
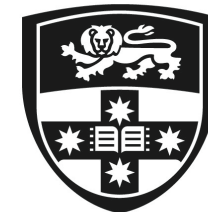


Use of Electronic Immunisation Registers to strengthen immunisation programs

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THE UNIVERSITY OF
SYDNEY

Outline

1. Electronic immunisation registries (EIRs) and immunisation information systems
 - Health Information Management Systems
2. Usefulness of EIRs in strengthening immunisation programs
 - Individual level
 - Population level
3. Considerations for implementation

Electronic immunization registries (EIRs)

- Tools that facilitate the monitoring of individual immunization schedules and the storage of individual immunization histories, and, consequently, help enhance the performance immunisation program.
- Immunisation registries can also be paper-based and non-individual



Australian Immunisation Register

Home
Claims
Identify Individual
Identify Individual
Individual Details
Record Encounter
Update Encounter
Payment Statements
Provider Menu
Reports

Identify Individual

An individual can be searched for using any of the identifiers - Medicare card number or IHI or a combination of an identifier and personal information. When a Medicare card number or IHI are unavailable, you can enter personal information only to identify individual.

This form has required and optional fields based on your search query, all required fields are marked with an asterisk *

Medicare

Medicare Number: IRN:

Individual Healthcare Identifier (IHI)

IHI:

Personal Information

The individual has only one name

Surname:

First Name:

Date of Birth: DD/MM/YYYY

Gender:

Postcode from: to:

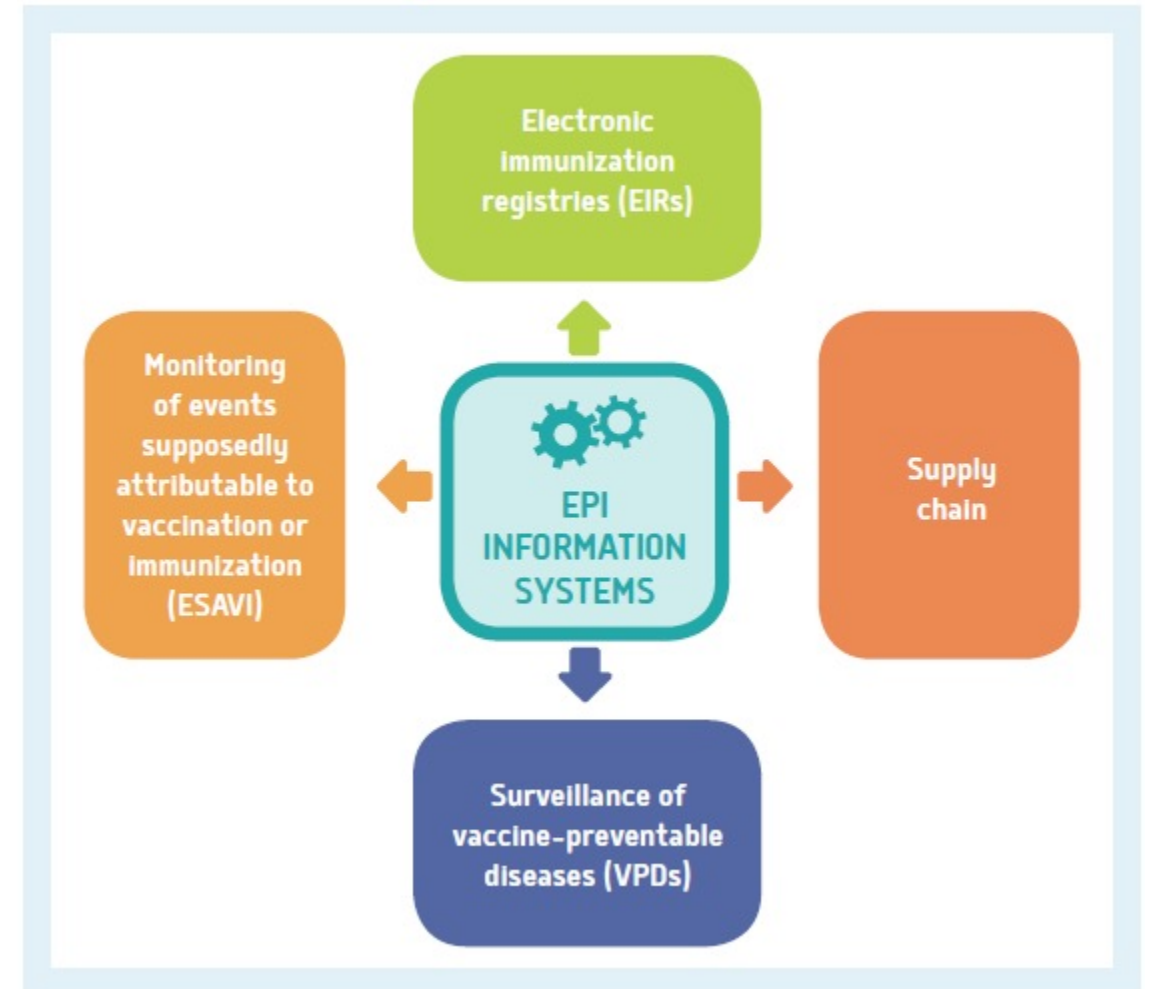
CLEAR SEARCH



Paper-based registry maintained by Tonga Ministry of Health since 1970s

Immunisation information systems (IIS)

- Produce information that will guide the strategic, managerial, and operational decisions of the EPI within each country.

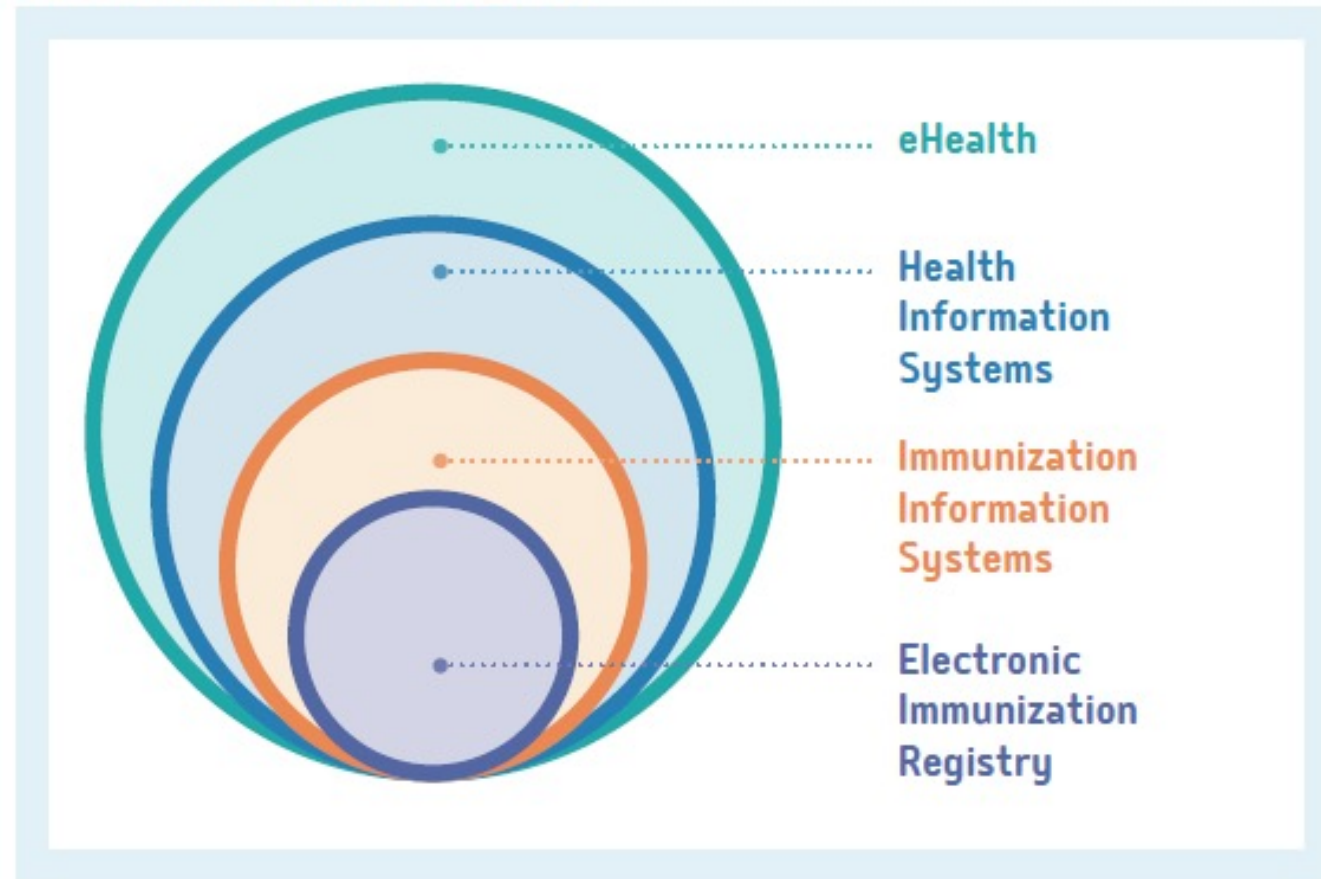


Health information systems (HIS)

- Tool for collection, processing, analysis, and transmission of information required for organizing and operating health services
- Provide useful, high-quality data in a timely fashion. Improvements in health information systems arise from the changing information needs of programs, sectors, users, and the population.
- Not just visualisation



Inter-relationships among HIS and IIS



Pan American Health Organization. Electronic Immunization Registry: Practical Considerations for Planning, Development, Implementation and Evaluation. Washington, D.C.: PAHO; 2017.

Do you have an immunisation
registry in your area/ country?

How can EIRs be used?

Electronic Immunization Registry

BENEFITS

Improves the vaccine recipient's experience

Improves EPI performance

Improves EPI management and efficiency

Provides improved evidence for operational response and research

Examples

Stores vaccine history

Improves coverage through follow-up

Improves resource and activity planning processes

Guides outbreak management

Helps ensure the quality of vaccine administration

Reduces dropout rates

Enables support for training and supervision

Supports estimation of vaccine effectiveness

Improves indicators of simultaneity in vaccine administration

Assess provider workload immunisation productivity

Supports vaccination safety studies

Allows complete vaccine traceability

Sheel et al, Vaccine, 2020, Electronic immunization registers – A tool for mitigating outbreaks of vaccine-preventable diseases in the Pacific
Immunization Data: Evidence for Action. A Realist Review of What Works to Improve Data Use for Immunization, Evidence from Low- and Middle-Income Countries. Seattle: PATH; Washington, DC: PAHO; 2019

Australian Immunisation Register

- Established 1996 – childhood vaccines <7 years
- Maintained by Services Australia on behalf of Australian Government Department of Health
- Jan 2016 – expanded to age 19 years
- Oct 2016 – expanded to include all ages
- 2018 – National HPV vaccine register data transferred to AIR

Australian Childhood Immunisation Register (ACIR)

Identifying and definitional attributes

| | |
|-----------------------------------|--|
| Item type: ⁱ | Data Source |
| Description: ⁱ | The Australian Childhood Immunisation Register (ACIR) is a national register administered by Medicare Australia that records details of vaccinations given to children under seven years of age who live in Australia. It was established in 1996 in response to a decline in childhood immunisation levels and an increase in preventable childhood diseases. |
| Link to data source: ⁱ | http://www.humanservices.gov.au/customer/services/medicare/australian-childhood-immunisation-register |



Australian Immunisation Register (AIR)

How does AIR work?

medicare

- Anyone Medicare-registered automatically added and assigned PIN
- If not Medicare-registered but vaccination reported assigned SIN
- 6/8 jurisdictions report directly into AIR
- Overseas vaccinations can also be added
- Limited data fields
 - Vaccine, dose number, date
 - Age, sex, Indigenous status, postcode of residence
 - Provider type
 - Exemptions (validated by authorised providers)
- But Medicare number is not a unique ID...

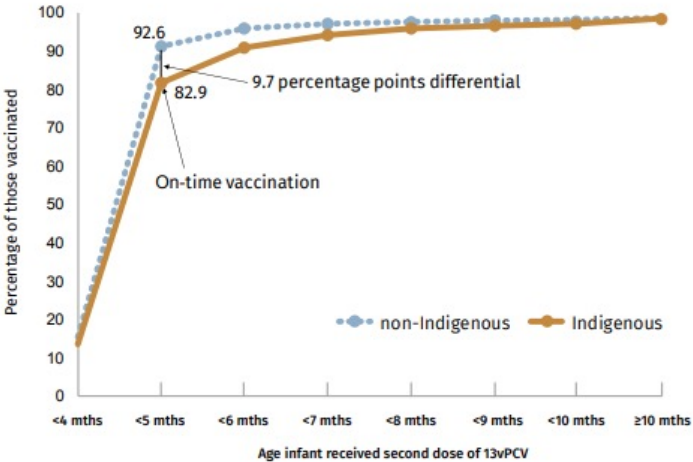
Individual level follow-up

- Compliance with vaccination schedule
- Reminder for those who maybe overdue (eg SMS)
- Safety monitoring for individuals
- Vaccine certificates (eg COVID-19 vaccine certificate)
- Immunisation history statement (eg for school entry program)

Program evaluation for population impact

Coverage

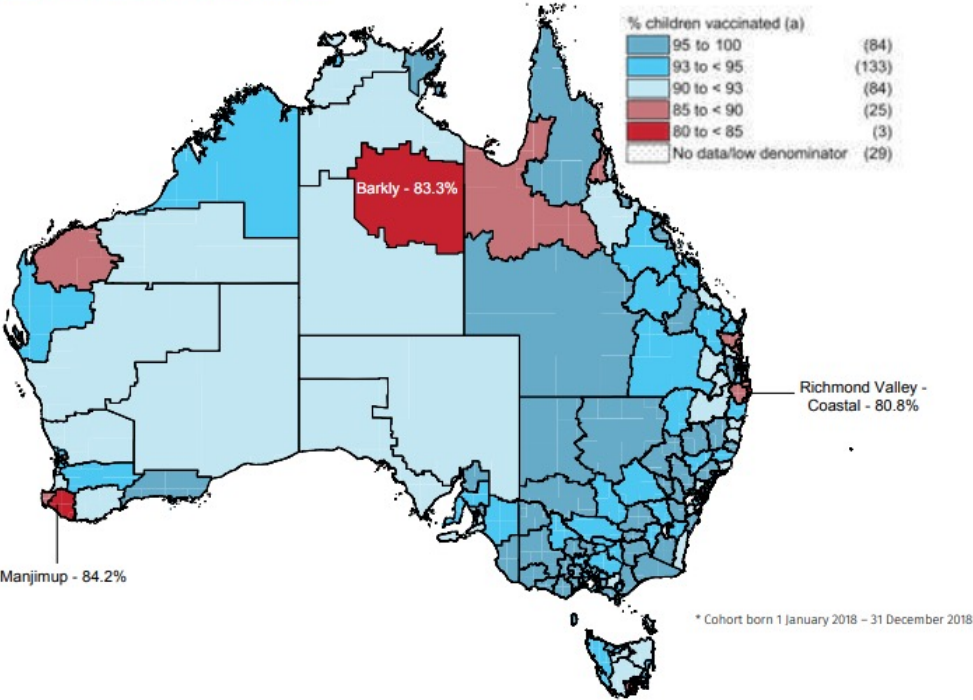
Figure 6: Cumulative percentage of infants vaccinated with the second dose of 13vPCV* by age in months and Indigenous status, Australia, 2020



* Shown as cumulative percentage vaccinated (number of infants who received vaccine dose at particular age / total number of infants who received the vaccine dose, expressed as a percentage).
 13vPCV = 13-valent pneumococcal conjugate vaccine
 Cohort born in 2019.
 Source: Australian Immunisation Register, data as at 31 March 2021.

<https://ncirs.org.au/our-work/vaccine-coverage>

Figure 11. Coverage of 4 doses of diphtheria-tetanus-acellular pertussis (DTPa)-containing vaccine at 24 months of age* by Statistical Area 3, Australia and major capital cities, 2020



* Cohort born 1 January 2018 – 31 December 2018

Program evaluation for population impact

Coverage using administrative and survey methods

Routine administrative method

Advantages:

- Based on data necessary for service provision
Timely management monitoring tool
- Provides data at local level

Disadvantage / Limitations :

- Denominator (target population may be projected based on old/poor census data)
- Transcription or calculation errors
- Incomplete reporting
- May include vaccination conducted outside the target group
- May not include private sector

Survey method

Advantages:

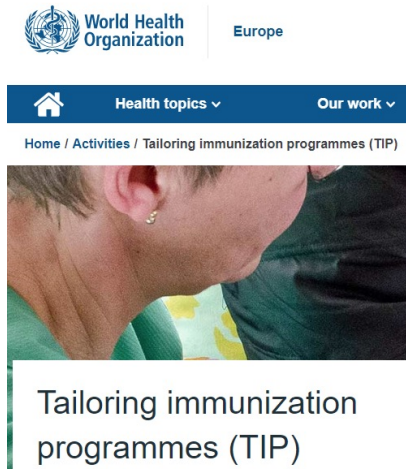
- Estimate of coverage can be obtained if the denominator is unknown.
- Provides additional information on social economical status, maternal characteristics, sex, etc of reached and unreached children
- Vaccinations given by the private sector reflected
- Allows assessing timeliness (among those with cards)

Disadvantage / Limitations:

- Bias – selection, information and sampling error
 - Provides information on the previous birth year's cohort.
 - Immunization card availability and quality
 - Reliance on recall in absence of card
 - Representativeness
- Interviewer interaction
- Length or complexity of the questionnaire may compromise accuracy
- Resource intensive

Program evaluation for population impact

Tailoring immunisation programs



Short communication

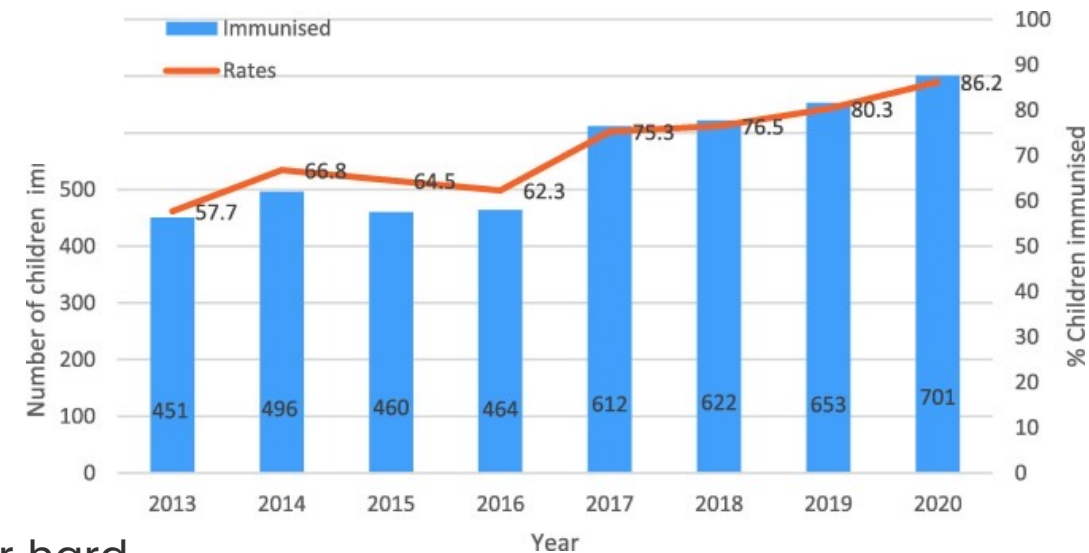
Improved childhood immunization coverage using the World Health Organization's Tailoring Immunization Programmes guide (TIP) in a regional centre in Australia

Susan Thomas ^a, David Durrheim ^{a, b}, Fakhru Islam ^b, Helen Higgins ^c, Patrick Cashman ^b

Vaccination is an excellent health intervention, saving millions of lives and even more pain and people not fully vaccinated?

There is no simple answer. People may forget or feel uncomfortable going to the health clinic if

Zero-dose children, and reaching other hard-to-reach populations



Program evaluation for population impact

Effectiveness

- Vaccine effectiveness
 - Needs individual vaccine data linked to disease outcome data
 - Context-specific data
 - Builds confidence in program
- Cost-effectiveness
- Efficiency, outbreak response
- Adverse events monitoring

Evaluation of protection by COVID-19 vaccines after deployment in low and lower-middle income countries

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^cInstitute of Clinical Medicine, University of Oslo, Norway

^dUniversity of Cambridge, United Kingdom

^eUniversity of Antananarivo, Antananarivo, Madagascar

Summary

The availability and use of vaccines for the coronavirus disease 2019 (COVID-19) in low and middle-income countries (L/MICs) lags far behind more affluent countries, and vaccines currently used in L/MICs are predominantly of lower efficacy. As vaccines continue to be deployed, it is essential to monitor both of vaccine protection and the distinctive medical and demographic factors that affect vaccine performance in these settings. Post-vaccination monitoring of COVID-19 outcomes constitute an important but currently underexplored area of research.

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Keywords: COVID-19 vaccines

Cost of a measles outbreak in a remote island economy: 2014 Federated States of Micronesia measles outbreak

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^bCenters for Disease Control and Prevention, Center for Global Health, Atlanta, GA, United States

^cDepartment of Health and Social Affairs, Government of the Federated States of Micronesia, Federated States of Micronesia

Abstract

After 20 years with no reported measles cases, on May 15, 2014 the Centers for Disease Control and Prevention (CDC) was notified of two cases testing positive for measles-specific immunoglobulin M (IgM) antibodies in the Federated States of Micronesia (FSM). Under the Compact of Free Association, FSM receives immunization funding and technical support from the United States (US) domestic vaccination program managed by the Centers for Disease Control and Prevention (CDC). In a collaborative effort, public health officials and volunteers from FSM and the US government worked to respond and contain the measles outbreak through an emergency mass vaccination campaign, contact tracing, and other outbreak investigation activities. Contributions were also made by United Nations Children's Emergency Fund (UNICEF) and World Health Organization (WHO). Total costs incurred as a result of the outbreak were nearly \$4,000,000; approximately \$10,000 per case. Direct medical costs (≈\$141,000) were incurred in the treatment of those individuals infected, as well as lost productivity of the infected and informal caregivers (≈\$250,000) and costs to contain the outbreak (≈\$3.5 million). We assessed the economic burden of the 2014 measles outbreak to FSM, as well as the economic responsibilities of

Nordic countries

- Most advanced
- Unique identifier
- Norwegian SYSVAK (established 1995)
- Danish vaccination register (established 2013)
- Finnish national vaccination register (established 2009)
- Based on unique PIN issued at birth or immigration
- Facilitates linkage to other national health registers
- Eg MMR/autism cohort study (657,461 children) linking data on autism diagnoses and risk factors

Original Research | 5 March 2019

Measles, Mumps, Rubella Vaccination and Autism FREE

A Nationwide Cohort Study

Anders Hviid, DrMedSci ✉, Jørgen Vinsløv Hansen, PhD, ... [View all authors](#) +

[Author, Article and Disclosure Information](#)

<https://doi.org/10.7326/M18-2101>

Observational data from Tanzania

- Add value to immunization stakeholders at all levels of the health system.
- Individual-level data can enable new analyses to understand service delivery or care-seeking patterns, potential risk factors for under-immunization, and where challenges occur.
- To achieve this potential, country programs need to leverage and strengthen the capacity to collect, analyze, interpret, and act on the data.

Published on 21.1.2022 in Vol 8, No 1 (2022): January

📄 Preprints (earlier versions) of this paper are available at <https://preprints.jmir.org/preprint/32455>, first published July 29, 2021.



Added Value of Electronic Immunization Registries in Low- and Middle-Income Countries: Observational Case Study in Tanzania

Andrew M Secor¹ ; Hassan Mtenga² ; John Richard² ; Ngwegwe Bulula³ 
Ellen Ferriss¹ ; Mansi Rathod¹ ; Tove K Ryman⁴ ; Laurie Werner¹ 
Emily Carnahan¹ 

How do you use ?

- individual data
- aggregated data
- what barriers have you experienced

Considerations for implementation

To make the most of new EIRs....

- Unique identifier
 - Denmark, Norway, Finland, New Zealand
- Clinical decision support systems to aid medical practitioners and improve individual experience Population denominator
- Data quality
 - Incomplete reporting and timeliness
 - Audit of the Australian Register*
 - Mandated through COVID-19 in Australia
- All-of-life esp in the context of COVID-19 vaccines

To make the most of new EIRs....

- Alignment with other components of immunisation information systems
 - VPD surveillance, notification, hospitalisation, deaths
- Real-time data analyses
- Interaction with electronic medical records/ 2-way interactive platform
- Inter-operability
- Resource allocation – hardware, software and human resources for data quality
- Data governance and privacy

Conclusions

- EIRs and Immunisation Information Systems can **improve vaccine coverage** and strengthening immunisation programs
- Data can enable **data-drive decision making**
- Strengthen immunisation information systems
- For settings where COVID-19 registries have been established, **program and process evaluation** can help with integration – don't waste a crisis!
- **EIRs take a long time to mature** – ensure resource allocation

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- Reports

Identify Individual

An individual can be searched for using any of the identifiers - Medicare card number or IHI or a con personal information. When a Medicare card number or IHI are unavailable, you can enter personal individual.

This form has required and optional fields based on your search query, all required fields are marke

Medicare

Medicare Number : x IRN: x ?

Individual Healthcare Identifier (IHI)

IHI: x ?

Personal Information

The individual has only one name ?

Surname: x

First Name: x

Date of Birth: DD/MM/YYYY x ?

Gender:

Postcode from: x to: x

- Home
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Address (DOB:) Medicare No

Current Indigenous Status: Neither Aboriginal nor Torres Strait Island origin

? If any of the personal details that appear for this individual are incorrect, please request that the appropriate person contacts Services Australia on 132 011.

This individual has a COVID-19 digital certificate. For more information please view the "Immunisation Certificates"

Update Individual

Return Mail Indicator Notify returned mail for this individual

Indigenous Status Indigenous Non-Indigenous

Notification of an Indigenous status is voluntary. The existing status recorded on the AIR will not be updated if no selection is made.

Additional Vaccines Required

Use this indicator for individuals who may require additional vaccines. Consult the [Australian Immunisation Handbook](#) for advice and recommendations when vaccinating **special risk groups**. By adding or removing this indicator, you acknowledge the individual has given consent to update their record.

Planned Catch up

Planned Catch up for Overdue Vaccines:

Tick this box if you would like to commence a planned catch up for the individual as you:

- were unable to administer all overdue vaccines today; or
- are waiting on results to support testing of natural immunity; or
- need to order in additional required vaccines.

Please note an individual can only ever have **one catch up schedule** recorded on the AIR.

You should **not** tick the box if:

- you have vaccinated the individual and they are no longer overdue for any vaccines, or
- you feel the parent/guardian does not intend to vaccinate the individual.

Due Details

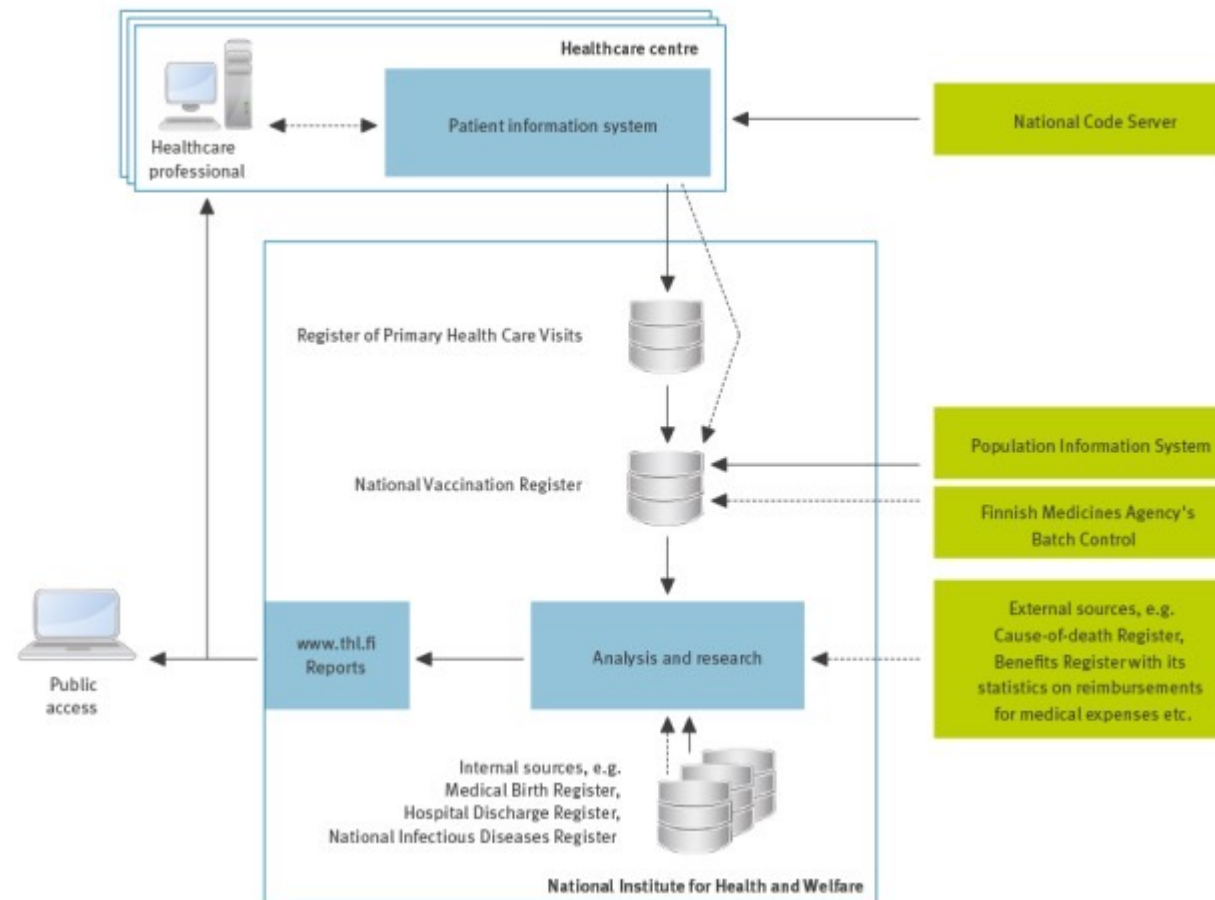
| Disease | Dose | Due Date |
|---|------|----------|
| ? There are no vaccinations due for this individual. | | |

- ### Immunisation Details
- Immunisation History
 - Immunisation Certificates (1)

Immunisation Details

| Date | Vaccine/Brand [Batch Number] | Serial Number | Dose | School Name | Status | Reason Code |
|-------------|------------------------------|---------------|------|-------------|----------|-------------|
| 02 Dec 2008 | Infanrix Hexa [] | | 1 | | Accepted | |
| 02 Dec 2008 | Prevenar 7 [] | | 1 | | Accepted | |
| 02 Dec 2008 | Rotarix [] | | 1 | | Accepted | |
| 11 Feb 2009 | Infanrix Hexa [] | | 2 | | Accepted | |
| 11 Feb 2009 | Prevenar 7 [] | | 2 | | Accepted | |
| 11 Feb 2009 | Rotarix [] | | 2 | | Accepted | |
| 07 Apr 2009 | Infanrix Hexa [] | | 3 | | Accepted | |
| 07 Apr 2009 | Prevenar 7 [] | | 3 | | Accepted | |
| 12 Oct 2009 | Hiberix [] | | 4 | | Accepted | |
| 12 Oct 2009 | Meningitec [] | | 1 | | Accepted | |

General architecture of the National Vaccination Register in Finland



Automated processes are indicated by solid arrows and manual processes by dashed arrows