Ontario’s Publicly Funded Immunization System:
Building on Today’s Strengths, Innovating for the Future

Report of the Advisory Committee for Ontario’s Immunization System Review

March 2014
The Advisory Committee for
Ontario’s Immunization System Review

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Dear Dr. King:

On behalf of the Advisory Committee for Ontario’s Immunization System Review, I am pleased to submit our final report to you. I would also like to thank you for giving us the opportunity to lead Ontario’s first-ever formal review of its immunization system.

Immunization is a fundamental part of promoting and protecting health. It provides benefits not only for individuals but for communities and society more broadly. As such, Ontario’s immunization system is of tremendous importance to the health of the province, and we are happy to have had this opportunity to consider its strengths and identify areas where we could be doing better.

This report contains our findings and advice on opportunities to improve the overall effectiveness and efficiency of Ontario’s publicly funded immunization system. We have identified what we feel are the key components of an immunization system that will meet the needs of Ontarians now and into the future. We have outlined where we are now, where we want to be, and some ideas on how to get there. We are hopeful that these findings will be useful as the Ministry develops its plan for the immunization system going forward.

We would like to thank the members of the four task groups who supported us by providing their advice related to the theme areas addressed during the review. Their expertise was invaluable and their advice is reflected throughout this report. We would also like to thank the many stakeholders who provided input and feedback on the themes and ideas explored during the review.

We are confident that the results from this review will form the foundation for building a stronger, more innovative immunization system – one that provides optimal immunization for all Ontarians while delivering the best value for money.

Sincerely,

Daniel Burns, Chair
Advisory Committee for Ontario’s Immunization System Review
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Executive Summary

The Challenge

Vaccines prevent diseases, save lives and reduce health care costs. Immunization is one of the most cost-effective and successful health interventions known.¹

Ontario’s immunization coverage is relatively high, yet falls short of national immunization targets. When immunization rates do not reach the thresholds required to provide population immunity, the risk of disease increases. In the past few years, for instance, there have been costly outbreaks of measles in European countries such as France, the Netherlands, and the United Kingdom, as well as in Canadian provinces including Quebec, British Columbia and Alberta – all related to under-immunized populations.

Ontario has always had a strong, effective immunization system. However, the system is facing unprecedented pressures, such as:

- changing public attitudes and greater hesitancy about vaccines
- the growing number of new vaccines
- an increasingly complex immunization schedule.

To reap the full health benefits of immunization programs, Ontario’s immunization system must continually evolve to respond and adapt to these pressures.

The Review

The Advisory Committee for Ontario’s Immunization System Review (the Committee) was established by the Chief Medical Officer of Health (CMOH) to identify opportunities to improve the overall effectiveness and efficiency of Ontario’s immunization system in preventing disease. The Committee met from fall 2012 to fall 2013 to complete its review. This process was supported by extensive consultation with stakeholders, a review of practices in other jurisdictions, and careful deliberations of four expert task groups that provided advice on key theme areas:

- system integration
- decision-making and program delivery
- vaccine acceptance and uptake
- the use of scientific evidence.

A High Performing Immunization System

The Committee has identified a series of steps that will help Ontario maintain a high performing, integrated, publicly funded immunization system that delivers and sustains optimal immunization for all Ontarians.
Based on its review of the literature as well as experience in Ontario and other jurisdictions, the Committee identified the following essential components of a high performing immunization system:

1. An informed, confident public across all segments of the population
2. Transparent, evidence-based processes for planning, decision-making and procurement
3. A timely, effective province-wide system for vaccine distribution, storage, handling and inventory management
4. An integrated, person-centred service delivery system – including skilled providers who administer the right vaccines at the right times in the right settings
5. Robust, provincial information and information systems
6. A coordinated cycle of program evaluation, research and knowledge exchange to drive continuous quality improvement
7. Engagement strategies that involve all stakeholders.

The Solutions: Building on Strengths and Innovating for the Future

It is important that Ontario maintain its hard-fought gains in preventing the spread of infectious diseases. To do this, the immunization system must capitalize on its strengths and be willing to innovate to safeguard health into the future. Ontario has a unique opportunity to take its immunization system to the next level and create a high performing system that will:

- reflect a culture of continuous quality improvement
- make the best use of evidence, vaccine technology, strategies and collaboration to prevent existing and new health threats
- clearly define and achieve the goals and targets of the province’s immunization system through coordinated action among all partners
- be a national and global leader in immunization.

In the Committee’s view, all the advice set out in this report must be considered to create an effective, efficient system that will optimize the reduction of vaccine preventable diseases. If Ontario needs to focus initially on a small number of innovative changes that will have the greatest impact on the existing system, the Committee has identified the following key priorities:

Priority 1. Promote Immunization and Build Public Confidence

Strong public support and confidence are critical to the success of the immunization system. It is essential to connect with all Ontarians – across all segments of the population – to:

- understand their concerns and perspectives
- provide the information, tools and supports they need – when and how they need them - to make informed immunization decisions.
Priority 2. Develop the Provincial Immunization Registry Now

A provincial immunization registry – that is, a single place where all immunizations administered are recorded and tracked – is the foundation for the whole system and must be developed now. The registry is crucial to support program delivery, tracking, reminder notifications and evaluation.

Priority 3. Use Evidence to Drive System Change

The immunization system must have access to sound evidence, including cost-effectiveness analysis, to inform policy and practice, drive change and support continuous quality improvement. Ontario needs to take a systematic approach to obtaining and disseminating evidence, using a coordinated cycle of program evaluation, research and knowledge exchange. To optimize the benefits of immunization for all people of Ontario, planning and decision-making should also be timely, transparent and informed by meaningful stakeholder engagement.
Background

Why Focus on Immunization?

Immunization is one of the most cost-effective health interventions. Vaccines prevent disease, save lives and reduce health care costs.

Immunization has saved more lives in Canada in the last 50 years than any other health care intervention.\textsuperscript{2} Vaccines have eliminated once-common and deadly diseases such as smallpox and polio, and have substantially reduced other serious diseases like measles and rubella (see Figure 1).

\textbf{Figure 1: Vaccines have significantly reduced many serious diseases in Canada}

<table>
<thead>
<tr>
<th>Disease</th>
<th>Cases in Canada in peak year, before routine immunization\textsuperscript{a}</th>
<th>Cases in Canada in 2011\textsuperscript{4,*}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diphtheria</td>
<td>9,010</td>
<td>1</td>
</tr>
<tr>
<td>\textit{Haemophilus influenzae b} (Hib)</td>
<td>671</td>
<td>32</td>
</tr>
<tr>
<td>Measles</td>
<td>61,370</td>
<td>752\textsuperscript{**}</td>
</tr>
<tr>
<td>Mumps</td>
<td>43,671</td>
<td>274</td>
</tr>
<tr>
<td>Pertussis</td>
<td>19,878</td>
<td>695</td>
</tr>
<tr>
<td>Polio</td>
<td>5,384</td>
<td>0</td>
</tr>
<tr>
<td>Rubella</td>
<td>37,917</td>
<td>2</td>
</tr>
<tr>
<td>Tetanus</td>
<td>25</td>
<td>2</td>
</tr>
</tbody>
</table>

\textsuperscript{a}2011 is the most recent year for which national data are available in the current version of the Canadian Immunization Guide published on the Public Health Agency of Canada (PHAC) website.

\textsuperscript{**}Outbreaks of measles in 2011 contributed to a higher number of cases than normal. In 2009, a more typical year, there were 14 cases.

For example, before a vaccine was developed, \textit{Haemophilus influenzae} type b (Hib) was the most common cause of childhood bacterial meningitis:

\begin{itemize}
  \item 1 in 20 children who contracted it died
  \item more than 1 in 10 suffered severe neurological damage
  \item almost 1 in 5 lost their hearing.
\end{itemize}

Within just a few years, the Hib immunization program was able to significantly reduce the number of cases and the health threat.\textsuperscript{5}

Vaccines are cost effective and, in some cases, cost-saving. For example, the World Health Organization’s 10-year program to eradicate smallpox cost $112 million and now saves $1 billion annually in global health expenditures.\textsuperscript{6} The Public Health Agency of Canada estimates that the country saves between $6 and $45 for every dollar spent on most routine immunization programs. Even those vaccines that are not cost saving are cost effective relative to other preventive interventions.\textsuperscript{7}
Why Review Ontario’s Immunization System? Why Now?

Ontario has always had a strong immunization system. However, the system is facing unprecedented pressures such as:

- changing public attitudes and greater hesitancy about vaccines
- the growing number of new vaccines
- an ever-evolving immunization schedule.

To be a high performing system for the 21st century — to meet immunization coverage targets and demonstrate clear value for money — the system must adapt and evolve.

More work is needed to achieve optimal immunization rates.

Most immunization programs work not only by providing direct protection to individuals, but also by immunizing enough people to reduce or stop the spread of an infectious disease within a population. This is known as herd immunity. Herd immunity is an important concept in immunization and a key factor in the setting of national coverage targets. Recommended national immunization coverage targets vary depending on the disease. They range from about 80% for influenza immunization (for persons aged ≥ 65 years with high risk conditions, health care workers and household contacts of people at high risk) to as high as 98% for immunization against diseases such as diphtheria, measles, mumps and polio.

Although Ontario’s immunization coverage is relatively high, it falls short of national immunization targets. Coverage is lower for newer vaccines (e.g., HPV) than for long-established routine childhood immunizations. Coverage may also be lower among vulnerable populations who also suffer from other health inequities (e.g., high rates of chronic diseases, lack of access to health services, poverty, substandard housing).  

As Figure 2 illustrates, there is a gap between the national vaccine coverage targets (solid black line) and recorded coverage for most childhood vaccines in Ontario — even those designated in 2011-12 under the Immunization of School Pupils Act.

Immunization coverage and surveillance issues

Ontario’s information systems are most effective at determining immunization coverage among the province’s school-aged children, because proof of immunization for designated diseases must be reported under the Immunization of School Pupils Act. For other populations (e.g., pre-schoolers, adults and seniors), immunization coverage is more difficult to ascertain.
Figure 2: There is a gap between target immunization coverage and recorded Ontario coverage for vaccines started in infancy and early childhood among children 7 and 17 years of age (2011-12 school year).

* Reported coverage is based on having received 2-doses of measles and mumps-containing vaccines, as per the publicly funded schedule for Ontario and NACI recommendations.

** Reported coverage is based on having received at least 1 dose of rubella-containing vaccines, as per NACI recommendations.

*** Reported coverage is based on having received at least 1 dose of varicella vaccine among five-year-olds.

Note: Pertussis, meningococcal disease, and varicella were not designated under the Immunization of School Pupils Act at the time of this analysis; however, they will become designated under the Act effective July 2014.

Low coverage increases risk of disease outbreaks.

Effective and efficient immunization programs that meet targets protect our health and well-being and optimize the use of limited resources. When immunization programs do not achieve their goals, the risk of disease outbreaks increases. For example, in the 2012 measles outbreak in Wales, which was related to low vaccine coverage, over 1,200 people developed measles, 88 had to be hospitalized and one person died. Within Canada, both British Columbia and Alberta experienced outbreaks of measles in 2013, with 16 confirmed cases in BC and 42 in Alberta. These outbreaks were linked to an ongoing outbreak in the Netherlands with more than 2,500 cases as of January 2014. Another significant measles outbreak occurred in Quebec in 2011, where 776 cases were reported. According to a recent report from Toronto Public Health, if measles coverage drops by just 10%, Toronto could see outbreaks of measles similar to those that have occurred in Europe over the past decade.

We have also experienced the impact of disease outbreaks linked to under-immunization close to home. For instance, in 2005, there was a rubella outbreak involving a total of 309 laboratory-confirmed cases in Southwestern Ontario that was attributed to under-immunization of persons in a community that is philosophically opposed to
immunization. Similarly, a pertussis outbreak in Southwestern Ontario that began in late 2011 in an under-immunized religious community resulted in almost 450 cases of this disease. The City of Toronto estimates that, if pertussis coverage drops by 25%, cases could rise by 400% among children aged two and under, with the associated impact on morbidity and mortality.

**Coverage is not the only issue. The immunization system needs the right mix of strategies to protect vulnerable populations.**

Some populations are at higher risk of serious outcomes of disease than others and need to be specifically targeted for immunization. Others receive less direct benefit from immunization because their immune systems are not as strong; they rely on protection from the immunization of others around them. Having the right mix of strategies is key to successful immunization programs. Examples include:

- targeting specific priority populations (high risk groups) who are at greatest risk of negative health outcomes from certain vaccine preventable diseases
- communicating the message that everyone who is healthy needs to be immunized to protect their vulnerable friends, family and other members of the community who cannot be immunized, or who are not as well protected by vaccines because their immune systems are weaker
- promoting immunization of pregnant mothers to protect their unborn children.

Ontario’s immunization system must continue to incorporate a range of innovative and strategic approaches to preventing disease in addition to the central concept of herd immunity.

**Some Ontarians are hesitant about or question the value of vaccines.**

Despite news of recent outbreaks of vaccine preventable diseases, public opinion research suggests that support for immunization may be weaker than in the past. In a recent public survey commissioned by the Ministry of Health and Long-Term Care:

- 39% of Ontarians reported being more concerned about vaccine safety than they were five years ago
- 55% felt that “we are becoming too reliant on vaccines”
- 42% believe many vaccines are not needed
- 33% said there are too many vaccines.

While the vast majority of parents continue to immunize their children according to the recommended schedule, a growing proportion of the public is less knowledgeable and more hesitant about vaccines. In fact, there seems to be an increasing trend worldwide toward vaccine hesitancy.

Specific factors linked to vaccine hesitancy include:

- The success of immunization programs. Ontarians have lived so long without experiencing certain vaccine preventable diseases (e.g., diphtheria or measles) that many no longer see them as a threat.
• Misperceptions about how vaccines work. A common misperception is that vaccines weaken the immune system. People may not understand that vaccines actually strengthen the immune response.  

• A vocal anti-vaccine movement. This movement has effectively used the Internet and social media to spread misinformation about vaccines. This contributes to the public’s uncertainty and misperceptions about immunization.  

Given the current state of public knowledge and attitudes, concerted efforts are required to maintain and enhance public support for immunization. The importance of listening to people’s concerns and understanding their perceptions cannot be overstated when developing public communications.  

**Immunization programs have become more complex.**  

Immunization programs are complex, long-term undertakings. They involve a mix of providers delivering a number of vaccines across the life span – from infancy to old age. Information about each immunization must be tracked over time to ensure immunizations are effective, delivered safely and that their benefits are sustained. This information includes who was immunized, when, by whom, with what vaccines and any adverse effects.  

In the last 10 years, the number of routine publicly funded vaccines has almost doubled, from 8 to 15 routine vaccines. Immunization schedules have become more complex with more vaccines given at a visit. The recommended immunization schedule for a child in Ontario may change over time, making it more difficult for both parents and health care providers to ensure that children are fully immunized in accordance with current recommendations. Furthermore, families move around in Canada, and each province and territory has a different immunization schedule. This makes it even harder for parents and providers alike to ensure up-to-date childhood immunizations.  

The vaccine pipeline also continues to expand. In the coming years we may see a wider range of vaccine options, including:  

• preventive vaccines for high risk groups (e.g., HIV/AIDS, cryptosporidiosis, Candida albicans)  

• therapeutic vaccines (e.g., targeting breast, ovarian and prostate cancers, and prion-mediated degenerative diseases such as ALS and Alzheimer’s disease)  

• expanded indications for existing vaccines.  

These advances will increase pressure on the system to publicly fund more vaccines for more people at the same time that public concern is growing about the increasing number of recommended vaccines.
The immunization system faces more pressure to demonstrate value for money.

Because of the rise in the number of routine publicly funded immunization programs from 8 to 15 since 2003, Ontario’s vaccine costs have nearly doubled over the past 10 years.

Vaccines have traditionally been cost saving. For many vaccine preventable diseases, the cost of an immunization program is substantially less than the cost of treating cases of disease (e.g., hospitalization, physician, treatment costs). The costs of managing disease outbreaks (e.g., costs related to contact tracing, communicating with the public and offering emergency immunization clinics) can also be considerable. Money that does not have to be spent treating vaccine preventable diseases can be redirected to provide other health services and address other pressures in the health care system (e.g., cancer care, hip and knee replacements). Ontarians have already benefitted significantly from the cost savings provided by publicly funded immunization programs.

Vaccines that have come to market more recently are more costly and less often cost saving; however, they are more cost effective than many other health interventions. As the health care system puts more emphasis on efficiency, immunization programs will be expected to demonstrate that their cost-to-benefit ratio is competitive relative to other investments in health care.

The immunization system is also expected to demonstrate that its resources are well managed. Vaccines are challenging products to store and distribute; they must be maintained at certain temperatures and used within a certain time of a vial being opened. A certain proportion of vaccine is lost each year to spoilage and waste. While some level of wastage is unavoidable, there is growing pressure on the system to be more efficient.

The World Health Organization (WHO) has set a maximum target of 5% vaccine wastage. Ontario is currently meeting this target; however, any opportunity to further reduce potential wastage should be built into the system. For example, there is increasing recognition internationally of the need for thermostable vaccines, and that existing vaccines may be more thermostable than previously thought.

The growing complexity and increasing cost of immunization programs make decision-making and priority setting more complicated and more important.
The Advisory Committee

Faced with these pressures on Ontario’s immunization system, Dr. Arlene King, Chief Medical Officer of Health (CMOH), established the Advisory Committee for Ontario’s Immunization System Review (the Committee): a group of experts in public health, primary care, immunization, social marketing, health economics, health services and health policy.

Chaired by Daniel Burns – former Deputy Minister of Health for Ontario – the advisory committee included:

- providers who are part of Ontario’s immunization delivery system, such as primary care physicians, paediatricians and nurses
- individuals with experience planning and delivering immunization programs in urban, rural and northern settings and with Aboriginal communities
- researchers with clinical and academic expertise in immunization
- individuals with strong links to national and international immunization initiatives
- public health experts with strong backgrounds in surveillance and program evaluation.

Dr. King asked the Committee for advice on how to improve the overall effectiveness and efficiency of Ontario’s immunization system in preventing disease. The Committee worked to identify where Ontario could strengthen the current system as well as where the province has the opportunity to innovate and lead.

The Review Process

The Committee used a highly structured and inclusive process to:

- assess the current system’s strengths and challenges
- gather evidence and advice on ways to develop and maintain a high performing immunization system in Ontario
- recommend innovative solutions.

This report reflects findings from extensive consultation with stakeholders, a review of practices in other jurisdictions as well as the careful deliberations of four expert task groups that provided advice on key theme areas:

- system integration
- decision-making and program delivery
- vaccine acceptance and uptake
- the use of scientific evidence.

The following figure outlines the structure and key components of the immunization system review:
Advisory Committee

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Former Deputy Minister of Health for Ontario

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Tupper Bean
Executive Director, Centre for Effective Practice

Liz Darling
Registered Midwife, Midwifery Group of Ottawa

Dr. Dat Tran
Staff Physician, Infectious Diseases, SickKids

Lyne Cantin
Manager, Immunization Promotion and Education, Public Health Agency of Canada

Dr. Vinita Dubey
Associate Medical Officer of Health, Toronto Public Health

Dr. John Lavis
Professor and Director, McMaster Health Forum

Dr. Jeff Kwong
Scientist, Institute for Clinical Evaluative Sciences

Phillip Haid
CEO, Public Inc.

Dr. Shelley Deeks, Chair
Medical Director, Immunization and Vaccine Preventable Diseases, Public Health Ontario

Dr. Tazim Virani
Principal Consultant, Tazim Virani & Associates

Dr. Anne Wormsbecker
Medical Epidemiologist, Immunization and Vaccine Preventable Diseases, Public Health Ontario

Task Group on Scientific Evidence

Stakeholder Engagement Activities

- In-depth interviews with 29 experts, including many from other provincial and international jurisdictions.
- Stakeholder survey completed online by 350 leaders and managers of organizations involved in Ontario’s immunization system, including public health, primary care, and others.
- Seven regional informal dialogues with parents, adolescents, seniors, and healthcare providers.
- One informal dialogue with vaccine industry representatives.
- Environmental scan and jurisdictional comparison completed for each of the four theme areas.
Toward a High Performing Immunization System

Vision
A high performing, integrated, publicly funded immunization system that delivers and sustains optimal immunization for all Ontarians.

Principles
In the Committee’s view, a high performing, integrated immunization system is founded upon the following principles:

Person-centered: Services are designed and offered in a way that is sensitive to people’s needs and preferences and makes it more likely they will value and participate in immunization programs.

Evidence-based: Programs are informed by the best available evidence (e.g., of need, safety and effectiveness). The system has the capacity to generate the evidence it needs to inform policies and planning.

Performance-driven: The system continually monitors and looks for ways to provide high quality services, improve performance, enhance impact and improve outcomes.

Value for money: The system is efficient and effective. It considers cost-effectiveness as an integral part of decision-making and demonstrates value for money.

Health equity: The system provides all Ontarians, with special attention to under-served populations, with equitable access to immunization programs. Immunization is viewed as a way to improve health outcomes and reduce health disparities.

Innovation: The system is innovative and creative. It inspires changes that enhance quality, impact and outcomes.

Shared responsibility: All partners in the system share responsibility and ownership for the success of its immunization programs. The public recognizes the importance of immunization as a fundamental aspect of health.

The Essential Components of a High Performing Immunization System
Based on its review of the literature and experience in Ontario as well as in other jurisdictions, the Committee identified the following essential components of a high performing immunization system:

1. An informed, confident public that understands immunization is an integral part of health, sees immunization as both a right and a responsibility, actively participates in immunization programs and advocates for immunization among their families and communities. These attributes should apply across all segments of the population.

2. Transparent, evidence-based processes for planning, decision-making and procurement that take into account population health status and emerging health needs, assess the cost-effectiveness of each immunization program, determine which vaccines will be publicly funded, design the best immunization strategy for delivering those vaccines, and secure the right supply.
3. A timely, effective province-wide system for vaccine distribution, storage, handling and inventory management that provides consistent access to needed vaccine supplies for all providers and ensures those supplies are stored and handled effectively, with a minimum of wastage.

4. An integrated, person-centred service delivery system where services are coordinated and seamless across providers, there is a strong link between public health and primary care, and skilled, knowledgeable providers administer the right vaccines at the right times in the right settings.

5. Robust, provincial information and information systems with the capacity to support rigorous comprehensive surveillance and monitoring.

6. A coordinated cycle of program evaluation, research and knowledge exchange to inform decisions about new vaccines and immunization programs and drive continuous quality improvement.

7. Engagement strategies that involve all stakeholders in developing and maintaining a high performing immunization system, including ongoing opportunities to identify and embrace innovation.

1. An Informed, Confident Public

Where We Are Now

Most Ontarians still actively participate in immunization programs, particularly routine childhood immunizations; however, public opinion research suggests a growing degree of hesitancy that could result in fewer Ontarians choosing to be immunized or have their children immunized. According to our survey of stakeholders, the main reasons for this shift in public attitudes are concerns about safety and effectiveness and the sense that immunization is no longer a high priority.29

A useful framework for conceptualizing people’s perceptions about immunization is through the three Cs:30, 31

a) Confidence in vaccines that may be influenced by:
   - Misinformation from a vocal anti-vaccine lobby – often spread over the internet and social media and then repeated in mainstream media. This has been associated with widespread myths and misperceptions about the safety of vaccines and their value.
   - Insufficient access to user friendly, accurate, balanced information about vaccines (particularly new vaccines), why they are important, how thoroughly they have been tested, how they work and how the risks of being immunized compared to the risks associated with having the disease.
   - Mixed messages from health care providers, some of whom have chosen not to be immunized. Health care providers – particularly primary care providers such as family physicians and nurse practitioners – continue to be the most trusted sources of health information for the Ontario public. Mixed messages from health care workers – or lack of a strong recommendation to be immunized - may reinforce public uncertainty about vaccines.
   - Larger social trends and changes in public attitudes marked by less confidence in government and “authority” and more emphasis on self-reliance and personal autonomy.32
b) Complacency due to:

- **The success of immunization programs.** Most Ontarians have never experienced the devastating impact of diseases like smallpox, polio or measles, so they may not consider immunization to be necessary. Some may now take the benefits for granted and do not realize how easily vaccine preventable diseases could again start to spread. With the ease of global travel, jurisdictions cannot afford to be complacent. When immunization coverage falls, the risk of imported disease and outbreaks rises.

- **Competing priorities.** People are busy, plain and simple. Despite best intentions, sometimes immunization falls off the radar and gets missed.

c) Convenience related to:

- **Access** to vaccines, which may be a challenge particularly for people who do not have primary care providers. The growing number of vaccines, most with different target ages, creates challenges in ensuring convenient access to immunization for all Ontarians.

**Where We Want to Be**

An immunization system can only achieve its immunization coverage targets when people show up and want to be immunized. In a high performing system, immunization programs will be highly trusted and accessible: they will provide the information, tools and supports people need – when and how they need them - to make informed decisions. This will include providing people with convenient access to their own immunization records and to immunization services.

In a high performing system, Ontarians will:

- understand the importance of immunization for their own health and the health of others in their communities
- value immunization as both an individual right to be protected and a responsibility to contribute to the protection of others
- hear consistent and balanced messages about immunization from all parts of the health care system
- be engaged in and supportive of immunization programs.

**How to Get There**

In a high performing immunization system, communication is as important as the vaccines themselves. Ontario must continuously instill public confidence in immunization programs.

To do that, the immunization system should:

- take into account the complex factors that influence immunization decisions
- consider a number of steps to address public concerns about vaccines
- shape Ontarians’ knowledge and attitudes
- “up its game” in terms of the use of the Internet and social media, with the vast majority of the public now obtaining health information online.
Effective strategies to build public confidence include:

### 1.1 A comprehensive, sustained immunization promotion strategy

Communications is an integral part of all immunization programs. An immunization promotion strategy is unlikely to change the attitudes of the relatively small number of people who are adamantly opposed to immunization, but it can help those who are concerned or hesitant about vaccines to make more informed decisions. It can also reinforce the views among the majority of Ontarians who take advantage of immunization programs and help them become immunization advocates for their families and communities.

A comprehensive, sustained immunization promotion strategy would include:

- **developing and implementing a social media strategy** with the help of a trusted source, arms-length from government. This approach would aim to dispel vaccine myths and misperceptions and counter misinformation with balanced, accurate and timely information (e.g., how vaccines help people build a natural immune response to disease, the risks of not being immunized, etc.)

- **“rebranding” vaccines in all health messaging** to emphasize that immunization is an integral part of a healthy lifestyle – like eating well and exercising – and to reinforce a sense of shared responsibility and ownership for immunization

- **using market segmentation to gather information and insight** into the perspectives and motivations of people who are concerned or hesitant about vaccines

- **identifying champions** (e.g., kids, parents) who can tell real stories about the negative impact of not being immunized

- **leveraging celebrity spokespeople** – such as athletes, actors and community leaders – to reinforce that immunization is an integral part of good health and become the “trusted face” of immunization programs

- **establishing partnerships with organizations that have strong “brand” recognition** with parents and the public as a trusted source of accurate information. Examples include: Sick Kids Hospital, The Children’s Hospital of Eastern Ontario (CHEO) and McMaster Children’s Hospital

- **developing strategies to enhance the immunization experience** by, for example, using pre-visit messaging and pain management strategies to reduce fear of needles and manage pain

- **providing rewards and recognition to promote immunization**, such as through a “preventive scorecard” for patients.
1.2 An organized program to engage health care providers as immunization champions

To capitalize on the ability of health care providers to communicate with the public and motivate them to be fully immunized, a high performing system would:

- engage a range of health care professionals in developing education resources and championing immunization
- develop an online one-stop shop where providers can go for immunization information and find answers to their questions about immunization schedules, immunization safety, training and tools such as webinars, patient videos and decision aids. Resources would include:
  - information on the history of immunization, its benefits and all approved vaccines including what they contain, why they were approved and their potential side effects
  - tools that providers can use to talk to patients who have concerns about the safety and risks of vaccines, including real life stories that address myths, misperceptions and fears
- make every effort to ensure that health care providers understand the benefits of immunization and participate fully in immunization programs, including:
  - developing information and education that appeal to providers’ ethics and altruism (e.g., “get the flu shot to protect your patients, residents or clients”)
  - working with regulatory bodies, professional associations and unions to either encourage their members to follow immunization guidelines or make compliance with Ontario’s immunization recommendations a standard of practice
  - implementing and expanding Ontario’s Three-Year Health Care Worker Influenza Immunization Strategy – a framework designed to increase health care worker influenza immunization coverage, with a focus on acute care and long-term care settings.

1.3 A transparent consistent response to adverse vaccine events

Serious adverse events following immunization (AEFIs) are very rare but can occur. To build public confidence, a high performing immunization system would include:

- open discussion of the risks of adverse events associated with vaccines relative to the risks of the diseases they protect against
- a robust provincial system of monitoring, tracking and reporting adverse events associated with all publicly funded vaccines
- ongoing enhancements to and renewal of the national vaccine safety system, as well as progress toward a national vaccine injury compensation program, through a renewed National Immunization Strategy.

1.4 School-based education about the importance of immunization

Evidence about the effectiveness of school-based education in changing children’s health behaviours is still evolving; however, educating youth early about vaccines may influence their attitudes and ability to make informed immunization decisions when they become adults and parents.
An innovative school-based education program would:

- provide information about the history of vaccines, how the immune system works and the benefits of immunization (e.g., as part of health, science and history classes)
- address myths and misperceptions about vaccines, improve science and health literacy, and educate youth to critically assess the accuracy of information on the internet
- be timed to coincide with school-based immunization clinics.

The Committee recognizes that this strategy would rely on a strong, collaborative partnership between the public health and education sectors. It would require ongoing evaluation to assess its effectiveness.

1.5 Immunization policies for newcomers and for travellers to and from Ontario

Ontario is silent on immunization requirements for people leaving and entering or re-entering the province — mainly because immigration and travel requirements are a federal responsibility. However, recognizing the threat posed by imported cases of measles and other vaccine preventable diseases, Ontario could:

- assess mechanisms to enhance and support the provision of travel vaccines
- work with groups representing major new Canadian communities to promote immunization for those who visit friends and family in countries where vaccine preventable diseases are still endemic
- encourage the federal government to work with the travel industry to develop mechanisms (e.g., through travel and ticketing web sites) to advise Canadians travelling abroad and visitors to Canada of the immunizations required or recommended when they are making their travel plans.

2. Transparent, Evidence-Based Processes for Planning, Decision-Making and Procurement

Where We Are Now

Planning high quality, equitable, cost-effective immunization programs is a complex process that includes:

- identifying which vaccines are needed and for whom
- deciding which vaccines will be approved for public funding and for whom
- deciding who will administer the vaccines and where, and the training they require
- forecasting the correct amount of vaccines to be used by the eligible groups
- procuring the vaccines.

Immunization planning and decision-making should be transparent, evidence-informed (including a thorough assessment of cost-effectiveness), and driven by the population’s health status and emerging health needs.
**The Current Process.** The current decision-making and procurement process consists of a number of related steps:

1. Decisions about product authorization are made at the federal level by Health Canada, based on the safety and efficacy of new vaccines.

2. The National Advisory Committee on Immunization (NACI) then makes scientific recommendations about vaccine use (e.g., which groups in the population will benefit most from a particular immunization program).

3. The Canadian Immunization Committee (CIC), reviews NACI recommendations and discusses policy and program implications and ways to implement and manage immunization programs to help encourage consistency and coordination across the country. The CIC includes representatives from all provincial and territorial health ministries and the federal government. In the context of the renewed National Immunization Strategy, the role and structure of the CIC is currently under review.

4. At the provincial level, the Provincial Infectious Diseases Advisory Committee - Immunization (PIDAC-I), an expert group, reviews the NACI recommendations and provides advice to Public Health Ontario (PHO) which, in turn, advises the Ministry of Health and Long-Term Care (the ministry) on:
   - the vaccines that should be considered for public funding
   - the best way to provide and deliver those vaccines in the Ontario context.
   PHO also provides advice to the ministry in line with its broader mandate.

5. The Public Health Division of the ministry then develops policy recommendations and a program implementation strategy, including stakeholder consultation and a communications plan. Policy and program considerations are informed by the recommendations from the various advisory committees.

6. The Ontario government, which is the ultimate decision-maker, considers recommendations related to new immunization programs and any significant changes to existing programs.

7. Once an immunization program has been approved, the Public Health Division, along with the Ontario Government Pharmaceutical and Medical Supply Service (OGPMSS) works with the federal Public Works and Government Services Canada (PWGSC) to procure vaccine supply for Ontario through the Federal/Provincial/Territorial (FPT) Bulk Purchasing Program.

8. Local public health units (PHUs) are then responsible for implementing the approved immunization program within their jurisdictions. This includes communicating with providers and managing the logistics of rolling out the program and distributing the vaccine at the local level.

9. PHUs are also responsible for local surveillance of coverage, diseases and safety. PHO provides provincial analysis of these data. Surveillance is an essential component of all immunization programs.
A rigorous process is central to planning and delivering high quality immunization programs. The current process faces several challenges:

- **Time.** The current review and approval process can take well over a year to consider the evidence, develop recommendations and reach a decision regarding public funding of new vaccines. The procurement process may then require a lead-time of approximately six months to establish new contracts and allow sufficient time for the manufacturing process. Time is also required for implementation. Public health units and immunization providers need time to learn about the program and its benefits, communicate with stakeholders and the public to build knowledge and awareness, and plan the extensive logistics required to roll out the program effectively. Opportunities to streamline this process should be considered, with the aim of providing the public with access to new vaccines as soon as reasonably possible.

- **Transparency.** There is currently no consistent way for people working in the system, outside of government, to know which vaccines are under review or being considered for public funding.

- **Perceived duplication.** There is some perceived duplication of effort among the various expert groups and organizations involved in reviewing new vaccines. The roles of these different groups, including roles related to cost-effectiveness analysis, are not always clearly understood. There may be opportunities to clarify each group’s responsibilities and streamline the processes.

- **Capacity for policy reviews.** When the government is deciding whether to fund a new immunization program, policy reviews are as important as scientific reviews. A comprehensive policy review includes an assessment of:
  - the overall cost and cost-effectiveness of the program
  - how it would be implemented (e.g., in which settings; by whom; logistical considerations)
  - the acceptability of the vaccine and its model of delivery with providers and the public
  - any equity, ethical and legal considerations.

  The ability of the current review process to generate and assess evidence from these multiple perspectives to inform comprehensive policy analysis may need to be enhanced.

- **Responsiveness.** Ontario’s approval process for adding new vaccines or making changes to immunization programs may not be as nimble or responsive as it could be. Changes to immunization programs generally require approval by the government. This is different from the current process used within the ministry’s Public Drug Programs Branch to approve new drugs and drug products, where a greater degree of decision-making authority has been delegated to ministry officials through the role of an Executive Officer.

- **Flexibility in vaccine purchasing.** Ontario participates in the FPT Bulk Purchasing Program. This program leverages the bulk purchasing power of provinces and territories, allowing Canadian jurisdictions to obtain competitive vaccine prices. Participating in the bulk purchasing program also makes it possible for Canadian jurisdictions to share vaccine supplies when there is a shortage in one region, thereby strengthening Canada’s security of supply. While Ontario benefits from bulk purchasing, there may be value in exploring further opportunities for improvement.
• **Relationships with other partners in the global vaccine enterprise.** In global terms, Ontario is a relatively small “market” for vaccines and may not be in a position to have significant influence over which new vaccines will be developed by industry. In general, decisions to develop new vaccines are influenced by global needs (potential market size) and on the vaccine industry’s strengths, priorities and capacity.

**Where We Want to Be**

For Ontario, each new vaccine added to the immunization schedule has an impact across the health system. It affects the cost of the immunization program itself, can result in more visits to providers and can feed into concerns of parents about the number of recommended vaccines and the complex immunization schedule.

To meet vaccine needs throughout the 21st century, Ontario needs a transparent, evidence-based planning and decision-making process that considers cost-effectiveness as an integral component of the analysis. This process would:

- use a consistent framework
- engage people with the right expertise and skills, and avoid unnecessary duplication
- focus on timeliness to ensure the benefits of the vaccine are available to the population as soon as possible
- be at least as efficient as other therapeutics approval processes, such as the pan-Canadian Oncology Drug Review (see inset).

For timely and value-added procurement, Ontario should continue its participation in the FPT Bulk Purchasing Program, while exploring opportunities for continually improving the process.

Beyond a highly efficient immunization approval process, Ontario would benefit from having the kind of relationships within the broader global vaccine enterprise to explore opportunities for the province to have greater influence on vaccine development priorities.

**How To Get There**

The following five items will help Ontario develop a transparent, evidence-based planning, decision-making and procurement process that considers cost-effectiveness as a key component of the analysis.

2.1 **A consistent, evidence-based review framework**

Ontario considers all components of Erickson, De Wals and Farand’s Analytical Framework for Immunization Programs in Canada during its policy review. This framework, which was developed to assess new vaccines, is now being adapted to inform decisions about whether to modify existing immunization programs. It helps planners and policy makers answer key scientific and implementation questions.
Ontario’s review process needs to provide evidence on all aspects of this framework to fully inform decision-making about public funding of vaccines.

**Table 1: Criteria and key questions outlined in the Erickson, De Wals, and Farand framework**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Key Questions</th>
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<tbody>
<tr>
<td>1 Burden of disease</td>
<td>Does the burden of disease justify a control program?</td>
</tr>
<tr>
<td>2 Vaccine characteristics</td>
<td>Do the characteristics of the vaccine permit implementation of an effective and safe immunization program?</td>
</tr>
<tr>
<td>3 Immunization strategy</td>
<td>Is there an immunization strategy which allows goals of the control program as well as sanitary and operational objectives to be attained?</td>
</tr>
<tr>
<td>4 Cost-effectiveness</td>
<td>Is it possible to obtain funding for the program and are cost-effectiveness indices comparable to those of other health care interventions?</td>
</tr>
<tr>
<td>5 Acceptability</td>
<td>Does a high level of demand or acceptability exist for the immunization program?</td>
</tr>
<tr>
<td>6 Feasibility</td>
<td>Is program implementation feasible given existing resources?</td>
</tr>
<tr>
<td>7 Ability to evaluate</td>
<td>Can the various aspects of the program be evaluated?</td>
</tr>
<tr>
<td>8 Research questions</td>
<td>Have important research questions affecting implementation of the program been adequately addressed?</td>
</tr>
<tr>
<td>9 Equity</td>
<td>Is the program equitable in terms of accessibility of the vaccine for all target groups?</td>
</tr>
<tr>
<td>10 Ethical considerations</td>
<td>Have ethical considerations regarding implementation of the immunization program been adequately addressed?</td>
</tr>
<tr>
<td>11 Legal considerations</td>
<td>Have legal concerns regarding implementation of the immunization program been adequately addressed?</td>
</tr>
<tr>
<td>12 Conformity of programs</td>
<td>Does the planned program conform to those planned or implemented elsewhere (other regions, countries)?</td>
</tr>
<tr>
<td>13 Political considerations</td>
<td>Will the proposed program be free of controversy and/or produce some immediate political benefits?</td>
</tr>
</tbody>
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**2.2 Clear roles and mechanisms to ensure timely, transparent reviews for new vaccines**

A transparent, timely, responsive review process would include:

- clearly defined roles and responsibilities for all the partners and players
- clear decision-making criteria and standard review processes and timelines (building on the pan-Canadian Oncology Drug Review model)
- mechanisms to ensure transparency (e.g. public meetings, lay membership, public minutes, recommendations published on the ministry website)
- efforts to reduce unnecessary duplication, such as leveraging the national scientific review process (which involves many Ontario experts) and focusing more on policy review and implementation considerations at the provincial level
- the capacity, skills and expertise to inform all aspects of the Erickson, De Wals and Farand framework, including assessment of:
  - cost-effectiveness of a new vaccine (compared to existing publicly funded vaccines as well as other health investments)
  - system infrastructure and capacity to implement the program
  - delivery strategies, such as the most appropriate and convenient settings, who should administer the vaccines and their training requirements, and the communications and information needed to support the program
- practical aspects such as packaging and storage requirements
- strategies to improve stakeholder and public acceptability, such as the type of products and model of delivery
- other issues such as any legal or ethical considerations, outstanding research questions and strategies to evaluate the program.

2.3 A streamlined process to approve new vaccines and modify existing immunization programs

With an eye to incorporating new evidence into existing immunization programs for the public as soon as possible, opportunities could be considered to view the approval process differently and streamline aspects of it using a phased approach, by:

- delegating responsibility to ministry officials (as opposed to Cabinet) for approving changes to existing immunization programs (e.g., new eligibility groups, new immunization strategies) that do not have broader policy implications or require substantial new funding.
- considering opportunities to further expand the delegation of authority to ministry officials in future. This approach would be consistent with that used in other ministry programs, such as the Ontario Public Drug Programs.

2.4 Stronger working relationships with national and international jurisdictions and the vaccine industry

A high performing immunization system develops strong working relationships with key players in other jurisdictions to inform immunization priorities and decisions. In Ontario’s case, that would include, for example, Health Canada, Public Health Agency of Canada, CIC, NACI, other provinces and territories, international jurisdictions, global vaccine initiatives and the vaccine industry. By working more collaboratively and being a more active participant in broader vaccine initiatives, Ontario could:

- create national (federal/provincial/territorial) and international partnerships to influence the development and enhancement of vaccine products (e.g., combination vaccines) that align with public health priorities
- leverage opportunities to enhance the monitoring and implementation of immunization programs
- more effectively manage manufacturer vaccine shortages when they occur
- engage in high quality immunization program evaluation and research that will provide evidence to guide provincial programs and inform global vaccine priorities.

The potential for conflict of interest must be carefully considered with respect to the above activities. In particular, any relationships with the vaccine industry would need to be open and transparent, guided by clear and considered processes and procedures.

2.5 Timely and value-added procurement process

Ontario reaps great advantages from the FPT Bulk Purchasing Program for vaccines and it makes sense to continue to actively participate. Given its size, the province may also benefit from procuring certain vaccines on its own in certain instances, as is done in the province of Quebec. To explore whether separate procurement should be considered in some cases, Ontario could:

- develop criteria to identify situations when the province could consider negotiating to procure vaccine on its own
- pilot its own procurement process and assess its impact / value in terms of a range of factors (e.g., price, security of supply, value).
3. A Timely, Effective Province-wide System for Vaccine Distribution, Storage, Handling and Inventory Management

Effective vaccine distribution is a complex process that involves:

- distributing vaccines in a timely way across the province
- ensuring vaccines are properly stored and handled
- getting the right supply of vaccines to the providers responsible for delivering vaccines
- making effective use of vaccine supplies and reducing/avoiding waste.

Where We Are Now

**Vaccine distribution.** Ontario is a vast province with many providers involved in vaccine service delivery (e.g., public health and primary care providers). Significant resources are required to get the right vaccines to the right people at the right times. Distributing timely supplies of vaccine can be particularly difficult in rural and remote communities, especially in the North. Ontario currently uses two approaches to distributing vaccines:

- **Inside Toronto:** the Ontario Government Pharmaceutical and Medical Supply Service (OGPMSS) organizes door-to-door delivery of vaccines to health care providers
- **Outside Toronto:** OGPMSS distributes vaccine to local public health units (PHUs), which are responsible for organizing the distribution of vaccine supplies to health care providers in their local areas. Distribution practices vary across PHUs. Some charge fees to providers for vaccine delivery. Others require providers to pick up the vaccine.

Supplies are delivered by OGPMSS to PHUs and Toronto clients according to set schedules, usually weekly, supplemented by emergency orders as needed. This differs from “on demand” delivery used in some other sectors (e.g., by some pharmacies for distribution of their drug supplies).

**Vaccine inventory management systems.** Forecasting and managing vaccine inventories in a highly demand-driven field like immunization is challenging. Strong inventory management practices are needed to ensure the right supplies are provided as and where needed, while minimizing the potential for vaccine wastage. The current information systems used to manage inventory have limitations. The provincial system used by OGPMSS does not “talk” to the system used by local public health units. As a result, it is difficult to have a complete provincial picture of the quantities of vaccine available for distribution to providers at any given time. Such information would be useful at the provincial level, particularly in times of vaccine shortages when the province needs mechanisms to redistribute vaccine from areas of low demand to areas of high demand.

Accurate and timely provincial information on vaccine distributed to providers at the local level would also facilitate vaccine forecasting for procurement purposes. The ministry is currently involved in the development of Panorama, a public health information system. One of its functions will help improve vaccine inventory management.
Maintaining the cold chain. Vaccines must be kept at a certain temperature throughout transportation, storage and handling. Providers who administer vaccines must have the equipment and knowledge to maintain the cold chain. Maintaining the cold chain is particularly difficult in more rural and remote parts of the province, where vaccines have to travel long distances, are loaded on and off vehicles, and may face transportation delays.

The World Health Organization (WHO) has set a maximum vaccine wastage target of 5% and Ontario’s estimated vaccine wastage rate is within this threshold. That said, there may be opportunities to achieve lower wastage rates and, at the same time, improve the efficiency of cold chain maintenance processes.

Ontario’s current cold chain inspection process is highly rigorous. To ensure that all vaccines are maintained according to guidelines, public health staff are required to visit all health care provider offices that store and administer publicly funded vaccines once a year to inspect their storage equipment and practices before any publicly funded vaccine can be released to the provider. Ontario is the only jurisdiction in Canada that requires annual on-site inspections of vaccine storage equipment in providers’ offices. This process has not been evaluated for its cost-effectiveness and there may be opportunities to consider efficiencies such as self-audit tools and random inspection processes.

Where We Want to Be

The immunization system for the 21st century will have the information, tools, expertise and capacity to distribute, track, store and handle all vaccines efficiently, ensuring that:

- the required supplies of vaccine will be available when needed in all parts of the province
- those vaccines will be managed appropriately.

How to Get There

A small number of strategic changes could significantly increase the efficiency of Ontario’s vaccine distribution system.

3.1 Standard equitable supply chain strategies and models

To strengthen the vaccine supply chain, Ontario could consider a number of strategies including:

- comparing the costs and benefits of other vaccine distribution models, including third party distribution models. This review should take into account factors such as timely, consistent and standardized provider access to vaccine supplies across the province, as well as the need to maintain stringent vaccine cold chain practices.
- developing a strong inventory management module within the province’s Panorama system that can integrate the province’s and public health unit’s inventory management information systems. This could improve vaccine distribution and wastage data and support improved forecasting and inventory management practices at the local and provincial levels.
- enhancing value for the “customer” by critically examining all current supply chain processes. The province should eliminate any that do not contribute to value, while identifying opportunities to improve efficiency, using a standardized approach such as Lean theory.
It should be noted that the above strategies will not be possible without effective information systems. These are discussed in more detail in Section 5.

3.2 Efficient cold chain inspection processes
Ontario should consider opportunities to streamline the annual cold chain inspection process, while maintaining the current high standards for protecting the vaccine cold chain. This could involve:

- moving away from the more resource-intensive annual cold chain inspection to a risk management approach. This would include a system of inspections based on an assessment of risk, a combination of routine and random assessments in provider offices, and leveraging other provider inspection processes (e.g., inspections conducted by various professional Colleges).
- supplementing the inspection process with the use of automated electronic fridge monitoring systems. These would alert the public health unit of cold chain incidents in provider offices – while recognizing that this strategy would have cost implications for the system or the provider.
- making better use of public health staff time and skills by combining cold chain inspections with other vaccine education and support for providers. This would include providing information on vaccines and immunization schedules and answering provider’s vaccine questions, potentially linked with continuing education credits.
- creating incentives for providers to measure, report and minimize vaccine wastage, and holding them accountable for results.

In the Vaccines for Children Program in the United States, providers are required to reimburse the government for vaccine that is wasted due to fraud, abuse or negligence.

4. An Integrated, Person-Centred Service Delivery System
To achieve targeted vaccine coverage, Ontario must have an integrated, person-centred service delivery system that:

- makes immunization as accessible and convenient as possible for the public
- coordinates seamless service across the many providers and stakeholders in the system, with a strong link between public health and primary care
- supports the providers who administer vaccine, ensuring they have the appropriate knowledge, skills, resources and tools to immunize Ontarians on time, according to recommended immunization schedules
- maintains integrated information flows from multiple providers to ensure continuity of vaccine preventable disease, coverage and safety surveillance.
Where We Are Now

**Primary care-based vaccine delivery.** Unlike some other provinces (e.g., Alberta), where all publicly funded childhood immunizations are administered by public health staff, Ontario uses a service delivery model that relies mostly on primary care providers to administer publicly funded vaccines. Key exceptions include some vaccines administered through public health units (e.g., through school-based immunization clinics that occur in grades 7 and 8) and influenza immunization clinics in a variety of settings.

This primary care-based delivery model has been highly effective in delivering childhood immunizations which are timed to coincide with routine well-baby care; however, it can be less convenient or accessible for adults who may not have a regular care provider or may not see their primary care provider routinely. Even children, once they are in school, may see their primary care provider less frequently. A broader range of school-based immunization programs may be a more efficient way to administer certain vaccines.

**Support for health care providers.** The ability of providers who administer vaccines to stay up-to-date with best practices may also be a challenge for busy clinicians and other health care providers. Given that the immunization schedule will continue to change and evolve, it is important to create continuing education programs on immunization that are timely, informative and accessible.

**Unique challenges with influenza immunization.** The Universal Influenza Immunization Program (UIIP) is particularly challenging to deliver. Influenza immunization is markedly different from other programs in that it is annual, strives to reach the entire population within a relatively short period of time (a few months) and is delivered by a wider range of providers. Despite the fact that influenza still causes significant illness and death, it is also perceived as less serious than many other illnesses.

In 2012, in an effort to make the influenza vaccine more convenient and accessible, the ministry has expanded the scope of practice of pharmacists to include the ability to administer the influenza immunization to people aged five years and older in accordance with the province’s UIIP. The more providers involved in vaccine delivery, the better the access to immunization. It will be important to weigh the benefits from further expanding the range and number of vaccine providers (e.g., in terms of increases in vaccine coverage) against any potential increases in system complexity or cost.

**Equity.** The ministry has identified equity as a key component of quality care and has developed the Health Equity Impact Assessment (HEIA) initiative to help reduce avoidable health disparities. The immunization system can play a pivotal role in reducing health disparities by taking coordinated action across system partners to ensure this important preventive measure is accessible to under-served populations. To take full advantage of opportunities to improve health equity, immunization data will need to be captured in a way that facilitates the regular and routine assessment of health equity outcomes. This level of analysis presents a challenge in the current system.

**Complexity of the Immunization Schedule.** Ontario’s ability to make vaccines accessible is complicated by the growing number of vaccines, each with its own recommended target ages, target groups (general population versus high risk groups), dosing and delivery approach. As new vaccines continue to come on line and immunization recommendations change based on new evidence, system complexity will only increase. It will become increasingly difficult for both providers and parents to
determine what additional vaccines a child may need – and when – to be optimally immunized.

Many Ontarians are juggling competing priorities and some find the growing number of immunizations confusing and inconvenient. They have difficulty incorporating all the recommended vaccines into their lives when they are not linked to routine medical visits/appointments, as they are with well-baby care.

Where We Want to Be

Ontario should have an integrated, person-centred service delivery system that will make it as easy and convenient as possible for all Ontarians to be optimally immunized. In this system:

- services will be coordinated and seamless across the multiple providers in the system, with a strong link between public health and primary care
- all vaccines will be delivered by competent providers who have the skills to administer vaccines and to communicate effectively with patients
- vaccines will be accessible to under-served populations and health disparities will be reduced
- the right vaccines will be delivered at the right times in the right settings.

How To Get There

To achieve greater health equity and optimal vaccine uptake, a high performing immunization system is designed to deliver convenient, timely access to vaccines for all Ontarians by skilled, knowledgeable providers in a coordinated, integrated way.

4.1 Convenient vaccine delivery models

There are clear advantages to Ontario’s current primary-care based service delivery model, which reinforces the relationship between patients and their trusted primary care provider. In addition to strengthening this delivery model, Ontario should explore other models to optimize access and uptake at different life stages. For example, the province could:

- expand the immunizations delivered through public health-administered school-based clinics beyond those currently held for hepatitis B, meningococcal disease, and HPV to include, for example, influenza, tetanus, diphtheria and pertussis
- deliver immunizations for adults, including seniors, through creative community-based, workplace and health care (e.g., long-term care) settings, including standard policies for offering certain immunizations to people being discharged from hospital
- enable a wider range of health care providers and other professionals who have the skills needed to administer vaccines through a careful assessment of the potential costs and benefits of doing so.

76% of stakeholders in our survey felt that Ontario should implement a school-based influenza immunization program to increase access to the influenza vaccine among school-aged children.
4.2 Simplified immunization schedules and reminders

To address public concerns that there are “too many vaccines” and immunization is inconvenient, the system could take steps to simplify immunization schedules and make them easier to understand by. For example, the province could:

- simplify communications to the public about vaccine recommendations using some form of age-based “bundling”. For example, the vaccines currently recommended between ages 4 and 6 years could be communicated as being given at approximately age 5. Similarly, the vaccines currently recommended for grade 7 and 8 students and between ages 14 and 16 could be communicated as being given at approximately age 10 and age 15, respectively. The subsequent vaccines recommended every 10 years thereafter could then be communicated as being administered at age 25, 35, 45, and so on. Communications could be simplified to reinforce for example “immunization on the five” (i.e., vaccines at every age ending with a 5, after the early childhood immunization series). As this is a new idea that has not been the subject of research, it would require further study to validate its effectiveness before proceeding.

- provide Ontarians with easy and secure on-line access to their immunization records as part of developing a provincial immunization registry so they can find out if their immunizations meet current recommendations. For details, see Section 5.

- promote the use of electronic health records and mobile apps to remind individuals and their providers when they are due to be immunized. 37, 38

- at the provider level, encourage online booking for immunizations. This would reduce the demand on office staff.

4.3 Skilled, knowledgeable providers

Effective immunization programs are delivered by skilled, knowledgeable providers. To enhance skills in a primary care-based delivery model, Ontario should consider:

- providing tools to help providers ensure appropriate timing of vaccines (taking into account variations related to changes in the schedule)

- creating a website and information service where providers can access vaccine information and get their questions answered quickly (see section 1.2)

- integrating immunization competencies into all professional health curricula and ongoing professional education programs and requiring a minimum standard of training for everyone who immunizes

- providing advice on how to improve office flow/design using – for example – fun theory to improve the immunization experience and increase immunization rates while respecting other care activities

- recognizing providers whose practices achieve high vaccine coverage and meet the objective of “on time, every time” immunization uptake.
4.4 Incentives

High performing immunization systems consider the strategic use of a range of incentives (financial and non-financial) for both providers and the public. Ontario already offers financial incentives to health care providers for vaccine administration. These include bonuses for primary care physicians who achieve high rates of immunization among their patients for childhood immunization and influenza immunization to patients over 65 years of age. While evidence continues to evolve on the use of incentives, Ontario should review existing programs and emerging evidence closely to:

- evaluate the effectiveness of existing incentive programs
- explore the potential to use a range of provider incentives to support:
  - immunization across the lifespan
  - vaccine counseling for patients
- weigh the value of incentives for parents, such as those used in Australia, in the context of any related ethical implications.  

If Ontario decides to implement provider and/or public incentives, these strategies should be carefully evaluated for their impact and effectiveness.

4.5 Health equity initiatives

Ontario should take steps now to systematically monitor, evaluate and reduce inequities in access to immunization and in vaccine coverage. To provide all Ontarians with equitable access, the immunization system should work with stakeholders to develop and implement initiatives that will enhance health equity. These initiatives, which could be phased in over time, include:

- applying the ministry’s Health Equity Impact Assessment (HEIA) to any new or existing immunization program planning or evaluation, and linking performance measures to the HEIA
- routinely collecting immunization coverage data in a way that supports health equity analysis, such as by geographic location, immigration status, socioeconomic status and ethnicity
- using data and assessments to develop strategies to reduce disparities through multi-stakeholder engagement
- working closely with the federal government and Aboriginal communities to develop mechanisms to ensure Indigenous residents of Ontario enjoy the same protection from vaccine preventable diseases as the rest of Ontario. This work will include identifying and addressing jurisdictional barriers.
4.6 Supportive legislation and policies

The Committee focused primarily on voluntary compliance with recommended immunizations; however, there is a role for supportive legislation. For example:

- the *Health Protection and Promotion Act* (HPPA) provides the framework for Ontario’s public health system, including its immunization programs
- the Ontario Public Health Standards and Protocols set out the requirements of boards of health in delivering those programs at the local level
- the *Immunization of School Pupils Act* (ISPA) requires all students enrolled in primary or secondary school to be immunized against specific vaccine preventable diseases
- the *Day Nurseries Act* (DNA) requires all children enrolled in a day nursery or private home daycare to be immunized as recommended by the local medical officer of health.

Under the latter two pieces of legislation, exemptions can be obtained by filing a statement of medical exemption or statement of conscience or religious belief with the local medical officer of health. These pieces of legislation encourage vaccine uptake; they also help local medical officers of health collect accurate data on immunization coverage in these age groups so that they can assess public health risks and appropriately respond to disease outbreaks in schools or daycare.

Regulations under the ISPA have recently been updated to be consistent with the recommended childhood immunization schedule.

In California, parents must go through a highly structured approach to request a philosophical exemption to immunization requirements for school attendance, which provides opportunities for education and discussion. See: [http://www.shotsforschool.org/pbe-faq/](http://www.shotsforschool.org/pbe-faq/)

To capitalize on the role of legislation and policies, the ministry could consider:

- working with local public health units to develop consistent strategies for ensuring parents are aware of the risks of not having their children immunized before they submit a statement of exemption under the ISPA or DNA. For example, local public health units could offer to notarize philosophical exemptions and use that opportunity to educate parents about the risks. The goal is to ensure that parents who choose not to have their children immunized are making an informed decision about the potential resulting risks of infection.
- working with local public health units to understand and address the variation in rates of exemptions issued across the province. This work could place special emphasis on exploring strategies for under-immunized communities who are philosophically or religiously opposed to immunization.
- exploring the potential to develop one overall piece of legislation to address disease prevention and infection control in school and daycare settings. This legislation could address immunization and outbreak management.
- ensuring regulations and policy mechanisms used to support the immunization system are flexible enough to adapt quickly to future changes in immunization schedules.
- leveraging the Ontario Public Health Standards and Protocols, which do not require legislative changes, to set targets and reinforce the importance of immunization programs.
5. Robust Provincial Information and Information Systems

A high performing immunization system must include advanced information systems to support surveillance, program management and decision-making. It must be able to:

- track, monitor and evaluate the impacts and outcomes of its immunization programs and services
- identify ways to continually make them stronger and more effective
- provide access to program information and scientific evidence, as well as people with the skills to analyze and interpret the information, including anticipation of emerging public health threats.

Where We Are Now

Systems. Ontario is working with an antiquated immunization information system. While the foundation is currently being set for the development of a much-needed comprehensive provincial immunization registry, the current systems gap means that the province cannot yet capture in one centrally accessible place all data on:

- who has been immunized
- the immunizations they received from whom and when
- the immunizations they still need.

A provincial immunization registry would also provide links to other important systems, such as those tracking vaccine distribution, vaccine preventable diseases and adverse events following immunization.

Because the ISPA requires parents to report their children’s immunization records in order for the child to attend school, coverage data for school-aged children is more reliable than coverage data for adults. Even so, the current Immunization Records Information System (IRIS) used by public health units to record children’s immunization information has limitations. The data are not available until after the children enter school, unless IRIS is also used to capture information on children in child care settings. This gap means that the immunization system may miss opportunities to monitor and potentially intervene to promote routine childhood immunization during the first few critical years of life.

People. Ontario requires the people and capacity to monitor the system and analyze and interpret immunization data. Public Health Ontario (PHO) is the provincial agency responsible for providing scientific and technical advice and support to clients working in government, public health, health care and related sectors. Within this role, PHO is the lead for immunization surveillance, including surveillance of vaccine coverage, vaccine safety, and vaccine preventable disease. In addition to PHO’s role, public health units carry out surveillance activities at the local level, as does the Public Health Agency of Canada at the national level, and the various bodies work closely together. The system must make strategic use of people and skills to:

- assess vaccine coverage
- identify areas or populations with low immunization uptake
- assess health equity outcomes
- identify emerging trends.
Where We Want To Be

Ontario should have 21st century information systems, including a provincial immunization registry. This registry would enable the province to accurately track all vaccines administered to all people in Ontario across the lifespan in a timely way, regardless of the provider or the setting where the vaccine was administered. The registry should be linked to information on adverse events following immunization (AEFIs), vaccine preventable diseases, and cancer registries. It should be used to its full potential to support:

- immunization surveillance
- performance monitoring
- evaluation
- research program management
- decision-making.

The public and their providers should have electronic access to their own immunization records and immunization reminders to help them follow the recommended immunization schedule.

How To Get There

A provincial immunization registry is the critical first step.

5.1 A comprehensive provincial immunization registry

A comprehensive provincial registry is the cornerstone for a high performing immunization system. An effective registry would have the capacity to:

- support surveillance of vaccine coverage, safety, vaccine preventable diseases and susceptibility to these infections
- maintain information on immunization throughout the life span
- give individuals and their providers easy access to their immunization records
- “push” person-specific immunization information (including recall and reminder notifications) to health care providers and individuals through electronic health records and personal health records
- respect and protect the privacy of personal health information.

An immunization module is now being implemented in Panorama, the public health information system in Ontario. This will provide the first step toward a comprehensive provincial immunization registry. In the near term, the immunization module of Panorama will focus primarily on immunizations given by public health staff to school-aged children. It will include the ability to forecast additional doses required based on the doses already received.

While this is an important development, a truly comprehensive province-wide registry must go further. It must include immunizations across the lifespan, delivered by all providers, with linkages to the electronic medical record and personal medical records. When developing its immunization registry, Ontario would benefit from working closely with the Physician eHealth Council, the electronic Child Health Network (eCHN) and the Trilateral First Nations Immunization Project to ensure effective data linkages and engagement.
It will take time to create this registry. In the meantime, Ontario could develop mechanisms, such as conducting vaccine coverage surveys, to support surveillance and program planning. These interim measures would also allow the province to report on key performance measures, such as the World Health Organization’s two-year-old vaccine coverage benchmark.

5.2 A focus on data quality, data linkage and skills
The provincial immunization registry will be used to help plan and drive immunization programs and individual immunization decisions. Therefore, it will be critical to:

- ensure registry data are accurate, comprehensive and of high quality
- address privacy concerns/requirements to allow for the appropriate sharing of information
- ensure the registry has the capacity for robust analyses and data linkages
- develop people with the skills and expertise to analyze the data and conduct data linkage studies.

6. A Coordinated Cycle of Program Evaluation, Research and Knowledge Exchange
A high performing immunization system must have the capacity and expertise to:

- conduct rigorous, relevant immunization research and program evaluations
- continually monitor and assess the performance of the overall immunization system
- support knowledge translation and exchange so that evidence can be applied effectively in practice
- provide access to scientific evidence to inform practice, drive change and support continuous quality improvement.

Where We Are Now
Quality improvement. The province has made progress in performance measurement through the development of public health unit Accountability Agreement indicators for vaccine wastage and school-based immunization programs to protect against human papillomavirus, hepatitis B and meningococcal C-ACYW-135. However, Ontario needs a broad-based performance monitoring framework to support continuous quality improvement of all aspects of the immunization system.

Evaluation. Individual immunization programs are currently assessed primarily in terms of doses distributed, vaccine wastage, vaccine coverage, AEFIs, disease prevalence and other measures. Formal evaluations of immunization programs are not always conducted. Ontario would benefit from a comprehensive evaluation framework and enhanced capacity to support a coordinated cycle of immunization program evaluation.

Research. Immunization research in Ontario is not as robust as it could be. Unlike some other jurisdictions, Ontario does not allocate a set proportion of its immunization program budget for research or evaluation. Instead, researchers must seek funding through competitive granting programs, such as the Canadian Institutes of Health Research, which may not align with Ontario’s immunization research priorities. As a result, the province does not have an ongoing immunization research program to inform program planning and policy decisions.
Knowledge translation and exchange. The information we do have from immunization research is not always easily accessible or relevant to immunization planners or providers. With more effective knowledge translation and exchange (KTE), Ontario would be able to maximize the effective use of scientific evidence to drive planning, vaccine delivery, public and provider education, and quality improvement – thereby reaping the full benefits of research in improving system performance.

Where We Want to Be

A coordinated cycle of immunization research and program evaluation should be an integral part of the immunization system. All programs and processes should be evaluated routinely and the findings used to improve efficiency and effectiveness. Ontario can be an important player in international immunization research and contribute to global knowledge. The province should:

- develop and maintain highly skilled researchers and evaluators who will have dedicated time and resources to conduct studies and analyses that reflect immunization system priorities
- develop innovative ways to share research findings and move them into practice.

How To Get There

A small number of strategic changes would significantly enhance immunization research and program evaluation in Ontario.

6.1 A robust program evaluation plan

Ontario invests over $130M a year on vaccine costs alone, not including payments to physicians and other providers for vaccine administration. To assess the impact of that investment, the province could earmark funding for evaluation and establish a formal, structured and coordinated evaluation approach that would include:

- a partnership across clinical, public health, policy, laboratory, academic and other domains that would build, enhance and provide stable, sustainable capacity and relevant expertise in immunization program evaluation
- an evaluation plan that would address all aspects of immunization programs, including planning and decision-making, integrated service delivery, vaccine acceptance and uptake, and continuous quality improvement
- key outcome measures that align with indicators of quality and include, at a minimum, evaluation of program implementation, vaccine coverage, vaccine safety, disease burden, vaccine effectiveness and value for money
- a standard evaluation timeframe and cycle for all immunization programs, including both process and evaluations, such as:
  - a formative (process) evaluation initiated within one year of program implementation
  - a summative (outcome) evaluation, including economic evaluation, initiated within three years where feasible, depending on the disease endpoints
  - a schedule for “catch-up” evaluations of existing immunization programs

Learning from Other Jurisdictions

Quebec invests 1 to 3% of its immunization program budget in evaluation.
consideration of susceptibility (i.e., sero-surveillance) as a component of evaluation to determine the proportion of the population who remain susceptible to vaccine preventable diseases and support the development of immunization strategies targeted to vulnerable populations

- strong relationships with other organizations, such as Health Quality Ontario (HQO) and boards of health, and other jurisdictions, such as the federal-provincial-territorial network, to make effective use of limited evaluation resources

- a provincial or national mechanism to publish program evaluation results, which would encourage knowledge translation of the evaluation work being done.

6.2 A system performance monitoring framework

To continually improve the immunization system, Ontario needs an overall approach to monitoring system performance. The framework would help shape program evaluations and would, in turn, be informed by the results of program evaluations.

A framework for monitoring the performance of the province’s immunization system would include:

- a scorecard with measures and targets to assess system performance against common goals and objectives

- individual immunization program performance measures and targets, including vaccine coverage targets based on the uptake required to achieve “herd immunity” within communities

- performance agreements that incorporate individual provider and organizational performance measures and targets, which could be introduced in stages:
  - short-term: embedding immunization indicators into existing quality improvement plans (QIPs) and agreements with public health units, LHINs, hospitals, community health centres, Aboriginal health access centres, long-term care homes, etc.
  - medium-term: embedding immunization indicators into new QIPs and agreements negotiated with physician enrollment models (e.g., family health teams) and nurse practitioner-led clinics
  - longer-term: moving beyond organizational plans into individual provider performance coverage targets

- formal relationships with HQO and other jurisdictions so Ontario's immunization system can take full advantage of existing evidence-informed quality improvement tools and approaches.

6.3 A coordinated immunization research plan

A high performing immunization system takes a planned and coordinated approach to applied research, ensuring these activities reflect stakeholder priorities, inform policy and practice, and maximize system performance. It also works closely with other jurisdictions nationally and internationally to avoid unnecessary duplication. An effective research plan includes:

- developing a process to consult with stakeholders (e.g., health care providers, public health agencies, policy makers) to identify relevant immunization research priorities. This process should build on the “Listening for Direction” process

The system should continually strive to improve quality and enhance performance and sustainability.
developed by the Canadian Institutes of Health Research (CIHR) and the Canadian Health Services Research Foundation (CHSRF, now called the Canadian Foundation for Healthcare Improvement)

- identifying research priorities that span all components of the immunization system (e.g., program implementation, vaccine hesitancy) and making researchers aware of policy relevant questions
- developing a work plan that would organize priorities as:
  - **short term**, where a sufficient body of knowledge could be synthesized and assessed within 3 to 6 months (i.e., rapid cycle learning). Examples include strengthening Ontario’s information base with the development of evidence briefs and synthesis of existing evidence through systematic reviews.
  - **longer-term**, such as primary research – where new evidence could be produced over the next 2 to 5 years.

- dedicating funds to support immunization research. To ensure support for immunization research in Ontario, the government could consider making immunization research one of the components of the ministry’s Health System Research Funding Strategy, or making policy-relevant immunization research questions known to those who might apply for health system research funding.
- leveraging other sources of research funding, such as through the Canadian Institutes of Health Research (CIHR) Institute for Infection and Immunity and the Public Health Agency of Canada /CIHR Influenza Vaccine Research Network (PCIRN)
- establishing research capacity with long-term stable funding and infrastructure to ensure a sustainable research infrastructure that can leverage additional funding, provide effective and efficient use of capacity, and develop and retain internationally recognized expertise in Ontario.

### To ensure maximum impact

For the immunization system, research that is funded should meet certain criteria, such as:
- being linked to Ontario’s immunization system research priorities (including hesitancy)
- not duplicating research funded elsewhere
- contributing to systematic reviews
- incorporating rapid cycle learning that will support implementation of early research findings.

6.4 **A multi-disciplinary Immunization Knowledge Translation and Exchange (KTE) Network**

To close the research and evaluation loop, and feed findings back into practice and policy, a high performing immunization system would establish a multi-disciplinary provincial immunization research and evaluation KTE network. This KTE network would contribute to:

- a one-stop shop for synthesizing immunization evidence, including the capacity to do rapid syntheses based on the immunization system’s research priorities
- a consistent, systematic way to share the results of program evaluations and use them to shape existing immunization programs and inform new ones
- an online forum/clearinghouse for user friendly summaries, tool kits, Q and As, and other resources for the public, providers, stakeholders and policy makers
open government and open data approaches

dynamic health evidence forums or deliberative stakeholder dialogues to engage policymakers, stakeholders and researchers in discussing current evidence on key immunization issues.

7. Engagement Strategies

An effective immunization system actively engages all stakeholders to ensure that all system partners are able to collaborate and contribute to achieving common goals. Stakeholders include the public, health care providers, public health professionals, policy makers, researchers, evaluators, other sectors and the vaccine industry.

Where We Are Now

The current structures for planning and delivering vaccines do not sufficiently engage the public or providers. According to our survey of stakeholders, 71% said they would like to be engaged and 82% said they would like their organization to be engaged in the planning and design of Ontario’s immunization system.42

Where We Want To Be

Ontario should have broadly based advisory groups that:

- reflect all stakeholders in the immunization system
- provide an effective way to identify and resolve issues
- communicate across the system.

How We Get There

During its deliberations, the Committee identified two different options for an advisory group approach and structure. These could be used to ensure the consistent, transparent, ongoing engagement of key players in the system and facilitate system linkages such as those between public health and primary care.

7.1 A time-limited, multi-sector Immunization System Council

The role of the Council would be to:

- guide the evolution of the immunization system
- oversee implementation of the immunization system strategy developed by the ministry
- engage stakeholders
- leverage system innovations
- report on the system’s progress in meeting common goals and targets over the next three to five years.
This time-limited group, which would focus on the changes to the immunization system, would sunset once the changes were made.

7.2 A permanent policy and implementation advisory capability

A more permanent, ongoing advisory capability would enhance the system’s capacity to:

- inform the ongoing policy and implementation assessments needed to inform decision-making
- advise the ministry on all aspects of implementing potential new immunization programs or program changes.

This ongoing advisory group or capability could complement or enhance the scientific and technical advice currently provided by the Provincial Infectious Diseases Advisory Committee - Immunization (PIDAC-I) and Public Health Ontario. It could be created either by expanding the membership/expertise of PIDAC-I or by establishing a separate group. Unlike the Council suggested above, it would focus more on informing the ongoing day-to-day policy work involved in introducing new vaccines and modifying existing immunization programs.
Next Steps: Priorities and Opportunities

Ontario has a unique opportunity to take its immunization system to the next level. Building on existing strengths and pursuing innovative strategies, the province can create a high performing system that will:

- reflect a culture of continuous quality improvement
- make the best use of evidence, strategies, collaborations, and vaccine technology to prevent existing and new health threats
- achieve the goals and targets of the province’s immunization system through coordinated action among all partners
- be a national and global leader in immunization.

The opportunity to rejuvenate our immunization system comes at a time when many worthy health initiatives are competing for scarce resources. Where should our energy and resources go first?

This report sets out an extensive list of actions required to create and sustain a high performing immunization system. In the Committee’s view, all of these steps are needed for the system to efficiently and effectively achieve desired immunization goals and optimize the prevention of vaccine preventable diseases. However, if Ontario needs to focus initially on a small number of innovative changes that will have the greatest impact, the Committee has identified the following key priorities:

Priority 1. Promote Immunization and Build Public Confidence

Strong public support and confidence are critical to the success of the immunization system. It is essential to connect with all Ontarians – across all segments of the population – to:

- understand their concerns and perspectives
- provide the information, tools and supports they need – when and how they need them - to make informed immunization decisions.

Priority 2. Develop the Provincial Immunization Registry Now

A provincial immunization registry – that is, a single place where all immunizations administered are recorded and tracked – is the foundation for the whole system and must be developed now. The registry is crucial to support program delivery, tracking, reminder notifications and evaluation.

Priority 3. Use Evidence to Drive System Change

The immunization system must have access to sound evidence, including cost-effectiveness analysis, to inform policy and practice, drive change and support continuous quality improvement. Ontario needs to take a systematic approach to obtaining and disseminating evidence, using a coordinated cycle of program evaluation, research and knowledge exchange. To optimize the benefits of immunization for all people of Ontario, planning and decision-making should also be timely, transparent and informed by meaningful stakeholder engagement.
Conclusion

Immunization is one of the most cost effective and successful health interventions known\textsuperscript{43}. To reap the full health and cost benefits of immunization, immunization programs must be delivered efficiently and effectively, and the public must be able to embrace them with confidence.

At its heart, a high performing immunization system is committed to creating a culture of continuous quality improvement. All components of the system strive to achieve goals and reach concrete targets. Immunization strategies are carefully thought out. Activities are measured and evaluated. The whole system is engaged in reflecting on practice, gathering evidence, improving performance, ensuring sustainability and enhancing health.

We congratulate the Chief Medical Officer of Health and the Ministry of Health and Long-Term Care for their willingness to take a critical look at the current immunization system, build on its strengths and explore innovations that will allow Ontario to maintain a high performing immunization system for the 21\textsuperscript{st} century.
References


3 Ibid.


28 Ibid.


