

# Automated Immunisation Assessments

Data quality before and after automation

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theAlfred

# Overview

- Problem for the SIEM team
- Collaborative approach taken to resolve
- Results of Automation
- Final Thoughts



Australian Government  
Department of Health,  
Disability and Ageing

Australian  
**Immunisation**  
Handbook

Occupation	Vaccine
<b>All health care workers</b>  Includes all workers and students directly involved in patient care or the handling of human tissue, blood or body fluids	<ul style="list-style-type: none"><li>• Hepatitis B</li><li>• Influenza</li><li>• MMR (if non-immune) **</li><li>• Pertussis (dTpa)</li><li>• Varicella (if non-immune)</li></ul>

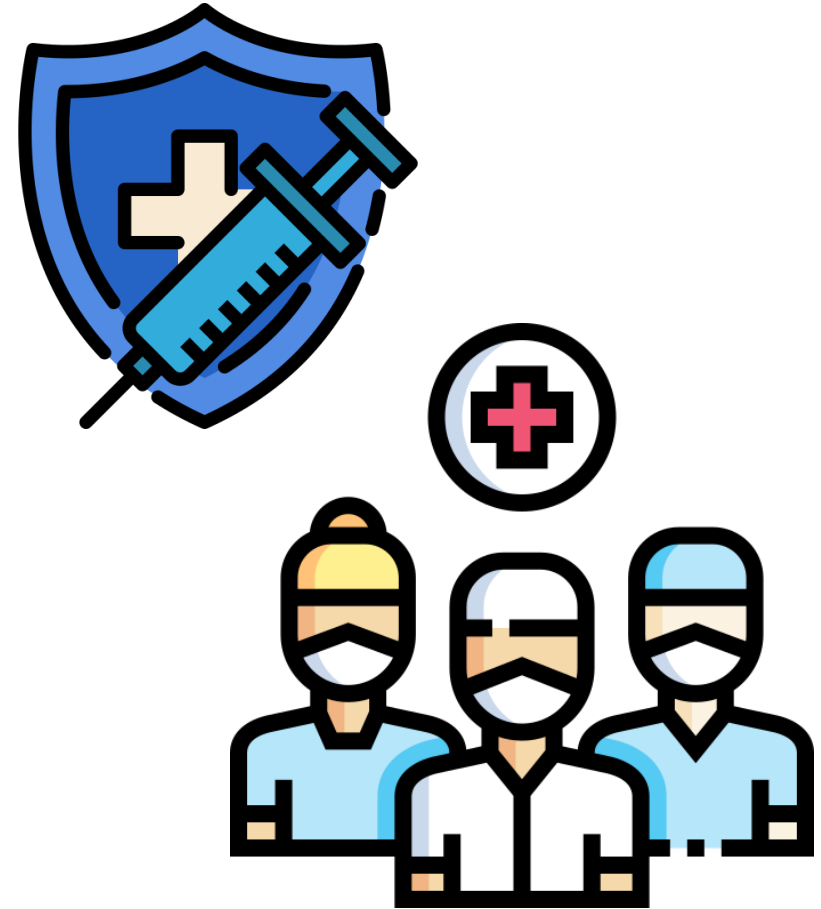


# Problem



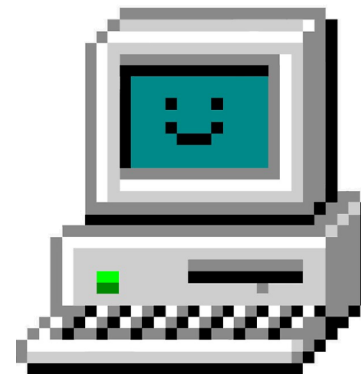
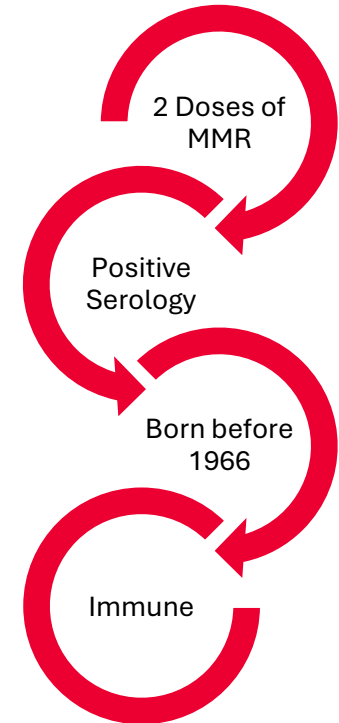
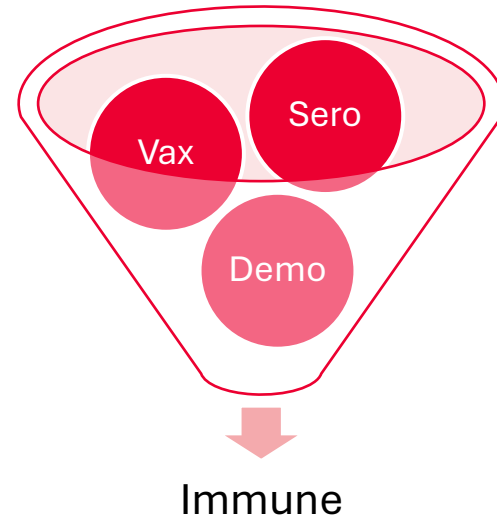
# SIEM Team Requirements

- Staff Immunisation and Exposure Management Team
- Immunisation status of Alfred Health workforce, including newly onboarded staff
- 13,000 staff across 3 campuses
  - Alfred Hospital
  - Caulfield Hospital
  - Sandringham Hospital
- ~70,000 data points
- No single source of truth



# Immunisation assessments are a complex set of rules

- Disease status of staff vaccination is a complex but logical (usually sequential) mix of data points  
e.g. MMR
- What data points do we need? Demographics, Serology, Vaccines?
- What unrealized preferences do we have? e.g. MMR
- How do we translate this for the computer?
  - Epidemiological Data Management Service (EDMS)



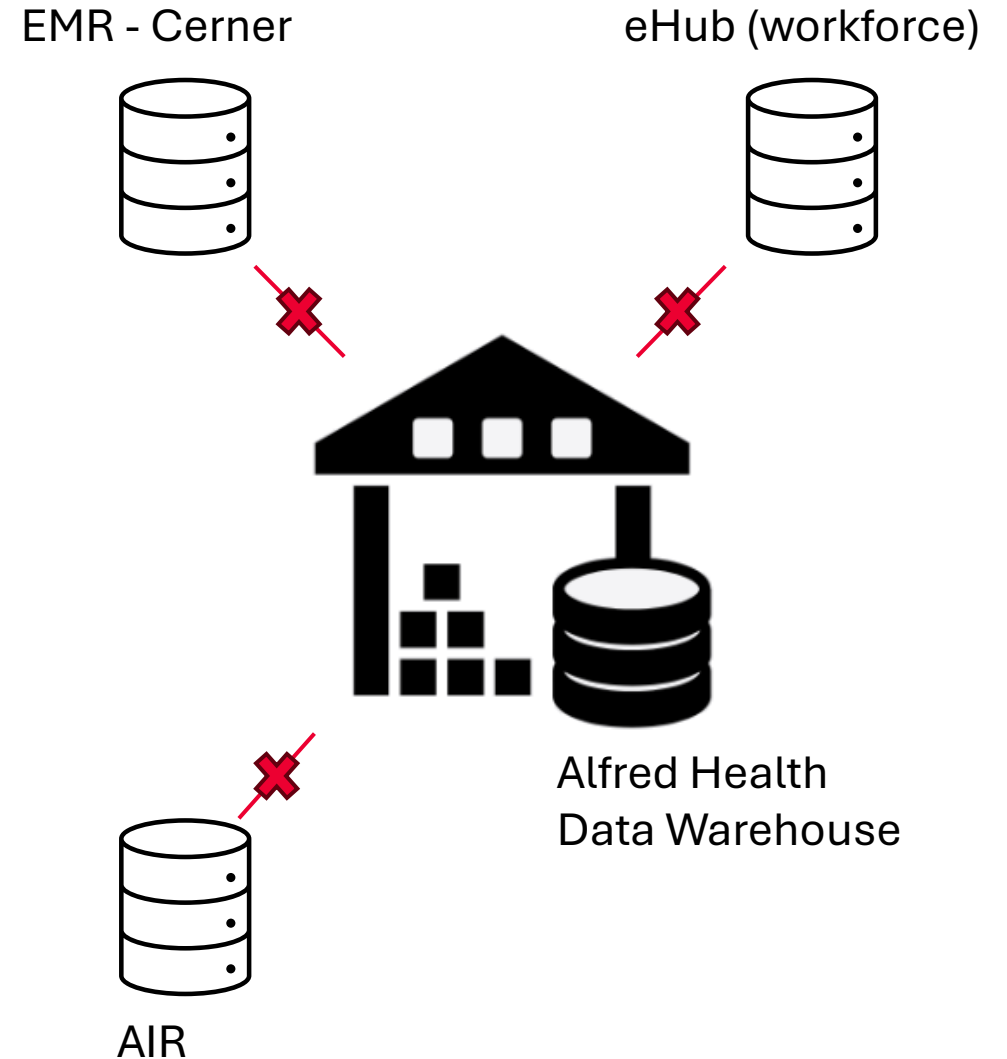
# The Data Infrastructure at Alfred Health

## Several Stores for Immunisation Data

- EMR (Cerner)
- eHub (workforce data)
- Australian Immunisation Register information
- Alfred Health Data Warehouse

## Interactions between Stores

- There were **no** interactions between datasets
- SIEM nurses had to manually update eHub / check Cerner



# The Data Infrastructure at Alfred Health

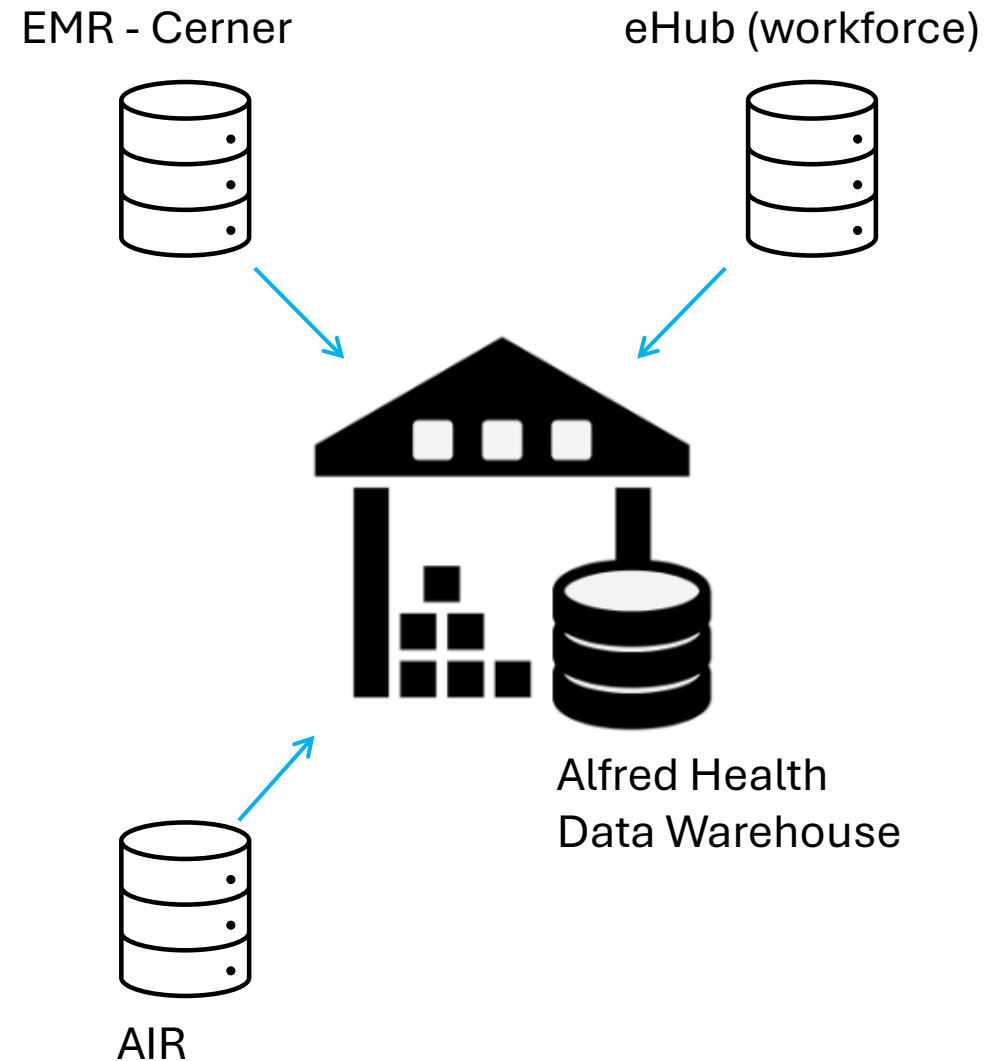
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➤ How to integrate systems?



# Approach

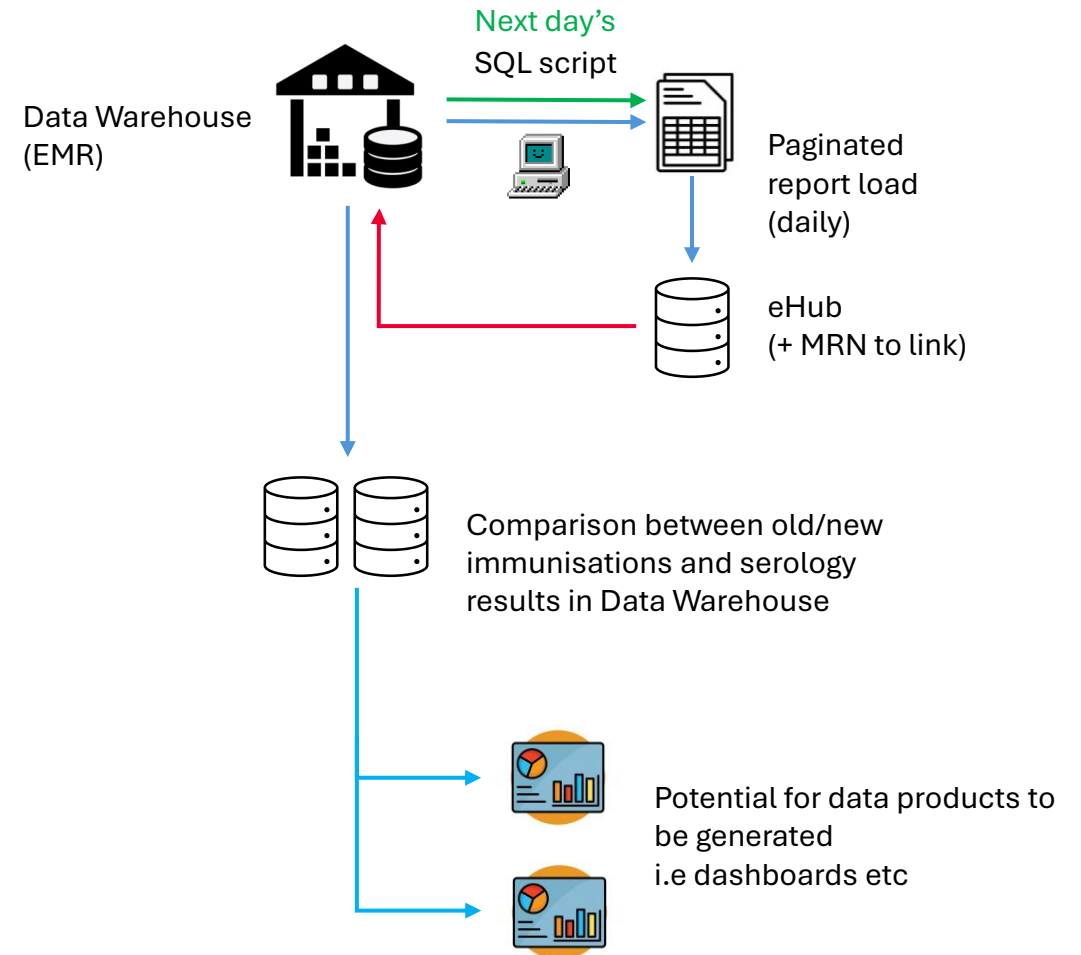
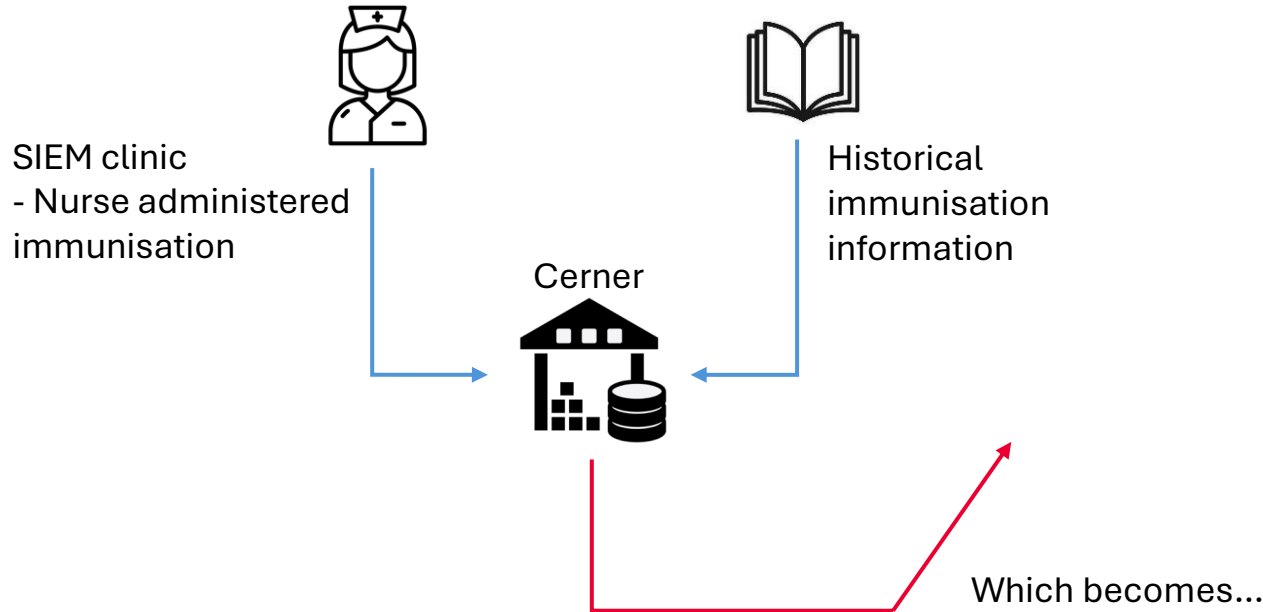


# Need a single source of truth

## Designated as the EMR

- Cerner became the focal point for data entry
- Allowed SIEM nurses to enter data in one place with flow on to other stores of information
- Ensured ability to continually correct information where needed

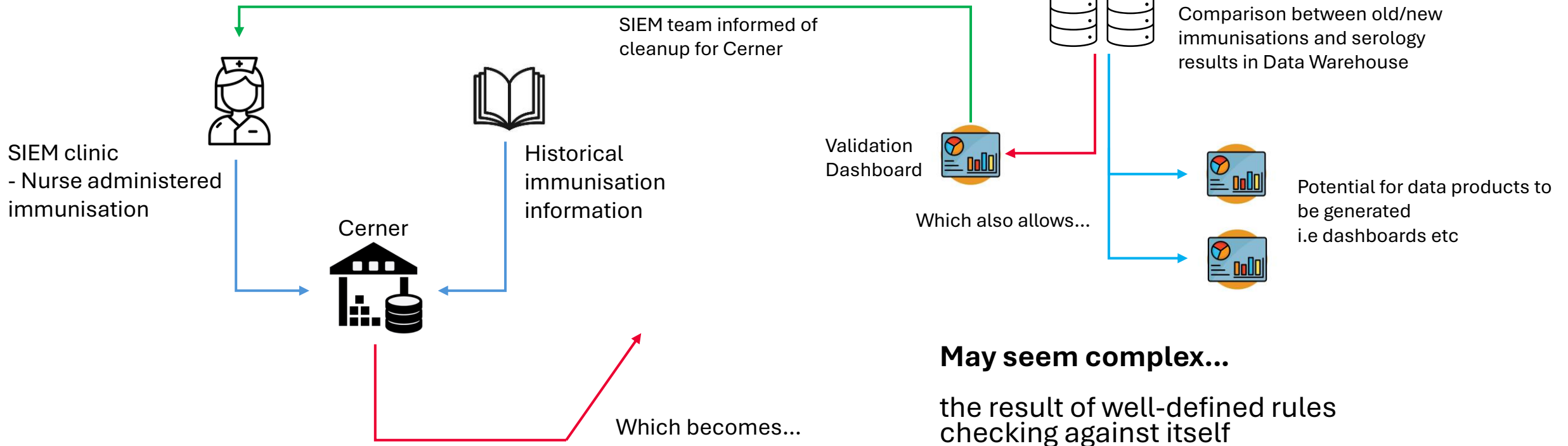
## Workflow Initiation



# Need a single source of truth

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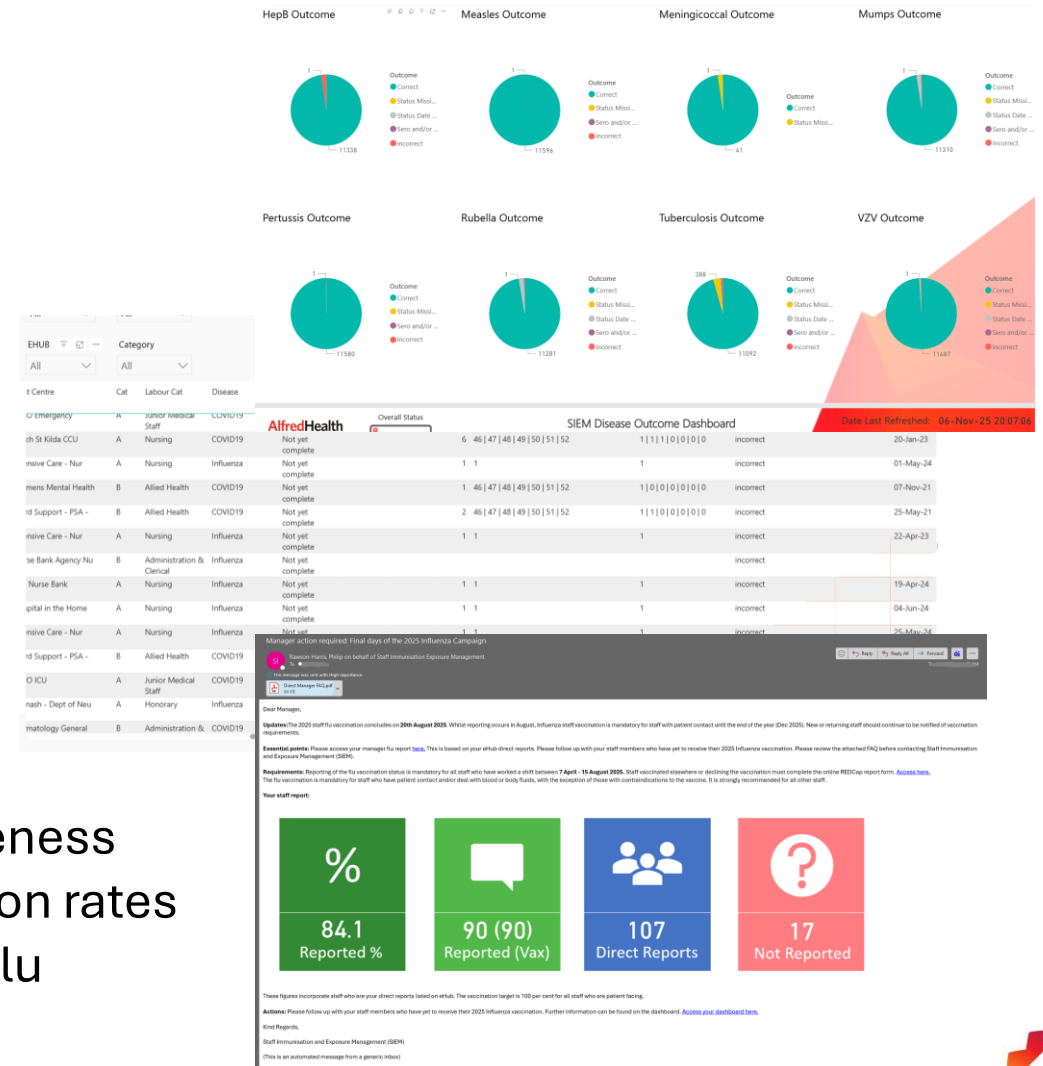
# A Data Ecosystem: beyond automation

## Process Outcomes

- SIEM nurses entering data in one place
  - reducing complexity and time
- Unified all health information into the EMR and Data Warehouse
  - Able to compare information across systems

## Opportunity Outcomes

- A single, up-to-date store of immunisation information:
  - Validation dashboards for data quality and completeness
  - Performance dashboards of overall staff immunisation rates
  - Automation of annual immunisation campaigns i.e Flu



# Complex Rules: Successive improvements

- Incremental improvements starting with the broadest rules
- 2 x MMR then immune
- Born before 1966 = Age immune
- VZV vaccine x 3 then immune

```
--- order is important otherwise things will be mislabelled. case statements are first rule first labelled.
--missing rules
Case when status is null then 'Status Missing'
  when es.SerologyLabel is null and vax_keylist is null and Status not in ('age immune','not yet complete') then 'Sero and/or Vax Data Missing'
  when status is not null and ei.RecordDate = '1988-01-01' and status <> 'not yet complete' then 'Status Date Missing'
  when status = 'Declined' and #base.Disease <> 'COVID19' then 'correct'
-- Vaccines alone
  when #base.Disease = 'COVID19' and status = 'immune' and vaccination_list like '1 | 1 | 1%' then 'correct'
  when #base.Disease = 'influenza' and status = 'immune' and vax.VZVvax_count > 0 then 'correct'
  when #base.Disease = 'Pertussis' and status = 'Immune for 10 years' and maxvax_maxdate > dateadd(year,-10,SYSDATETIME()) then 'correct'
  when #base.Disease = 'Meningococcal for Micro staff' and status = 'Immune for 5 years' and menb_maxdate > dateadd(year,-5,SYSDATETIME()) and menCV_maxdate > dateadd(yea
-- serology rules
  when #base.Disease = 'Tuberculosis' and status = 'Completed not immune' and es.SerologyResultLabel in ('unlikely','Negative') then 'correct'
  when #base.Disease in ('HepB','Rubella','VZV (Chickenpox)','measles','Mumps') and status = 'immune' and es.SerologyResultLabel in ('positive','low positive') and hbsAg
  when #base.Disease in ('HepB') and status = 'immune' and es.SerologyResultLabel = ('Negative') and hbsAg.SerologyResultLabel = 'Positive' then 'correct'
-- Negative VZV
  when #base.Disease = 'VZV (Chickenpox)' and status = 'immune' and es.SerologyResultLabel = 'negative' and vaccination_list = '1 | 1 | 1' then 'correct'
  when #base.Disease = 'VZV (Chickenpox)' and status = 'immune' and ISNULL(es.SerologyResultLabel, 'negative') IN ('negative', 'equivocal') and vaccination_list = '1 | 1
-- Non responder HepB
  when #base.Disease = 'HepB' and status = 'Completed not immune' and es.SerologyResultLabel = 'non responder' and (hbsAg.SerologyResultLabel = 'Negative' or hbsAg.Esplo
  when #base.Disease = 'HepB' and status = 'Completed not immune' and hbsAg.SerologyResultLabel like 'BPositive' and es.SerologyResultLabel = 'No' then 'correct'
  when #base.Disease in ('HepB','Rubella','VZV (Chickenpox)','measles','Mumps') and status = 'Completed not immune' and contra.EmployeeNumber is not null then 'correct'
-- Negative Measles,Mumps
  when #base.Disease in ('measles','Mumps') and status = 'immune' and (es.SerologyResultLabel IN ('negative', 'equivocal') or es.SerologyResultLabel is null) and VZVvax_c
-- Negative Rubella
  when #base.Disease in ('Rubella') and status = 'immune' and (es.SerologyResultLabel = 'negative' or es.SerologyResultLabel is null) and VZVvax_count >= 2 and maxvax_max
-- Likely TB
  when #base.Disease = 'Tuberculosis' and status = 'Completed not immune' and es.SerologyResultLabel in ('likely','positive') and VZVvax_count >= 2 and maxvax_maxdate > e
-- Not yet complete
  when #base.Disease in ('HepB','Rubella','VZV (Chickenpox)','measles','Mumps','Tuberculosis','pertussis','Meningococcal for Micro staff') and status = 'not yet complete'
  when #base.Disease in ('measles','Mumps','rubella') and dob < '1966-01-01' and Status = 'age immune' then 'correct'
correct'
```

```
69 menCV as ( select EmployeeNumber
70 , disease='Meningococcal for Micro staff'
71 , max(daterreceived) as maxdate
72 from [Workforce].[dbo].[employeevaccines](nolock) ev
73 where VaccineID in (8,6,9)
74 group by employeenumber
75 )
76
77
78
79 menb as (
80 select EmployeeNumber
81 , disease='Meningococcal for Micro staff'
82 , max(daterreceived) as maxdate
83 from [Workforce].[dbo].[employeevaccines](nolock) ev
84 where VaccineID in (7)
85 and DoseID >1
86 group by employeenumber
87 )
88
89
```



# Results of automation

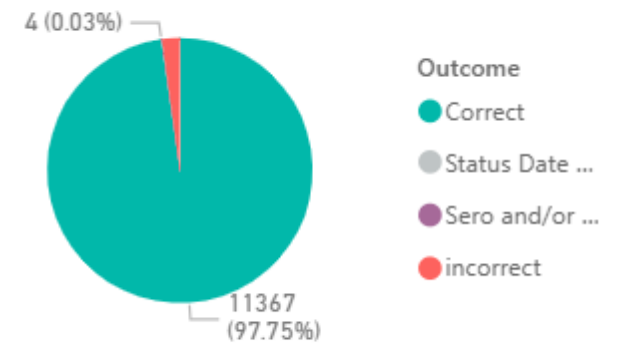
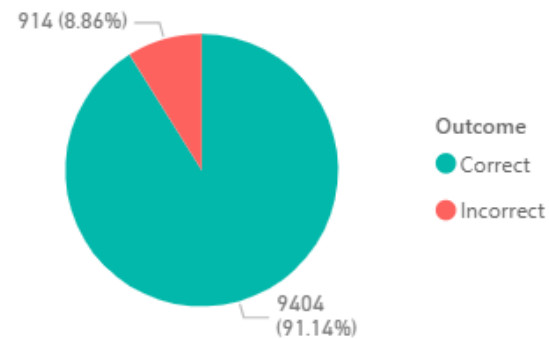


Before  
Nov 23

After  
Nov 25

## Results: Hepatitis B

- From 91% to 95%
- Currently 98%

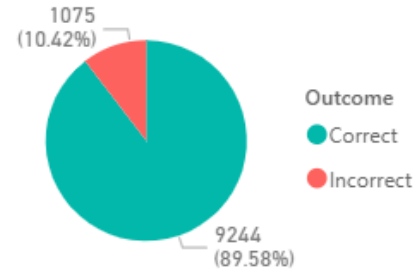


# Results: MMR

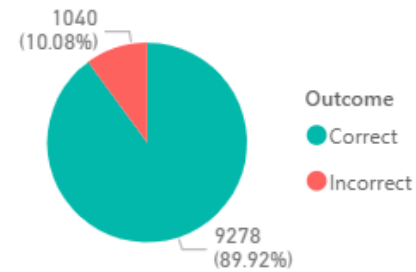
- From ~90% to 94%
- Currently 97-99%

Before  
Nov 23

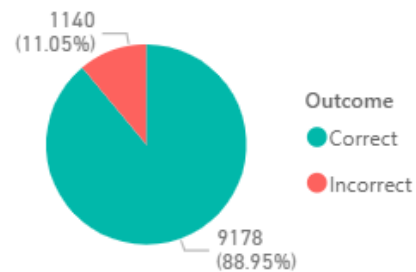
Measles Outcome



Mumps Outcome

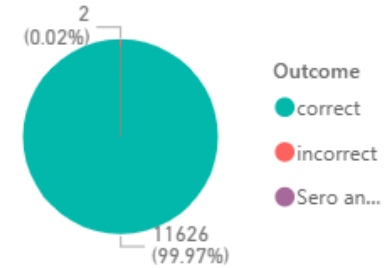


Rubella Outcome

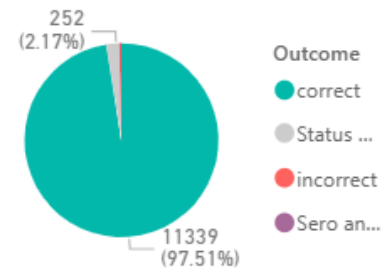


After  
Nov 25

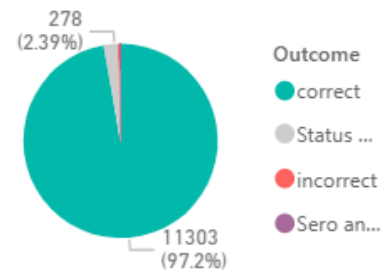
Measles Outcome



Mumps Outcome



Rubella Outcome



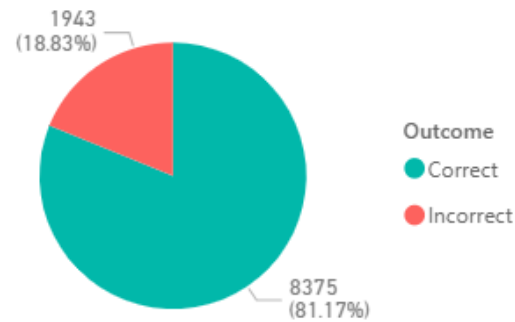
Before  
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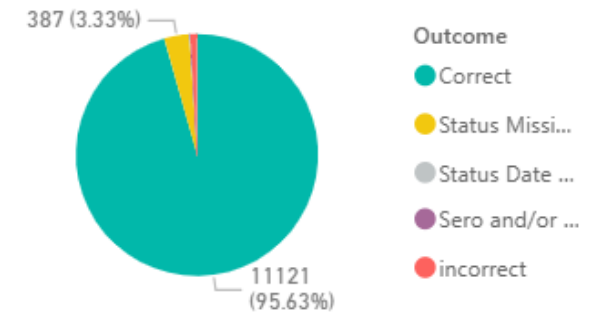
## Results: TB

- From 81% to 94%
- Currently 96%

Tuberculosis Outcome



Tuberculosis Outcome



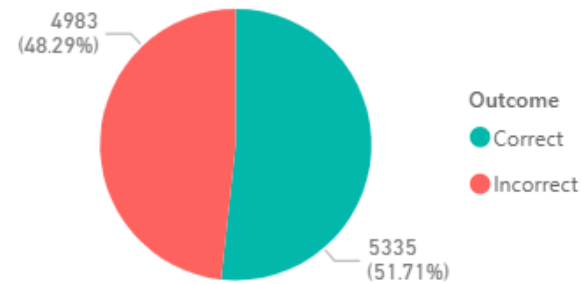
Before  
Nov 23

After  
Nov 25

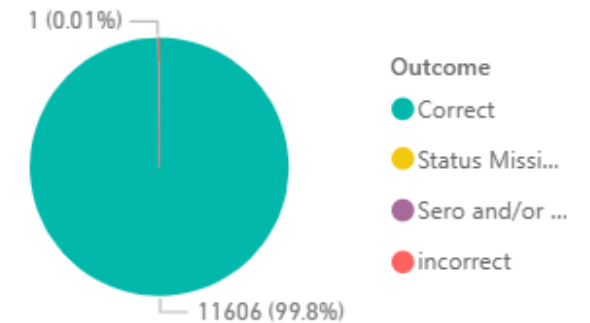
# Results: Pertussis

- From 52% to 99%
- Currently 100%

Pertussis Outcome



Pertussis Outcome

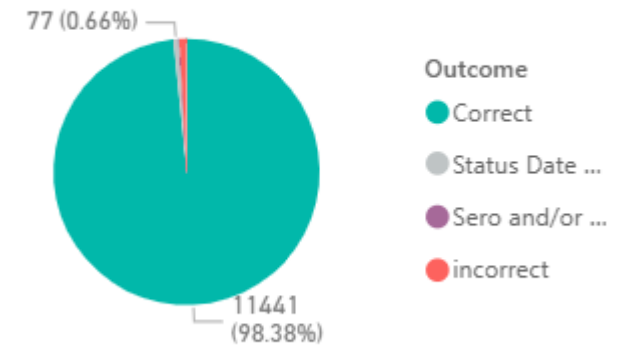
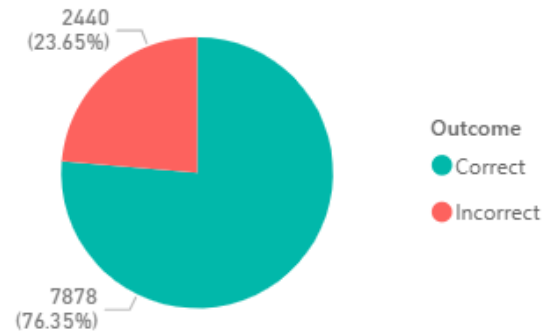


Before  
Nov 23

After  
Nov 25

## Results: VZV

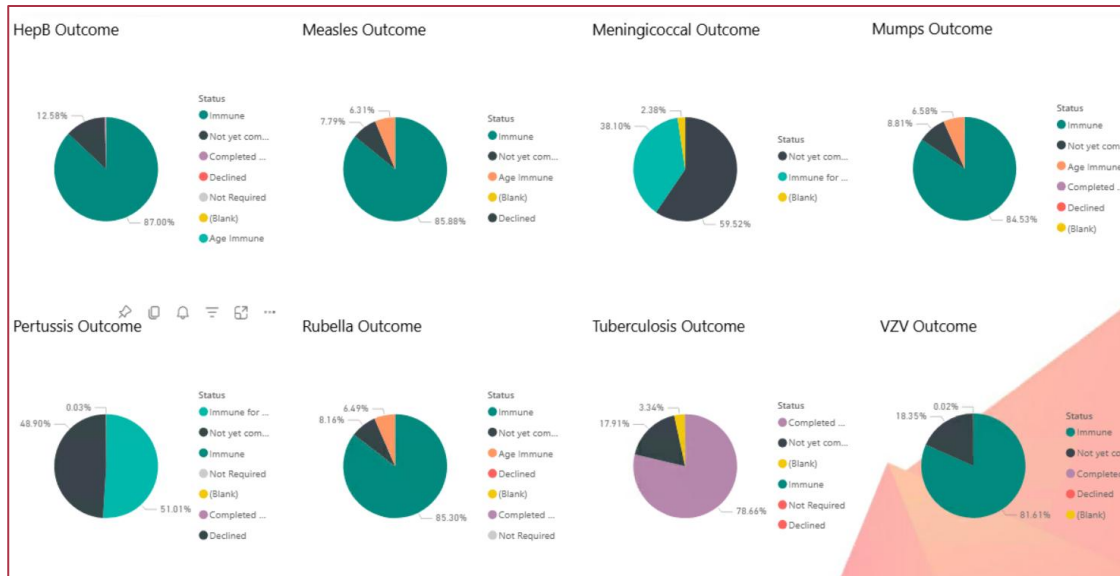
- From 76% to 98%



# Onwards Improvements:

- Daily refresh and review of all staff medical pathology and vaccinations
- Improved review of contact tracing times
- Democratised review of staff

100%		4819 (37%)	10089 (87%)	5893 (51%)	10518 (91%)	10639 (92%)	10595 (91%)	9423 (81%)	10712 (82%)	38 (90%)	11538	12939		
Target: Patient Facing		RPP Pass	HepB	Pertussis	Mumps	Measles	Rubella	VZV	COVID19	Meningococ...	Patient Contact	Staff Count		
Influenza	Emp No.	Full Name	RPP Outcome	PtContactCat	HepB Status	Pertussis Status	Mumps Status	Measles Status	Rubella Status	VZV (chickenpox) Status	Tuberculosis Status	COVID19 Status	Meningococcal for Micro staff Status	
RPP & other Vaccina			Expired	Patient Contact	Complete	Incomplete	Complete	Complete	Complete	Complete	Complete	Complete	Not Required	
Staff Member			Expired	Patient Contact	Complete	Incomplete	Complete	Complete	Complete	Complete	Incomplete	Incomplete	Complete	Not Required
All			Expired	Patient Contact	Complete	Incomplete	Complete	Complete	Complete	Incomplete	Incomplete	Complete	Not Required	
Contact Type			Expired	Patient Contact	Complete	Incomplete	Complete	Complete	Complete	Complete	Complete	Complete	Not Required	
All			Pass	Patient Contact	Complete	Incomplete	Complete	Complete	Complete	Incomplete	Incomplete	Complete	Not Required	
Reported Status			No Test	Patient Contact	Complete	Incomplete	Complete	Complete	Complete	Incomplete	Incomplete	Complete	Not Required	
All			Pass	Patient Contact	Complete	Incomplete	Complete	Complete	Complete	Incomplete	Incomplete	Complete	Not Required	
Vaccination Status			Expired	Patient Contact	Complete	Incomplete	Complete	Complete	Complete	Incomplete	Incomplete	Complete	Not Required	
All			Expired	Patient Contact	Complete	Incomplete	Complete	Complete	Complete	Incomplete	Incomplete	Complete	Not Required	
Cost Centre			Pass	Patient Contact	Complete	Incomplete	Incomplete	Incomplete	Incompl...	Incomplete	Incomplete	Complete	Not Required	
All			Pass	Patient Contact	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Not Required	
Facility			Expired	Patient Contact	Complete	Incomplete	Complete	Complete	Complete	Incomplete	Incomplete	Complete	Not Required	
All			Pass	Patient Contact	Complete	Incomplete	Complete	Complete	Complete	Complete	Complete	Complete	Not Required	
			Expired	Patient Contact	Complete	Incomplete	Complete	Complete	Complete	Incomplete	Complete	Complete	Not Required	



Dear Manager,

**Updates:** The 2025 staff flu vaccination concludes on **20th August 2025**. Whilst reporting occurs in August, Influenza staff vaccination is mandatory for staff with patient contact until the end of the year (Dec 2025). New or returning staff should continue to be notified of vaccination requirements.

**Essential points:** Please access your manager flu report [here](#). This is based on your eHub direct reports. Please follow up with your staff members who have yet to receive their 2025 Influenza vaccination. Please review the attached FAQ before contacting Staff Immunisation and Exposure Management (SIEM).

**Requirements:** Reporting of the flu vaccination status is mandatory for all staff who have arrived a shift between **7 April - 15 August 2025**. Staff vaccinated elsewhere or declining the vaccination must complete the online REDCap report form. [Access here](#). The flu vaccination is mandatory for staff who have patient contact and/or deal with blood or body fluids, with the exception of those with contraindications to the vaccine. It is strongly recommended for all other staff.

**Your staff report:**

84.1 Reported %	90 (90) Reported (Vax)	107 Direct Reports	17 Not Reported
--------------------	---------------------------	-----------------------	--------------------

These figures incorporate staff who are your direct reports listed on eHub. The vaccination target is 100 per cent for all staff who are patient facing.

**Actions:** Please follow up with your staff members who have yet to receive their 2025 Influenza vaccination. Further information can be found on the dashboard. [Access your dashboard here](#).

Kind Regards,  
Staff Immunisation and Exposure Management (SIEM)  
(This is an automated message from a generic inbox)

# Final thoughts



# Final thoughts

## Data maturity, security and reliability

- Process facilitated by maturity of data warehouse
- Allows for Row Level Security (RLS) on dashboards – can tailor to recipients/groups
- Any lost/incorrect data can be restored from Cerner – single source of truth

## Assisting with other SIEM requirements

- Upcoming mandated vaccines – working with clean data
- Managing vaccination requirements – stock levels and expiry dates

## Use case for AI

- Hard-coded outcomes with logical rules
  - Not a logical use case for AI

## Bayside Health Merger 2026

- 13,000 staff → 22,000 staff
- Automatically\* update information for SIEM

(\*Should!)



# Acknowledgements

Infection Prevention and SIEM:

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