



Synthesis on immunization

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How important is it?

Immunization is a [clinical preventive service](#) that is recommended for virtually every child in the world. After proper administration of a single dose or a series of doses of vaccine, they generally confer long-lasting immunity upon the recipient. Vaccines interrupt the circulation of the disease-causing bacteria or virus, which means they protect not only the child vaccinated, but also potentially individuals who were not vaccinated.

Historically, infectious diseases have been a significant source of childhood illness, in many cases leading to disability or death. To this effect, immunization programs for young children are one of the great [public health success stories](#) of the twentieth century. Through immunization, smallpox and polio have been eradicated from the western hemisphere, and cases of measles have been reduced by over 99%. In Canada, immunization programs have reduced the incidence of their target diseases (diphtheria, tetanus, pertussis, mumps, rubella, etc.) by over 90%.

What do we know?

In the U.S. and Canada, children are now [routinely protected](#) against 12 vaccine-preventable diseases: diphtheria, tetanus, pertussis (whooping cough), poliomyelitis, hepatitis B, invasive haemophilus influenzae disease (an invasive disease that may produce any of several clinical syndromes, including meningitis or pneumonia), invasive pneumococcal disease, measles, mumps, rubella (German measles), varicella (chicken pox) and influenza.

In general, all of these diseases are serious and may be fatal, while the [vaccine adverse events](#), if they occur, are usually minor, such as local discomfort and/or inflammation at the site of the injection and/or mild fever or rash. To reap the benefit from these vaccines, children must be immunized and immunized on time. In Canada, the National Advisory Committee on Immunization (NACI) recommends that all children be immunized at two, four, six and eighteen months of age.

Unfortunately, [immunization programs](#) are the victims of their own success. As the diseases against which the vaccines protect become more rare, they also become less feared by the population. Vaccine-associated adverse events that are uncommon become relatively more frequent as the diseases and their manifestations become rarer. As a result, vaccines that are being used in healthy children become more feared by parents than diseases that they have never seen.

Among the most [controversial allegations](#) at present is whether childhood immunizations are associated with autism. Two hypotheses have emerged: a link between MMR (Measles-Mumps-Rubella) vaccine and autism, and exposure of young

infants to excessive amounts of thimerosal, a mercury-based chemical used to stabilize vaccine preparation.

Over the last few years, a number of studies have examined the MMR-autism hypothesis. To-date, no epidemiological study has found an [association between autism and MMR](#). Recent reviews of this hypothesis by the Institute of Medicine concluded that the evidence was in favour of its rejection. Moreover, systematic reviews of vaccine safety are regularly performed, and there had been no reports of autism as a possible adverse event following measles vaccine or MMR vaccine.

Children exposed to high doses of methyl mercury were also followed and again, no increased incidence of autism has ever been documented. (It should be noted that the thimerosal substance has never been used in the MMR vaccine, and that most vaccinations now exist in a thimerosal-free format.)

Several epidemiological designs have tested these hypotheses and found that increased prevalence of autism and related conditions (pervasive developmental disorders) was due to diagnostic switching, changes in diagnostic criteria, improved detection of autism in populations and greater awareness about the disorder in both the professional and lay audience. Since the epidemiologic data to date indicate that MMR vaccination is not associated with an increase in autism in the population, the known neurologic and other serious risks of these preventable diseases is considered to be much greater than the risk of the vaccine.

What can be done?

Education

Parents and immunization providers need to be aware of how important it is to keep children and patients on track with their immunizations. The very success of childhood vaccination, however, brings the challenge of communicating to parents the importance of protecting their children when the diseases prevented through vaccination are no longer seen. Therefore, immunization programs need to pay more attention to educating and reassuring parents about diseases and vaccines, by providing parents with evidence-based information that will enable them to make informed decisions about their children's immunization.

Research has shown that a number of factors can [enhance vaccine uptake](#), including timely reminders, quality parent education materials, after-hours and weekend clinics, vaccine uptake monitoring, multiple vaccines given during one visit, standing orders for vaccines, multi-component provider education, and the elimination of financial barriers to immunization. [Evidence-based interventions](#) range from simple recall and reminder systems to quality improvement activities undertaken by provider offices. Parents also now have access to informative books and Internet Web sites devoted to education about vaccines and vaccine-preventable diseases.

In the United Kingdom, routine surveys are conducted to ascertain the attitudes of parents and health-care professionals, and all immunization promotion materials are extensively pre-tested and the impacts of such materials evaluated. These forms of [operational immunization research](#) are going to become more important as immunization programs face increasing pressures, especially with respect to doubts about the need for immunizations and their safety.

Improving access

In Canada, health is a provincial responsibility. Each province and territory decides which vaccines it will fund, which creates confusion and inequities across the country. Consequently, not all children and infants have access to all NACI-recommended vaccines, putting them at risk for problems such as acquired deafness from meningitis due to pneumococcal infection. A [national immunization program](#) is therefore needed to improve equity of access to all of the NACI-recommended vaccines in order to be able to protect all Canadian children from the potential damage incurred by vaccine-preventable diseases.

Monitoring vaccine safety

To optimize children's protection, immunization providers need to ensure that the safest and most effective vaccines are administered to children in as timely and efficient a manner as feasible. In 1994, Health Canada set up the Advisory Committee on Causality Assessment (ACCA), an expert committee charged with the task of monitoring vaccine safety by evaluating reported serious vaccine events in Canada. Health Canada also funds IMPACT (Immunization Monitoring Program, ACTIVE), an [active surveillance system](#) for vaccine-associated adverse events. Run by the Canadian Paediatric Society, this network involves 12 paediatric hospitals across Canada, which account for over 90% of the tertiary-care paediatric beds in Canada and serve as the local hospital for 45% of Canada's paediatric population.

On the international level, the World Health Organization created the Global Advisory Committee on Vaccine Safety in 1999. Its task is to respond promptly, efficiently and with scientific rigor to vaccine safety issues of potential global importance.

Policy and infrastructure

The potential for vaccines to prevent suffering and death among children is great and will continue to increase as new vaccines are developed and traditional vaccines are improved. Realizing this potential, however, requires carefully developed vaccination policy recommendations and a delivery infrastructure that is able to conduct the essential roles of immunization programs: financing the purchase of vaccines, ensuring that evidence-based strategies are used to raise coverage levels, monitoring coverage levels and vaccine safety, and conducting surveillance of vaccine-preventable diseases.