

2012 Results

CANADIAN PAEDIATRIC SURVEILLANCE PROGRAM





Mission Statement

To contribute to the improvement of the health of children and youth in Canada by national surveillance and research into childhood disorders that are high in disability, morbidity, mortality and economic costs to society, despite their low frequency.



► New CPSP website

Visit the new CPSP website — www.cpsp.cps.ca

There are many improvements to make information easier to find. The main changes are:

- a sign-up option for electronic reporting on each page
- new search and sorting capabilities, which make navigating of the site much easier
- quick access on the homepage to studies, ADR Tips and annual *CPSP Results*
- news and notices for participants and researchers
- publications, including resource articles and CPSP Highlights, sorted alphabetically or by date with links to relevant studies
- current and concluded studies on their own page with all related links
- one-time survey questions and results

► eCPSP – One year later

More than half (62%) of the CPSP participants are now responding to their monthly report forms online, and half report the first day they receive the e-mail. We encourage all participants to switch to online reporting because:

- It's greener
- It's simple and quick through a hyperlink sent each month
- No log-in or passwords are required
- Reporting is possible from anywhere with Internet access
- Case definitions and full protocols can be accessed instantly
- Up-to-date study statistics are easily available
- Detailed questionnaires are mailed promptly or can be downloaded and printed from the website
- Data is fully encrypted, transmitted and hosted securely in Canada

In 2013:

- Performance monitoring
- Ongoing recruitment to e-reporting
- Launch of one-time surveys online
- Development of online detailed questionnaires

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Acknowledgements

The key strength of the Canadian Paediatric Surveillance Program (CPSP) is its commitment to improve the health of children and youth in Canada and around the world. This would not be possible without the participation of Canadian paediatricians, subspecialists and other health care providers in the monthly collection of information on rare paediatric conditions, principal investigators who design studies and analyze the data to provide knowledge and educational solutions, and the guidance of the Steering Committee members. We thank them all.

We also thank IMPACT (Immunization Monitoring Program ACTive) centres for their role in verifying the acute flaccid paralysis study data collected and for their support of the CPSP.

The strong partnership between the Canadian Paediatric Society and the Public Health Agency of Canada allows the program to grow in Canada and to take a leadership role on the international scene.

Funding

Funding for the CPSP is required to support program management. The surveillance program is funded through a combination of government support and unrestricted grants from Canadian charities, research institutions, hospitals and corporations. All funding is provided to maintain and expand the program.

We gratefully acknowledge the financial support received in 2012 from the Public Health Agency of Canada, Health Canada's Therapeutic Effectiveness and Policy Bureau, and the following non-governmental sources:

- Division of Paediatric Haematology/Oncology, IWK Health Centre
- Histiocytosis Association of Canada
- New Investigator Fund, Hamilton Health Sciences
- Novartis Pharmaceuticals Canada Inc.
- St. Michael's Hospital AHSC AFP Innovation Fund
- SickKids Foundation

Foreword

Federal Minister of Health

The Honourable Leona Aglukkaq

The Canadian Paediatric Society is to be commended for helping to protect the health of Canadian children and youth. For more than a decade, your organization has effectively monitored rare diseases and conditions through the Canadian Paediatric Surveillance Program (CPSP).

The CPSP gathers current national data required to understand the burden of rare paediatric conditions and to improve clinical practice. Thanks to the active participation of over 2,500 paediatricians and subspecialists, we have up-to-date information that is increasingly used by governments to develop innovative prevention practices.

Prevention and support for those living with all forms of disease are priorities for the Government of Canada. Partners such as the Canadian Paediatric Society play a vital role in helping to achieve our health promotion and disease prevention goals in communities across Canada.

As Minister of Health, I would like to thank the Canadian Paediatric Society for its leadership. I would also like to extend my thanks to each member who participated in this year's studies, and also, for their overall contribution to helping give Canadian children and youth a healthy start in life.



Chief Public Health Officer of Canada

Dr. David Butler-Jones

On behalf of the Public Health Agency of Canada, I would like to acknowledge the Canadian Paediatric Surveillance Program (CPSP) for its ongoing commitment to monitor rare diseases and conditions that affect young Canadians nationally. Your annual report provides an opportunity for everyone to reflect on the important role surveillance plays in the fight against disease.

Each year the CPSP collects data from more than 2,500 front-line community health care providers working with children. This collaborative initiative between the Public Health Agency of Canada and the Canadian Paediatric Society allows researchers to access quality information while advancing knowledge and better informing patients, families and health professionals. In addition, it also helps us better understand the needs of children and youth living in our communities across Canada.

I would like to thank the Canadian Paediatric Society for its steadfast commitment to ensuring that this invaluable information is made available to decision makers to help inform future policies and programs. Together, I am confident that we will continue to improve the health and well-being of children and youth.



President of the Canadian Paediatric Society

Dr. Richard Stanwick

As President of the CPS and founding CPSP Chair, I had the privilege to see this program grow, prosper and become a leader, nationally and internationally. Through the CPSP, many public health issues affecting children and youth have been studied, such as the important role of overweight/obesity in the etiology of type 2 diabetes mellitus and the presence of comorbidities at diagnosis, the return-to-play decision in sports-related brain concussion, the injuries associated with baby products like strollers and wheeled walkers, and the prevalence of conversion disorder. I am very proud to be part of the CPSP and its achievements.



Through the years, I have witnessed increased collaboration among PHAC staff and epidemiologists, Health Canada staff, and researchers on different studies. This valuable partnership has advanced epidemiological research for the benefit of children with rare diseases and the capture of events not picked up by existing surveillance systems.

I am also very pleased and grateful to have a commitment from the Public Health Agency of Canada to see the CPSP continue active disease surveillance and remain an important component complementing other national surveillance strategies.

CPSP Chair

Dr. Kimberly Dow

The Canadian Paediatric Surveillance Program had a very successful and busy year in 2012, both from a technological and scientific standpoint. As a result of the launch of eCPSP last year, 62% of our participants are now online reporters, and we are pleased to say that we have a reporting rate of 90%, with approximately half of these participants replying within 24 hours. The success rate of electronic reporting is gratifying to see and further efforts to increase online participation are forthcoming.



November 2012 saw the launch of the new and improved CPSP website with many enhancements, such as quick access to a list of current studies, the latest ADR tips of the month and annual *CPSP Results*, easier navigation with new search and sorting capabilities, and a page for each study, past and present, including all related links. A visit to www.cpsp.cps.ca is a must.

I would like to encourage all university paediatric programs and their leadership to support colleagues and members in becoming active CPSP participants. Conducting a surveillance study through the CPSP provides a number of tremendous academic opportunities for investigators. This is an excellent way for researchers to work with the Canadian Paediatric Society in meeting CanMeds roles through translation and dissemination of study results for education, policy-making and advocacy purposes.

Finally, I would like to thank all Canadian paediatricians who are contributing on a monthly basis to the success of our surveillance program. Our participation rate is evidence that, together, we can and are making a difference.

CPSP Steering Committee

Kimberly Dow, MD (Chair)
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Jeff Scott, MD
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Kim Tytler
Anne-Marie Ugnat, PhD

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Centre for Food-borne, Environmental and Zoonotic Infectious Diseases,
Public Health Agency of Canada
Canadian Paediatric Society
Canadian Paediatric Society
Paediatric Chairs of Canada
Canadian Association of Child Neurology (Liaison)
Canadian Paediatric Society
Canadian Paediatric Society
Canadian Paediatric Society
Canadian Paediatric Society
IMPACT (Immunization Monitoring Program ACTIVE) (Liaison)
Consultant
Canadian Paediatric Society
Canadian Paediatric Society
Canadian Paediatric Society
Canadian College of Medical Geneticists (Liaison)
Canadian Paediatric Society
Centre for Chronic Disease Prevention,
Public Health Agency of Canada

CPSP Working Group

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Alison Quartaro, BA
Kim Tytler
Anne-Marie Ugnat, PhD

Canadian Paediatric Society
Canadian Paediatric Society
Canadian Paediatric Society
Canadian Paediatric Society
Canadian Paediatric Society
Canadian Paediatric Society
Canadian Paediatric Society
Canadian Paediatric Society
Centre for Chronic Disease Prevention,
Public Health Agency of Canada

Publications 2008–2012

Published papers related to studies

(See www.cpsp.cps.ca/publications/published-papers-related-to-studies for a complete list with hyperlinks.)

Acquired demyelinating syndromes of the CNS

Incidence of acquired demyelination of the CNS in Canadian children. Banwell B, Kennedy J, Sadovnick D, Arnold DL, Magalhaes S, et al. *Neurology* 2009;72:232–9

Child maltreatment

The Canadian Paediatric Surveillance Program: A framework for the timely data collection on head injury secondary to child maltreatment. Bennett S, Grenier D, Medaglia A. *Am J Prev Med* 2008;34(4S):S140–2

Head injury secondary to suspected child maltreatment: Results of a Canadian national surveillance program. Bennett S, Ward M, Moreau K, Fortin G, King J, MacKay M, Plint A. *Child Abuse Negl* 2011;35(11):930–6

Complementary and alternative medicine

Adverse events associated with paediatric use of complementary and alternative medicine: Results of a Canadian Paediatric Surveillance Program survey. Vohra S, Brulotte J, Le C, Charrois T, Laeeque H. *Paediatr Child Health* 2009;14(6):385–7

Congenital myotonic dystrophy

Congenital myotonic dystrophy. Campbell C. *J Neurol Neurophysiol* 2012;S7:1–8. doi:10.4172/2155-9562.S7-001

Congenital myotonic dystrophy in a national registry. Prendergast P, Magalhaes S, Campbell C. *Paediatr Child Health* 2010;15(8):514–8

Patient registries and trial readiness in myotonic dystrophy: TREAT-NMD/Marigold International Workshop Report. Campbell C. Additional outcome measures for childhood and congenital DM1. Thompson R, Schoser B, Blonsky K, Lochmuller H. *Neuromuscul Disord* 2009;19:860–6

Congenital rubella syndrome

Rubella elimination: The Canadian experience. Macey JF, Tam T, Lipskie T, Tipples G, EisBrenner T. *J Infect Dis* 2011;204:S585–92

Eating disorders

Incidence and age-specific presentation of restrictive eating disorders in children – A Canadian Paediatric Surveillance Program study. Pinhas L, Morris A, Crosby RD, Katzman DK. *Arch Pediatr Adolesc Med* 2011;165(10):895–9. doi:10.1001/archpediatrics.2011.145

Kernicterus / neonatal hyperbilirubinemia

Incidence of chronic bilirubin encephalopathy in Canada, 2007–2008. Sgro M, Campbell DM, Kandasamy S, Shah V. *Pediatrics* 2012;130(4):e886–90. doi:10.1542/peds.2012-0253

Acute neurological findings in a national cohort of neonates with severe neonatal hyperbilirubinemia. Sgro M, Campbell D, Barozzino T, Shah V. *J Perinatol* 2011;31(6):392–6. Epub 2010 Dec 9; doi:10.1038/jp.2010.137

Prevention of kernicterus – New guidelines and the critical role of family physicians. Shaw E, Grenier D. *FP Watch, Can Fam Physician* 2008;54(4):575–6

Lap-belt syndrome

The spectrum of seat belt syndrome among Canadian children: Results of a two-year population surveillance. Santschi M, Lemoine C, Cyr C. *Paediatr Child Health* 2008;13(4):279–83

Medium-chain acyl-CoA dehydrogenase deficiency

Incidence of medium-chain acyl-CoA dehydrogenase deficiency in Canada using the Canadian Paediatric Surveillance Program: Role of newborn screening. Prasad C, Speechly KN, Dyak S, Rupar CA, Chakraborty P, Kronick JB. *Paediatr Child Health* 2012;17(4):185–9

Non-type 1 diabetes mellitus

Differing clinical features in Aboriginal vs. non-Aboriginal children presenting with type 2 diabetes. Amed S, Hamilton JK, Sellers EAC, Panagiotopoulos C, Hadjiyannakis S, Shah BR, Booth GL, Laubscher TA, Dannenbaum D, Dean H. *Pediatr Diabetes* 2012;13(6):470–5. doi:10.1111/j.1399-5448.2012.00859.x

Type 2 diabetes, medication-induced diabetes, and monogenic diabetes in Canadian children: A prospective national surveillance study. Amed S, Dean HJ, Panagiotopoulos C, Sellers EAC, Hadjiyanakis S, Laubscher TA, Dannenbaum D, Shah BR, Booth GL, Hamilton JK. *Diabetes Care* 2010;33(4):786–91

Transfusion-related acute lung injury

Transfusion-related acute lung injury in the Canadian paediatric population. Gauvin F, Robillard P, Hume H, Grenier D, Whyte R, Webert KE, Fergusson D, Lau W, Froese N, Delage G. *Paediatr Child Health* 2012;17(5):235–9

CPSP Highlights and Commentaries published in 2012 in *Paediatrics & Child Health*

(See www.cpsp.cps.ca/publications/cpsp-highlights for a complete list with hyperlinks.)

Identifying depression in childhood: Symptoms, signs and significance. Korczak D. *Paediatr Child Health* 2012;17(10):572

Can surveillance provide epidemiological data on Aboriginal health? Grenier D et al. *Paediatr Child Health* 2012;17(8):441–2

Conversion disorder: Not a malingering matter. Krasnik C, Grant C. *Paediatr Child Health* 2012;17(5):246

The challenge of periodic fevers in children. Dancey P, Benseler S, Junker AK, Laxer RM, Miettunen PMH, Turner LA, Gattorno M. *Paediatr Child Health* 2012;17(3):123

Health hazards related to energy drinks: Are we looking for them? Taddeo D, Harvey J, Boutin A. *Paediatr Child Health* 2012;17(2):101

Food-induced anaphylaxis: Clinical highlights and knowledge gaps. Ben-Shoshan M, Clarke AE. *Paediatr Child Health* 2012;17(1):29–30

Presentations in 2012

(See www.cpsp.cps.ca/publications/presentations for a complete list with hyperlinks.)

National

Acute flaccid paralysis

Does active surveillance of acute flaccid paralysis by the International Network of Paediatric Surveillance Units meet WHO standards? Smith T, Desai S, Grenier D, Altpeter E, Beeli D, Dickson N, Thorley B, Sabbe M, Elliot E, Zurynski Y. Canadian Immunization Conference, Vancouver, in December (poster)

Complementary and alternative medicine

Complementary therapies and children in your practice: What's the evidence? Vohra S. Canadian Paediatric Society Annual Conference, London, in June (oral)

Congenital cytomegalovirus infection

What's new in congenital infections? Vaudry W. Canadian Paediatric Society Annual Conference, London, in June (oral)

Energy drinks

Energy drinks in children and teenagers: A CPSP survey. Taddeo D. Canadian Paediatric Society Annual Conference, London, in June (oral)

Fragile X syndrome

Fragile X in British Columbia: Past, present, future. Aubertin G. International Fragile X Conference, Miami, in July (oral)

Kernicterus / neonatal hyperbilirubinemia

Incidence of chronic bilirubin encephalopathy in Canada, 2007–2008. Sgro M. Annual Neonatal & Maternal-Fetal Medicine Research Day, University of Toronto, Toronto, in April (oral)

Physical examination of the newborn and group B *Streptococcus*. Sgro M. Midwifery Clinical Skills Course, Ryerson University, Toronto, in November (oral)

Surveillance – General

Paediatric neurological diseases: What does active Canadian surveillance tell us? Grenier D. Canadian Paediatric Society Annual Conference, London, in June (oral)

Travel-related illnesses

Travel-related illnesses in paediatric travellers who visit friends and relatives abroad. Crockett M. Canadian Paediatric Society Annual Conference, London, in June (oral)

International

Concussion management

Concussion management by paediatricians: A national survey of Canadian paediatricians. Gordon K, Do MT, Thompson W, McFaul S. International Consensus Conference on Concussion in Sport, Zurich, in November (poster)

Food allergies

Comparison between allergists and non-allergists on issues related to food-induced anaphylaxis. Desjardins M. American Academy of Allergy, Asthma, and Immunology Annual Meeting, Orlando, in March (poster)

Presentations in 2012

Kernicterus / neonatal hyperbilirubinemia

Severe neonatal hyperbilirubinemia and bilirubin encephalopathy in Canada. Sgro M. Annual Audrey K. Brown Kernicterus Symposium, PAS/ASPR Annual Conference, Boston, in April (oral)

Paediatric myasthenia

Paediatric myasthenia: Results of the Canadian Paediatric Surveillance Program (CPSP). VanderPluym J, Kolski H. Child Neurology Society Annual Meeting, Huntington Beach CA, in October/November (oral)

Surveillance – General

Neonatal Disease Research through active surveillance. Grenier D. Annual Meeting of Paediatrics, 1st World Seminar on Neonatology – Babies Without Borders, Acapulco, in August (oral)

Paediatric neurological diseases: What does active Canadian surveillance tell us? Grenier D. Congress of the European Academy of Paediatric Societies (EAPS), Istanbul, in October (oral)

Public health impacts of active surveillance. Grenier D. Dutch Pediatric Society Annual Meeting (NVK 2012), Veldhoven, in November (oral)

Surveillance at Work

Overview

The importance of surveillance to the practice of medicine cannot be overstated. Through the ongoing, systematic collection of data, the burden of disease can be determined, interventions to prevent the occurrence of a disorder can be assessed, and information collected can be used in the development of health policy. Surveillance takes research data into action.

According to Statistics Canada, the Canadian population at July 1, 2012 was an estimated 34,880,491, with 7,826,123 individuals 0–19 years of age, which represents approximately 22.4% of the population. Although individually uncommon, rare diseases affect thousands of these children and youth and typically have lifelong impacts. The actual incidence of many of these disorders is not readily available, and yet is essential for improved clinical care, advocacy and health service planning.

The CPSP provides an innovative means to undertake paediatric surveillance and increase awareness of childhood disorders that are high in disability, morbidity, mortality and economic cost to society, despite their low frequency. Preference is given to studies that have strong public health importance or could not be undertaken any other way. All studies in the program must conform to high standards of scientific rigour and practicality, and the CPSP assures the confidentiality of all information collected. To enhance data capture on individual studies, the program works collaboratively with other professional groups, such as psychiatrists, pathologists/coroners, and adult endocrinologists. The program also offers an opportunity for international collaboration, through the International Network of Paediatric Surveillance Units (INoPSU), with other paediatric surveillance units worldwide.

Process

The CPSP Steering Committee oversees the program and reviews new study proposals. Upon initiation of a new study, practising Canadian paediatricians, paediatric subspecialists and other health care providers receive a summary of the protocol, including the case definition and a brief description of the condition. This serves to educate and increase awareness of conditions under surveillance while providing a uniform basis for reporting. The CPSP uses a two-tiered reporting process to ascertain and investigate cases: an initial 'check-off' form and a detailed questionnaire. Case ascertainment is undertaken by comparing a few selected study results with cases reported to the Hospital Discharge Abstract database of the Canadian Institute for Health Information (CIHI) and by investigating duplicate reports and comparing data with relative programs or centres. To date, case ascertainment has been excellent.

Reporting

The 'check-off' form, listing the conditions currently under surveillance, is distributed monthly to participants. For each condition, respondents are asked to indicate the number of new cases seen in the last month, including 'nil' reports. A 'nil' report is very important in active surveillance; the CPSP cannot simply assume that no reply means no cases. In October 2011, the program launched eCPSP, an electronic platform giving participants the opportunity to receive their monthly forms online. By December 2012, 54% of program participants reported electronically.

Participants report all cases meeting the case definitions, including suspect or probable cases. This sometimes leads to duplicate reports but avoids missed cases. The list of studies conducted by the program since 1996 can be accessed at www.cpsp.cps.ca/surveillance.

Provinces/territories	Reporting rates (%)	Number of participants
Alberta (AB)	77	389
British Columbia (BC)	74	305
Manitoba (MB)	77	140
New Brunswick (NB)	76	37
Newfoundland and Labrador (NL)	76	59
Nova Scotia (NS)	82	111
Northwest Territories (NT)	79	2
Nunavut (NU)	66	3
Ontario (ON)	77	1,060
Prince Edward Island (PE)	100	7
Quebec (QC)	78	661
Saskatchewan (SK)	71	63
Yukon (YT)	92	1
Canada	77	2,817

Surveillance at Work

Confidentiality is maintained by using only non-nominal patient information, such as the date of birth and sex of the child. This anonymous information is used to exclude duplicates and is sent to the original respondent to request case-specific information.

Once the detailed questionnaire is returned to the CPSP, it is forwarded to the investigator for analysis. If further information is required to confirm or exclude a case, the program manager contacts the respondent on behalf of the investigator.

Participants who do not reply every month receive reminders. In addition, information on the monthly compliance rates and the number of cases reported is distributed quarterly to all participants to keep them informed of progress. In 2012, the national reporting rate was 77% (Table 1) and the response rate for completion of detailed questionnaires, 82% (Table 2).

Participant workload

The monthly reporting system is simple and the follow-up study questionnaires are easy to complete. As only non-nominal, non-identifiable data are collected through the CPSP, respondents do not hesitate to provide clinical information.

In 2012, the majority of participants (87%) had 'nil' cases to report. The importance of zero reporting must be re-emphasized. Table 3 illustrates the number of cases reported by respondents in 2012. As studies come and go, the workload shifts to different subspecialties. Through the years, studies with national collaborative networks have been very successful. The 2012 studies with the most reports were Conversion disorder in children and youth, Early-onset neonatal sepsis and meningitis, and Periodic fever syndromes.

The CPSP is extremely grateful that the majority of participants faithfully complete the detailed questionnaires subsequent to reporting cases. This demonstrates that they appreciate the enormous value of the scientific data collected and reinforces the Steering Committee's insistence on short, precise and pertinent detailed questionnaires.

To thank paediatricians and paediatric subspecialists for their tremendous commitment and support, names of participants who completed the initial reporting forms for all months in 2012 and/or returned one or more detailed questionnaires were entered in draws for various prizes.

Investigators' corner

Through timely, active surveillance, the CPSP provides investigators with an innovative means of obtaining non-nominal, national data on low-frequency diseases and conditions from over 2,500 participants. The program is committed to a high case ascertainment rate and, due to follow-up reminders to non-respondents, obtains

TABLE 2 – 2012 detailed questionnaire completion rates as of May 1, 2013

Studies/conditions	Reported cases*	Pending	% Completion rate
Acute flaccid paralysis	47	5	89
Adrenal suppression	10	3	70
Adverse drug reactions – serious and life-threatening	37	10	73
Conversion disorder in children and youth	95	24	75
Early-onset major depressive disorder	19	2	90
Early-onset neonatal sepsis and meningitis	90	17	81
Fragile X syndrome	14	4	71
Intravenous fluid-related symptomatic acute hyponatremia	4	0	100
Langerhans cell histiocytosis	15	1	93
Neonatal hyperbilirubinemia – severe (2011-2013)	61	7	89
Obesity-hypoventilation syndrome (Pickwickian syndrome) in children	3	1	67
Periodic fever syndromes	91	15	84
Persistent albuminuria in the paediatric population with type 2 diabetes mellitus	9	0	100
Respiratory syncytial virus (RSV) infections in paediatric transplant patients	8	2	75
Total number of cases (all studies)	503	91	82

* Excluding duplicate and excluded cases

TABLE 3 – Number of cases reported by respondents in 2012

Number of cases	% Respondents
0	87.2
<5	12.3
5–10	0.3
>10	0.2

a response rate of 82% on detailed questionnaires (Table 2). The CPSP offers an opportunity for international collaboration with other paediatric surveillance units worldwide and a chance to make a difference in the health and well-being of Canadian children and youth.

Individual researchers are encouraged to submit proposals for new studies that meet the Criteria for Inclusion, and follow the Format for Submission, available on the CPSP website at www.cpsp.cps.ca/apply-proposez. The Steering Committee reviews submissions at its spring and fall meetings, giving preference to studies that have either strong scientific and public health importance or those that could not be undertaken any other way. Following the review, studies must receive ethical approval and have external funding arrangements in place before final acceptance to the program. Researchers interested in obtaining more information about the program are encouraged to visit the website, www.cpsp.cps.ca, or contact the manager of surveillance at cpsp@cps.ca.

One-time survey questions

The CPSP is also available to investigators as a cost-effective tool to survey participants on a one-time basis to identify the prevalence of a problem or answer a specific question. Once approved by the CPSP Steering Committee, the one-time survey is sent to all participants with the monthly initial reporting form. Collected results are forwarded to the investigator for data analysis.

Results of the 2012 one-time survey questions are found on pages 43–45, and the list of surveys completed to date can be accessed at www.cpsp.cps.ca/surveillance/one-time-surveys.

Glossary of terms for tables of cases in each study results

Reported: Reports of cases received

Duplicates: Cases reported by more than one participant

Excluded: Cases not meeting the case definition

Pending: Detailed reports not received or not yet confirmed

Confirmed: Cases verified as meeting the case definition

CPSP Principal Investigators

Surveillance studies in 2012



Dr. Shalini Desai
Acute flaccid paralysis



Dr. Ellen Goldbloom
Adrenal suppression



Margaret Zimmerman
*Adverse drug reactions –
serious and life-threatening*



Dr. Christina Grant
*Conversion disorder in
children and youth*



Dr. Daphne Korczak
*Early-onset major
depressive disorder*



Dr. Michael Sgro
*Early-onset neonatal
sepsis and meningitis
and
Neonatal
hyperbilirubinemia –
severe (2011–2013)*



Dr. Gudrun Aubertin
Fragile X syndrome



Dr. Carolyn E. Beck
*Intravenous fluid-related
symptomatic acute
hyponatremia*



Dr. Bruce Crooks
*Langerhans cell
histiocytosis*



Dr. Raphael (Ralph) Folman
*Obesity-hypoventilation
syndrome (Pickwickian
syndrome) in children*



Dr. Paul Dancey
Periodic fever syndromes



Dr. Elizabeth Sellers
*Persistent albuminuria
in the paediatric
population with type 2
diabetes mellitus*



Dr. Joan Robinson
*Respiratory syncytial
virus infections in
paediatric transplant
patients*

Surveillance Studies in 2012

Acute flaccid paralysis

January 1996 to December 2013

S Desai, T Smith

Highlights 2012

- Vigilant surveillance of acute flaccid paralysis (AFP) is essential in light of ongoing transmission of wild poliovirus in countries around the world.
- Guillain-Barré syndrome (GBS) is the most frequent diagnosis for AFP in Canada.
- Canada's AFP surveillance continues to work toward World Health Organization (WHO) targets for AFP detection, stool specimen collection and follow-up for residual paralysis.
- The CPSP is actively reviewing current AFP surveillance and how this process can be enhanced.

Background and objectives

The complete protocol can be accessed at www.cpsp.cps.ca/surveillance.

Case definition

Acute onset of focal weakness or paralysis characterized as flaccid (reduced tone) without other obvious cause (e.g., trauma) in children less than 15 years of age. Transient weakness (e.g., postictal weakness) does not meet the case definition.

Results

There were 46 notifications of AFP through the CPSP to the Public Health Agency of Canada with onset in 2012, which included 33 confirmed cases. Approximately 43% of all reports came from the CPSP network and 57% from IMPACT. Three AFP reports were excluded because they did not meet the case definition based on age criteria.

Reported	Duplicates	Excluded	Pending	Confirmed
46	2	4	7	33

An additional case was excluded due to loss to follow-up. The 33 confirmed cases represent a non-polio AFP detection rate of 0.59/100,000 in children younger than 15 years of age (Table 2). As documented in previous years, Canada's annual AFP incidence rate has been artificially low due to delays in receiving detailed case report forms in the reporting calendar year. Because this study is ongoing, AFP delayed reporting occurs and the figures are adjusted accordingly once detailed case report forms have been received.

In 2012, AFP cases ranged in age from one month to 11 years (median 4.6 years, mean 5.0 years), with the majority of cases between two and seven years of age. A total of 58% of AFP cases were male and 42% were female.

Among the AFP cases reported in 2012, documentation of age-appropriate polio immunization was found to be incomplete: 12 cases (36%) had documented receipt, six cases (18%) were recorded as "up-to-date" with no further information, and the remaining 15 cases (46%) included no information on immunization. Vaccine uptake rates of inactivated poliovirus vaccine (IPV) in Canada are estimated to be approximately 85% for four doses or more among seven-year-olds, based on preliminary data from the 2011 Childhood National Immunization Coverage Survey (unpublished data).

Investigation for polio virus, other enteroviruses or *Campylobacter*

Virological investigation included testing of stool specimens for 16 cases (48%), cerebrospinal fluid (CSF) for 15 cases (46%), and throat swabs for nine cases (27%). Where stool was collected, 88% had an adequate sample taken within 14 days of the onset of paralysis. For the remaining cases, stool collection happened later, once the sensitivity of enterovirus isolation was lower. Overall, 42% (n=14) of cases had an adequate stool sample collected within 14 days of the onset of paralysis (Table 2). None of the samples collected in 2012 were positive for polioviruses. Testing was also conducted for *Campylobacter* in 15 cases (46%) and this bacterium was not isolated in any of the samples.

Surveillance Studies in 2012

Neurological investigations

In 2012, all cases underwent at least one type of neurological investigation (CSF examination, nerve conduction studies/electromyography, MRI/CT scan). The most frequently used investigative methods were nerve conduction studies/electromyography exams (82%) and MRI/CT scans (82%). Of these tested cases, approximately 46% had abnormal CSF chemistry results, 96% had abnormal electromyography and/or nerve conduction studies and 85% had an abnormal MRI or CT scan. As observed in previous years, the majority of AFP cases (26, 79%) were diagnosed as GBS, three of which were Miller-Fisher variants. The remaining seven cases were diagnosed as acute disseminated encephalomyelitis (n=3) and other (n=4).

Hospitalization and outcome

All confirmed AFP cases reported in 2012 required hospitalization. Except in four cases with unknown length of stay, length of hospital stay ranged from two to 43 days (median eight days, mean 11 days). Outcome at the time of the initial report was documented in 29 cases (88%): three (10%) fully recovered, 20 (69%) partially recovered with residual weakness or paralysis, five (17%) were not fully recovered, and one case (4%) died. The death occurred in a one-month-old with a diagnosis of spinal muscular atrophy (Type 1). In this case, a stool sample was taken within 14 days of paralysis onset and tested negative for polio. Additional EMG testing subsequently confirmed the diagnosis. Only seven cases (21%) had clinical outcome reported at 60 days, including five cases who had fully recovered and two with partial recovery (i.e., some residual weakness or paralysis).

Discussion

The majority of cases of poliomyelitis are asymptomatic. A small percentage of cases, approximately 4% to 8%, may manifest as a nonspecific fever and sore throat. Approximately 1% of cases develop paralytic poliomyelitis. Symptoms of this form of polio include severe muscle pain and stiffness of the back and neck; rapid onset of asymmetric acute flaccid paralysis may occur. There is usually a fever present at the onset of illness and the paralysis depends on the location of nerve cell infection. If poliomyelitis is suspected, further consultation with a neurologist and infectious diseases specialist would be prudent.

As a result of the Global Polio Eradication Initiative (GPEI), the annual number of paralytic polio cases has been on the decline since 1988.¹ In 2012, there were 223 cases of wild poliovirus reported in five countries. India has been polio-free since January 2011, leaving only three countries with ongoing endemic transmission (Afghanistan, Nigeria and Pakistan). The GPEI's current aim is the cessation of wild poliovirus transmission by the end of 2014 and global polio-free certification by the end of 2018. Until this is achieved, AFP surveillance is a core program that assists in monitoring Canada's polio-free status.

While health authorities are confident that there is no circulating polio in this country, the recommended target for non-polio AFP incidence rate (1.0/100,000) has only been met three times since AFP surveillance began in 1996 (in 1999, 2000 and 2009). The targets for stool testing (in 80% of cases) and 60-day follow-up (in 80% of cases) have never been met. To examine this issue more closely, the Public Health Agency of Canada and the Canadian Paediatric Society conducted a study comparing AFP surveillance systems used by other member countries of

TABLE 2 – Measure of WHO AFP surveillance targets in Canada, 1996–2012

Year	Number of cases	Incidence rate*	% with adequate stool sample†	% with 60 days follow-up‡
1996	27	0.45	18.5	70.4
1997	35	0.59	28.6	45.7
1998	43	0.72	25.6	46.5
1999	60	1.01	33.3	33.3
2000	64	1.09	45.3	37.5
2001	52	0.89	36.5	38.5
2002	44	0.75	31.8	34.1
2003	44	0.76	34.1	22.7
2004	38	0.66	44.7	28.9
2005	53	0.93	26.4	32.1
2006	39	0.69	20.5	43.6
2007	50	0.89	42.0	46.0
2008	42	0.75	33.3	42.9
2009	59	1.05	30.5	49.2
2010	47	0.84	34.0	55.3
2011	43	0.76	32.6	48.8
2012	33	0.59	42.0	18.2

* Incidence rate per 100,000 population; WHO target: 1.0/100,000

† Adequate stool sample refers to one stool sample taken within 14 days of paralysis onset; WHO target: 80%

‡ WHO target: 80%

the International Network of Paediatric Surveillance Units. Findings from this study are already informing planned system improvements, including a revision of the case report form in 2013.

Publications and presentations

Smith T, Desai S, Grenier D, Altpeter E, Beeli D, Dickson N, Thorley B, Sabbe M, Elliot E, Zurynski Y. Does active surveillance of acute flaccid paralysis by the International Network of Paediatric Surveillance Units meet WHO standards? Canadian Immunization Conference, Vancouver, December 2012. (Poster presentation)

Acknowledgements

The contributions of Kelly Mansfield and Myriam Saboui are greatly appreciated.

Reference

1. Global Polio Eradication Initiative. www.polioeradication.org

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Adrenal suppression

April 2010 to March 2012 – Final report

E Goldbloom, A Ahmet, S Abish, S Benseler, E Cummings, H Huynh, A Mokashi, A-M Ugnat, W Watson

Highlights

- During the two years of surveillance, 44 paediatric cases of symptomatic adrenal suppression (AS) were confirmed.
- Adrenal crisis, a condition with significant morbidity, occurred in six cases.
- The most common presentations were growth failure and non-specific symptoms.
- The predominant form of glucocorticoid (GC) treatment in most cases was inhaled corticosteroids (ICS) – often in high but commonly prescribed doses. Many were treated with more than one form of GC (e.g., inhaled and intranasal).
- There were no reported cases of AS being treated with intranasal or topical GCs alone.

Background and objectives

The complete protocol can be accessed at www.cpsp.cps.ca/surveillance.

Case definition

Report any new patient less than 18 years of age treated with any form of GC therapy with evidence of adrenal suppression defined as:

- Adrenal crisis, an acute critical illness out of proportion in severity to the current illness and manifested by any of the following:
 - Hypotension/shock
 - Decreased level of consciousness/lethargy
 - Unexplained hypoglycemia or hyponatremia
 - Seizure
 - Death

or

- Symptomatic* adrenal insufficiency with supportive biochemical evidence

* Signs/symptoms can include anorexia, weakness, fatigue, lethargy, fever, gastrointestinal symptoms (nausea, vomiting, constipation, diarrhea, abdominal pain), morning headache, hypoglycemia, myalgia, arthralgia, psychiatric symptoms and growth failure.

Exclusion criteria

Adrenal insufficiency unrelated to GC therapy, including adrenocorticotrophic hormone (ACTH) deficiency due to hypothalamic or pituitary gland abnormalities, and primary adrenal disorders, such as:

- Congenital adrenal hyperplasia
- Autoimmune adrenalitis or polyglandular syndromes
- Adrenal hypoplasia congenita
- ACTH resistance syndromes
- Metabolic disorders (adrenoleukodystrophy, peroxisome biogenesis disorders, cholesterol metabolism, mitochondrial disorders)
- Infectious disorders (sepsis, tuberculosis, fungal infections, viral infections)
- Infiltrative/destructive causes (hemorrhage, amyloidosis, sarcoidosis, metastases)
- Drugs inhibiting steroid biosynthesis (e.g., ketoconazole, etomidate, suramin, aminoglutethimide, metyrapone)

Results

In the two years of surveillance, 113 cases of symptomatic AS were reported. Forty-seven cases were excluded for the following reasons: asymptomatic AS (n=31), not meeting inclusion criteria (n=13), physician did not have

Year	Reported	Duplicates	Excluded	Pending	Confirmed
2010*	42	4	15	1	22
2011	62	3	29	11	19
2012†	9	0	3	3	3
Total	113	7	47	15	44

* April 1 to December 31, 2010

† January 1 to March 31, 2012

patient information (n=2), and physician withdrew the report (n=1). A total of 44 cases have been confirmed to date. The reporting rate for completion of the detailed questionnaire was 87%. The estimated minimal annual incidence of symptomatic AS is 0.34/100,000 children aged 0 to 18 years (95% CI 0.25–0.45).

Demographics

Of the 44 confirmed cases of symptomatic AS, 28 (64%) were male. The mean age at diagnosis of AS was 8.63 years (range 0.12–17.93 years, three missing). Thirty-nine patients were Caucasian, and the other five were Mexican/Caucasian, Asian/Caucasian, Asian, East Indian and Sri Lankan. The underlying conditions requiring GC treatment are listed in Table 2. Twenty cases (45%) were from Ontario, 17 (39%) from Quebec and the remaining seven (16%) from British Columbia, Alberta, New Brunswick and Nova Scotia. They presented in a physician's office or clinic (31 cases, 77%), in an emergency department (four cases, 10%), on an inpatient unit (two cases, 5%) or in a paediatric intensive care unit (one case, 3%). Data regarding presentation setting was missing in two cases.

Glucocorticoid therapy

Thirty-six children (82%) received inhaled corticosteroids alone or in combination with other GC forms (Table 3). Eight children received primarily systemic GCs: a combination of intravenous and oral GCs (n=4) and oral only (n=4). The specific types, doses and treatment durations of GCs were variable and were not consistently reported. The most commonly reported inhaled corticosteroid was fluticasone, usually in doses of 500 mcg/day for a period of months to years.

Presentation

Of the 44 confirmed cases of symptomatic AS, the most common presentations were growth failure and non-specific symptoms (e.g., fatigue, nausea, myalgia). Six cases (14%) had adrenal crisis. The presenting symptoms and signs of the remaining cases are described in Table 4.

Physical activity

The underlying condition requiring GC therapy caused a decrease in physical activity in 14 (32%) children. The GC therapy caused a decrease in physical activity in six (14%) children. Ten (23%) experienced a weight gain on GC therapy.

Outcome and management

After confirmation of AS, 23 (52%) children were treated with GC replacement, four (9%) were not, and this information was either missing or unknown for 17 (39%) children. The reporting physician consulted a paediatric endocrinologist in 28 cases (64%), did not consult in four cases (9%), and this information was missing in

TABLE 2 – Conditions requiring glucocorticoid treatment

Conditions	Number of cases (%)
Asthma alone	30 (69)
Asthma and atopy	4 (9)
Malignancy	2 (5)
Eosinophilic esophagitis	2 (5)
Asthma and croup	1 (2)
Asthma, subglottic stenosis and atopy	1 (2)
Arthritis	1 (2)
Vasculitis	1 (2)
Inflammatory bowel disease and arthritis	1 (2)
Bronchopulmonary dysplasia	1 (2)

TABLE 3 – Types of ICS therapy, alone or in combination (n=36)

Conditions	Number of cases (%)
ICS alone	12 (33)
ICS + oral	8 (22)
ICS + intranasal	6 (17)
ICS + intranasal + short course oral	7 (19)
ICS + oral + topical	1 (3)
ICS + topical ICS (for eosinophilic esophagitis)	2 (6)
TOTAL receiving ICS	36 (82% of total cases)

ICS = inhaled corticosteroids

TABLE 4 – Presenting symptoms and signs (n=44)

Symptoms and signs	Number of cases (%)
Adrenal crisis	6 (14)
Growth failure alone	16 (36)
Non-specific symptoms* alone	11 (25)
Growth failure and non-specific symptoms	6 (14)
Cushings syndrome	3 (7)
Prolonged upper respiratory tract infection	1 (2)
Secondary diabetes and non-specific symptoms	1 (2)

* Non-specific symptoms include one or more of the following: fatigue, lethargy, nausea, anorexia, vomiting, abdominal pain or myalgia.

Surveillance Studies in 2012

12 (27%) cases. Of those with hospital stay information provided (18 cases, 41%), 14 were managed as outpatients and four were hospitalized. Two were treated in the paediatric intensive care unit.

Conclusion

The minimal estimated incidence of symptomatic AS is 0.34/100,000 children up to 18 years. Importantly, this incidence is for the entire paediatric population. The number would be higher if only the at-risk group (i.e., children treated with GCs) was the denominator.

A large proportion of patients presented with growth failure and/or non-specific symptoms. This underlines the importance of close monitoring of children's growth and potential symptoms associated with AS. The lack of consistent, specific signs and symptoms for AS means that many cases may not be recognized without proactive screening. Six patients presented with adrenal crisis, demonstrating the potential morbidity associated with this condition.

Symptomatic AS was reported more commonly in boys. This result could be attributable to referral bias (i.e., short stature or poor growth being identified more commonly in boys) or to more boys being treated with inhaled corticosteroids because asthma is more prevalent in boys. Most reported cases involved inhaled corticosteroids – usually fluticasone – at high but commonly used doses (500 mcg/day). To reduce the risk of AS, physicians must be aware of the potential side effects of asthma therapy and revisit GC doses frequently to ensure that patients are being treated with the lowest effective dose. Almost half the cases were treated with some combination of inhaled, intermittent oral and intranasal GCs, with the inhaled GC dose being 500 mcg/day or less in 48% of cases. It is therefore important to consider the cumulative GC dose when assessing for risk of AS. Despite the relative rarity of eosinophilic esophagitis, which is treated with topical GC (i.e., swallowed ICS), the fact that two cases were diagnosed may suggest that this population is a high-risk group.

Further studies are needed to assess screening methods and to further evaluate risk factors and duration of suppression. Studies evaluating AS in specific populations (e.g., rheumatology patients, patients with eosinophilic esophagitis) are currently underway.

Publications and presentations

Goldbloom EB, Ahmet A. Adrenal suppression: An under-recognized complication of a common therapy. *Paediatr Child Health* 2010;15(7):411–2

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Adverse drug reactions – serious and life-threatening

January 2004 to December 2013

M Zimmerman

Highlights 2012

- The study confirmed 31 suspected paediatric adverse reaction (AR) cases.
- Product groups most commonly associated with suspected adverse reactions were antibacterial agents, antiepileptics and psychoanaleptics.
- A natural product, fenugreek, received via breast milk, was suspected by the reporter to have caused a dystonic reaction.

Background and objectives

The complete protocol can be accessed at www.cpsp.cps.ca/surveillance.

Case definition

Report serious and life-threatening adverse reactions* in an infant or child up to the age of 18 years, associated with the use of prescription, non-prescription, biological (immunoglobulin) products, complementary medicines (including herbals) and radiopharmaceutical products.

* Noxious and unintended severe response to a health product, which occurs at any dose and results in emergency observation, hospitalization, persistent or significant disability or death.

Exclusions

Do not report reactions to medical devices, blood products (platelets, red cells and single-donor plasma), vaccines, poisonings or self-administered overdoses.

Results

From January 1 to December 31, 2012, 50 cases of suspected serious adverse drug reactions (ADRs) were reported and 31 cases were confirmed as meeting the case definition. On average, 53 reports per year were received from 2007 to 2011. The number of reports received in 2012 is consistent with this trend.

Reported	Duplicate	Excluded	Pending	Confirmed
50	0	5	14	31

Of the 31 confirmed cases, 13 were male and 18 were female, ranging in age from nine months to 17 years. By age group, an equal number of reports involved children aged six to 12 years and adolescents aged 13 to 17 years (n=14 each group), followed by cases involving children five years of age or younger (n=3). Table 2 compares age distribution for confirmed cases over the last six years.

	2012 (n=31)	2011* (n=29)	2010* (n=32)	2009* (n=51)	2008 (n=40)	2007 (n=45)
Up to 5 years of age	3	9	6	14	15	9
6 to 12 years	14	7	15	16	14	16
13 to 17 years	14	13	10	21	11	18
Not reported	0	0	1	0	0	2

* The number of cases has been adjusted to reflect delayed reports not included in the *CPSP Results* publication.

All 31 confirmed cases were classified as serious, with more than one reason for seriousness reported in nine cases. Table 3 compares the reasons for seriousness reported over the last six years.

Information on patient outcome was provided for 29 of 31 confirmed cases, as follows: recovered (n=22); recovering/resolving (n=3); not yet recovered (n=3); death (n=1).

The one fatal report involved a youth who developed hepatitis and metabolic acidosis suspected with the use of carbamazepine and levetiracetam to treat a seizure disorder. The patient had been taking both drugs for several years. During a hospitalization, the patient suffered a cardiac arrest and died four days after admission. Concurrent conditions included microcephaly with basal ganglia calcifications and spastic quadriplegia.

Surveillance Studies in 2012

Most reports described reactions documented in standard drug references for the health products suspected, based on Canadian approved product monographs. Three reports involved reactions not described in standard drug reference sources: (1) optic neuritis in a seven-year-old female with the use of somatropin for the treatment of Turner syndrome; (2) dystonic reaction in a 10-month-old male infant with exposure to a natural health product, fenugreek, via breast milk (the indication using fenugreek by the mother was not reported); and (3) withdrawal syndrome from oral baclofen (including hyperthermia, hypermetabolic state and rhabdomyolysis with acute renal failure) in an 11-year-old male; in this case the symptoms experienced are labelled for withdrawal from intrathecal baclofen but not for withdrawal of oral administration.

Suspected health products

Table 4 lists the health products described in 31 reports, sorted by number of reports received for each individual product. In 22 reports, a single product was suspected of causing the reaction(s). Two suspected products were reported in six cases and four suspected products were reported in two cases. The class of health products most frequently suspected of causing adverse reaction(s) was antibacterial agents (n=10), followed by antiepileptics (n=8) and psychoanaesthetics (n=7: six antidepressants, one psychostimulant for the treatment of attention-deficit hyperactivity disorder). The classes of health products most frequently involved have varied somewhat with each year of the program but the top three have generally included the classifications listed above.

Conclusion

The classes of health products most frequently suspected of causing the adverse reaction(s) in 2012 were antibacterial agents, antiepileptics and psychoanaesthetics. All of these health products are used frequently in the treatment of paediatric patients. While the reactions described in most cases are documented in Canadian-approved product monographs, three cases involved reactions not previously documented in standard drug references.

Continued sharing of AR reports through the CPSP helps to ensure the safety of health products used in children.

Caveat: Adverse reactions (ARs) to health products are considered to be suspicions, as a definite causal association often cannot be determined. Spontaneous reports of ARs cannot be used to estimate the incidence of ARs because ARs remain under-reported and patient exposure is unknown.

ADR Tips of the Month

The "ADR Tip of the Month" is an educational tool on adverse drug reaction topics, sent to participants on a monthly basis to build support and awareness of the study on adverse drug reactions, facilitating case ascertainment and impacting new information relating to the study or broader ADR surveillance topics. (See www.cpsp.cps.ca/publications/adr-tips-of-the-month for a complete list with hyperlinks.)

Principal investigator

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TABLE 3 – Annual comparison of reasons for seriousness of confirmed cases

	2012 (n=31)	2011 (n=31)	2010 (n=32)	2009 (n=45)	2008 (n=35)	2007 (n=41)
Death	1	1	0	1	3	2
Life-threatening	11	11	6	14	12	9
Hospitalization	20	18	19	28	18	19
Disability	2	4	2	3	0	0
Medically important condition*	13	17	18	21	12	11

* A medically important reaction is defined as one that may not be immediately life-threatening or result in death or hospitalization but may jeopardize the patient or may require intervention to prevent one of these other outcomes from occurring.

TABLE 4 – Suspected health products in AR reports (n=31) in 2012

Suspected health product	# Times reported (n=42)
Acetaminophen/pseudoephedrine/chlorpheniramine suspension*, amoxicillin, ampicillin, atomoxetine, baclofen, cyclosporine, doxycycline, drospirenone/ethinyl estradiol†, duloxetine, fenugreek, gentamicin, hydrochlorothiazide, ketorolac, lansoprazole, levetiracetam, levonorgestrel/ethinyl estradiol†, lidocaine with epinephrine 2%, linezolid, methimazole, morphine, piperacillin, pregabalin-tazobactam, propofol, quetiapine, somatropin, sufentanil, valproic acid, vancomycin	1 (n=28)
Amitriptyline, cefazolin, sertraline	2 each (n=6)
Methotrexate	3 (n=3)
Carbamazepine	5 (n=5)

* Combination cough/cold product

† Combination oral contraceptives

Conversion disorder in children and youth

September 2011 to August 2013

C Grant, C Krasnik, J Cairney, A Chapman, M Connolly, S Findlay, O Jamouille, A Kam, E Lipman, R MacNay, B Meaney

Highlights 2012

- The majority of the 45 confirmed cases are female, which is consistent with the literature.
- The average age of confirmed cases is 13.7 years with a range of 8–18 years.
- Antecedent stressors were reported in 95% of youth.

Background and objectives

The complete protocol can be accessed at www.cpsp.cps.ca/surveillance.

Case definition

Report any new patient less than 18 years of age with suspected or diagnosed conversion disorder* defined as the persistent appearance of symptoms/signs that affect the patient's:

- Voluntary motor function (e.g., weakness, abnormal gait or movements, difficulty with swallowing or loss of speech) **and/or**
- Sensory function (e.g., loss or diminished sensation of touch, sight, or hearing) **and/or**
- Non-epileptic seizures ("pseudoseizures" or "psychogenic seizures")

and suggest a neurological or medical disease/condition

and

- May be accompanied by psychological factors at presentation
- Cause significant distress and/or impairment in daily activities, such as self-care, school, play, peer and family relationships and/or activities

and

- Cannot be adequately explained by a medical condition, substance abuse, or other mental disorder according to the clinical judgment of the treating physician after a comprehensive physical exam and appropriate investigations
- Show no evidence that they have been intentionally produced

* If the diagnosis is uncertain or awaiting confirmation, the case should still be reported.

Exclusion criteria

Patients who have predominantly or exclusively symptoms that are secondary to substance abuse; intentionally produced; secondary to pain disorder, somatization disorder or fatigue; due exclusively to another psychiatric disorder, such as depression, psychosis or tic disorder diagnosed by a child psychiatrist

Results

There were 45 confirmed cases of CD with onset in 2012. Of these, 27% were male and 73% female; with an average age of 13.7 years (range 8–18 years). Approximately 20% of cases were children 10 years of age or younger, and only one of these eight children was male.

Reported	Duplicate	Excluded	Pending	Confirmed
96	4	4	43	45

Demographically, 58% of cases originated in Ontario, 13.3% in Quebec, 22% in Western Canada (AB and BC). The remaining 7% of cases were in Atlantic Canada (NS, PE, NL). In terms of ethnicity, 75% of cases were Caucasian, 9% were Black, 7% were First Nations, with the remaining 9% being Asian, Middle Eastern and of unknown origin.

Surveillance Studies in 2012

Presentations were clinically complex, with 87% having multiple conversion symptoms. Symptoms vary widely across the spectrum but can include altered motor function, altered sensation, altered or loss of consciousness, visual changes, speech disturbances and dizziness. The most common presentations were disturbance of voluntary motor function (56%), pseudo-seizures (42%), sensory symptoms (38%), visual deficits (27%), speech disturbance (11%) and hearing deficits (7%).

Hospital admission in order to determine diagnosis was required for the majority of cases (63%), with an average stay of 21.5 days (range 1–110; SD \pm 27.6 days). The average number of subspecialists involved in the diagnostic work-up of these youth was approximately five. Antecedent stressors (family conflict, academic pressure, peer pressure, abuse) were reported in 95% of cases, and a prior history of mental health concerns in 44%. Thirty-eight percent (38%) of cases were associated with a positive family history of anxiety or depression. In terms of functional impairment, approximately 70% of affected adolescents had missed school an average of 36 ± 53 days (range 1–180).

Psychotropic medications for anxiety or depression had been previously prescribed in approximately 33% of patients. The average duration of symptoms, from time of onset to diagnosis, was between one and six months, with most cases confirmed by the six-month timepoint.

Conclusion

Conversion disorder is a significant burden for affected adolescents, their families, and the Canadian health system. Gender preponderance and age data are consistent with the literature to date. Preliminary data suggest an association of CD with anxiety and depression, and highlight the potential impact of life stressors. Interestingly, identifiable stressors (in 95% of cases) are significantly higher than the 60% to 70% range reported in the literature. The types of stressors reported are consistent with the Australian paediatric surveillance study.

Publications and presentations

Krasnik C, Grant C. Conversion disorder: Not a malingering matter. *Paediatr Child Health* 2012;17(5):246

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Early-onset major depressive disorder

January 2012 to December 2014

D Korczak, M Feldman, J LeBlanc, M Ofner, P Parkin, S Wong

Highlights 2012

- In the first year of surveillance, eight cases of early-onset major depressive disorder (EOMD) were confirmed.
- Most cases were significantly impaired in all functional domains.
- Cases had a 1:1 male to female ratio, consistent with the literature.
- Most children had been symptomatic for more than six months before presentation.
- There was a considerable range of psychopharmacological medications prescribed to treat depression.

Background and objectives

The complete protocol can be accessed at www.cpsp.cps.ca/surveillance.

Case definition

Report any child aged 5 to 12 years of age inclusively, seen in the previous month, with newly diagnosed early-onset major depressive episode, including children with unipolar mood disturbances sufficient to cause a disruption to social, family and/or academic functioning.

“Major depressive episode” is defined in DSM-IV-TR as:

- 1) Depressed or irritable mood, most of the day, nearly every day,

or

- 2) Markedly diminished interest or pleasure in all, or almost all, activities most of the day, which is either newly present or has clearly worsened compared with the child’s pre-episode status.

and

At least **four** of the following seven symptoms present during the same two-week period as either (1) **or** (2) above. These symptoms occur daily or near daily and represent a distinct change from previous functioning.

- 1) Significant weight change, failure to make expected weight gains **or** significant appetite change.
- 2) Insomnia (difficulty falling asleep, night-waking or waking too early) **or** hypersomnia.
- 3) Psychomotor agitation **or** retardation: observable by others and does not represent subjective feelings.
- 4) Fatigue **or** loss of energy.
- 5) Feelings of worthlessness **or** excessive or inappropriate guilt (not merely guilt about being sick).
- 6) Diminished ability to think or concentrate, **or** indecisiveness.
- 7) Recurrent thoughts of death, recurrent suicidal ideation, **or** a suicide attempt.

and

Impairment in social functioning (social withdrawal, family or peer conflicts) or academic functioning (school refusal, decreased school performance), which is either *newly present or worsened* compared with pre-episode status.

Exclusion criteria

- 1) Symptoms due to the direct physiological effects of a substance or a general medical condition.
- 2) Symptoms occurring exclusively during acute bereavement period (within two months after the loss of a loved one). Note: This exclusion does not apply to palliative care patients.
- 3) A previous diagnosis of a manic episode or bipolar disorder.

Surveillance Studies in 2012

Results

In the first year of surveillance, 21 EOMD cases were reported, lower than the number of cases anticipated. As only eight cases have been confirmed to date, detailed results are premature. There was a 1:1 male to female ratio observed in the cases reported, consistent with the literature for this age group. Children with childhood-onset depression were generally globally impaired in all functional domains. Six out of eight (75%) children with depression had reported having distressing symptoms of illness for more than six months before presentation. Following confirmation of depression, a variety of antidepressant pharmacological treatments were prescribed, including fluoxetine (n=5), with one case each prescribed citalopram, escitalopram, venlafaxine, quetiapine, amitriptyline, and two cases (25%) being prescribed more than one antidepressant, in combination. Analysis of the 11 pending cases will be important to identify the clinical features of EOMD more accurately, including duration of illness at presentation, common routes toward diagnosis, and current management approaches for Canadian children with this treatable illness.

Reported	Duplicate	Excluded	Pending	Confirmed
21	0	2	11	8

Publications and presentations

Korczak DJ. Identifying depression in childhood: Symptoms, signs and significance. *Paediatr Child Health* 2012;17(10):572

Principal investigator

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Early-onset neonatal sepsis and meningitis Neonates less than seven days of age

January 2011 to December 2012 – Final report

M Sgro, DM Campbell, S Lee, K Sankaran, D Tran, M Yudin

Highlights

- During the two years of surveillance, 73 cases of early-onset neonatal sepsis and meningitis (NSM) were confirmed.
- Antibiotic prophylaxis during labour was given to 38% of mothers.
- Group B *Streptococcus* (48%) and *E. coli* (31%) accounted for the vast majority of cases.
- There appear to be very few cases of sepsis caused by other types of bacteria.

Background and objectives

The complete protocol can be accessed at www.cpsp.cps.ca/surveillance.

Case definition

Report any neonate less than seven days of age presenting with one of the following:

- Positive blood culture*

and/or

- Positive cerebrospinal fluid (CSF) culture* from a lumbar puncture (LP)

Neonates with possible nosocomial infections should also be reported.

* Culture growth includes bacterial or fungal pathogens

Exclusion criteria

- 1) Neonates who are asymptomatic with positive culture, such as coagulase-negative *Staphylococcus*, diphtheroids, *Corynebacterium* spp., *Bacillus* spp., *Propionibacterium* spp., *Aerococcus* spp., *Micrococcus* spp.
- 2) Positive CSF from a drain, reservoir, shunt or intracranial surgical procedure

Results

During the two years of surveillance, 196 cases of early-onset neonatal sepsis and meningitis were reported. Of these, 73 were confirmed, 17 were excluded for not meeting the case definition, seven were duplicates and 99 are pending review. The 73 confirmed cases were predominantly from Quebec (n=24), Ontario (n=21), and British Columbia (n=10), while six other provinces and one territory each reported less than seven cases (AB, SK, MB, NB, NS, NL, NU).

Year	Reported	Duplicate	Excluded	Pending	Confirmed
2011	109	1	7	40	61
2012	87	6	10	59	12
Total	196	7	17	99	73

All affected infants were born between 24 and 41 weeks gestation, with a mean gestational age of 35 weeks and three days and a mean birth weight of 2,624 g (range 560–4,249). The male to female ratio is 1.3:1 (41 males, 32 females). Maternal group B *Streptococcus* status was positive in 12 cases (16%), negative in 30 cases (41%), and unknown in 31 cases (42%); however, 28 mothers (38%) received antibiotic prophylaxis.

Bacteria were confirmed primarily from blood cultures (n=56), and positive cerebrospinal fluid cultures were also reported in five cases. Initial data analysis suggests that group B *Streptococcus* (48%) and *E. coli* (31%) were the most commonly reported positive bacterial cultures. There appear to be very few cases of positive cultures caused by other bacterial organisms.

Conclusion

In Canada, the organisms predominantly responsible for early-onset neonatal sepsis and meningitis continue to be group B *Streptococcus* and *E. coli*. In the era of maternal antibiotic prophylaxis, it appears that the proportion of organisms causing this serious neonatal infection is shifting significantly. The rate of *E. coli* sepsis is increasingly similar to that of group B *Streptococcus* sepsis. Early indicators from this surveillance study suggest a need to re-evaluate maternal antibiotic prophylaxis strategies for women in labour to better reflect the changing proportions of organisms causing early-onset neonatal sepsis and meningitis.

Publications and presentations

Sgro M, Yudin MH, Lee S, Sankaran K, Tran D, Campbell DM. Early-onset neonatal sepsis: It is not only group B streptococcus. *Paediatr Child Health* 2011;16(5):269

Sgro M. Neonatal sepsis and the changing patterns of infection. Paediatric Update, Canadian Paediatric Society Annual Conference, Quebec City, June 2011. (Oral presentation)

Sgro M. Early-onset neonatal sepsis in industrialized countries. Global Health Symposium – Group B streptococcal sepsis in newborns: An international expert panel discussion on the global burden and opportunities for prevention, The Hospital for Sick Children, Toronto, October 2011. (Oral presentation)

Sgro M. Physical examination of the newborn and group B *Streptococcus*. Midwifery Clinical Skills Course, Ryerson University, Toronto, November 2012. (Oral presentation)

Bacterial organism	Frequency (%)
<i>Bacillus mannanilyticus</i>	1 (2)
Coagulase-negative <i>Staphylococcus</i>	2 (3)
<i>E. coli</i>	23 (31)
<i>E. faecalis</i>	1 (2)
Group A <i>Streptococcus</i>	1 (2)
Group B <i>Streptococcus</i>	35 (48)
<i>H. influenzae</i>	3 (4)
<i>S. anginosus</i>	1 (2)
<i>S. epidermidis</i>	1 (2)
<i>S. mitis</i>	1 (2)
<i>S. pneumoniae</i>	2 (3)
<i>S. viridans</i>	1 (2)
Unknown	1 (2)

Principal investigator

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Fragile X syndrome

April 2012 to March 2014

G Aubertin, J Down, G Graham, T Nelson, M Ofner, C Paribello

Highlights 2012

- In the first nine months of surveillance, seven cases of fragile X syndrome (FXS) were confirmed.
- An early diagnosis can lead to earlier intervention and supports.
- Confirmation of FXS in a child is important because it allows accurate genetic counselling for parents on the risk of having another affected child.

Background and objectives

The complete protocol can be accessed at www.cpsp.cps.ca/surveillance.

Case definition

Report any new patient less than 18 years of age with diagnosed fragile X syndrome (FXS) meeting the following criteria:

- 1) **Genetic criteria:** Males or females, with laboratory confirmation of a CGG-repeat allele in the full mutation size range (>200 repeats), including mosaicism

and

- 2) **Clinical criteria, one** of the following:
 - Global developmental delay, manifesting as the clinical impression of delays in two or more domains of development **or**
 - Intellectual disability, mild, moderate or severe, diagnosed through standardized psychological testing **or**
 - Asymptomatic infant, tested because of a positive family history, including prenatally diagnosed cases.

Exclusion criteria

Clinical evidence of global developmental delays or intellectual disability with laboratory confirmation of a CGG-repeat allele in the normal or premutation size range.

Results

In the first nine months of surveillance, there were 14 reported cases with 10 completed questionnaires. Of these, one was a duplicate report and two were excluded for already having been seen with an FXS diagnosis before the study start date. Because only seven cases have been confirmed to date, detailed results are premature. Of the cases confirmed, six were male, and gender was unspecified in one case. The youngest case was a 15-month-old boy whose mother was a known carrier. The remainder ranged in age from approximately three to 10 years. All cases were reported in central Canada (MB, ON, QC) and were ethnically diverse.

Reported	Duplicate	Excluded	Pending	Confirmed
14	1	2	4	7

So far, results suggest a lower number of newly diagnosed individuals with FXS than would be anticipated. To verify case ascertainment independently of this study's results, data will be sought from genetic laboratories performing FXS diagnostic testing to compare the number of cases reported to the CPSP with the number of positive laboratory tests being reported.

Conclusion

There is limited information in the medical literature on the demographics of FXS in Canada. This study aims to ascertain the incidence of new FXS diagnoses, along with data on demographics, clinical features, burden of illness and management approaches in Canada.

Surveillance Studies in 2012

It is important to increase paediatricians' awareness of FXS when assessing children with developmental delay, given two recent developments in the field. First, population screening – including newborn screening – is being endorsed by the National Institutes of Health (NIH) and the Centers for Disease Control and Prevention (CDC) in the United States. Second, advances in the understanding of molecular pathways underlying FXS have led to the study of newer pharmaceutical agents in clinical trials, giving rise to speculation that targeted therapies will become available to patients in the next few years.

Publications and presentations

Aubertin G. Fragile X in British Columbia: Past, present, future. International Fragile X Conference, Miami, July 2012. (Oral presentation)

Principal investigators

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Intravenous fluid-related symptomatic acute hyponatremia

March 2012 to February 2013 – Final report

CE Beck, K Choong, JN Friedman, D Hartfield, J Holland, J Lacroix, PS Puligandla

Highlights

- During the surveillance period, no cases of intravenous (IV) fluid-related symptomatic acute hyponatremia (HNA) were confirmed.
- Study results may reflect under-recognition, under-reporting, fear of medico-legal implications or a change in practice due to increased awareness around this issue.
- HNA is caused by excess free water intake (from hypotonic IV and oral solutions) combined with inability to excrete free water (e.g., due to antidiuretic hormone [ADH] effect).
- Hospitalized children are at risk for excess ADH secretion due to pain, nausea, infections, malignancies, anesthesia and several medications.
- Symptoms of acute hyponatremia stem from cerebral edema and range from headache, nausea, vomiting and muscle cramps, to lethargy, seizures, respiratory arrest and death from brainstem herniation.
- Hospital-acquired hyponatremia can be prevented by the empirical use of isotonic solutions (0.9% NaCl in D5W), regularly adjusting IV fluid content and volume based on the child's electrolytes, fluid status and oral intake, and by monitoring electrolytes daily in children receiving more than 50% of their maintenance fluids via IV.

Background and objectives

The complete protocol can be accessed at www.cpsp.cps.ca/surveillance.

Case definition

Report all children and youth less than 18 years of age, receiving IV fluid, who develop symptomatic acute hyponatremia during their hospitalization, including those who receive IV fluids from a referring hospital, during transfer, in the emergency department or operating room.

Symptomatic acute hyponatremia is defined as:

- 1) A fall in serum sodium from the normal range (135–145 mmol/L) to <130 mmol/L within 48 hours. (In the case of a previously healthy child hospitalized for elective reasons, in whom baseline laboratory values were not drawn, a serum sodium <130 mmol/L, within 48 hours of IV fluid initiation, will be accepted.)

and

- 2) Temporally accompanied by one or more of the following manifestation(s):
 - Seizures
 - Decreased level of consciousness
 - Loss of consciousness
 - Respiratory arrest
 - Cardiac arrest
 - Death

Exclusion criteria

- 1) Preterm infants <37 weeks
- 2) Patients on diuretic therapy
- 3) Patients with severe gastrointestinal losses (e.g., diarrhea, nasogastric or ostomy output >50% of total enteric intake or >15 mL/kg/day if *nil per os*)
- 4) Patients with cardiac or renal failure
- 5) Patients with known diabetes insipidus
- 6) Patients with diabetic ketoacidosis
- 7) Patients with chronic hyponatremia due to other etiologies

Surveillance Studies in 2012

Results

During the surveillance period, four cases of symptomatic acute hyponatremia (HNA) were reported.

Two cases were excluded because they were cases of hypernatremia, not hyponatremia, one was excluded because the initial serum sodium was just outside of the normal range (134 mmol/L), and the last case was

excluded due to a gap of more than 48 hours between the normal and low serum sodium levels.

Reported	Duplicate	Excluded	Pending	Confirmed
4	0	4	0	0

Despite its exclusion, the report where the initial serum sodium was low is nonetheless of interest because it involved a neonate transferred to a level III NICU for decreased level of consciousness following a sodium decline from 134 mmol/L to 126 mmol/L within three days. As is common practice for the newborn population, this baby was receiving 100% electrolyte-free water (plain D10W). The last excluded case also reported a neonate with a serum sodium of 124 mmol/L and decreased level of consciousness, although information on laboratory values and IV fluids received at the referring hospital were unavailable. IV fluid-related acute hyponatremia in the neonatal population is unstudied, and investigation into fluids use in the newborn group may be warranted.

Hypothetically, reasons for the small number of cases reported include: a failure to recognize or recall cases; a reluctance to report cases based on either medico-legal implications or anticipated difficulty with the data reporting form; or a decrease in incidence due to increasing awareness of the issue and resulting practice change.¹

A survey of United States paediatric residents conducted in 2009 revealed that the majority (78%) would prescribe hypotonic IV fluids to children hospitalized for a variety of hypothetical scenarios.² While the most commonly prescribed fluid was 0.45% NaCl (hypotonic), 35.6% of respondents would have used 0.2% NaCl (very hypotonic) fluid for six-month-old infants. While these results indicate that hospitalized children in the United States are still likely to receive a significant amount of free water via IV fluids, and therefore be at risk of developing acute hyponatremia, it is reassuring that residents who were aware of the clinical controversy (75.4%) were twice as likely to recommend isotonic fluids as those who were unaware.

Conclusion

In almost a year of surveillance in Canada, the CPSP study did not confirm any cases of HNA. For reasons cited above and with agreement from investigators, it was decided to conclude this study. The research team will continue to study HNA via alternative routes. If it is deemed necessary, this issue can be revisited in future.

Publications and presentations

Beck CE, Choong K, Puligandla PS, Hartfield D, Holland J, Lacroix J, Friedman JN. Avoiding hypotonic solutions in paediatrics: Keeping our patients safe. *Paediatr Child Health* 2013;18(2):94–5.

References

1. Friedman JN; Canadian Paediatric Society, Acute Care Committee. Risk of acute hyponatremia in hospitalized children and youth receiving maintenance intravenous fluids. *Paediatr Child Health* 2013;18(2):102–4.
2. Freeman MA, Ayus JC, Moritz ML. Maintenance intravenous fluid prescribing practices among paediatric residents. *Acta Paediatrica* 2012;101:e465–8.

Principal investigator

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Langerhans cell histiocytosis

July 2009 to June 2012 – Final report

B Crooks, D Dix, L Parker, S Weitzman

Highlights

- During three years of national surveillance, 66 cases of Langerhans cell histiocytosis (LCH) were confirmed, for a minimal estimated incidence of 22 cases per year in Canada, and a rate of 2.82 per million children per year.
- The average time to diagnosis was 13.6 weeks (range 0–104 weeks).
- Most patients saw multiple physicians before receiving a diagnosis.
- Presentations varied, with bony disease occurring in most cases (77%).
- Eight cases required salvage therapy; however, overall outcomes were good, with all cases surviving.

Background and objectives

The complete protocol can be accessed at www.cpsp.cps.ca/surveillance.

Case definition

Report any new patient presenting from birth to the 18th birthday with:

- Clinical LCH features that may include unexplained bone pain and soft tissue swelling, diabetes insipidus and hypothalamic-pituitary dysfunction, proptosis, recurrent otitis or otorrhoea, maculopapular rash or seborrhoeic dermatitis or diaper dermatitis resistant to treatment, interstitial pneumonitis or sclerosing cholangitis

and

- Either a) or b)
 - a) Biopsy-proven LCH, with lesional cells containing:
 - Birbeck granules demonstrated on electron microscopy and/or
 - CD1a positive cells and/or
 - Langerin-positive cells and/or
 - S100 positive cells with characteristic H&E histopathology
 - b) Lytic bony lesions or pituitary/hypothalamic lesions characteristic of LCH without biopsy where:
 - Risks of biopsy are considered too hazardous due to site of lesion
 - Lesion has shown characteristic spontaneous regression

Results

For this study, national surveillance of LCH was conducted using three parallel methods: the CPSP, the C17 network of paediatric haematology/oncology centres and other allied specialty physicians (orthopaedics, neurosurgery, ENT, dermatology, ophthalmology, endocrinology and pathology). From July 1, 2009 to June 30, 2012, a total of 116 cases of LCH were reported, 95 cases by CPSP participants (Table 1). Of the 66 confirmed cases, 58 (88%) were reported by CPSP participants and eight (12%) were uniquely reported by alternative surveillance, with only one reported through both mechanisms. The minimal estimated incidence of LCH is approximately 22 cases per year in the Canadian paediatric population. If outstanding cases are confirmed, this estimate could increase to 29 cases per year.

Of the 66 confirmed cases, the male to female ratio was 2.3:1 (46 males, 20 females). The mean age at diagnosis was 4 years 11 months (range: birth to 16 years, 4 months). The main ethnicity reported was Caucasian (n=41) but others included South Asian (n=9), Middle Eastern (n=5), Hispanic (n=3), Black (n=2), First Nations

TABLE 1 – LCH cases from July 1, 2009 to June 30, 2012

Year	Reported	Duplicate	Excluded	Pending	Confirmed
2009*	23	4	7	1	11
2010	25	8	0	1	16
2011	34	4	0	6	24
2012†	13	0	0	6	7
Total	95	16	7	14	58

* July 1 to December 31, 2009

† January 1 to June 30, 2012

TABLE 2 – Total LCH cases from July 1, 2009 to June 30, 2012 – Combined CPSP and alternate surveys

Source	Reported	Duplicate	Excluded	Pending	Confirmed
CPSP	95	16	7	14	58
Alternate	21	1	5	7	8
Total	116	17	12	21	66

Surveillance Studies in 2012

(n=3); in three cases ethnicity was not specified. There were 21 cases each from Ontario and Quebec, eight from Alberta, five each from British Columbia and Nova Scotia. The remaining cases were in three provinces and one territory (MB, NB, NL, NT). The time to diagnosis varied from birth to 104 weeks, with an average of 13.6 weeks. Patients with skin or non-skull vault bony disease waited the longest time for diagnostic biopsy. All cases were eventually referred to paediatric hematologists or oncologists but were seen by a wide variety of other specialists before diagnosis.

Presenting features were varied and are described in Table 3.

There were 51/66 (77%) cases presenting with single-system bony disease, including those with CNS-risk lesions of the skull base and facial bones. Eight cases (12%) presented with other single-system disease (skin, lung or lymphadenopathy). Multisystem disease occurred in seven cases (11%), with four involving high-risk organs (bone marrow, spleen, liver).

The 16 cases (24%) with skull base/facial lesions are classified as having CNS-risk disease: these patients are reported to have higher risk of developing late neurological degeneration and diabetes insipidus. However, only three cases presented initially with symptoms of diabetes insipidus. Follow-up data are not available for this study.

Features	Number of cases (%)
Unifocal bone disease (mainly vault of skull)	28 (42)
Skull/facial disease (CNS “risk”)	16 (24)
Multifocal bone disease	7 (11)
Solitary skin disease	5 (8)
Isolated lymphadenopathy	2 (3)
Lung disease	1 (2)

CNS = central nervous system

Treatment was by observation alone (n=16), curettage alone (n=16) and chemotherapy with or without curettage (n=34). No clinical trials for LCH therapy were open during this surveillance period, but many cases were reported to follow guidelines derived from the LCH-III trial. First-line chemotherapy was vinblastine and steroid. Six patients did not respond to initial therapy and required salvage therapy (with cladribine +/- cytarabine in most cases). Two cases relapsed and required repeat treatment (cladribine and vinblastine/steroid respectively). All cases survived, but this study was not designed to consider long-term outcomes or recurrence.

Conclusion

The minimal estimated incidence of LCH is approximately 22 cases per year in the Canadian paediatric population, with a possible outside estimate of 29 cases per year. The projected estimated minimal incidence would be 2.82–3.72 cases per million children per year in Canada, lower than has been suggested in other national surveys. Although most cases in this study were reported by CPSP participants, use of alternative surveillance mechanisms was validated by eight cases being uniquely reported. This finding is mirrored by other national surveys, highlighting the importance of cross-surveillance for rare diseases.

The time from onset to diagnosis can be long, and patients often see several health professionals. Diagnosis is significantly delayed in cases with skin disease and non-cranial bony disease. The mean time to diagnosis, however, is three months, with most patients being diagnosed within this time frame. This delay suggests that an LCH diagnosis is not typically entertained in skin and other non-classic presentations. All cases were eventually referred to paediatric haematologists or oncologists. Although treatments varied widely, from observation to intensive chemotherapy, all patients survived.

This study provides important data on presenting features, evaluation and management of LCH in the Canadian paediatric population, permitting comparison with current recommended management guidelines. It will help to raise awareness of LCH as a possible diagnosis in patients with classic and non-classic symptoms, and guide physician education to the benefit of affected children and youth.

Publications and presentations

Crooks B, Grenier D. Langerhans cell histiocytosis: A complex recurrent disease. *Paediatr Child Health* 2010;15(2):69–70

Principal investigator

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Neonatal hyperbilirubinemia – severe (2011–2013) Infants 60 days or less

March 2011 to February 2013

M Sgro, T Barozzino, DM Campbell, M Ofner, V Shah

Highlights 2012

- The study confirmed 19 cases of NHS. The mean reported peak bilirubin level was 487 $\mu\text{mol/L}$.
- ABO incompatibility was the most common cause of NHS followed by the presence of other antibodies and sepsis.

Background and objectives

The complete protocol can be accessed at www.cpsp.cps.ca/surveillance.

Case definition

Report any infants 60 days of age or less with unconjugated hyperbilirubinemia (NHS), who have had peak serum total bilirubin $>425 \mu\text{mol/L}$ or neonatal exchange transfusion

Exclusion criteria: Infants who have had exchange transfusion for well-documented Rh isoimmunization disease or who were born at less than 35 weeks gestational age.

Results

From January 1 to December 31, 63 cases of severe neonatal hyperbilirubinemia were reported in infants 60 days of age or less. Of these, 19 cases were confirmed, three were excluded for not meeting the case definition, one was a duplicate report, and 40 remain under review.

Reported	Duplicate	Excluded	Pending	Confirmed
63	1	3	40	19

As expected from the study criteria, the mean gestational age was 38.5 weeks (range 35–41) with a birth weight of 3,465 g (range 2,571–4,474). These results are similar to those reported in 2011 (mean gestational age of 38 weeks [range 36–41] and mean birth weight of 3,262 g [range 2,569–3,770]). Of the cases confirmed, six each were reported in Ontario and Quebec. The remaining cases were in three provinces and one territory (BC, SK, MB, NWT). The male to female ratio is 2.8:1, and all infants were breastfed.

The cause of severe hyperbilirubinemia was identified in about half (10/19) of confirmed cases. ABO incompatibility ($n=7$) was the most common cause, followed by the presence of other antibodies ($n=2$) and sepsis ($n=1$). The mean reported peak bilirubin level was 487 $\mu\text{mol/L}$ (range 181–737), compared with 461 $\mu\text{mol/L}$ (range 301–604), in 2011. Management included various options, the most common being phototherapy (in 16 of 19 confirmed cases), five of which needed an exchange transfusion, while four received intravenous immunoglobulin. Other treatments reported include exchange transfusion alone ($n=1$), intravenous immunoglobulin alone ($n=1$), and red blood cell transfusion ($n=1$). Data from this study will allow for comparison with two previous CPSP studies, on severe neonatal hyperbilirubinemia (2002 to 2004) and kernicterus (2007 to 2009). The specific goal of this study is to look at rates of severe hyperbilirubinemia and kernicterus before and after introduction of the 2007 Canadian Paediatric Society's *Guidelines for detection, management and prevention of hyperbilirubinemia in term and late preterm newborn infants* (35 or more weeks' gestation), and to comment on how effective these guidelines have been.

Publications and presentations

Sgro M. Severe neonatal hyperbilirubinemia and bilirubin encephalopathy in Canada. Audrey K. Brown Kernicterus Symposium, PAS/ASPR Annual Conference, Boston, April 2012. (Oral presentation)

Sgro M. Incidence of chronic bilirubin encephalopathy in Canada, 2007–2008. Annual Neonatal & Maternal-Fetal Medicine Research Day, University of Toronto, Toronto, April 2012. (Oral presentation)

Principal investigator

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Obesity-hypoventilation syndrome (Pickwickian syndrome) in children

April 2012 to March 2013 – Final report

R Folman, C Birken, P Campisi, MT Do, V Forte, I MacLusky, B McCrindle, I Narang, M Witmans

Highlights

- During the surveillance period, three cases of obesity-hypoventilation syndrome (OHS) were reported.
- The incidence of OHS appears to be low.

Background and objectives

The complete protocol can be accessed at www.cpsp.cps.ca/surveillance.

Case definition

Report any new patient less than 18 years of age with the following clinical features:

- Weight: >95th percentile for age
- BMI: >95th percentile for age, or >30 kg/m²
- Nocturnal: sleep apnea, i.e., snoring, restless sleep, mouth-breathing
- Excessive daytime drowsiness: falling asleep in class, or at other inappropriate times.

plus at least two of the following:

- Hypercapnia: serum bicarb >27 meq/L
- PaCO₂ : >45 mm Hg (arterial or capillary gases, obtained in daytime)
- Oxygen saturation: <92%, in awake state, and room air

Exclusion criteria

- Primary lung diseases, e.g., cystic fibrosis, bronchiectasis. (Asthma is not an exclusion.)
- Hypothyroidism
- Cushing's syndrome
- Prader-Willi syndrome
- Primary cardiac diseases, congenital or acquired (e.g., viral myocarditis)
- Congenital craniofacial abnormalities (e.g., Apert, Cohen, Carpenter, Crouzon syndromes)
- Pseudohypoparathyroidism (Albright hereditary osteodystrophy)
- Laurence-Moon-Biedl syndrome
- Central hypoventilation syndrome (Ondine's disease)

Results

Three OHS cases were reported during the surveillance period, which is less than the predicted number of cases per year. Two cases were excluded because they did not meet the inclusion criteria, and a third case is pending. In view of the increasing prevalence of childhood overweight and obesity, one would have expected more reported cases.

Reported	Duplicate	Excluded	Pending	Confirmed
3	0	2	1	0

Worldwide, the incidence of paediatric OHS is not well documented. While other significant morbidities related to paediatric obesity have been extensively documented, one can speculate that OHS is either rarely recognized or under-reported by practicing paediatricians, in spite of the serious consequences of non-treatment. When the condition is recognized, many affected children must still wait for enrollment in sleep apnea studies where the confirmatory diagnostic biochemical investigations are often performed. Hypothetically, OHS might also be a very rare disease, especially since Prader-Willi syndrome is one exclusion criteria.

Conclusion

In one year of surveillance in Canada, the CPSP study did not confirm any cases of OHS. For reasons cited above and with agreement from investigators, it was decided to conclude this study. Nevertheless, practising paediatricians still need to keep the possibility of OHS in mind and perform confirmatory investigations, especially in patients with obstructive sleep apnea and excessive daytime sleepiness.

Publications and presentations

Folman R, Grenier D, Birken C, Campisi P, Do MT, Forte V, MacLusky I, McCrindle BW, Narang I, Witmans M. Obesity-hypoventilation syndrome: A different beast. *Paediatr Child Health* 2013;18(1):36

Principal investigator

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Periodic fever syndromes

September 2011 to August 2014

P Dancey, S Benseler, M Gattorno, AK Junker, RM Laxer, P Miettunen, LA Turner

Highlights 2012

- The study confirmed 56 cases of periodic fever syndrome (PFS).
- Undefined PFS was the most commonly reported diagnosis.
- Aphthous stomatitis, pharyngitis and adenitis (PFAPA) and familial Mediterranean fever (FMF) were also confirmed in a significant proportion of cases.
- Patients with a clinical presentation consistent with possible FMF, cryopyrin-associated periodic syndromes (CAPS), tumor necrosis factor receptor-associated periodic syndrome (TRAPS) and hyperimmunoglobulinemia D syndrome (HIDS) were each represented in the undefined group, but genetic testing results were still pending at the time of reporting.

Background and objectives

The complete protocol can be accessed at www.cpsp.cps.ca/surveillance.

Case definition

Report any patient less than 18 years of age presenting with a newly diagnosed periodic fever syndrome (autoinflammatory syndrome) meeting the criteria outlined below.

Inclusion criteria

Patients must have one of the following diagnoses (see appendix and table in protocol for specific details and characteristic features):

- Familial Mediterranean fever (FMF)
- Tumor necrosis factor receptor-associated periodic syndrome (TRAPS)
- Hyperimmunoglobulinemia D syndrome (HIDS)
- Cryopyrin-associated periodic syndromes (CAPS), including familial cold autoinflammatory syndrome (FCAS), Muckle-Wells syndrome (MWS), and neonatal-onset multisystem inflammatory disease (NOMID)
- Periodic fever, aphthous stomatitis, pharyngitis and adenitis (PFAPA)
- Periodic fever syndrome – undefined

Exclusion criteria

- Detailed clinical assessment and investigations compatible with infections, malignancy, or the classical inflammatory or autoimmune rheumatic diseases (e.g., systemic lupus erythematosus, systemic juvenile idiopathic arthritis, inflammatory bowel disease)
- Febrile attacks with regular periodicity and low neutrophil counts, suggestive of cyclic neutropenia

Results

During the 2012 surveillance, 87 cases of PFS were reported. Of the 56 confirmed cases, 28 were undefined PFS, 19 were PFAPA and 9 were FMF (Table 2). The mean age at diagnosis was five years old (range: six months to 17 years of age). The majority of reporting physicians are paediatric rheumatologists (63%), along with general paediatricians (30%), infectious disease specialists and nephrologists.

Reported	Duplicate	Excluded	Pending	Confirmed
87	0	3	28	56

Undefined PFS cases (n=28) had a mean age of six years (range: 19 months to 17 years). The male to female ratio is 1.8:1. Patients experienced an average of 12 fever attacks per year, with episodes lasting a mean of 4.2 days. The most frequent fever-associated manifestation was fatigue, experienced by 43% of patients in this group.

PFAPA cases (n=19) had a mean age of four years (range: six months to 10 years). The male to female ratio is 1:0.9. Patients experienced an average of 10 fever attacks per year, with episodes lasting a mean of 4.4 days. The most frequent fever-associated manifestations were pharyngitis (84%), stomatitis (79%), cervical lymphadenopathy (68%) and abdominal pain (53%).

FMF cases (n=9) had a mean age of six years (range: two to 11 years). The male to female ratio is 1:1.5. Patients experienced an average of 11 attacks per year, with episodes lasting a mean of 2.8 days. The most frequent fever-associated manifestation was abdominal pain (78%).

Other manifestations reported with most attacks but seen in less than half of PFS cases in each group are reported in Table 3 and listed in decreasing order of frequency.

Most confirmed cases (69%) had genetic testing ordered in the process of evaluation and over half (56%) had results available at the time of this report. Most cases where genetic testing was not requested were diagnosed with PFAPA. The undefined PFS group included patients whose genetic testing was not yet available; therefore, the final PFS subtype could not be confirmed at the time of reporting. The suspected diagnoses in this undefined group included 11 FMF, three PFAPA, three CAPS, one HIDS, and one TRAPS. It is hoped that following up genetic testing results, as these become available, will clarify the PFS subtypes being reported.

Conclusion

Study results already show that periodic fever syndromes affect many paediatric patients with recurrent, self-limiting inflammatory episodes of unprovoked fever. They present with a wide variety of fever-associated manifestations. Genetic testing of these children is important to better define the PFS subtypes. Early recognition and confirmation of diagnosis open the possibility of effective treatment to ameliorate symptoms and – at times – to prevent or reverse cumulative organ damage, such as renal amyloidosis, hearing loss or arthritis.

Publications and presentations

Dancey P, Benseler S, Junker AK, Laxer RM, Miettunen P, Turner LA, Gattorno M. The challenge of periodic fevers in children. *Paediatr Child Health* 2012;17(3):123

Principal investigator

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PFS type	Number of cases	Mean age at diagnosis (range)	Mean number of fever attacks/year (duration)
Undefined	28	6 years (19 months to 17 years)	12 (4.2 days)
PFAPA	19	4 years (6 months to 10 years)	10 (4.4 days)
FMF	9	6 years (2 to 11 years)	11 (2.8 days)

Undefined PFS Vomiting, myalgia, arthralgia, headache, diarrhea, pharyngitis, lymphadenopathy, stomatitis, abdominal pain, maculopapular rash, urticarial rash, polyarthritis, uveitis, conjunctivitis, cough, mood changes and aseptic meningitis.
PFAPA Vomiting, myalgia, arthralgia, headache and fatigue.
FMF Vomiting, myalgia, arthralgia, headache, fatigue, diarrhea, pharyngitis, lymphadenopathy, stomatitis and seizure.

Persistent albuminuria in the paediatric population with type 2 diabetes mellitus

April 2010 to March 2012 – Final report

E Sellers, S Hadjiyannakis, S Amed, A Dart, H Dean, R Dyck, J Hamilton, V Langlois, C Panagiotopoulos, A-M Ugnat

Highlights

- Persistent albuminuria, the first sign of diabetic nephropathy, was confirmed in 50 youth with type 2 diabetes mellitus (T2DM). The complication occurred within a year of being diagnosed with diabetes.
- Minimum prevalence of persistent albuminuria in youth with T2DM is 7.4%.
- Children of First Nations heritage are disproportionately affected.
- A family history of diabetes-related renal disease and exposure to pregestational or gestational diabetes is frequently found.

Background and objectives

The complete protocol can be accessed at www.cpsp.cps.ca/surveillance.

Case definition

Report any patient up to 18 years of age with type 2 diabetes mellitus

and

persistent microalbuminuria or macroalbuminuria, defined as 2/3 positive samples at least one month apart over a three- to six-month period.

Canadian Diabetes Association definition of diabetes:

- Fasting plasma glucose (FPG) ≥ 7.0 mmol/L* or
- Random plasma glucose ≥ 11.1 mmol/L* or
- Two-hour plasma glucose ≥ 11.1 mmol/L* after a standard oral glucose tolerance test

* Requires a second, confirmatory test if child is asymptomatic

Diagnosis of T2DM is based on the following clinical features:

- Obesity (body mass index >95th percentile for age and gender)
- Family history of T2DM in a first or second degree relative(s)
- Belonging to a high-risk ethnic group (e.g., Aboriginal, African, Hispanic, South-Asian)
- A history of exposure to diabetes in utero (diagnosed before or during pregnancy)
- Evidence of insulin resistance: acanthosis nigricans, polycystic ovarian syndrome, hypertension, dyslipidemia
- Absence of diabetes-associated autoantibodies when available

TABLE 1 – Definition of albuminuria*		
	Urine albumin to creatinine ratio (ACR) [†]	24-hour urine collection for albumin
Microalbuminuria	2.0–20.0 mg/mmol (male) 2.8–28.0 mg/mmol (female)	30–300mg/day (male or female)
Macroalbuminuria	>20.0 mg/mmol (male) >28.0 mg/mmol (female)	>300 mg/day (male or female)

* Persistent albuminuria defined as 2/3 positive samples over a 3–6 month period, samples must be at least one month apart

† Confirmation with either first-morning urine sample or overnight urine collection

Results

Over the 24 months of surveillance, 50 cases of persistent albuminuria were confirmed in youth with T2DM. Based on this study, the minimum prevalence of persistent albuminuria in youth with type 2 diabetes in Canada is 7.4%. All of the excluded cases (n=9) were secondary to the lack of a confirmatory first-morning or overnight urine sample, highlighting the practical difficulties in ongoing surveillance of this high-risk population.

Of the 50 cases of persistent albuminuria confirmed, 32 (64%) were female. Eighty percent (80%) of the cases were children of First Nations heritage, 10% were Caucasian, 6% Métis and 4% Filipino. The mean age at diagnosis for diabetes was 12.3 years (SD 2.1, range 6.8–16.8 years) and the mean duration of diabetes at diagnosis of albuminuria was 0.76 years (range 0–4.25 years). Associated comorbidities were common, with hypertension being the most frequently reported (in 28 cases [56%]), dyslipidemia in 24 (48%), and non-alcoholic liver disease in 13 (26%). Exposure to pregestational or gestational diabetes was also a frequent finding (in 19 [38%] and 13 cases [26%]), respectively. A family history of diabetes-related renal disease was reported in 25 cases (50%).

Year	Reported	Duplicate	Excluded	Pending	Confirmed
2010*	19	1	3	0	15
2011	35	0	6	0	29
2012†	8	2	0	0	6
Total	62	3	9	0	50

* April 1 to December 31, 2010

† January 1 to March 31, 2012

Conclusion

The results of this two-year surveillance study demonstrate that persistent, non-orthostatic albuminuria in youth with T2DM occurs with a minimum estimated prevalence of 7.4%. Children with First Nations heritage are disproportionately affected. This serious renal complication occurred in the first year after the diagnosis of diabetes, raising concern around the burden of illness and the risk of earlier end-stage renal failure. Results also confirmed that comorbidities, such as hypertension and dyslipidemia, were common in youth with T2DM. The frequent associations with a family history of diabetes-related renal disease and with exposure to pregestational or gestational diabetes are important findings that need further research.

These national surveillance data are important for screening and intervention program planners, as well as for paediatricians, community physicians and community health professionals. Furthermore, this information also provides a baseline prevalence estimate for future comparison. Identifying at-risk populations of children affected with T2DM and albuminuria will aid further research into the etiology and prevention of this significant complication.

Publications and presentations

Sellers E. Renal disease in youth with type 2 diabetes: Need for early detection. *Paediatr Child Health* 2010;15(5):256–7

Principal investigators

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Respiratory syncytial virus infections in paediatric transplant patients

September 2010 to August 2013

JL Robinson, HT Akwar, U Allen, I MacLusky

Highlights 2012

- The incidence of severe respiratory syncytial virus (RSV) infections in paediatric solid organ or hematopoietic stem-cell transplants appears to be low.

Background and objectives

The complete protocol can be accessed at www.cpsp.cps.ca/surveillance.

Case definition

Report all inpatients and outpatients less than 18 years of age who have:

- Laboratory-confirmed RSV infection

and

- Received solid organ transplantation or hematopoietic stem cell transplantation within the two previous years

Results

Four cases of paediatric transplant patients with RSV infections were confirmed in 2012: in three hematopoietic stem-cell transplant (HSCT) recipients, and in one renal transplant recipient. One nosocomial case (13 months of age; 151 days post-HSCT) required ventilation for six days, and one community-acquired case (15 months of age; 96 days post-HSCT) was being ventilated when the case was reported. Another nosocomial case (12 years of age; 18 days post-renal transplant) did not require intensive care unit admission. The fourth case (4 years of age; 140 days post-HSCT) remained an outpatient.

Reported	Duplicate	Excluded	Pending	Confirmed
6	0	0	2	4

The incidence of severe RSV infections in paediatric solid organ or hematopoietic stem-cell transplant patients appears to be low. Because RSV prophylaxis is available, data gathering on the incidence and morbidity associated with RSV infection in Canadian transplant recipients is of the utmost importance for establishing the potential costs and benefits of using palivizumab in this population.

Publications and presentations

Robinson JL, Grenier D. What happens when you mix a transplant with respiratory syncytial virus? *Paediatr Child Health* 2011;16(1):12

Principal investigator

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Survey Questions

Paediatric concussion management

February 2012

K Gordon, MT Do, S McFaull, W Thompson

Given the attention that concussion had garnered worldwide in recent years, a short, one-time CPSP survey (www.cpsp.cps.ca/uploads/surveys/concussion-management-survey-questions.pdf) was developed asking whether respondents had managed children and youth with concussion or mild traumatic brain injury (mTBI). If they had, follow-up questions included which guidelines had been used, how they determined whether patient symptoms had resolved, whether a return-to-play (RTP) protocol was initiated immediately upon symptom resolution or after a period of time, and the duration of recommended steps in the RTP sequence.

Out of 809 respondents (31% of the total surveyed), 503 had managed children or youth with newly diagnosed concussion or mTBI. Collectively, they reported managing approximately 6,900 patients within the last 12 months. Most respondents used at least one of the available concussion/mTBI guidelines (see Table 1).

Guideline	Percentage
Canadian Paediatric Society (2006, 2012)	69%
American Academy of Pediatrics	29%
Concussion in Sport Group (Vienna 2001, Prague 2004, Zurich 2009)	18%
Canadian Academy of Sport and Exercise Medicine	17%
American Academy of Neurology	7%
Other	13%

The respondents most often used multiple criteria to determine whether their patients' symptoms had resolved (Table 2).

Criteria	Percentage
Free from all concussion symptoms, by patient report	92%
Free from all concussion symptoms, by proxy report (parent or other)	76%
Normal physical examination	65%
In school full-time, with usual school performance	53%
Free from continuous daily (unremitting) headache	45%
Free from intermittent headache (present some days, absent others)	43%
Recovered to baseline symptom score; e.g., SCAT2*, CSI†	18%
Normal physical examination after exertion	15%
Recovered to zero or near-zero symptom scores; e.g., SCAT2, CSI	12%
Recovered to normal population symptom scores; e.g., SCAT2, CSI	6%
Neurocognitive testing recovery to baseline values; e.g., Axon Sports, Cogstate Sport, ImPACT Test Canada	3%
Neurocognitive testing within normal population values; e.g., Axon Sports, Cogstate Sport, ImPACT Test Canada	2%

Once a patient was determined to be clear of concussive symptomatology, 85% of respondents who managed patients indicated that they would choose to wait before initiating an RTP sequence: generally, a further seven days (primary mode) or 14 days (secondary mode). When the RTP sequence was initiated, there was significant variation (range: same day–180 days), with a preference for seven days (primary mode) or 14 days (secondary mode).

* Sport Concussion Assessment Tool 2 (SCAT2)

† Concussion Symptom Inventory (CSI)

Canadian paediatricians frequently encounter patients with concussions.

They use a variety of criteria to determine when their patients become asymptomatic. Then, most respondent chose to wait for a further period of time before initiating RTP. Once initiated, the duration of RTP sequences also varies. More research and education is needed to ensure optimal management of concussions.

Presentation

Gordon K, Do MT, Thompson W, McFaull S. Concussion management by paediatricians: A national survey of Canadian paediatricians. International Consensus Conference on Concussion in Sport, Zurich, November 2012. (Poster presentation)

Principal investigator

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Paediatric medication shortages

December 2012

MJ Rieder, D Grenier, M Laffin Thibodeau, D Rieder

Problems associated with medication shortages have escalated over the past five years and affect a range of drugs, including antibiotics, histamine receptor antagonists, and sympathomimetics. Shortages can result in having to use suboptimal medications to treat children and youth, with the risk of serious consequences.

The CPSP conducted a national one-time survey of medication shortages affecting children and youth, to assess impact on paediatric practice and collect data on medication alternatives. The survey was circulated to all participants with a response rate of 27%.

Sixty-two per cent (62%) of respondents reported experiencing a medication shortage while caring for children and youth. Only 32% had received advance notice of pending shortages, usually from a hospital pharmacy department. Over half of respondents (53%) noted an increase in calls from local pharmacies requesting information about alternatives to medications that were unavailable. A few (16%) also reported that a medication shortage had resulted in complications, primarily in terms of delay in treatment, while only 4% of respondents indicated that using an alternative medication had resulted in medication errors. Importantly, 4% also reported that vital medications were not substituted. Although 63% of respondents acknowledged that they did not know the actual cost of medications, 7% indicated the alternatives used were more expensive. Troublingly, one-quarter of respondents (24%) reported finding problems with therapy after medications had been removed from the market despite their usefulness for treating children and youth.

When asked about the publicly accessible websites providing information on medication shortages, the vast majority of respondents (93%) were unaware of their existence. Not surprisingly, when asked about the possible solutions to prevent paediatric medication shortages and improve access to appropriate therapy during shortages, respondents identified the pharmaceutical industry as the most common group that would need to be part of the solution. Other solutions included educational approaches to inform child health care providers as to drug shortages, ideally in advance of the shortage, as well as increasing research on the development of optimal therapies for the paediatric population.

This is the first study to investigate the issue of medication shortages affecting children and youth in Canada. Results confirm that this is a common problem, with a significant number of cases resulting in delayed treatment or the disappearance of useful drugs from the market.

Principal investigator

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Use of growth charts

October 2012

SE Lawrence, EA Cummings, C Rodd

The U.S. Centers for Disease Control and Prevention (CDC) developed growth charts in 2000 that predominated growth monitoring in children in Canada and elsewhere until 2010, when new growth charts were released by the World Health Organization (WHO). The WHO growth charts were widely recommended for use in Canada by the Public Health Agency of Canada and several health organizations, including the Canadian Paediatric Society (CPS).¹ A one-time survey was conducted to assess the availability, utilization and satisfaction with growth charts in clinical practice in Canada.

The survey was sent to 2,544 paediatricians and 280 family physicians with a stated interest in paediatrics. The response rate was 24%, including 64% general paediatricians, 35% paediatric subspecialists and 1% family physicians. Of these respondents, 68% preferred the WHO charts for infants and almost half (49%) the WHO charts for children and youth 2 to 19 years of age.

Regarding the use of the WHO charts, nearly half of respondents (49.7%) reported significant concerns with their inability to assess weight except as a function of BMI beyond age 10 years of age. Although many recognized the importance of monitoring BMI, particularly from a public health standpoint, they indicated that clinicians need to be able to track weight changes for individual patients, particularly in the context of acute and chronic illnesses.

The second most common concern was the change in percentiles presented in the WHO charts. Almost a quarter (24%) of respondents felt that there were too few percentile lines between the 3rd and 97th percentiles for infants, while 19% had similar reservations about the child and youth measures. They reported greater difficulty in identifying when patients are "crossing centiles". The addition of extreme percentiles (0.1 and 99.9), shading on charts and unavailability with electronic health record provider were other concerns mentioned by 10% to 13% of respondents. Interestingly, only 31% of those who preferred the WHO charts had completed the educational modules developed by the CPS and Dietitians of Canada.

In summary, there is support for the use of the WHO data for monitoring the growth of Canadian infants, but only half of respondents prefer the WHO charts for older children. Design concerns were also raised. Evaluating clinical tools such as growth charts is important for ensuring they meet the needs of front-line practitioners. Concerns should be addressed through education, especially because rates of module completion were low. These survey results also lend support to the development of alternative growth charts that use the WHO data and methodology but address design and other concerns. Ideally, these would be stand-alone charts requiring minimal specific education to use for practitioners already familiar with existing growth charts.

Reference

1. Dietitians of Canada; Canadian Paediatric Society, Nutrition and Gastroenterology Committee; College of Family Physicians of Canada; Community Health Nurses of Canada. Promoting optimal monitoring of child growth in Canada: Using the new World Health Organization growth charts. www.cps.ca/en/documents/position/child-growth-charts.
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Principal investigator

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International Developments

The International Network of Paediatric Surveillance Units (INoPSU) was established in 1998 to enhance collaboration between units from four continents, providing a unique opportunity for simultaneous cross-sectional studies of rare diseases in populations with diverse geographic and ethnic characteristics.

Currently, INoPSU has 12 national paediatric surveillance units worldwide that are full members: Australia, Britain, Canada, Cyprus/Greece, Germany, Ireland, Latvia, Netherlands, New Zealand, Portugal, Switzerland and Wales. The network also has four affiliate members: the British Ophthalmology Surveillance Unit, the British Neurology Surveillance Unit, the UK Obstetric Surveillance System, and the Belgium Paediatric Surveillance Unit.



Publications from INoPSU members

Australian Paediatric Surveillance Unit (APSU)



Dr. Elizabeth Elliott

Kirby T. Elizabeth Elliott: champion of child health in Australia. *The Lancet* 2012;379(9827):1695. doi:10.1016/S0140-6736(12)60706-5.

- The APSU Director's research in the area of Fetal Alcohol Spectrum Disorders began with an APSU study that led to the development of diagnostic aids, educational materials for health professionals, the development of a model for health service provision, in addition to supporting alcohol consumption guidelines in pregnancy.

Elliott EJ, et al. Novel inpatient surveillance in tertiary paediatric hospitals in New South Wales illustrates impact of first-wave pandemic influenza A H1N1 (2009) and informs future health service planning. *J Paediatr Child Health* 2012;48:235–41.

Argent E, et al. Australian Paediatric Surveillance Unit study of haemoglobinopathies in Australian children. *J Paediatr Child Health* 2012;48(4):356–60.

Elliott EJ, et al, and Members of SWINet. Novel inpatient surveillance in tertiary paediatric hospitals in New South Wales illustrates impact of first-wave pandemic influenza A H1N1 (2009) and informs future health service planning. *J Paed Child Health* 2012;48:235–41.

CF Munns, et al. Incidence of vitamin D deficiency rickets among Australian children: an Australian Paediatric Surveillance Unit study. *Med J Aust* 2012;196(7): 466–8.

Belgium Paediatric Surveillance Unit (BePSU)

Hombrouck A, et al. Viral aetiology of influenza-like illness in Belgium during the influenza A(H1N1) 2009 pandemic. *Eur J Clin Microbiol Infect Dis* 2012;31:999–1007. doi:10.1007/s10096-011-1398-4.

British Paediatric Surveillance Unit (BPSU)

Hudson L, et al. Medical instability and growth of children and adolescents with early onset eating disorders. *Arch Dis Child* 2012;97(9):779–84. doi:10.1136/archdischild-2011-301055.

White LE, et al. Childhood coeliac disease diagnoses in Scotland 2009–2010: the SPSU project. *Arch Dis Child* 2013;98:52–56. doi:10.1136/archdischild-2012-302056. Epub 2012 Nov 26.

Busfield A, et al. Vitamin K deficiency bleeding after NICE guidance and withdrawal of Konakion Neonatal: British Paediatric Surveillance Unit study, 2006–2008. *Arch Dis Child* 2013;98:41–7. doi:10.1136/archdischild-2011-301029. Epub 2012 Nov 12.

Khalid JM, et al. Incidence and clinical features of congenital adrenal hyperplasia in Great Britain. *Arch Dis Child* 2012;97:101–6. doi:10.1136/archdischild-2011-300234.

Ward KN, et al. Herpes simplex serious neurological disease in young children: incidence and long-term outcome. *Arch Dis Child* 2012;97:162–5. doi:10.1136/adc.2010.204677.

Erlewyn-Lajeunesse M, et al. Anaphylaxis as an adverse event following immunisation in the UK and Ireland. *Arch Dis Child* 2012;97:487–90.

International Developments

Absoud M, et al. Incidence, clinical, MRI and investigative features of children with first episode CNS inflammatory demyelination: a prospective British Isles active surveillance study. *Arch Dis Child* 2012; 97(Suppl 1):A4. doi:10.1136/archdischild-2012-301885.9.

British Paediatric Surveillance Unit (BPSU)/UK and Ireland Childhood CNS Inflammatory Demyelination Working Group

Absoud M, et al. Paediatric acquired demyelinating syndromes: incidence, clinical and magnetic resonance imaging features. *Mult Scler* 2013;19(1):76–86. doi:10.1177/1352458512445944. Epub 2012 Apr 19.

German Paediatric Surveillance Unit (ESPED)

Lainka E, et al. Familial Mediterranean fever in Germany: epidemiological, clinical, and genetic characteristics of a pediatric population. *Eur J Pediatr* 2012;171(12):1775–85. doi:10.1007/s00431-012-1803-8. Epub 2012 Aug 19.

Netherlands Paediatric Surveillance Unit (NSCK)

van Emmerik NMA, et al. High cardiovascular risk in severely obese young children and adolescents. *Arch Dis Child* 2012;97(9):818–21. doi:10.1136/archdischild-2012-301877.

Ketelslegers A, et al. Incidence of acquired demyelinating syndromes of the CNS in Dutch children: a nationwide study. *J Neurol* 2012;259(9):1929–35. doi:10.1007/s00415-012-6441-6. Epub 2012 Feb 17.

New Zealand Paediatric Surveillance Unit (NZPSU)

Kunac D, et al. Active surveillance of serious adverse drug reactions in New Zealand children. *Arch Dis Child* 2012;97:761–2. doi:10.1136/archdischild-2011-301457. Epub 2012 May 6.

Wilson C, et al. Diagnosis of disorders of intermediary metabolism in New Zealand before and after expanded newborn screening: 2004–2009. *N Z Med J* 2012;125(1348):42–50.

Switzerland Paediatric Surveillance Unit (SPSU)

Laubscher B, et al, and the Swiss Paediatric Surveillance Unit (SPSU). Prevention of vitamin K deficiency bleeding with three oral mixed micellar phyloquinone doses: results of a 6-year (2005–2011) surveillance in Switzerland. *Eur J Pediatr* 2013; 172(3):357–60. doi:10.1007/s00431-012-1895-1. Epub 2012 Nov 29.

Bonhoeffer J, et al. Prospective surveillance of hospitalisations associated with varicella-zoster virus infections in children and adolescents. *Eur J Pediatr* 2005; 164(6):366–70. doi:10.1007/s00431-005-1637-8. Epub 2005 Mar 4.

Further publications can be found at www.inopsu.com.

The 8th INoPSU Symposium – Melbourne 2013

Melbourne, Australia is hosting the 27th International Congress of Paediatrics (ICP), August 24–29, 2013. The theme is “Bridging the gap in child and adolescent health”. Leading experts will explore different opinions, treatment methodologies, and practices of paediatric and adolescent care.

The APSU, established in 1992, will also be celebrating 20 years of active surveillance and hosting the 8th INoPSU symposium, providing a unique opportunity for INoPSU members to showcase most recent findings and their significance. Surveillance researchers are looking forward to a great meeting.



Further information is available at www2.kenes.com/ipa/Pages/Home.aspx.

RESEARCH OPPORTUNITIES

Call for New Studies

Wanted

Investigators to initiate new CPSP studies

The program

- Well established, timely and cost-effective
- Multi-faceted surveillance, capable of collecting reliable data in a variety of fields
- Effective at monitoring low-frequency, high-impact diseases and conditions

Track record

- 77% response from approximately 2,500 paediatricians
- 82% data completion rate

Study ideas

- Adverse effects of adolescent use of social media
- Adverse neonatal outcomes of delivery or labour in water
- Bronchiectasis – non-cystic fibrosis
- Congenital syphilis
- End-stage renal disease in early infancy
- Juvenile-onset recurrent respiratory papillomatosis
- Late-diagnosed cyanotic congenital heart disease
- Lyme disease
- Marijuana-induced psychosis
- Near-miss suicide
- Pet-related *Salmonella* infections
- Pre-school obesity with complications
- Severe neonatal hypernatremia
- Severe sports-related head trauma

If you are interested in these or other studies, or for more program information, please contact 613-526-9397 ext. 239 or e-mail cpsp@cps.ca.



“For more than 15 years, the CPSP has been an important collaborative asset for research, health policy development and the active surveillance of less common paediatric disorders. The hundreds of Canadian child care specialists who participate monthly in the program ensure that the CPSP is an effective way to foster continuing medical education on a wide spectrum of clinical conditions that might otherwise go largely unrecognized.”

Dr. Bryce Larke, past Chief Medical Officer of Health, Whitehorse, Yukon Territory, and past member of the CPSP Steering Committee from 2004 to 2010



**For more information on the
Canadian Paediatric Surveillance Program
or a French version of this report,
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