiang (winning with chair, Dr. Francis Livernoche)

Dr. Fredrick with Best Paediatric Research award winner, resident category. Dr. Frances Lessard
Dr. Fredrick with Best Paediatric Research award winner, fellow category. Dr. Stefanie With-Wong
Dr. Fredrick with Best Paediatric Research award winner, junior category. Dr. Frances Lessard

See you there in 2012!

MEDICAL EDUCATION NETWORK CANADA INC.

Canadian Paediatric Society 88th Annual Conference

Canadian Paediatric Society

CPS Today is published by Medical Education Network Canada Inc. for the annual meeting of the Canadian Paediatric Society. mednet@mednet.ca • www.mednet.ca

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Medical Translation (inserts)
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See you there in 2012!
**Question:** What do you like best about your work?

**Dr. Steven McFaul, Ottawa, Ontario:** As an injury epidemiologist, I like looking for patterns of injury in children with the ultimate goal of being able to prevent those injuries. We also like to present our data at conferences like this one because paediatricians are on the front lines of prevention and they can pass along some of our findings to parents and hopefully prevent a large proportion of these injuries. Sometimes, it takes a very simple measure to reduce the risk of injury, e.g., children can get strangled in blind cords so parents can just install a hook to make sure the child can’t reach the cord.

**Gabriella Bergsten, Edmonton, Alberta:** As a dietitian working in a neonatal intensive care unit (NICU), I like seeing the impact we have on babies as they grow. As part of a multi-disciplinary team, we work together to try to get the best possible outcomes for infants. Protein and energy intake are hugely important for these infants. They do far better in terms of growth and development if they achieve appropriate protein intake in the first week and it’s rewarding to know that the impact we make early on in the NICU will affect these babies for the rest of their lives.

**Dr. Douglas Campbell, Toronto, Ontario:** As a paediatrician, what I like best is the opportunity to interface with families, both the children at an individual level as well as with their families and other health care professionals who interact with us all. It’s a great opportunity to make a difference not only to the child but also to the whole family unit. I think it’s exciting and a privilege to be able to make a big difference in the lives of children for years to come. That is what I enjoy the most.

**Dr. Tiphaine Mialet-Marty, Rennes, France:** As a neonatologist, we can help preterm infants get a start in life. Infants in the NICU face very serious problems, one of them being respiratory distress; their lungs are immature and we need to help them with ventilation. Neurocognitive development is also another big problem. Their brains are also immature, so we must provide them with parenteral nutrition in order for them to achieve better neurocognitive development. If a baby <1000 g was born before we had NICUs, they would not have survived, so we are giving these babies a chance to both survive and thrive and I think it’s wonderful.
Question: What are you most interested in hearing about at this meeting?

Dr. Lauri Alto, Winnipeg, Manitoba: I'm a general paediatrician in the community so I do a fair amount of primary care in addition to consultant care. I am interested in attending sessions that I think are going to improve or change the way I practice. I am also looking to make sure that some of the practices that I follow are current and up-to-date. So the meeting is a nice way to do it, just sitting at a table or in a room with people who know a lot more than I do about a particular topic and to find out if I am on point or not.

Dr. Josée Quesnel, Sherbrooke, Québec: I guess I am most interested in hearing about updates on practical subjects—emergency paediatrics, neonatal paediatrics and hospital-based paediatric issues. I'm a general paediatrician but work in a hospital so hospital-based care is of interest. I am generally interested in what goes on in the ER, on the wards, about the newborns, about ADHD and other developmental issues.

Dr. Jonathan Kronick, Halifax, Nova Scotia (recipient of this year’s Michel Weber Education Award): What I am most interested in at this meeting is learning about advocacy on behalf of children and child health. For many reasons, Canada does not do as well by its children as we should be doing for a well-developed, wealthy country and children do not have a strong voice like seniors, like political parties, and like many other sections of society. I see part of our role as paediatricians to advocate on behalf of children both individually, in our communities and nationally.

Dr. Leslie Rourke, St. John’s, Newfoundland: As a family physician, there are several things that interest me here. Firstly, family physicians look after children as well as paediatricians. In fact, we are the primary health care providers for children in most places. I am here to improve my own knowledge but I also sit on the planning committee for this meeting so that it can be accredited not only for paediatricians for their CME hours but also family physicians for their hours as well. The third reason is despite doing general family medicine, my specific area of interest is the Rourke Baby Record which is a structured form for documenting well baby visits and which is something I produce in collaboration with Dr. Denis Leduc.
Antibiotic resistance in children: containment through appropriate use

Québec City - Antibiotic resistance is a global concern. The mechanisms by which bacterial organisms acquire resistance are diverse but the more bacteria are exposed to antibiotics, the more resistant they become and inappropriate use of antibiotics greatly exacerbates resistance issues. Treatment of common paediatric infections in the era of antibiotic resistance requires careful consideration of the most appropriate antibiotic choice. Reducing carriage of certain pathogens through early childhood vaccination may also help reduce the need for antibiotics to treat infections, thereby containing the development of resistance in common bacterial pathogens.

Reviewed by Dr. Léna Coïc, Montréal, Québec. Dr. Coïc reviews clinical reports for Medical Education Network in numerous therapeutic disciplines on a regular basis. In her role as Clinical Research Coordinator in Infectious Diseases at CHU Ste-Justine, she is particularly interested in the areas of paediatrics and infectious disease.

A comprehensive evaluation of antibiotic resistance in children and how to both control and treat it in an era of growing resistance will be one of the final sessions of this year’s annual meeting here tomorrow morning at 8:00 a.m.

Dr. François Boucher, Associate Professor of Paediatrics, Université Laval, Québec City, will present the epidemiology of antibiotic resistance in Canada and how different bacteria acquire resistance to various antibiotics. For example, it has been known for over a decade that Streptococcus pneumoniae is frequently resistant to beta-lactam antibiotics by a mechanism that is special—and different from—the usual beta-lactamases, as he observes in a written abstract of his presentation.

“These beta-lactam-resistant pneumococci have membrane receptors with a lower affinity for this class of antibiotics,” he states, “and these lower-affinity penicillin-binding proteins (PBPs) reduce the sensitivity to this class of agents.” Penicillin-resistant pneumococci are especially common among children attending daycare centres, as he also notes. In general, pneumococci cause among the most common infections seen in Canadian children, including acute otitis media (AOM), sinusitis and pneumonia.

Common Causes

Methicillin-resistant Staphylococcus aureus (MRSA) may be acquired both in the community and in hospital; both types of MRSA can cause skin and pulmonary infections and both can be severe. MRSA infections also represent a “real challenge” to physicians, as Dr. Boucher points out, “not only because of their spectrum of disease but also because treatment of these infections varies according to the agent, its antimicrobial susceptibilities and the type of infection considered.” Vancomycin-resistant enterococci (VRE) is mostly acquired on paediatric wards and largely affects immunosuppressed children as well as children with other comorbidities.

VRE infections are difficult to treat and often lead to prolonged and costly hospital stays. Much less common at least at this point in Canada are multiple resistant Mycobacterium tuberculosis and the New Delhi metallo-beta-lactamase 1 (NDM-1)-producing Klebsiella pneumoniae and Escherichia coli. As Dr. Boucher explains, NDM-1 is an enzyme that makes bacteria resistant to a broad range of beta-lactam antibiotics including the carbapenems, currently a mainstay for the treatment of antibiotic-resistant bacterial infections.

According to recent reports (Emerg Infect Dis 2011;17:242-4, 2011;17:306-7), only 2 cases of infection with an NDM-1 organism has been described in Canada as of May 2011. As his colleague Dr. Joan Robinson, Professor of Paediatrics, University of Alberta, Edmonton, explains in her abstract describing her presentation, the NDM-1-producing organisms are of great concern because NDM-1 resistance genes are readily spread from bacteria to bacteria by plasmids and they are resistant to all antibiotics other than colistin and tigecycline, both of which are only available intravenously (i.v.) and which have inherent limitations in terms of toxicity and efficacy.

“Antibiotic resistance constitutes a menace to everyone, but children are at particular risk [as] they are more vulnerable to bacterial infections than adults,” Dr. Boucher confirms. “Physicians need to be aware of these emerging problems in order to recognize them and treat life-threatening infections effectively when they appear in young patients.”

Treatment of Common Paediatric Infections

Dr. Robinson in turn will address treatment issues of common paediatric infections in the era of antibiotic resistance. Some infections including AOM should not be treated initially; rather, the Canadian Paediatric Society (CPS) recommends “expectant” symptomatic treatment with AOM, reserving antibiotics only for children who do not improve without
them. In Canada, AOM is most frequently due to pneumococcus. “Conjugated pneumococcal vaccines have had some effect but cover a maximum of 13 of the >90 pneumococcal serotypes,” reports Dr. Robinson. Therapy should be primarily directed at pneumococcus, she adds, as spontaneous resolution is common with Haemophilus influenzae and Moraxella catarrhalis, both of which cause AOM although less commonly than pneumococcus.

Approximately 20% of pneumococci in Canada have some degree of penicillin resistance, but high-dose penicillin can usually overcome this resistance. “If the decision is made to start antibiotics, there is no oral antibiotic that is likely to work better than amoxicillin and amoxicillin remains the drug of choice,” Dr. Robinson states. Bacterial pharyngitis is still primarily due to group A streptococcus, which remains uniformly susceptible to penicillin and to all other beta-lactams.

It is also believed that “the vast majority” of bacterial pneumonia in previously well children 3 months to 18 years of age is due to either pneumococcus or Mycoplasma pneumoniae. As it is largely self-limiting, coverage for pneumococcus is generally the first priority, Dr. Robinson observes. The CPS is expected to release guidelines on the management of pneumonia by the end of the year.

In the meantime, for children who do not have empyema or lung abscess, amoxicillin is the oral agent of choice, with high doses again being recommended. “If children do not respond to amoxicillin, imaging to exclude an empyema and coverage for atypical pneumonia with azithromycin or clarithromycin should be considered,” Dr. Robinson states, adding that if children are ill enough to require i.v. antibiotics, ampicillin is still usually the drug of choice. Cefotaxime or ceftriaxone should be used instead of ampicillin if a child has severe pneumonia, defined as a child who requires significant supplemental oxygen and is in moderate or severe respiratory distress.

In previously well children, cellulitis is most commonly due to group A streptococcus while subcutaneous abscesses in the form of boils, furuncles and carbuncles are usually due to S. aureus. As Dr. Robinson points out, most cases of cellulitis will respond to oral cephalexin or i.v. cefazolin. Unfortunately, the prevalence of subcutaneous abscesses due to MRSA has markedly increased across the country and physicians are concerned about not prescribing antibiotics for abscesses due to suspected MRSA since this is a virulent pathogen. However, the only benefit of using antibiotics in this situation appears to be a smaller risk of recurrence within 10 days of completion of therapy; consequently, “in most cases, antibiotics should not be prescribed,” Dr. Robinson states.

Regarding treatment of urinary tract infections (UTIs) in previously well children 3 months of age or older, at least 30% of community-acquired E. coli are now known to be resistant to amoxicillin and there is also sufficient resistance to trimethoprim-sulfamethoxazole (TMP/SMX) and to cephalexin that they should not be used empirically for UTIs either, as Dr. Robinson points out. The recommended oral agent for empiric therapy of a possible UTI is cefixime. TMP/SMX or cephalexin may still be a reasonable choice for cystitis where rapid cure is less vital, she adds.

“Once susceptibilities are available, it would be fine to switch to amoxicillin or TMP/SMX if the isolate is susceptible,” but as parents may question buying a second antibiotic, “one usually just finishes a 10-day course with the original antibiotic if the isolate is susceptible,” Dr. Robinson confirms.

Additional Considerations

Inappropriate use of antibiotics greatly contributes to antibiotic resistance and physicians must choose antibiotics carefully and use them sparingly in the treatment of common paediatric infections. Reducing carriage of common pathogens such as pneumococcus may also be part of the solution. Currently, most provinces recommend the 13-valent pneumococcal conjugate vaccine (PCV13) be given routinely at 2, 4 and 12 months and no catch-up program is currently being considered in Canada. In February 2010, however, the Advisory Committee on Immunization Practices (ACIP) in the US recommended a catch-up program be offered for children between 14 and 59 months of age who had previously received the PCV7 vaccine. A recent analysis presented at the European Society for Paediatric Infectious Diseases (ESPID) conference this year predicted that this catch-up program would prevent an additional 1,711,890 cases of pneumococcal disease and 90 deaths compared with routine PCV13 vaccination and no catch-up program. The recommendation for catch-up has been in effect in the US for 1 year and all indications are the program has been successful.

Presentation of interest:
Saturday, June 18 (08:00-9:30), Kent Room, Hilton Québec.
“Antibiotic resistance and its impact on children.” Janet Grabowski, MD.