Beyond the excel spreadsheet!

Re-imagining data for newborn hearing screening programs

UNHS and Early Intervention Programme's 10th Anniversary and nation hui

11 May 2021

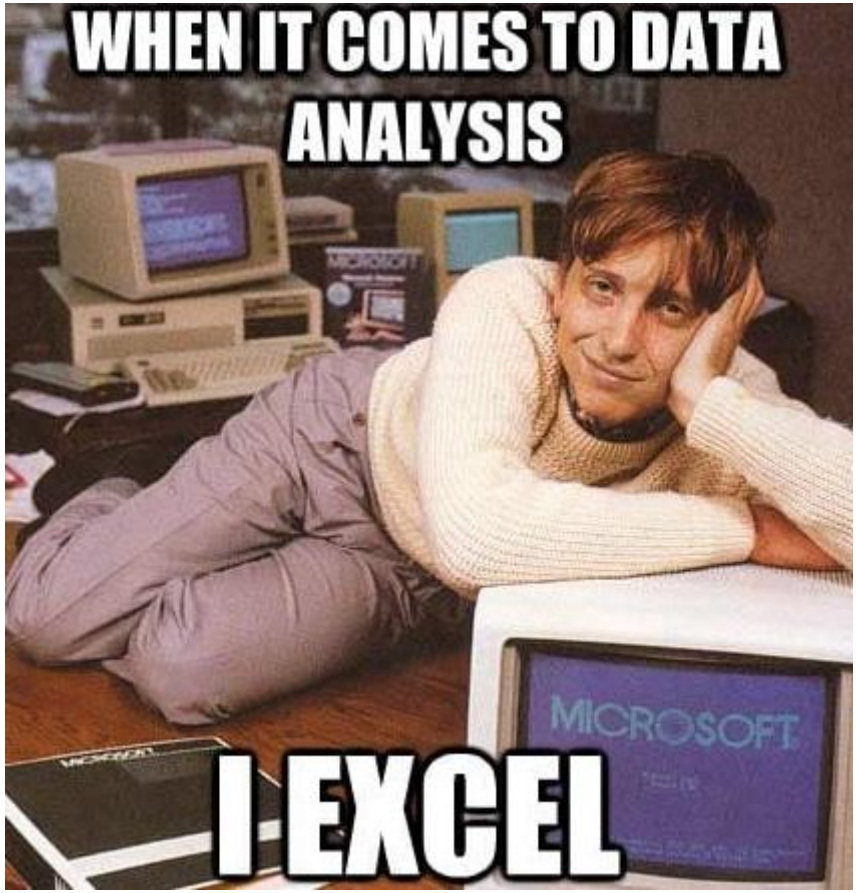
Rachael Beswick

Director, Healthy Hearing Program

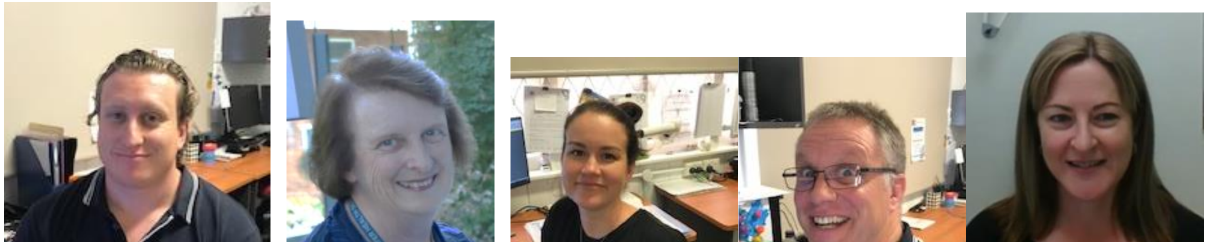
Queensland Government

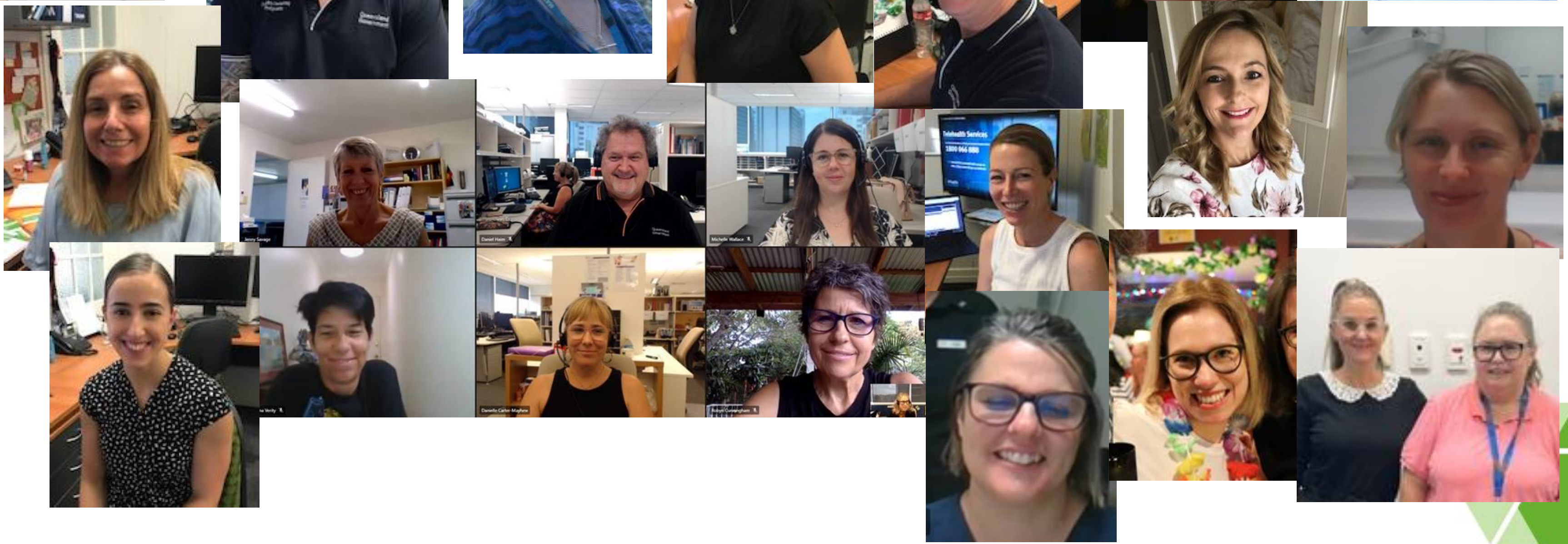

SO EXCITED
I CAN'T WAIT!!


Me: This show is boring.
Boss: Again, this is a Zoom conference.


WHEN IT COMES TO DATA ANALYSIS
MICROSOFT
I EXCEL

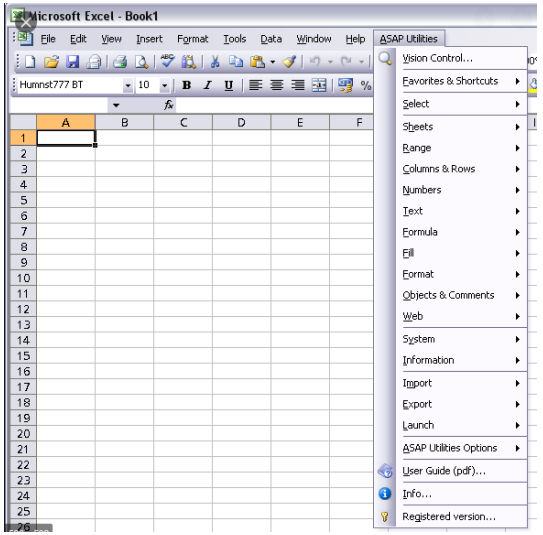
Healthy Hearing team



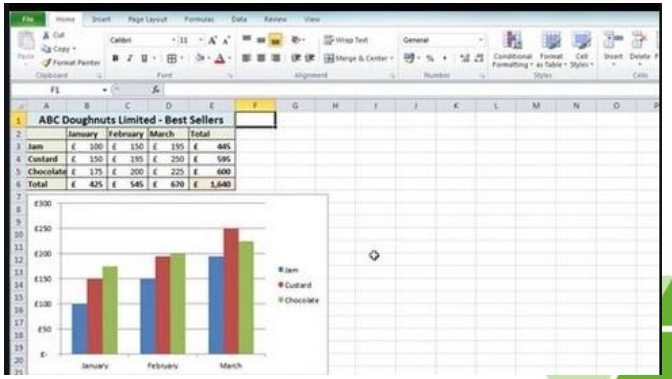


Where it all began…..

October 4, 2004 Healthy Hearing began

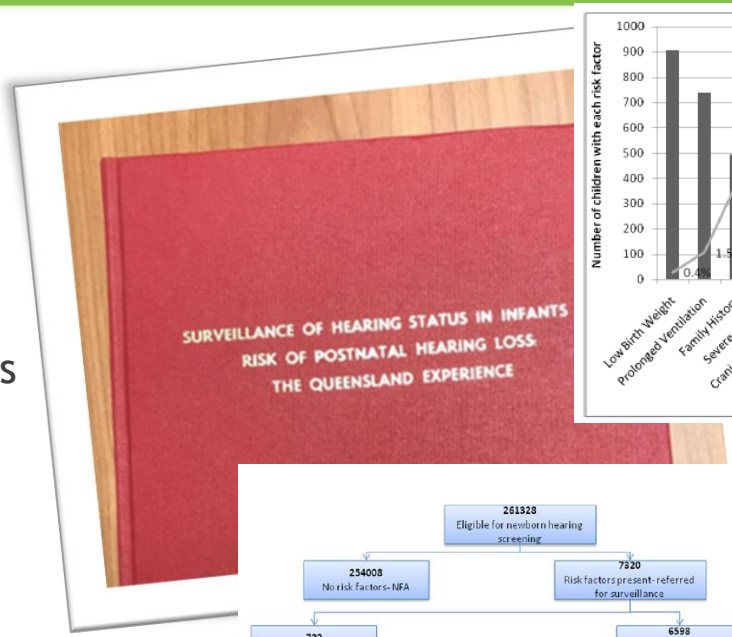


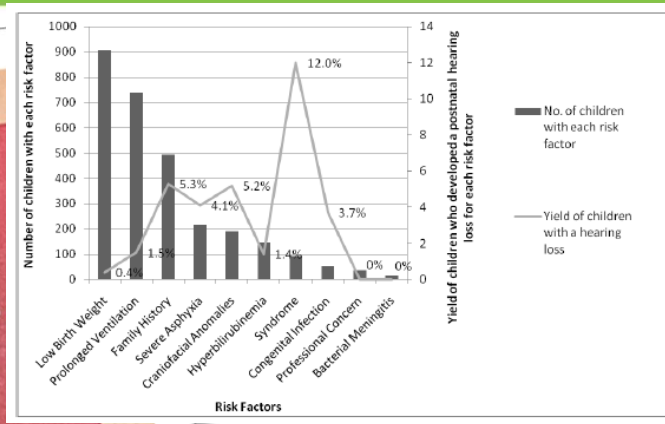
2008 moved to an off the shelf product Oz Systems eSP

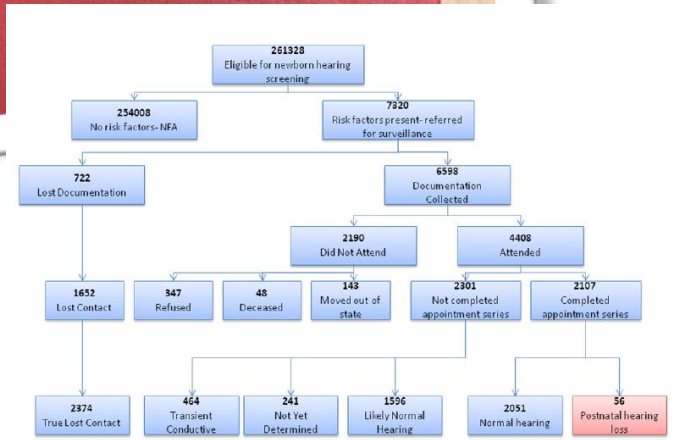


What we could do

- State-wide reporting!
- Retrospective data analysis
  - Relied on data extraction tools and Macros



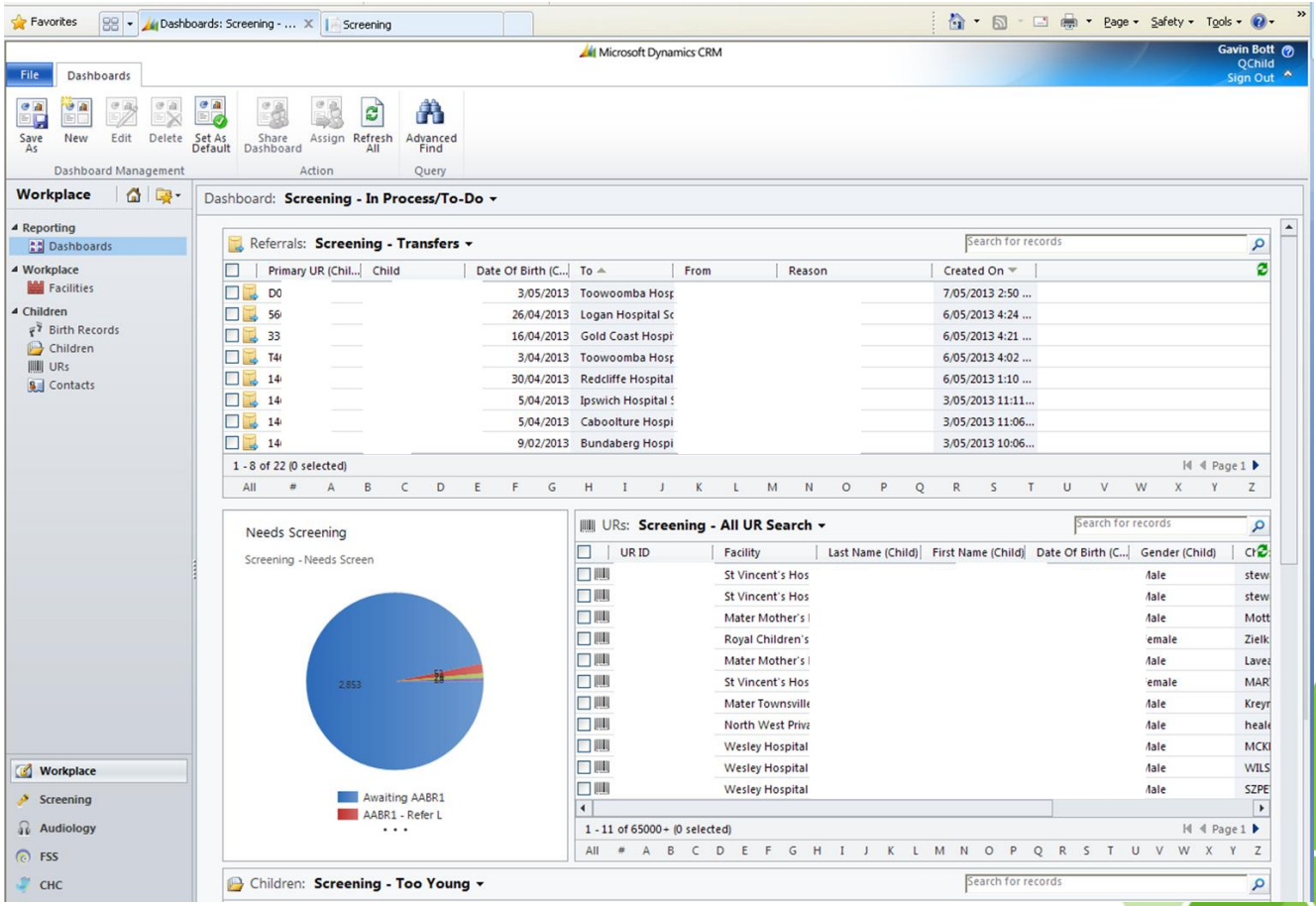




What we couldn't do

- Restricted pathway information
- Restricted reporting

March 2013, developed QChild



Audiology

Family Support

Screening

Child Hearing Clinics

Deadly Ears

Early Intervention

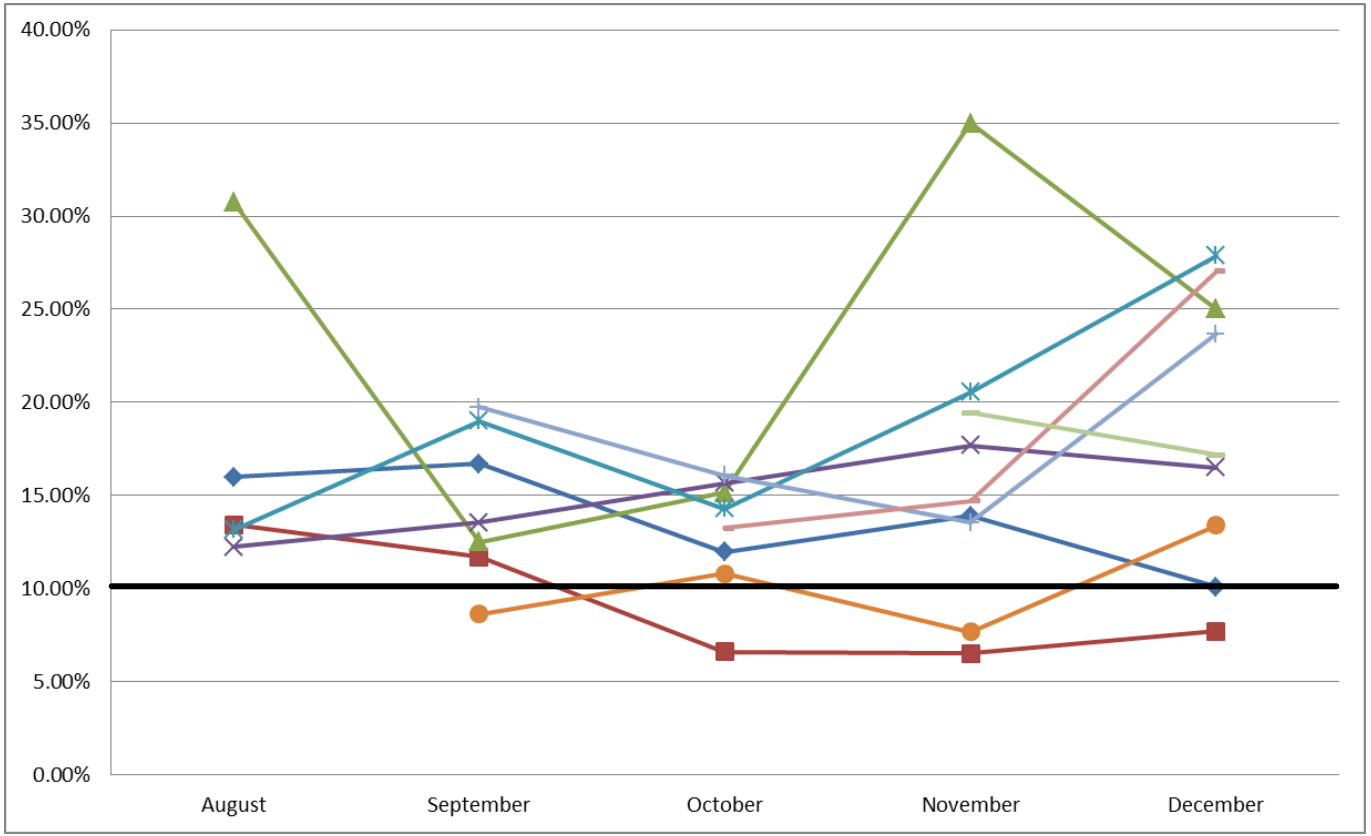
Hearing Implant

Data to explore current problems

On-ward issues explored through data

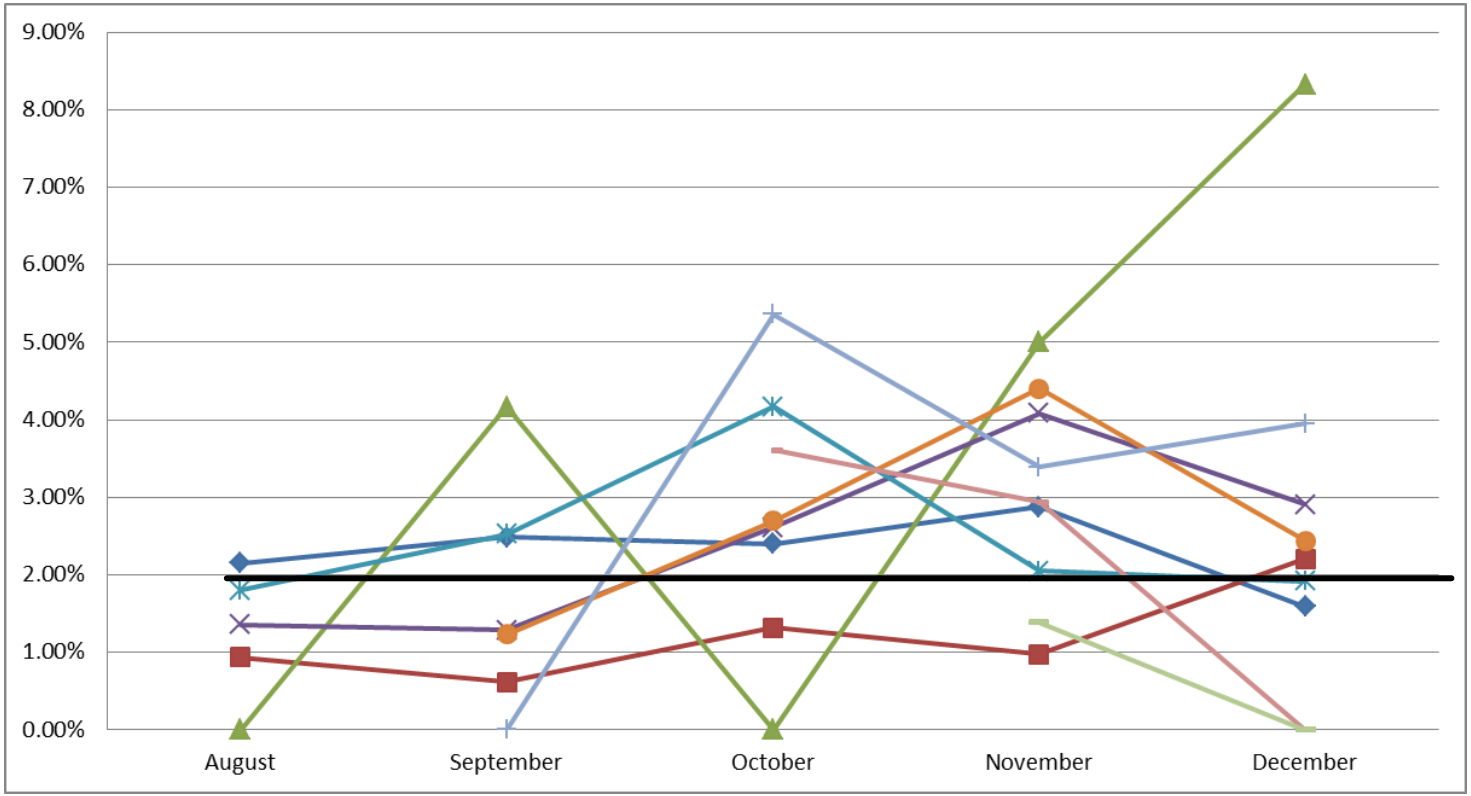
- Dec 2014 approval to go to tender for new screening device
- Tender process and equipment evaluation – 12 months
- Extensive stakeholder group + consultation
- Extensive equipment trial
- Unanimous decision – Dec 2015
- Roll-out from Aug 2016

The honeymoon is over – first refer rate



10%

The honeymoon is over – second refer rate

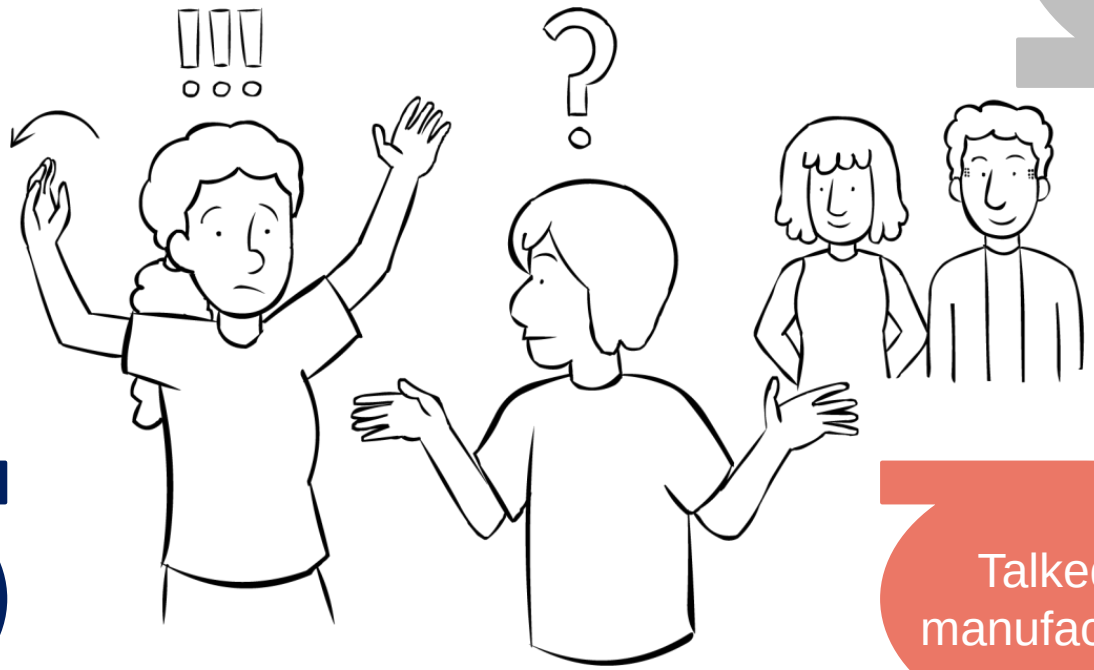


2%

Time to trouble shoot

Talked to hospitals

Review broad data – hospitals, screening models

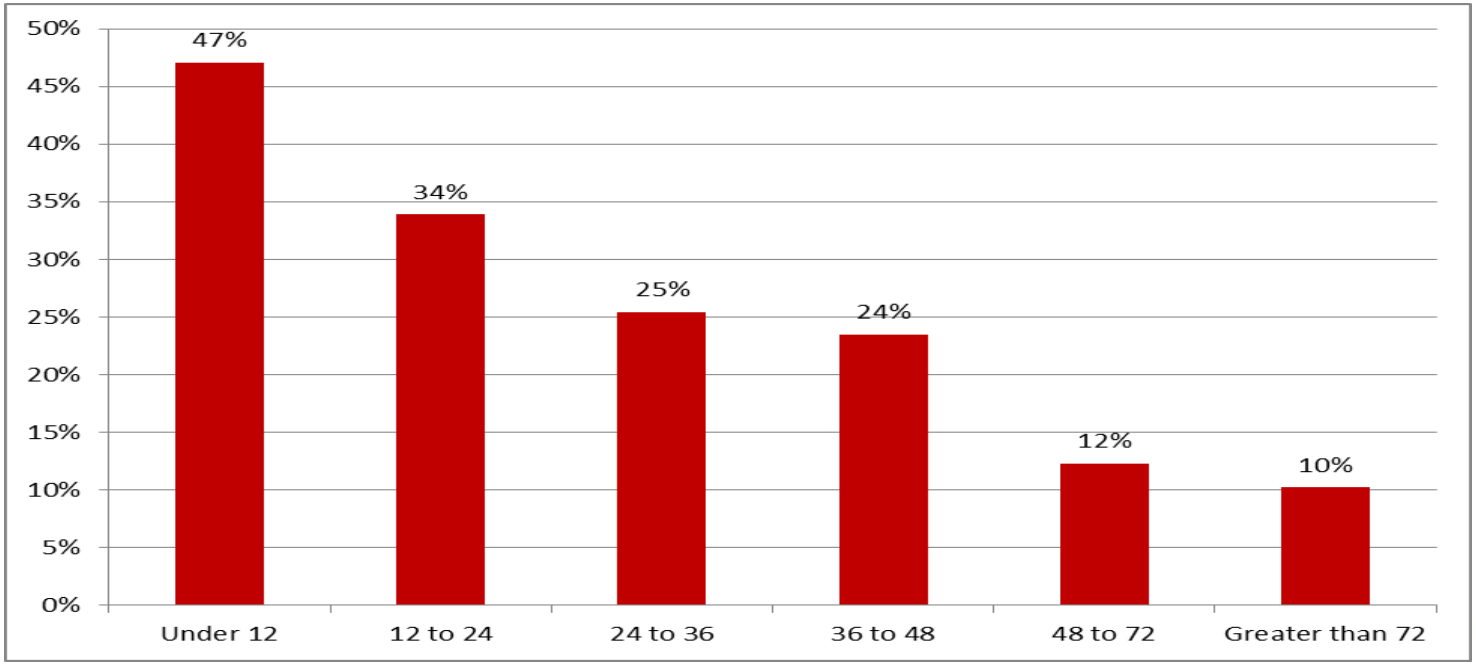


QChild data review

Talked to manufacturers

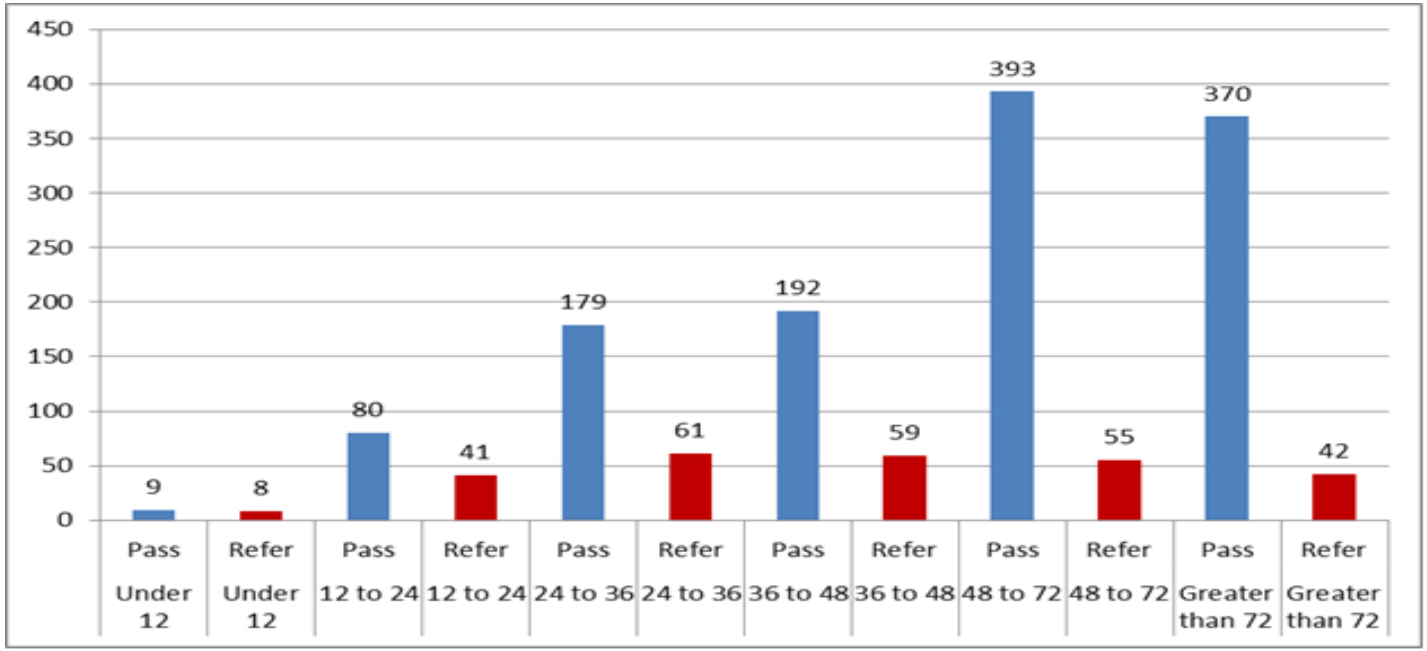
QChild data review

First refer rate and time of screen



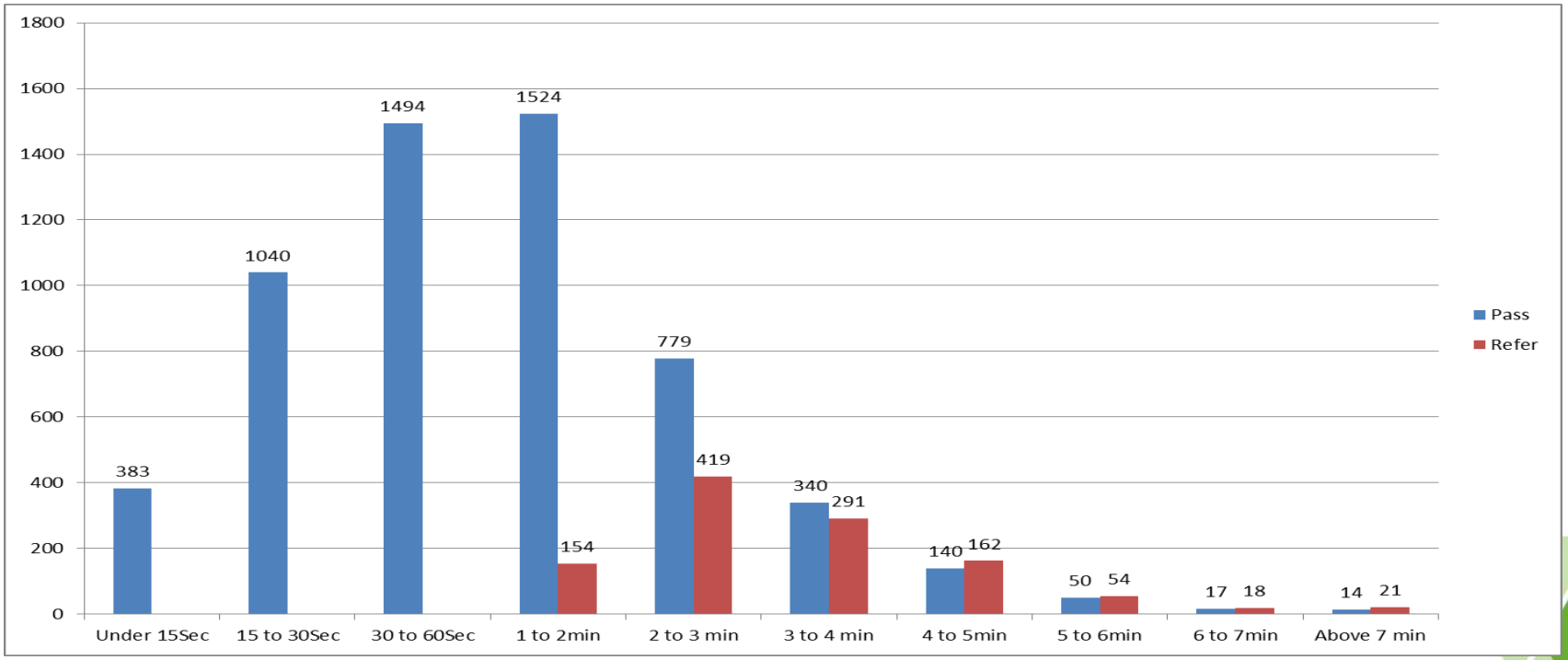
QChild data review

First refer rate and time of screen



QChild data review

Screen duration



QChild data review

- **Comparison of individual devices**
  - No difference in referral rates
- **Ear Hugs vs. Couplers**
  - No difference

Analysis continues

- Reviewing trend data
  - 1st hospital met 1st refer KPI in December!
- Discussion with team reasons for improvement
  - Less births in December, less pressure to screen
  - Modification to practice:
    - NuPrep on every baby
    - Baby selection critical
    - Clarification on using “stop” vs “pause”

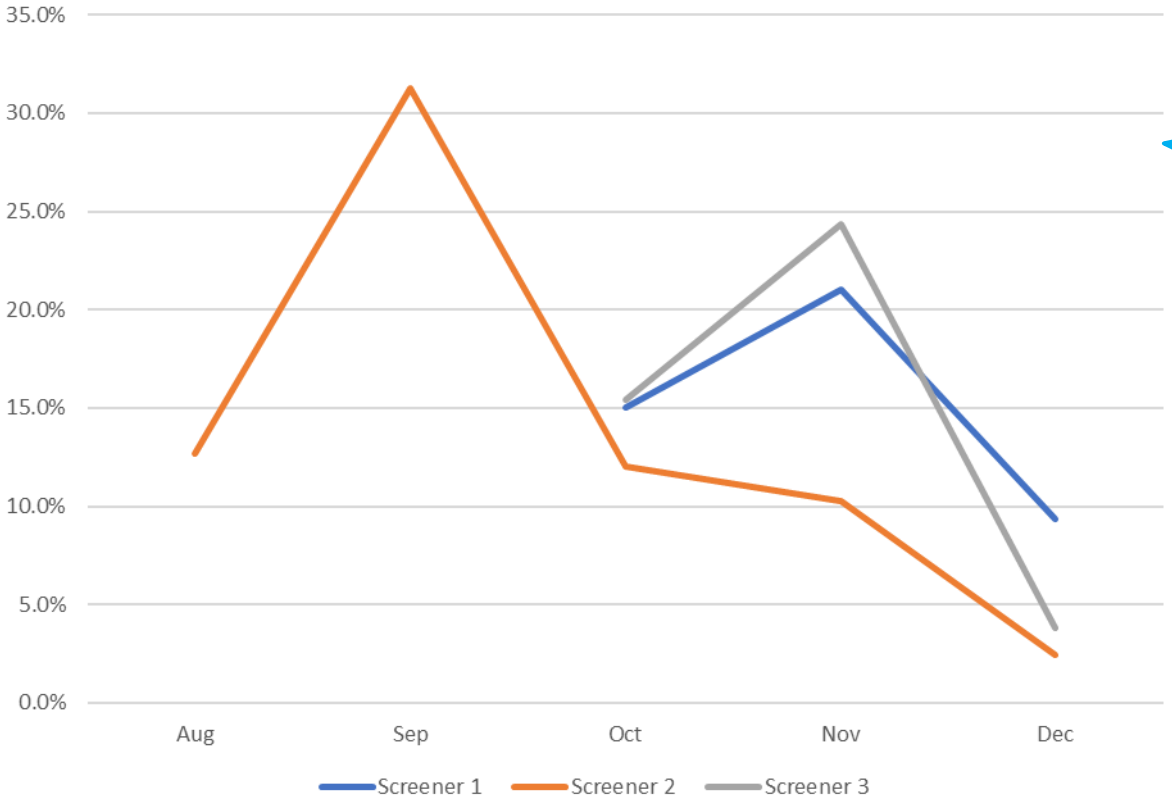
Analysis continues

- Discussion with team reasons for improvement
  - Less births in December, less pressure to screen
  - Modification to practice:
    - NuPrep on every baby
    - Baby selection critical
    - Clarification on using “stop” vs “pause”

- Review of individual screener performance

QChild data review

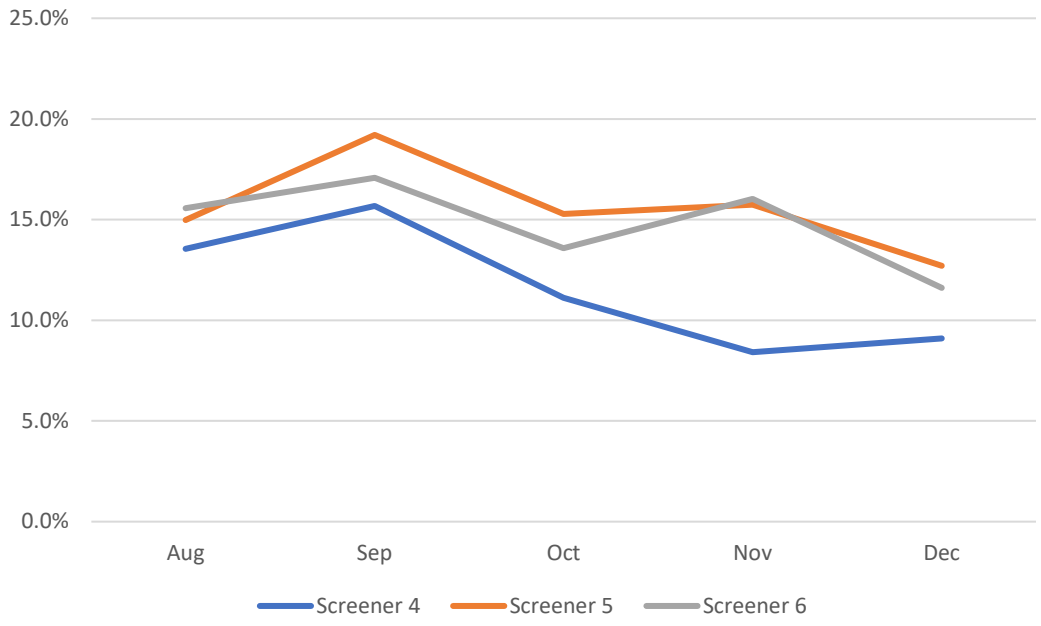
Individual screener performance



Improved performance meeting KPIs

QChild data review

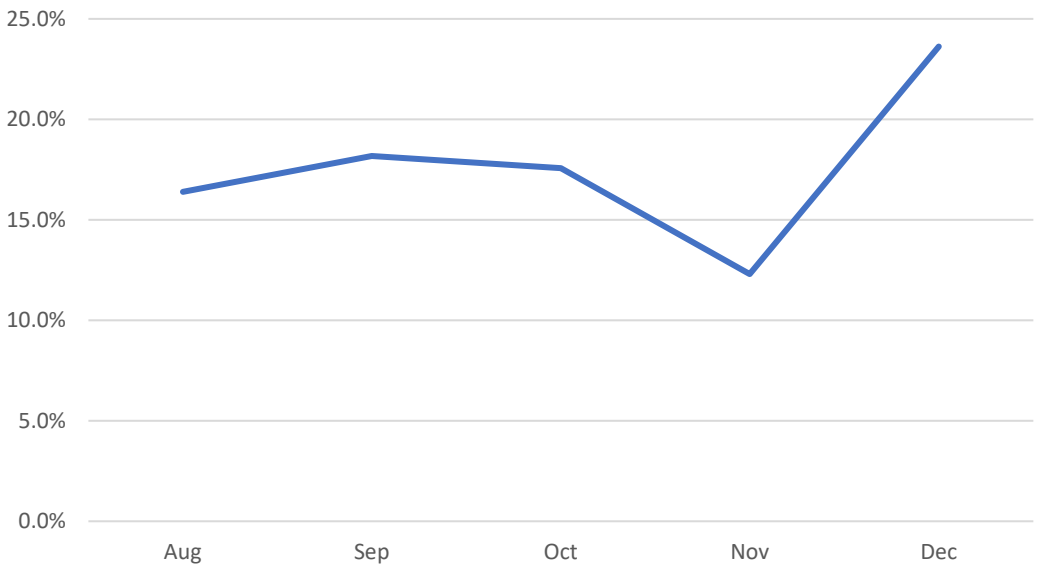
Individual screener performance



Improved performance - KPIs almost met

QChild data review

Individual screener performance

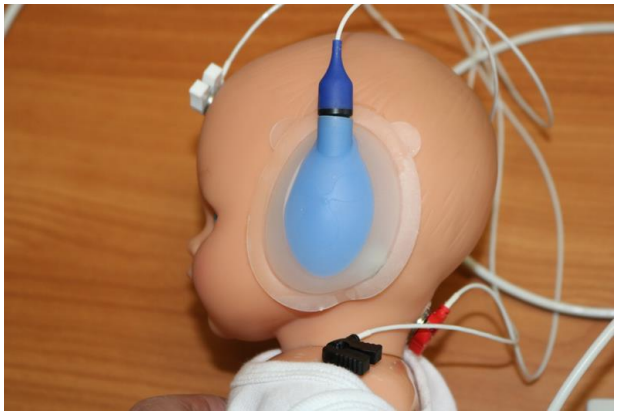


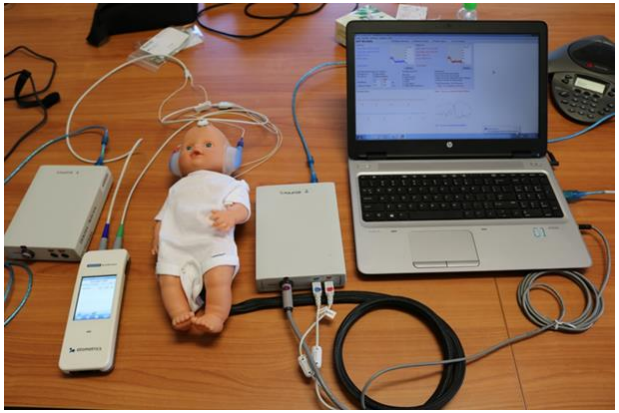
Not yet meeting KPIs

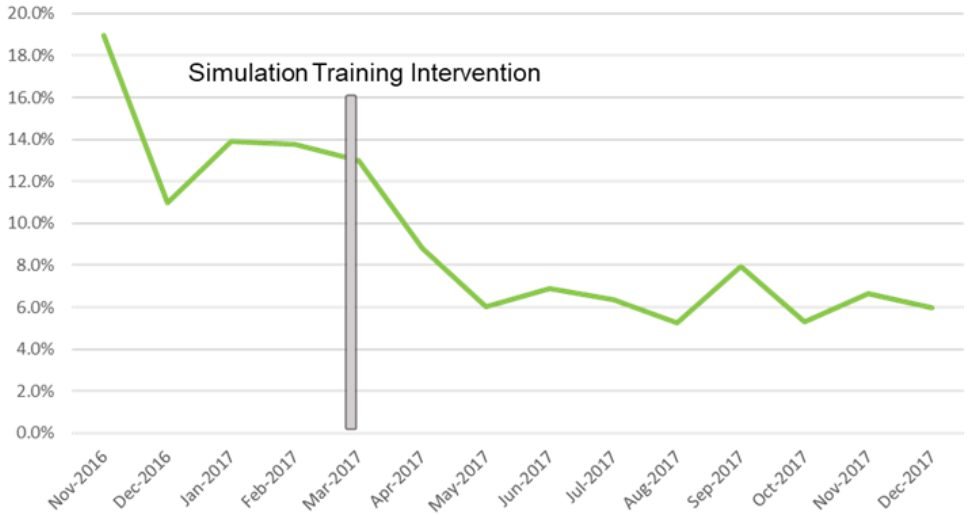
What happens next

- Data provided to Director
- Director discussed results with team – story behind the data
- Tailored support to improve service delivery
- On-going state-wide review of hospital refer rates and screener performance

“Hands on” teaching tool





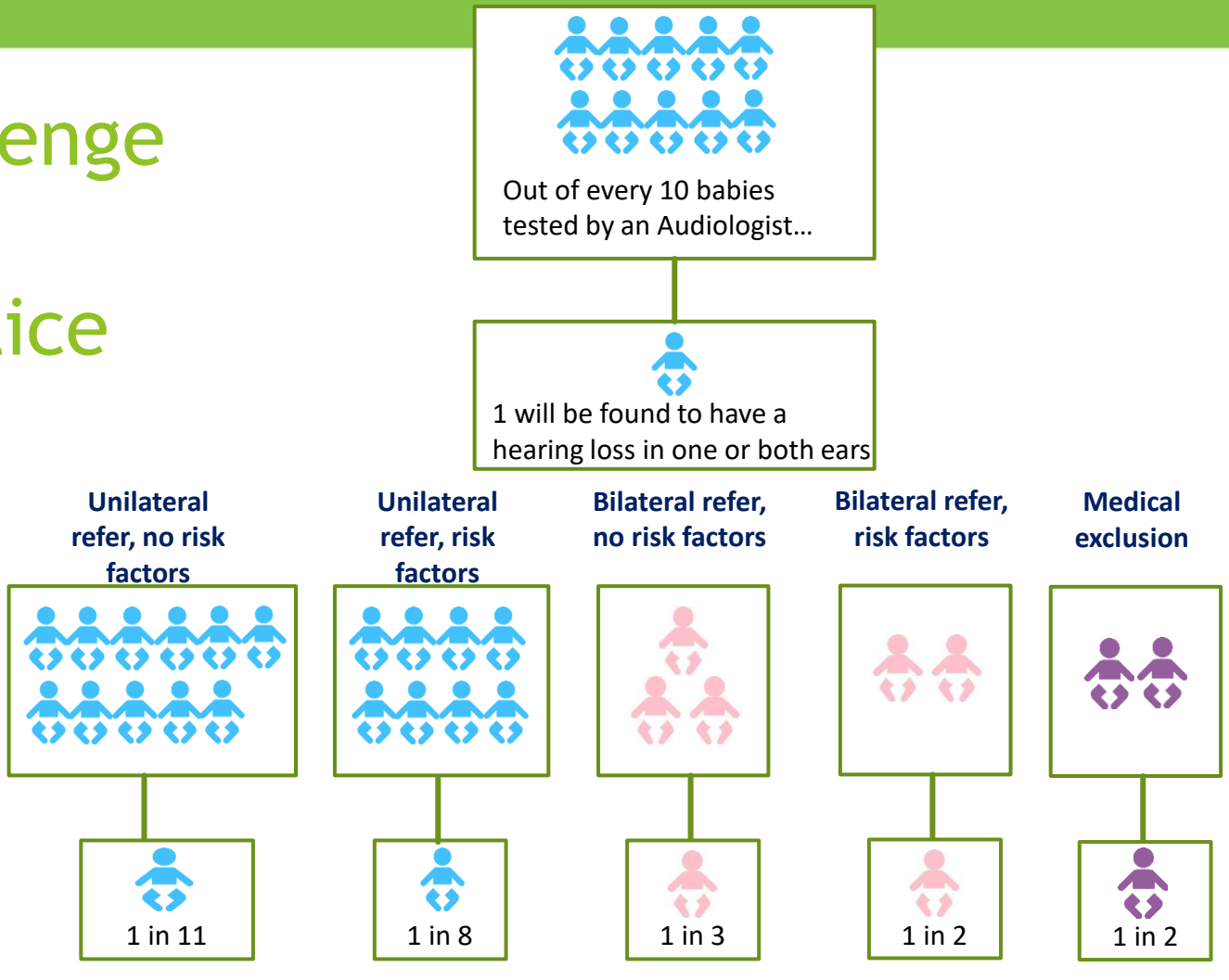


How has this data affected practice?

- The nurses decision making is the critical factor!
- Baby selection is key
  - Quiet, calm babies
- Swaddling to limit excessive movement
- Prep the skin for good sensor attachment for faster screens
- Nurses trust their experience and don’t proceed with unsettled babies

Data to predict outcomes

Challenge our practice



INTERNATIONAL JOURNAL OF AUDIOLOGY
https://doi.org/10.1080/14992027.2021.1871975

ORIGINAL ARTICLE

Predicting hearing loss from 10 years of universal newborn hearing screening results and risk factors

E. Jane Fitzgibbons[a], Carlie Driscoll[b], Joshua Myers[b], Kelly Nicholls[a] and Rachael Beswick[a]

[a]Healthy Hearing Program, Children's Health Queensland Hospital and Health Service, Brisbane, Australia; [b]School of Health and Rehabilitation Services, University of Queensland, Brisbane, Australia

ABSTRACT

Objective: This study investigated whether demographic variables, risk factor presence or absence and universal newborn hearing screening (UNHS) results can be used to predict permanent childhood hearing loss (PCHL) in infants referred from screening.

Design: Retrospective analysis of a UNHS database.

Study sample: Data were extracted from the state-wide UNHS database storing details of the 613,027 infants who were born in Queensland, Australia between 1 January 2007 and 31 December 2016 and participated in UNHS. This study included the 6735 children who were referred from the UNHS program for diagnostic audiology due to failing the screen in one or both ears or bypassing screening.

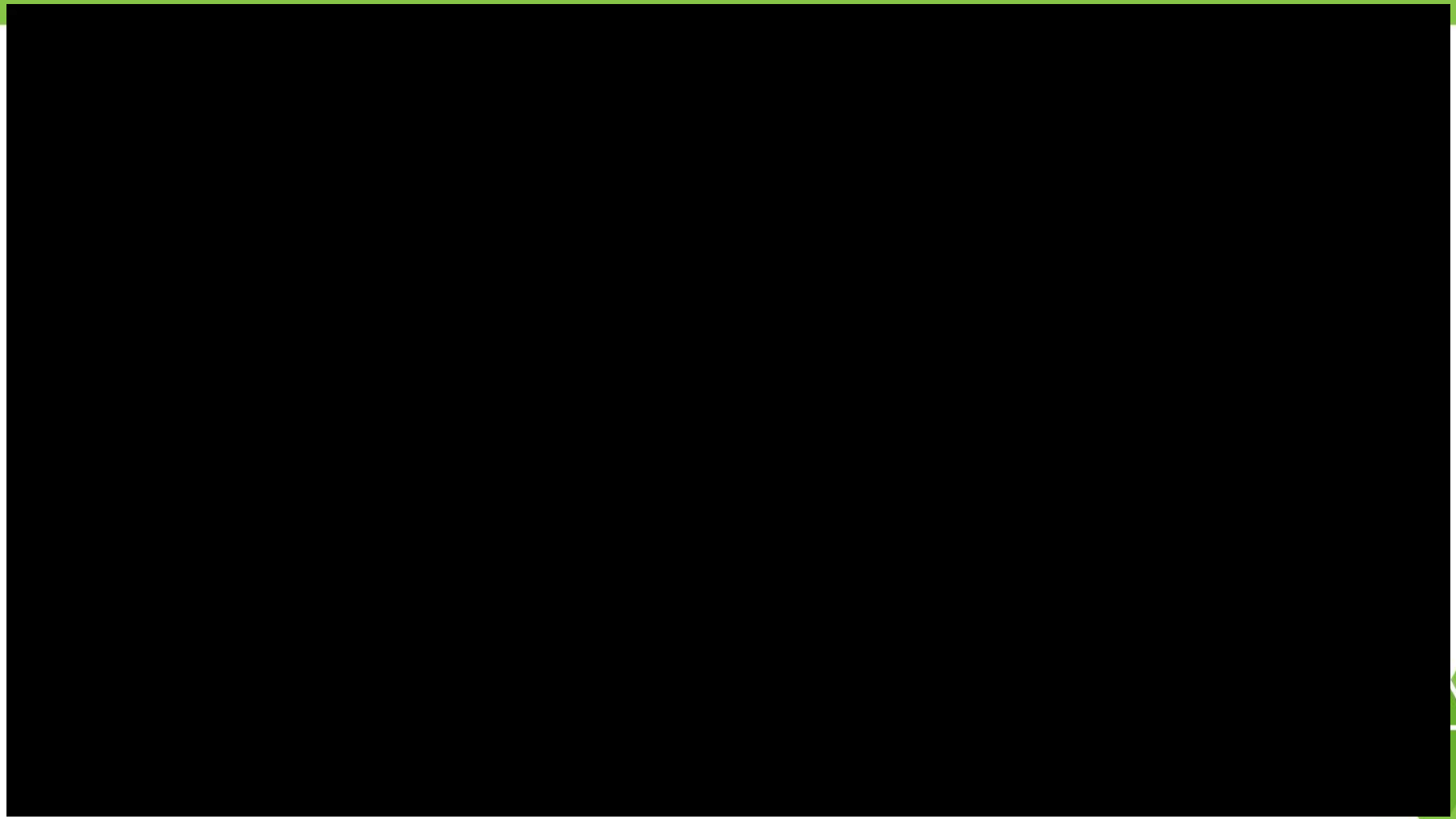
Results: Factors with a significant positive association with PCHL that were incorporated into a logistic regression model were: female gender, non-indigenous status, family history of PCHL, craniofacial anomalies and syndromes associated with PCHL, and a bilateral refer result on screening.

Conclusions: Odds of PCHL vary among infants referred for diagnostic assessment from UNHS programs. When an infant refers on the newborn hearing screen, information about their gender, indigenous status, identified risk factors and specific screening outcome can be used to predict the likelihood of a congenital PCHL diagnosis.

ARTICLE HISTORY
Received 15 July 2020
Revised 1 November 2020
Accepted 29 December 2020

KEYWORDS
Audiology; hearing loss; infant; risk factors; screening

https://healthy-hearing.shinyapps.io/Risk-calculator/

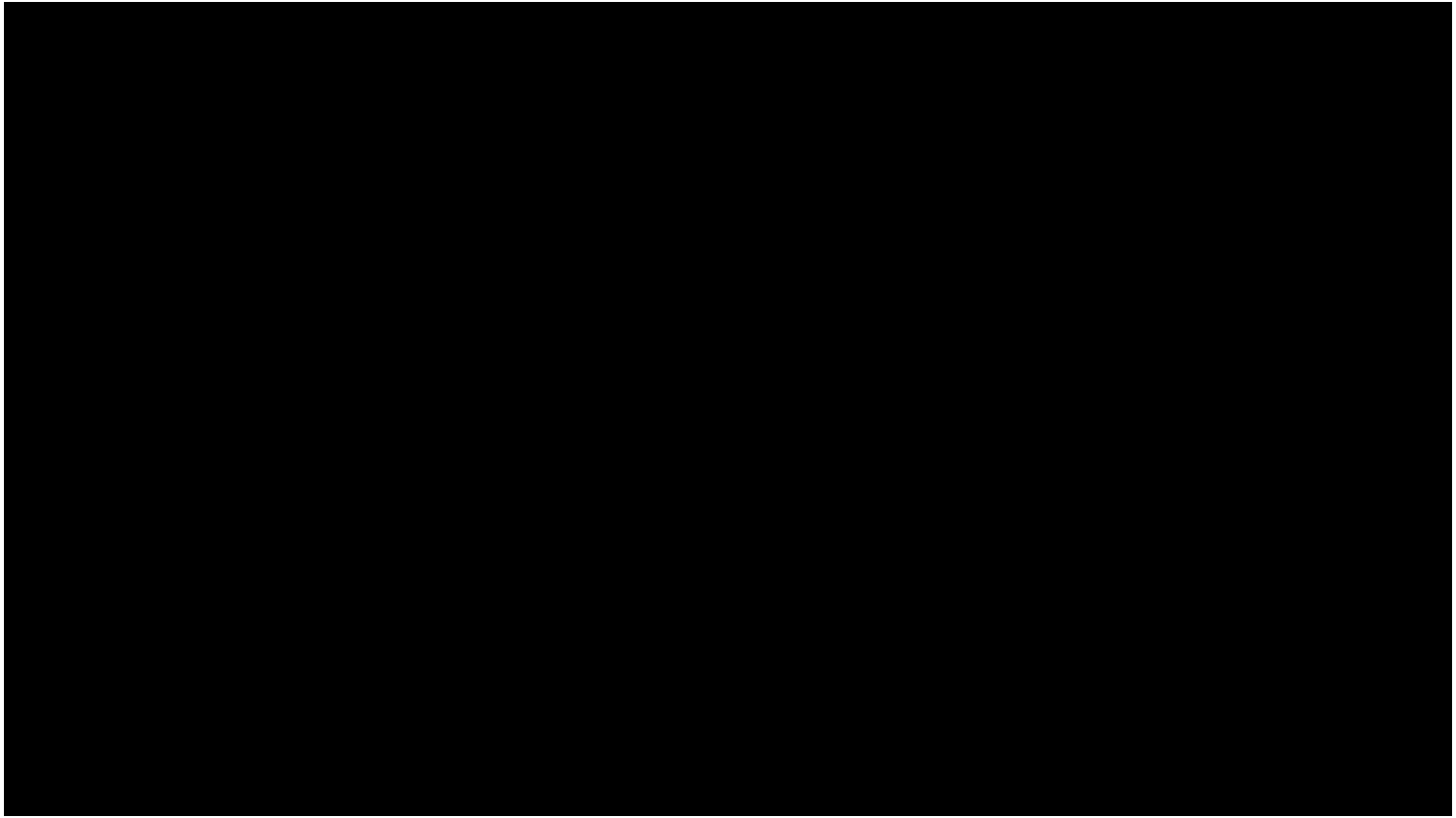


Clinical implications

- Patient scheduling
- Resource allocation

Data visualisation and Machine Learning

Data visualisation



Aboriginal and Torres Strait Islander children have one of the highest rates of middle ear disease and hearing loss in the world.

“Hey, can you get QChild to display these otoscopy images so ENT’s can look at them outside of being on the trip in person?”

Right Ear

Add Image(s)

Demo oto 1.JPG
Uploaded

Finding R

Aerated middle ear

Comments R

- [ ] Cholesteatoma
- [ ] Grommet
- [ ] Foreign Body
- [ ] Otitis Externa
- [ ] Wax
- [ ] Retraction

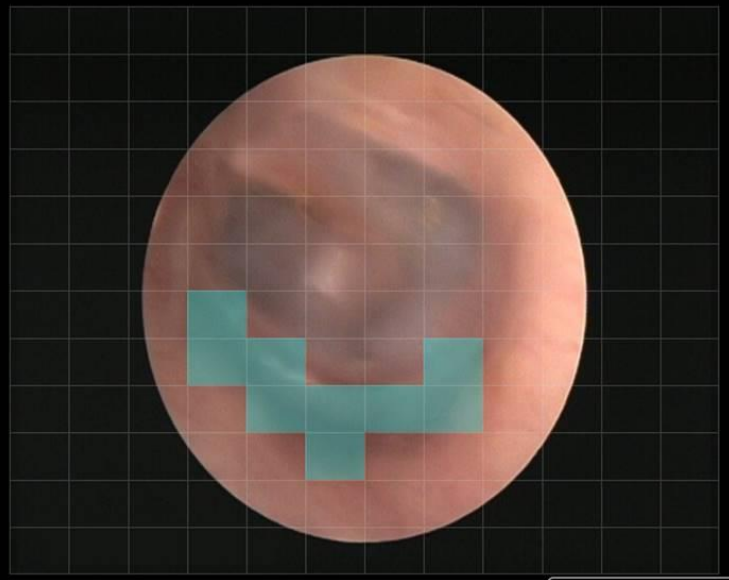
Case Review Portal

Sign Out

Right Ear

This ear has been flagged for referral (0.343 probability of Otitis Media with Effusion)

1 of 1



Diagnosis Degree
Moderate

Diagnosis Type
Mixed

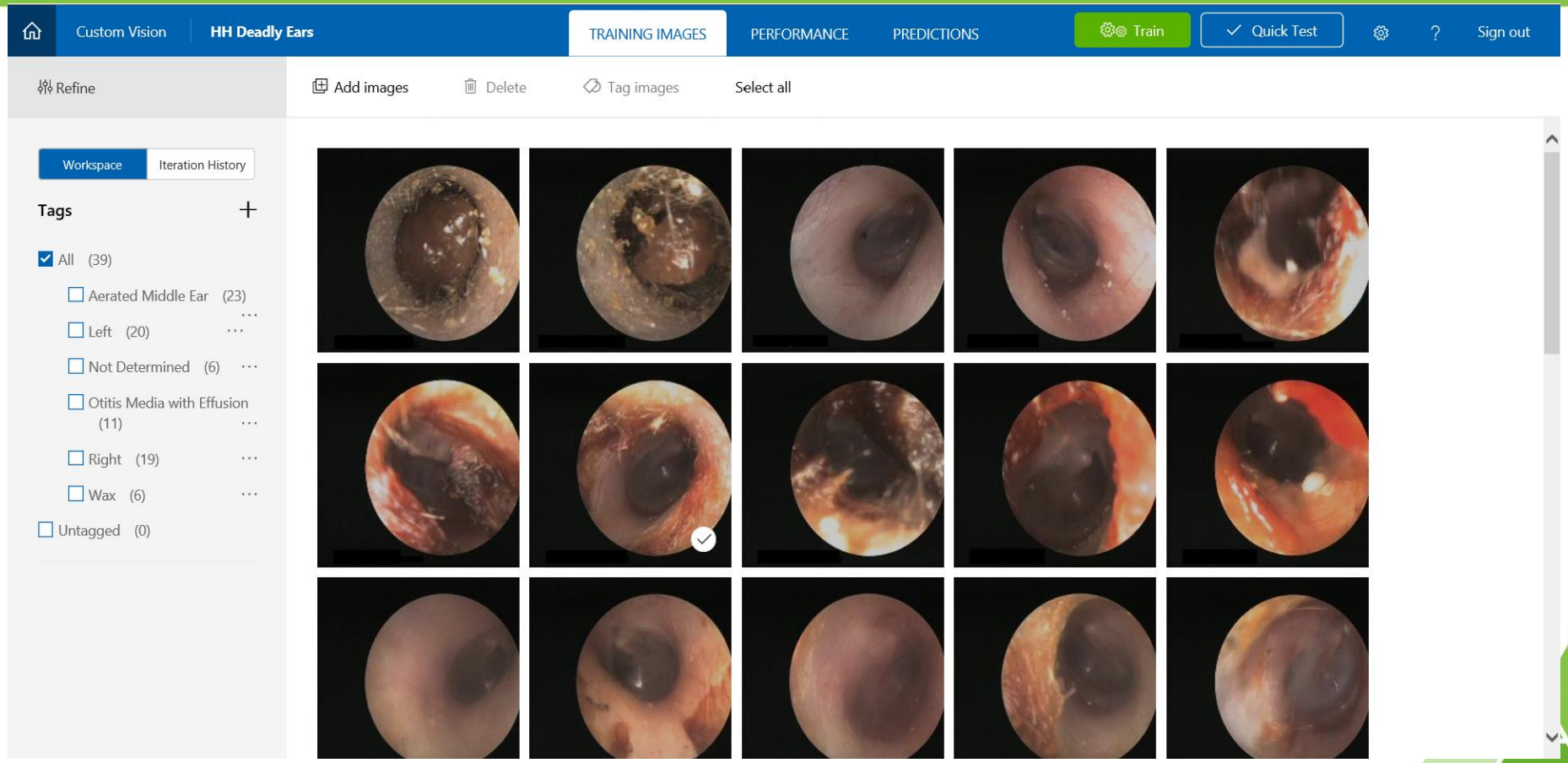
Tymp Type
B

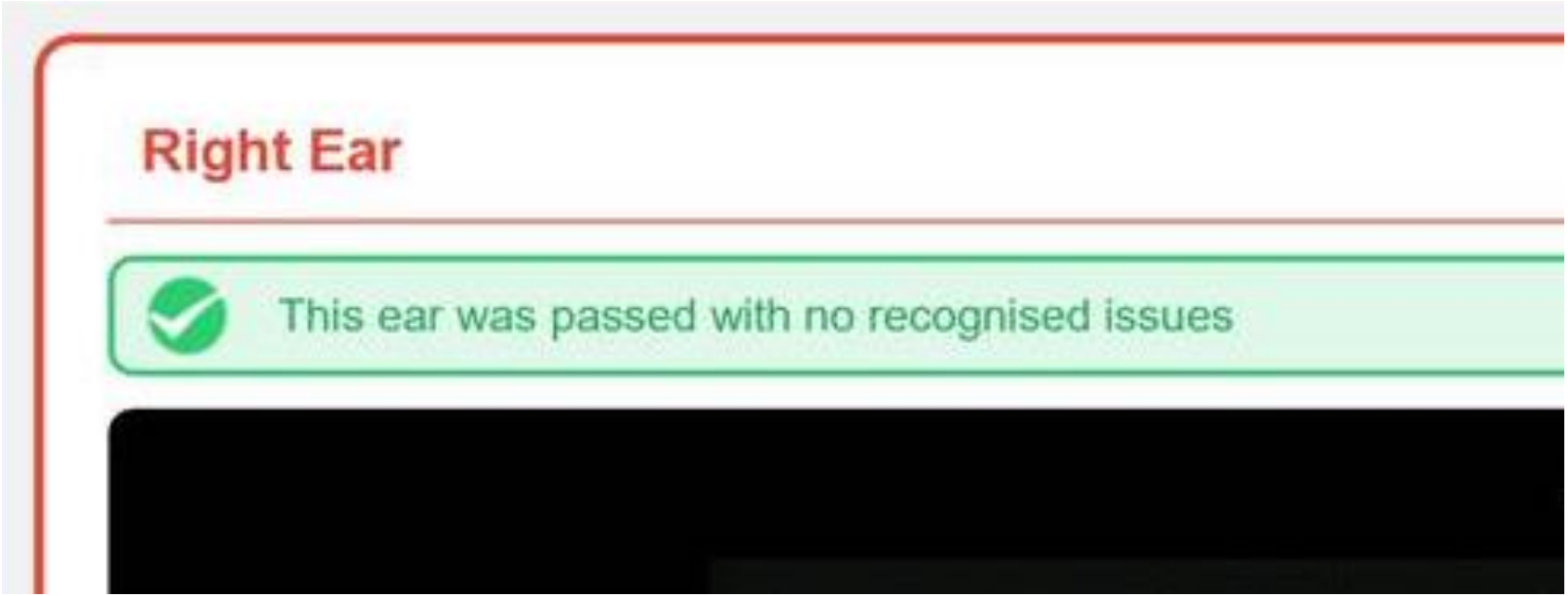
AB Gap
No

View Full Audiology Report

Hide Area of Concern

Full Screen


Custom Vision
HH Deadly Ears
TRAINING IMAGES
PERFORMANCE
PREDICTIONS
Train
Quick Test
Sign out
Refine
Add images
Delete
Tag images
Select all
Workspace
Iteration History
Tags
All (39)
Aerated Middle Ear (23)
Left (20)
Not Determined (6)
Otitis Media with Effusion (11)
Right (19)
Wax (6)
Untagged (0)


Right Ear
This ear was passed with no recognised issues

Right Ear

This ear has been flagged for referral (0.343 probability of Otitis Media with Effusion)

1 of 1

Diagnosis Degree
Moderate

Diagnosis Type
Mixed

Tymp Type
B

AB Gap
No

View Full Audiology Report

View Area of Concern Full Screen

Potential applications

- Shortage of ENT specialists across QLD
- Primary care setting
- Other parts of our business including Audiology

Supporting other state-wide programs

Audiology

Family Support

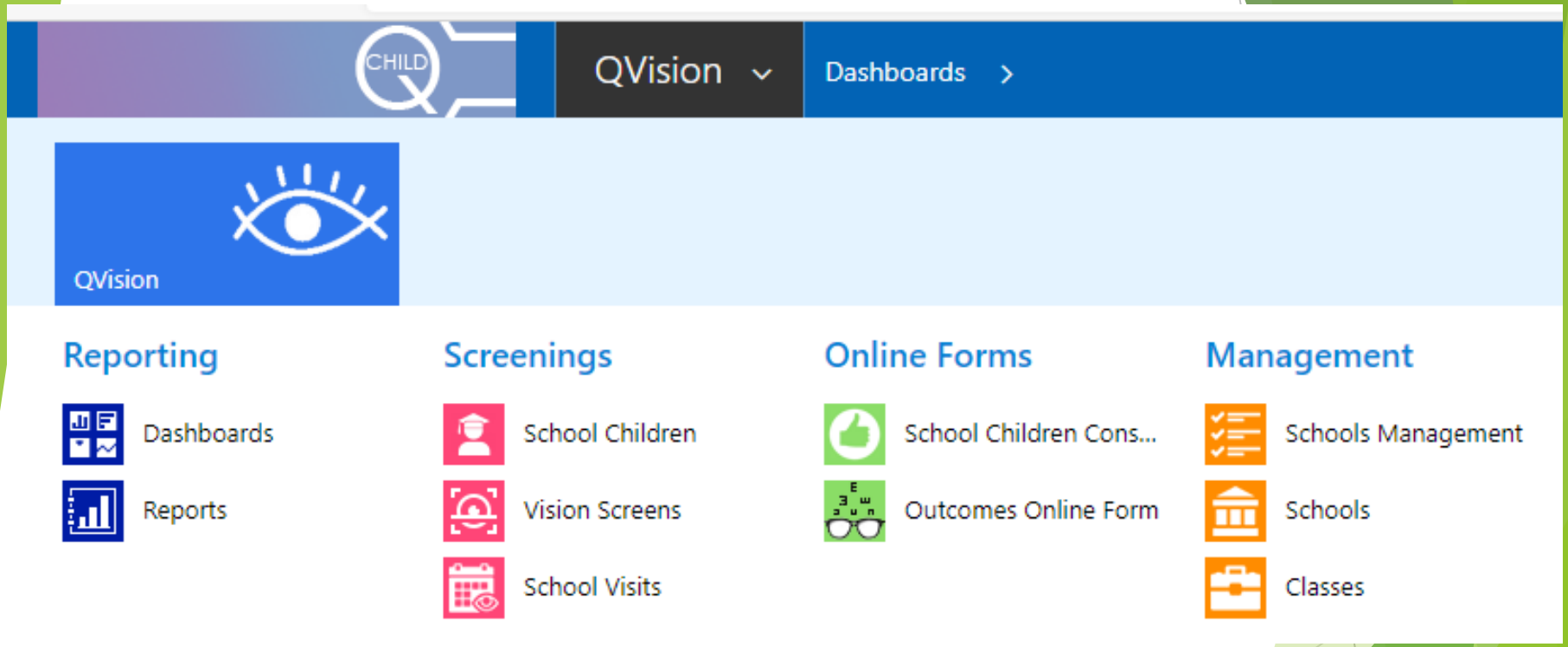
Screening

Child Hearing Clinics

Deadly Ears

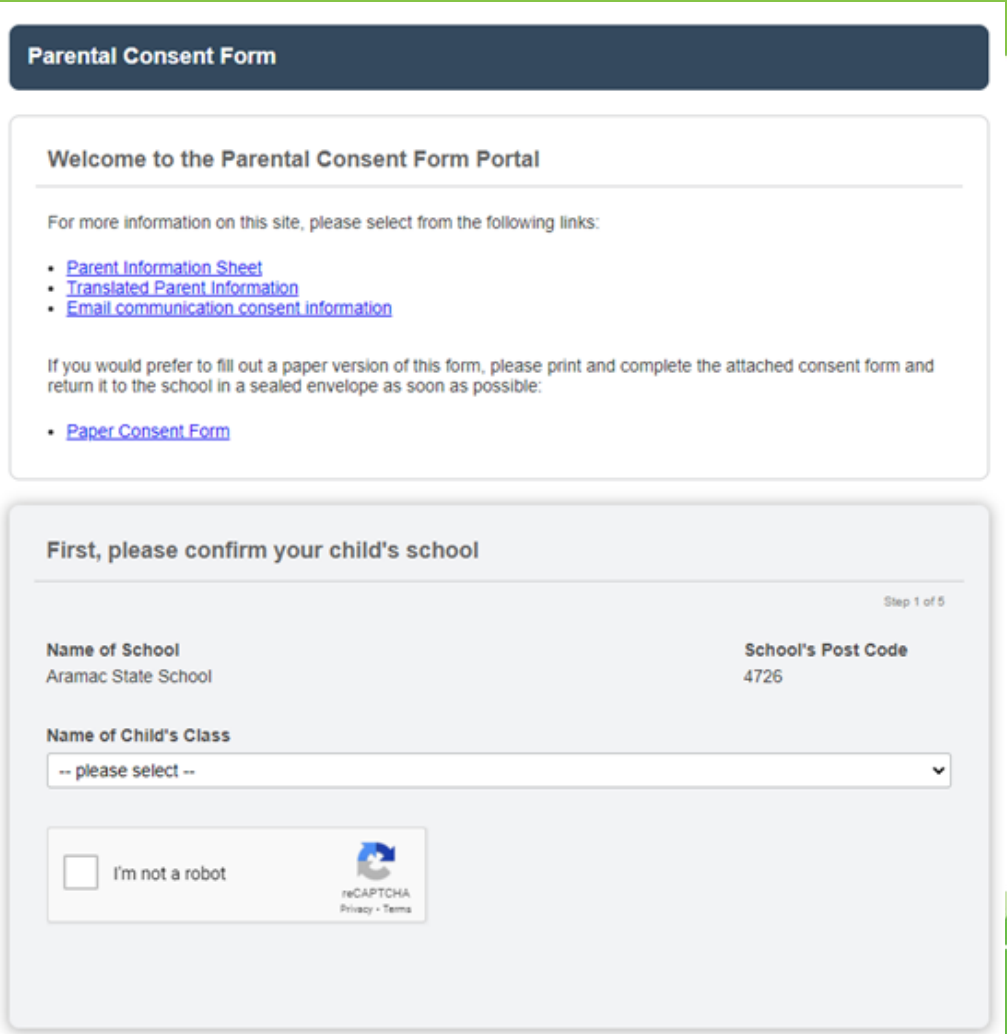
Early Intervention

Hearing Implant


CHILD
QVision
Dashboards
QVision
Reporting
Dashboards
Reports
Screenings
School Children
Vision Screens
School Visits
Online Forms
School Children Cons...
Outcomes Online Form
Management
Schools Management
Schools
Classes

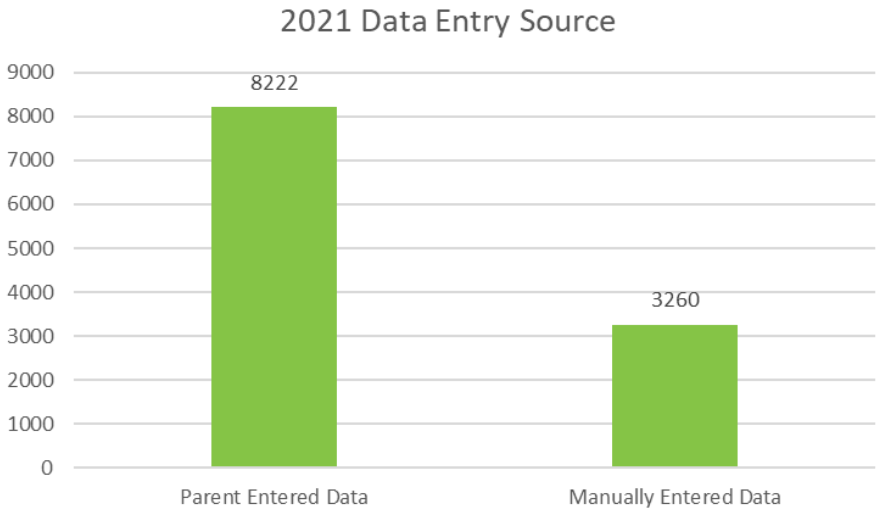
State-wide vision screening program

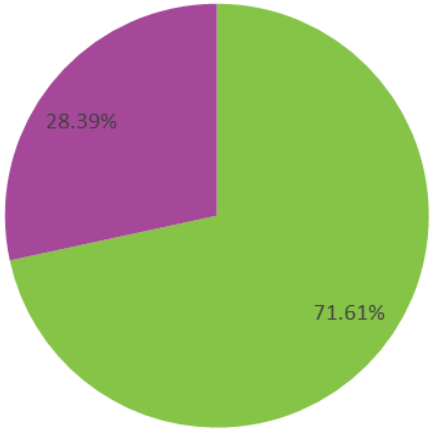
Online consent



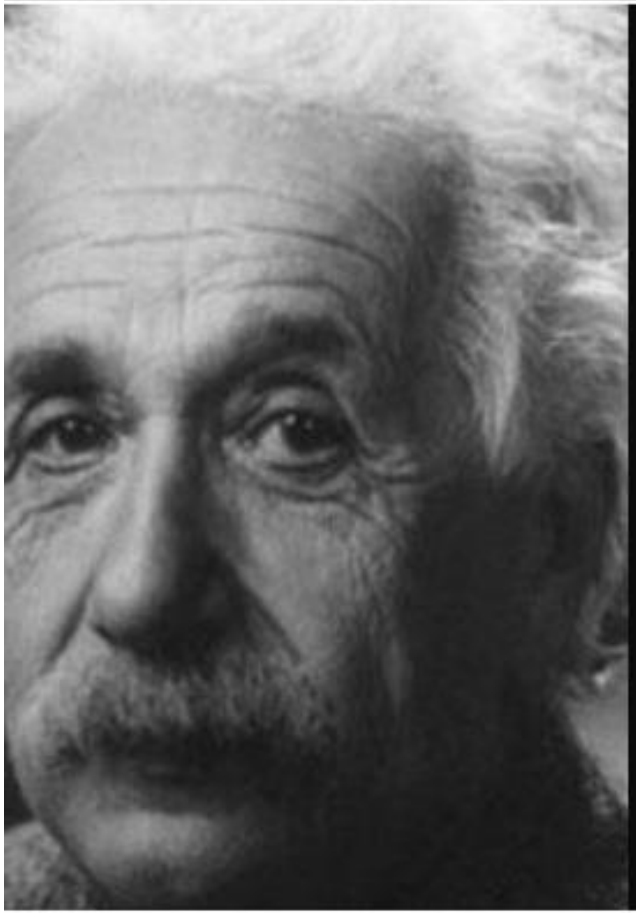
State-wide vision screening program

Online consent





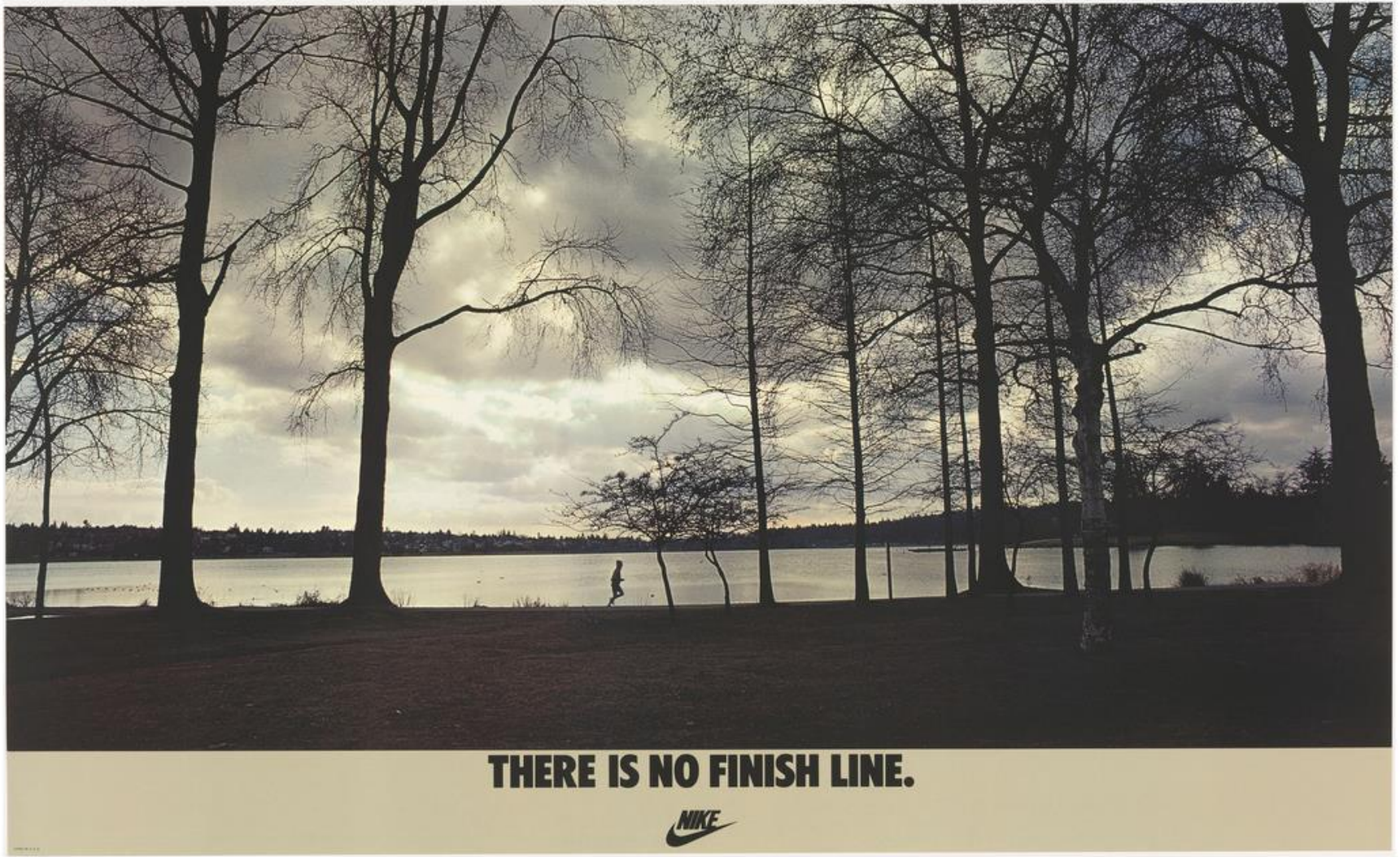
>70% in Q1 entered via portal



The more I learn, the more I realize I don't know.

— Albert Einstein —

AZ QUOTES


THERE IS NO FINISH LINE.
NIKE