

UNIT NO. 5

IMMUNISATION UPTAKE IN SINGAPORE

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ABSTRACT

Good coverage of immunisation in the population is required to reduce the risk of disease transmission to susceptible individuals within a population. The family physician plays a vital role in promoting immunisation by helping the public to understand the benefits and risks associated with vaccines. The submission and maintenance of accurate and timely immunisation records help to shape and guide disease surveillance and monitoring for the population. Singapore's overall immunisation coverage for five key childhood immunisations (measles, diphtheria, tuberculosis, poliomyelitis and hepatitis B) in 2009 for children at two years of age was 97%. While Singapore has achieved good immunisation coverage for the primary doses of key childhood immunisations, there remain challenges. The average coverage for booster dose is 91% for MMR, DPT and Sabin. This needs to be improved. To enhance Singapore's immunisation surveillance, electronic submission will facilitate faster turnaround time for reporting and allow relevant actions to be taken where necessary.

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INTRODUCTION

The family physician plays a central role in immunisation, by helping the public to understand the benefits and risks associated with vaccines. The uptake of immunisation programmes and the development of new vaccines provide opportunities to sustain the health of children (Pollard A 2007). Successful immunisation programs are dependent on high rates of coverage and acceptance (Omer SB, Salmon DA et al. 2009). The avoidance of vaccination may lead to loss of protection from infectious diseases and increase disease incidence, morbidity and mortality (Goh 2010).

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In Singapore, the National Immunisation Registry (NIR) collects data from all healthcare institutions and primary care doctors. It also provides regular updates on immunisation coverage rates for vaccine preventable diseases. This is to facilitate policy formulation to ensure herd immunity in Singapore. The submission and maintenance of accurate and timely immunisation records help to shape and guide disease surveillance and monitoring for the population. The discussion within this paper centres on the following key areas:

- The role of the family physician in the National Immunisation Program.
- Singapore's immunisation coverage rates and challenges faced.
- The use of immunisation data for public health practice.

THE ROLE OF THE FAMILY PHYSICIAN IN THE NATIONAL IMMUNISATION PROGRAMME

The family physician is usually the primary contact for immunisation in the population. In Singapore, a majority of immunisations for children below the age of two years are given at private clinics and polyclinics. Based on 2009 data from the NIR, 41% of immunisations were given at private clinics, 36% at polyclinics and the remaining at public (12%) and private hospitals (11%). Parents are almost twice as likely to consider vaccines to be safe if their immunisation decision was influenced by their child's health care provider (Omer SB, Salmon DA et al. 2009). Family physicians play an important role in delivering immunisation in 3 key ways:

- 1) Educating the public to understand what vaccines are available and essential for their patients depending on their needs. The National Childhood Immunisation Schedule is constantly reviewed to ensure its relevance to the public health picture of vaccine-preventable diseases in the country. Family physicians can help increase awareness of such changes and encourage parents to complete the required vaccine dosage for their children, according to the immunisation schedule.
- 2) Helping to dispel myths on the risks of certain vaccines so that misconstrued perceptions do not lead to decreased immunity. For example, in 2004 there was a measles outbreak involving 94 confirmed cases. The coverage rates for the Measles, Mumps and Rubella (MMR) vaccine are lower in comparison to other vaccines; partly attributed to Wakefield's study published in the Lancet in 1998 which alleged a link between autism and the MMR vaccine (Goh 2010). The family physician can help the public to better understand the risks associated with vaccines due to their specialised knowledge about the indications

for and contraindications to immunisation (Omer SB, Salmon DA et al. 2009).

- 3) Submitting patients' immunisation records in a timely manner to the NIR facilitates better monitoring for the population. Accurate immunisation records can help channel resources to identify sectors of the population with low coverage rates, so that targeted interventions to increase coverage and protect children from disease can be implemented (WHO 2005).

IMMUNISATION COVERAGE IN SINGAPORE

The NIR plays a key role in ensuring that the vaccination records of children from birth to 18 years of age in Singapore is complete, accurate and updated so that coverage rates can be monitored. The NIR also facilitates the provision of immunisation coverage reports to Singapore government ministries, schools and the World Health Organization. Immunisation coverage rates serve as useful indicators for assessing whether a population is adequately immunised and identify areas that need intervention in order to prevent outbreaks of infectious disease.

Coverage for measles, diphtheria, BCG, poliomyelitis & hepatitis B immunisations

Singapore has achieved good immunisation coverage among children for the key diseases - measles, diphtheria, BCG, poliomyelitis and hepatitis B (Table 1) - with the rates comparable to the best in the world. The overall immunisation coverage rate in 2009 for children at two years of age was 97% for all the five vaccines.

Table 1: Immunisation coverage for Singapore Residents at two years of age, 2003-2009.

Year	BCG (%)	DPT (%)	SABIN (%)	MMR (%)	Hep B (%)
2003	99.3	96.0	95.9	93.2	95.3
2004	99.2	94.6	94.5	95.3	93.5
2005	97.8	96.1	96.0	95.6	95.7
2006	98.3	95.4	95.4	94.5	94.6
2007	99.4	96.6	96.6	95.0	95.6
2008	99.5	96.9	96.9	95.0	96.8
2009	99.3	96.8	96.7	95.2	96.4

Source: National Immunisation Registry, Health Promotion Board 2010

Experience of other developed countries

Overall, the national coverage rates for Singapore across the different vaccines are among the best in comparison to developed countries (Table 2). Singapore's coverage rate for Diphtheria (DTP) and Poliomyelitis (Pol) is comparable to countries like Finland and Japan. With the introduction of the immunisation of Hepatitis B (HepB) among new born

children since September 1987 and the implementation of a 4-year catch-up programme conducted among school children in 2001, Singapore has also attained a high coverage of immunisation against HepB of about 96%. The Measles (MCV) immunisation rate is also high compared to that of the UK (86%), USA (92%) and New Zealand (86%).

Challenges in reporting coverage rates

Whilst the primary coverage for the five childhood vaccines is high, the uptake of booster doses is generally lower. This could be due to reasons such as fewer parents taking their children for the booster dose and clinics not submitting their patients' immunisation records to the NIR. Table 3 outlines the primary and booster dose coverage for DPT and Sabin vaccines. Even though the booster coverage improved in 2009 for both vaccines to about 91%, this needs to remain consistent in order to achieve herd immunity.

To promote childhood immunisation awareness, HPB has produced a pamphlet targeting parents, monitoring children with missing measles immunisation notification by sending reminders to the parents and clinics where the last immunisation records were received. Older children are followed-up in schools by HPB's School Health Service during the routine school health visit.

To improve accuracy in notification, NIR has worked with various healthcare institutions to reduce the number of missed notifications for the five childhood immunisations. Electronic submission will aid to improve immunisation surveillance and reporting by enhancing the access to real time data. (Please refer to Annex 1 of this article for guidelines on how to e-submit your patient's immunisation records).

Although the immunisation coverage in Singapore has been maintained around 95%, this is only slightly above the average target coverage to achieve herd immunity. A slight reduction in the immunisation coverage can compromise herd immunity within our population. A concerted effort combining public education by healthcare providers, submission of accurate and timely immunisation reporting, surveillance and monitoring, policy and access to healthcare service is required to achieve high immunisation coverage in the population and prevent disease outbreaks.

THE USE OF IMMUNISATION DATA FOR PUBLIC HEALTH PRACTICE

Accurate immunisation records help identify sectors of the population with low coverage rates so that targeted intervention to increase coverage and protect children from diseases can be implemented. This benefits the entire community. Table 4 outlines the key uses of NIR data for policy makers, healthcare providers and parents. The uptake of two new vaccines (pneumococcal and H1N1) is used to exemplify the utilisation of NIR data.

Table 2: 2008 Immunisation Rates: International Comparisons 2008.

	Singapore	Australia	Canada	Finland	Japan	New Zealand	United Kingdom	United States of America
National coverage rates								
DTP1	98%	97%	97%	99%	99%	91%	97%	99%
DTP3	97%	92%	94%	99%	98%	89%	92%	96%
HepB3	96%	94%	14%	----	----	90%	----	93%
MCV	95%	94%	94%	97%	97%	86%	86%	92%
Pol3	97%	92%	90%	97%	95%	89%	92%	93%

Source: World Health Organization, 2009

Table 3 Primary and booster dose coverage for DPT and Sabin for children at 2 years of age, 2003-2009.

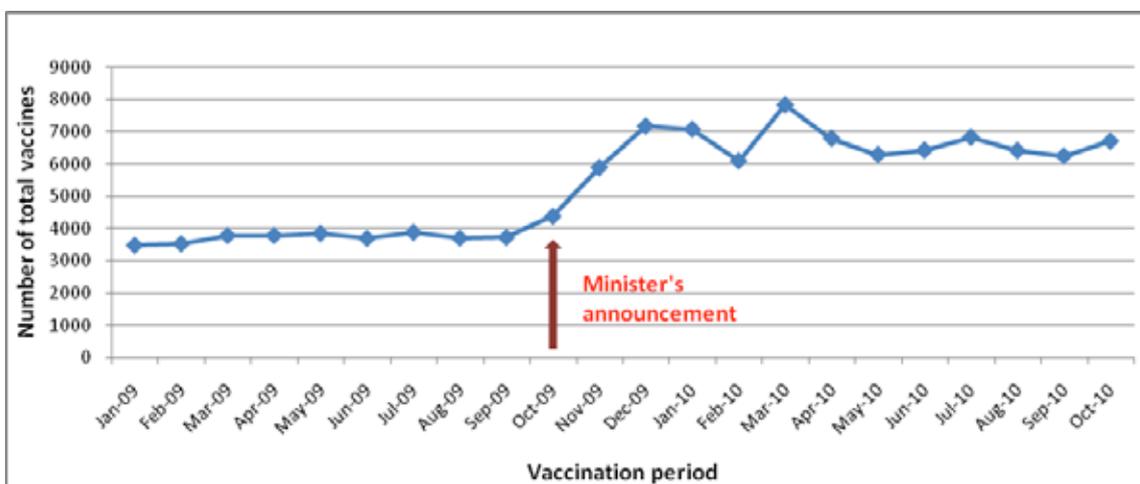
Year	DPT primary dose coverage (%)	DPT booster coverage (%)	Sabin primary dose coverage (%)	Sabin booster coverage (%)
2003	96.0	84.0	95.9	83.0
2004	94.6	89.9	94.5	88.5
2005	96.1	91.0	96.0	90.6
2006	95.4	90.0	95.4	89.7
2007	96.6	88.3	96.6	87.9
2008	96.9	87.3	96.9	86.6
2009	96.8	91.0	96.7	90.6

Source: National Immunisation Registry, Health Promotion Board 2010

Table 4: Utilisation of NIR data for public health practice.

Utilisation of NIR data	
National immunisation coverage	<ul style="list-style-type: none"> To determine and report the overall immunisation and individual vaccine coverage among children from birth till 18 years in Singapore. To assess population that is inadequately immunised so that intervention of policies can be planned and implemented to improve coverage.
Monitoring uptake of vaccines	<ul style="list-style-type: none"> Monitors immunisation uptake of new vaccines to assist in the decision making process for administering vaccinations to the population. e.g. Pneumococcal vaccine. Analyse the number of doses administered and to calculate the incidence rate of any adverse event that occurred. e.g. H1N1 vaccine.
Assist health care providers	<ul style="list-style-type: none"> Immunisation history for each individual child is consolidated from various health care providers. To help health care providers determine which vaccines are required for their patients as per the immunisation record of the patient.
Reminders and notifications to parents*	<ul style="list-style-type: none"> To notify parents when their child is due for immunisation or has missed a particular immunisation. This helps both the parents and the healthcare providers to ensure that a child is only immunised with the required vaccines.
E-Services for the public and healthcare services	<ul style="list-style-type: none"> On-line immunisation history of children allows physicians to check immunisation records before administering vaccine. Parents are also able to check the history of their child's immunisation history.

Figure 1. Primary dose coverage rates for Pneumococcal vaccination, 2009-2010.



Source: National Immunisation Registry, Health Promotion Board 2010

Pneumococcal vaccination for children

The pneumococcal vaccine was included in the National Childhood Immunisation Schedule in October 2009. Epidemiological studies had showed a significant burden in Singapore due to invasive pneumococcal disease (Lee 2010). Prior to the official introduction of the vaccine, the vaccine coverage was an estimate of 20% of all newborns (Ministry of Health Singapore 2009). Results of the NIR data from 2009-2010 showed a noticeable rise in the number of vaccines administered after the Ministry’s announcement in October 2009 of its inclusion in to the Schedule and allowing MediSave to be used for paying the cost of the immunisation.

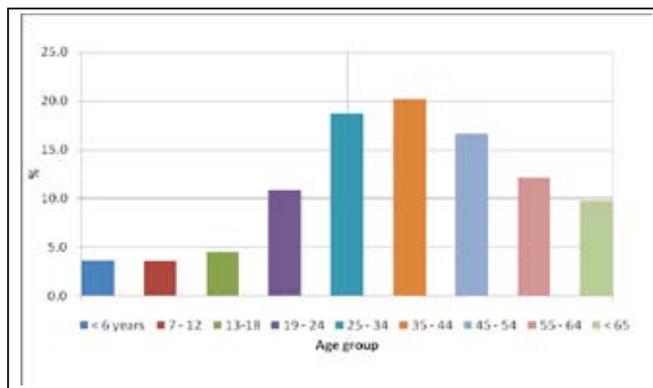
H1N1 Influenza vaccination

The H1N1 vaccine became available in December 2009 during the H1N1 pandemic of 2009. The NIR monitored the uptake of the vaccine in the population. The majority of patients who received the H1N1 vaccination were adults, with the 35-44 year age group recording the highest uptake at 22 % (Figure 3). The records also enabled the Health Sciences Authority (HSA) to profile the safety of the H1N1 vaccines. Physicians were also able to use the NIR system to submit the immunisation records and check the vaccination details of their patients.

CONCLUSIONS

The family physician plays a key role in the immunisation delivery of new and routine vaccines by educating the public on the risks and benefits associated with vaccines. The challenges in reporting coverage rates for the Singapore population are attributed to the low uptake of booster doses and missed notifications within patients’ immunisation

Figure 2: H1N1 vaccination uptake by age group, 2010.



Source: National Immunisation Registry, Health Promotion Board 2010

records. The timely and accurate submission of immunisation data is vital for recording the immunisation coverage rates. Disease surveillance and monitoring for the population can be enhanced by electronic submission of immunisation data by family physicians.

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LEARNING POINTS

- **The family physician plays a central role in immunisation, by helping parents to understand the benefits and risks associated with vaccines. Key benefits of immunisation include protection for individuals who have not developed immunity for vaccine preventable diseases.**
- **Successful immunisation requires a significant portion of the population to be vaccinated against a particular disease. The avoidance of vaccination may lead to loss of protection from infectious diseases and an increase in disease incidence, morbidity and mortality.**
- **The submission and maintenance of accurate and timely immunisation records help to shape and guide disease surveillance and monitoring for the population. Immunisation data can be used to guide public health program planning for identifying populations at high risk for vaccine preventable diseases.**
- **Immunisation data from new vaccines and booster doses of routine vaccines assist in the decision making process for administering vaccinations to the population.**
- **E-submission assists in achieving a more accurate data collection process by reducing the time lag for data processing and human error and improving access to real time data.**

E-Submission to National Immunisation Registry

National Immunisation Registry (NIR) is accessible for all the general practitioners through the Health Professional Portal (HPP) @ www.hpp.moh.gov.sg.

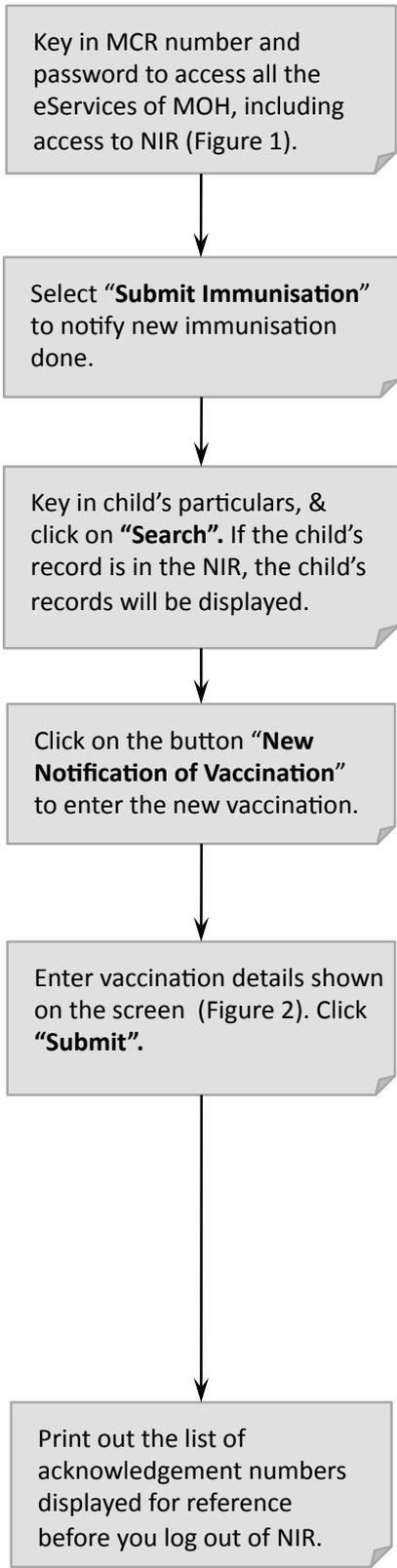


Figure 1: NIR webpage for immunisation notification by doctors

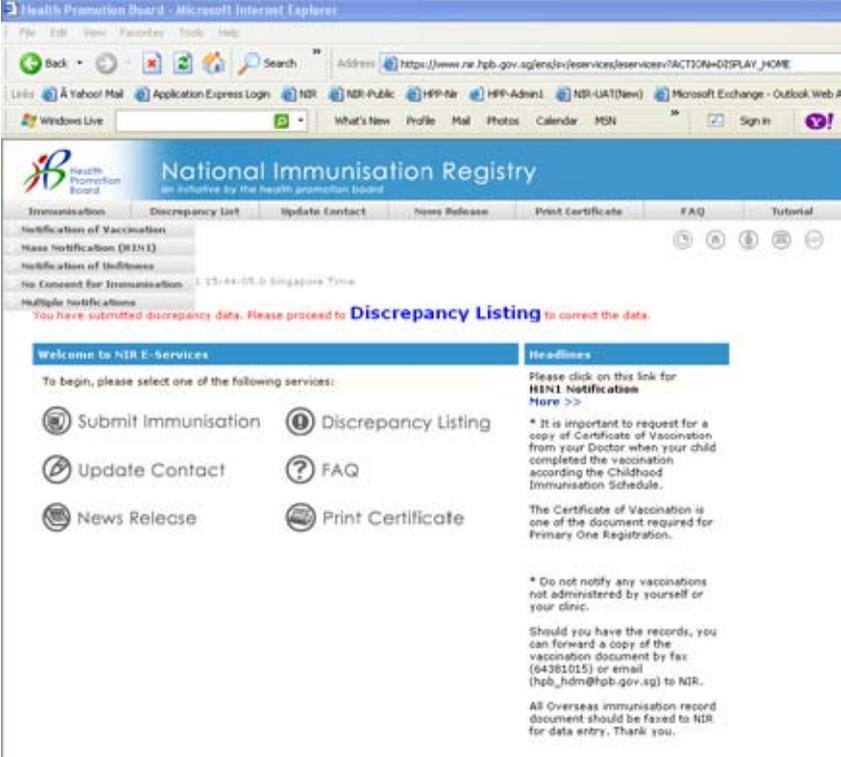


Figure 2: Vaccination Details Screen

