

Can active surveillance provide a rapid response to an emerging child health issue? The melamine example

D Grenier MD FRCPC^{1,2}, A-M Ugnat PhD³, C McCourt MD FRCPC³, J Scott MD FRCPC⁴,
M Laffin Thibodeau BCom¹, MA Davis MBA¹, NP Dickson MD⁵

In mid-September 2008, the federal government became aware of an outbreak of renal disease (renal stones and/or acute renal failure) in very young children in China, associated with consumption of powdered infant formula that was adulterated with melamine. Thousands of children in China were hospitalized, and several died (1). Melamine contamination was also found in other Chinese products that had a milk component, such as candies and coffee drinks.

Some Chinese milk-derived products sold in Canada were found to contain low levels of melamine and were recalled from the market (2). Infant formula manufactured in China is not approved for sale in Canada, and the manufacturers of infant formula sold in Canada do not use any milk ingredients originating in China. Therefore, the likelihood of Canadian infants being exposed to the formula that was affecting so many children in China was very low. Nevertheless, in light of patterns of international travel, adoption and immigration, there was a possibility that infants in Canada might be affected. Working in concert with Health Canada and the Canadian Food Inspection Agency, the Public Health Agency of Canada (PHAC) provided information for health care professionals and the public on this issue (3,4). The PHAC also endeavoured to determine whether there were cases of renal illness in Canadian children that may have been caused by the milk formula contamination in China.

The data in national hospitalization databases are not timely enough to meet this type of health surveillance need. Therefore, as a first step in the identification of possible melamine-associated illness in Canada, the PHAC asked paediatric hospital emergency departments, Paediatric Chairs, Paediatric Surgical Chiefs of Canada and members of the Canadian Association of Paediatric Health Centres to report any recent increases or unusual patterns of renal illness, in particular urinary calculi or renal failure, in infants or very young children seen in their institutions. The PHAC followed this inquiry, which had no positive reports, with a request to the Canadian Paediatric Surveillance Program (CPSP) to conduct an emergency one-time survey on the issue. It is this process that is the subject of the present article.

CPSP SURVEILLANCE PROCESS

The CPSP, established in 1996, conducts active surveillance by consulting with more than 2400 paediatricians and paediatric subspecialists monthly to assess low-frequency, high-impact conditions affecting children and youth (5). The program collects valuable national epidemiological data and contributes to the International Network of Paediatric Surveillance Units (6).

To assess whether Canadian children were presenting with renal stones and/or acute renal failure that may have been caused by melamine contamination, the CPSP initiated a one-time survey (Figure 1) adapted from, and in collaboration with, the New Zealand Paediatric Surveillance Unit (NZPSU), which also undertook such a survey following a similar request from their government. The results of the NZPSU survey will be published elsewhere. Before dissemination, the Canadian survey questions were reviewed by members of the CPSP steering committee – a broad group of paediatricians and other professionals with expertise in paediatric surveillance.

The 2475 CPSP participants were asked whether, over the past 12 months, parents had consulted with them about possible milk product contamination. They were also asked whether they had recently seen any infants (younger than one year of age) with renal stones and/or unexplained acute renal failure. If the answer was affirmative for the second question, participants then completed the next part of the survey, which consisted of a short clinical questionnaire.

RESULTS OF THE CPSP

The response rate was 42%. No cases of melamine-associated renal disease were reported by the 1153 respondents. Twelve cases of renal stones were reported, and one of these cases also had acute renal failure. The majority of children had urinary tract infections (n=7). Other associated factors included hydronephrosis, diuretic therapy, hyperparathyroidism and prematurity. Hypercalciuria was present in seven cases and hyperoxaluria in one case. Interestingly, almost 10% of respondents mentioned that parental concerns about contaminated milk products were voiced to them, especially to those who worked in international adoption clinics.

¹Canadian Paediatric Society; ²Children's Hospital of Eastern Ontario; ³Public Health Agency of Canada, Ottawa, Ontario; ⁴IWK Health Centre, Halifax, Nova Scotia; ⁵University of Otago, Dunedin, New Zealand

Correspondence: Canadian Paediatric Surveillance Program, 2305 St Laurent Boulevard, Ottawa, Ontario K1G 4J8. Telephone 613-526-9397 ext 239, fax 613-526-3332, e-mail cpsp@cps.ca

Accepted for publication March 23, 2009



Survey

Renal stones and/or unexplained acute renal failure in infants

Is melamine contamination an issue in Canadian infants?

Currently, there is an outbreak of renal stones and renal failure in very young children in China, associated with consumption of milk formula contaminated with melamine. Other dairy products, such as frozen yogurt, chocolate cookies and toffee candies, made in China and exported to other countries have been found to contain melamine.

Infant formula manufactured in China is not approved for sale in Canada. Health Canada has confirmed with the four major manufacturers of infant formula sold in Canada that they do not use any milk ingredients that come from China.

The Public Health Agency of Canada has commissioned this survey to assess if any presentations of renal stones and/or acute renal failure in Canadian children may have been caused by a melamine contamination.



I. Over the past 12 months:

1. Have parents consulted you about possible milk products contamination? Yes ___ how many? ___ No ___

2. Have you seen any infants (less than one year) with renal stones and/or unexplained acute renal failure? Yes ___ No ___ **If No, we thank you for participating in this survey.**

II. If yes, how many cases in infants? Renal stones ___ Unexplained acute renal failure ___ Both ___

III. For each case you have seen, please complete this part of the survey (photocopies can be used).

1. Date of birth (day/month/year) ___ Sex ___ Age at presentation: ___ weeks ___ months
 Child's ethnicity (check all that apply): Aboriginal ___ Black ___ Caucasian ___
 Asian ___, specify ___ Other, specify ___
 Born in Canada? Yes ___ No ___, specify country ___ age at arrival ___
 Travel outside Canada within the past 12 months? Yes ___, specify country ___ No ___

2. If renal stones, on what basis was the diagnosis made?
 Findings on first urinalysis: Hematuria ___ Proteinuria ___ Leukocytes ___ Other ___
 Any evidence of urinary tract infection? Yes ___ No ___
 Any evidence of known causes of stones:

	Yes	No	Unknown		Yes	No	Unknown
Hypercalciuria	___	___	___	Distal renal tubular acidosis	___	___	___
Hyperoxaluria	___	___	___	Extreme prematurity	___	___	___
Cystinuria	___	___	___				

Other causes : _____
 Results of abdominal ultrasounds: _____
 Results of other imaging: _____
 Any family history of renal stones: _____

3. If unexplained acute renal failure, on what basis was the diagnosis made?
 Highest serum creatinine: ___ micromoles/L
 Major investigations undertaken to determine cause: _____

4. Progress and outcome: _____

5. Milk products originating from China used in the past 12 months? Yes ___ Possibly ___ No ___

6. What do you feel was the most likely cause of the infant's renal stones and/or acute renal failure?

Please return this survey as soon as possible in the enclosed postage-paid envelope. Thank you for your participation.

Figure 1) The CPSP one-time survey on renal stones and/or unexplained acute renal failure in infants

DISCUSSION

The melamine example demonstrates how a national paediatric surveillance program can be mobilized quickly to conduct enhanced surveillance in the event of an emerging public health concern in children.

Within 10 working days of being asked by the PHAC to undertake this task, the CPSP sent out a one-time survey to its 2475 participants. This was performed in collaboration, first, with the NZPSU, and second, with the PHAC staff who rapidly entered and analyzed the data. The results were available three weeks after the survey was initiated.

In this situation, the CPSP was the appropriate tool for gathering the required information. First, as demonstrated by the response rate, the paediatricians who report every month are willing to participate in emergency surveillance. Second, because of the nature of the illness (rare, unusual and complex), it is highly likely that a paediatrician would

have seen these cases. Third, the data collected, which included clinical information, were unique to this surveillance program – national hospitalization data are not timely enough, and laboratories, in this instance, would not be a feasible data source.

At first glance, the response rate of 42% may seem low. However, a review (7) of 321 distinct published physician mail surveys showed a mean response rate of 54%. Also, the CPSP survey was performed without incentives and without reminders. Furthermore, many of the 2475 program participants were paediatric subspecialists (eg, adolescent medicine, neurology) who would not be seeing cases of renal stones and/or unexplained acute renal failure in infants, and have not responded to the present one-time survey.

The melamine example has demonstrated the potential for the PHAC and the Canadian Paediatric Society to work together through the CPSP to carry out national emergency surveillance of rare conditions quickly and inexpensively, to inform public health responses to disease management and prevention. This surveillance program has the advantage of being well established, with a national network of diligent, frontline paediatricians and an international network of paediatric surveillance units. The CPSP currently uses regular mail to send out and receive survey results. The program is in the process of considering electronic reporting, which has the potential to improve survey response rate and speed of responses.

REFERENCES

1. World Health Organization. Epidemic and pandemic alert and response. Melamine-contaminated powdered infant formula in China. <www.who.int/csr/don/2008_09_19/en/> (Version current at April 1, 2009).
2. Canadian Food Inspection Agency. Report on testing results for melamine in foods containing milk and milk-derived ingredients from China. <www.inspection.gc.ca/english/fssa/concen/2008melinfoe.shtml> (Version current at April 1, 2009).
3. Public Health Agency of Canada. Guidelines for health care professionals: Melamine contamination of food products made in China. <www.phac-aspc.gc.ca/media/cpho-acsp/080928melamine_bkg-eng.php> (Version current at April 1, 2009).
4. Public Health Agency of Canada. Statement from Canada's Chief Public Health Officer on melamine. <www.phac-aspc.gc.ca/media/cpho-acsp/080928-eng.php> (Version current at April 1, 2009).
5. Grenier D. Active surveillance: An essential tool in safeguarding the health and well-being of children and youth. CMAJ 2007;177:169-71. <http://www.cmaj.ca/cgi/reprint/177/2/169.pdf> (Version current at April 1, 2009).
6. Grenier D, Elliott EJ, Zurynski Y, et al. Beyond counting cases: Public health impacts of national paediatric surveillance units. Arch Dis Child 2007;92:527-33. <www.cps.ca/english/surveillance/CPSP/Publications/BeyondCountingCases.pdf> (Version current at April 1, 2009).
7. Asch DA, Jedziewski MK, Christakis NA. Response rates to mail surveys published in medical journals. J Clin Epidemiol 1997;50:1129-36.

The Canadian Paediatric Surveillance Program (CPSP) is a joint project of the Canadian Paediatric Society and the Public Health Agency of Canada, which undertakes the surveillance of rare diseases and conditions in children and youth. For more information, visit our Web site at <www.cps.ca/cpsp>.