



Adolescent and adult pertussis

A problem and a solution

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New and emerging infections have been a recurring theme in communicable disease control over the past two decades. Whether it is HIV, multiple drug-resistant tuberculosis, or West Nile fever, the biological threat usually leaves us scrambling for solutions.

Most now agree that pertussis has emerged as a common and important cause of respiratory disease in adolescents and adults. This is partly a consequence of improved diagnosis and surveillance but also represents a true shift in the epidemiology of the disease. Fortunately, the new acellular pertussis vaccine has been demonstrated to be safe and effective for adolescents and adults. Our capacity to control a new and emerging infection has, for once, matched the pace of the disease.

The problem

Over the past half century, the epidemiology of pertussis in North America has followed a roller coaster course. Before the vaccine era, pertussis was a common and deadly childhood disease. Widespread use of whole-cell vaccine for children, beginning in the 1940s and 1950s, resulted in a dramatic drop in disease incidence. By the early 1970s, disease rates had dropped by as much as 99%. In the late 1970s, however, pertussis rates began to increase with cyclic peaks every 3 to 4 years.¹ Pertussis has the highest reported incidence of any notifiable vaccine-preventable disease in Canada.²

Increasing rates of pertussis in adolescents and adults have accompanied this general resurgence of the disease. Reported incidence has increased sharply, but this almost certainly understates the problem. Pertussis in adolescents and adults can be difficult to diagnose. It is usually characterized by a nonspecific, chronic, persistent cough without the "whoop" characteristic of childhood disease.¹

Surveillance studies have shown that pertussis is now quite common in adolescents and adults. The Sentinel Health Unit Surveillance System, sponsored by Health Canada, estimated that pertussis caused 15% of cough illness in these age

groups.³ Other studies have estimated this proportion to be between 12% and 26%.⁴ In some recent outbreaks, the highest attack rates were seen among teenagers.⁵ One study⁶ estimated that the incidence of adult pertussis is comparable to that of peptic ulcer disease.

Adolescent and adult infections are an important reservoir of pertussis infection. They are particularly important as a source of infection for very young infants, many of whom are too young to have received three doses of pertussis vaccine. Pertussis can still be a serious and life-threatening illness for these children.⁷

The explanation

The waning of vaccine-induced immunity and the resulting growth of a susceptible adult population is the main reason for the resurgence of pertussis. The whole-cell vaccine was unsuitable for people older than 7 years, because of relatively high rates of adverse reactions. Epidemiologic and serologic evidence shows that vaccine-induced immunity against pertussis is not lifelong. People immunized in childhood become susceptible to pertussis infection as they grow older.⁸

Pertussis immunization is a victim of its own success. It has protected generations of children from a serious disease but has inadvertently created new cohorts of susceptible adolescents and adults.

The solution

Introduction of acellular pertussis vaccine is an important advance in pertussis control. The critical advantage of acellular vaccine over whole-cell vaccine is its dramatically lower rate of adverse reactions. Acellular vaccine has rapidly replaced whole-cell vaccine as the standard for pediatric immunization.

Development of acellular pertussis vaccine opens the door to immunization of adolescents and adults. A new⁹ five-component acellular pertussis vaccine, in combination with diphtheria and tetanus vaccines (Adacel), has recently been

licensed in Canada for use in people up to age 54. We now have a safe and effective means of preventing pertussis in adolescents and adults.

Provincial and territorial governments should move quickly to take advantage of this new opportunity for pertussis control. The logical place to begin is to include acellular pertussis vaccine in adolescent boosters. This change will be particularly straightforward because it can be done in conjunction with phasing out the adolescent polio vaccine. The new acellular pertussis vaccine simply replaces the tetanus-diphtheria-polio booster. Family physicians would be the principal delivery agents in most parts of the country. So far, only one province, Newfoundland, has taken this logical step.

Following the introduction of adolescent pertussis immunization, consideration should be given to extending pertussis immunization to groups who are important reservoirs of exposure for very young infants. These people would include parents of young children, elementary school teachers, and day-care workers. Pilot projects for these groups would probably be a reasonable first step. Eventually, acellular pertussis vaccine will become part of routine immunization for all adults.

Vaccines are ineffective unless they are used. In Canada, vaccines do not find widespread application until they are included in public programs, as the recent national experience with pneumococcal vaccine clearly demonstrates. Adolescent and adult pertussis will remain a new and emerging infection until we use the tools at hand to control it. ❁

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