Victorian Infant Hearing Screening Program

Melissa Wake

Director, Research & Public Health

Centre for Community Child Health

VIHSP

The Team

VIHSP

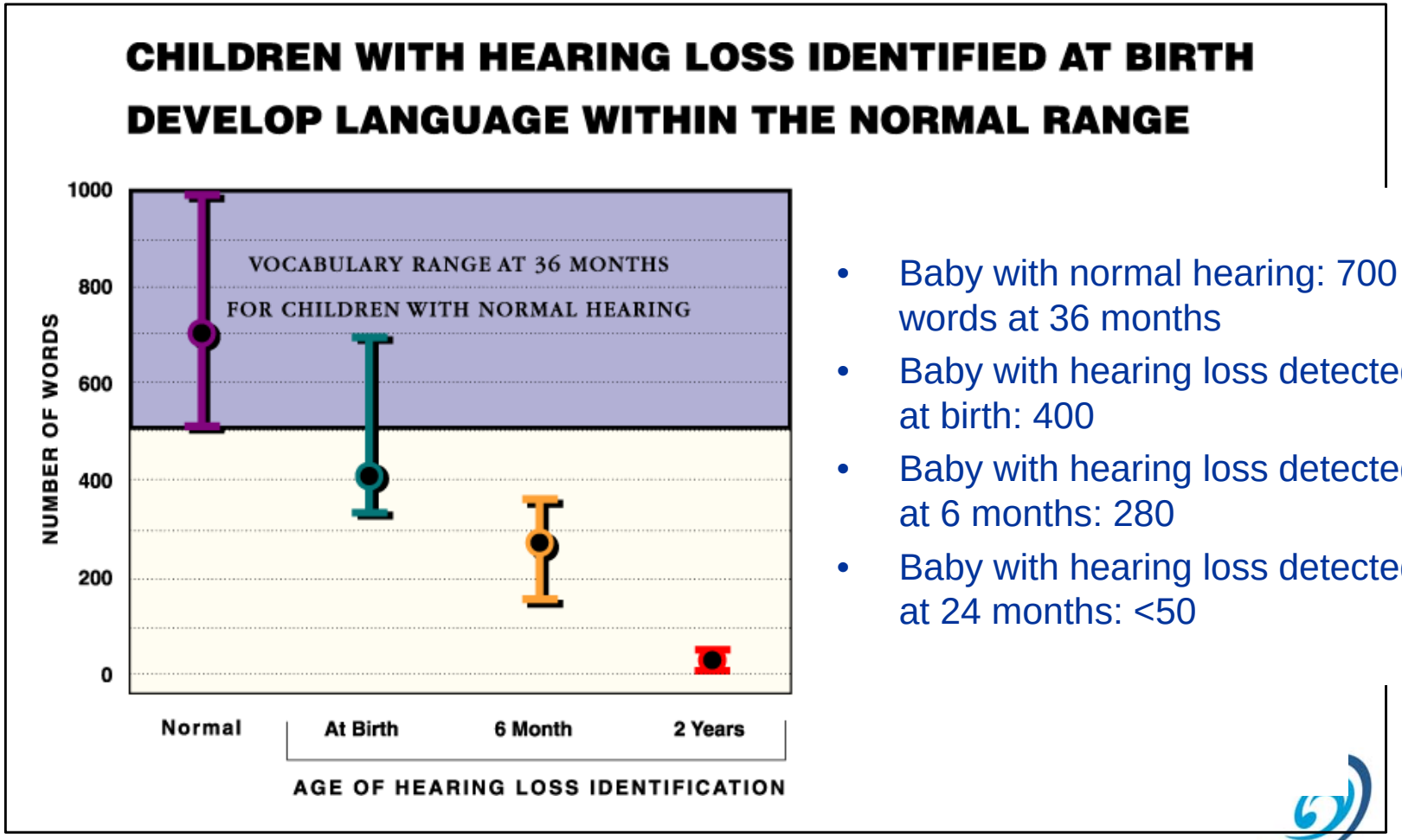
Why screen for hearing loss in newborns?

Importance of Early Identification

- Deafness is currently detected late
- Hearing impairment has no visual indicators
- Established evidence base that the most important period for speech and language development is 0-6 months of age
- The average age of identification in the absence of screening is over 12 months of age – i.e. **too late**

VIHSP

Why screen for hearing loss in newborns?

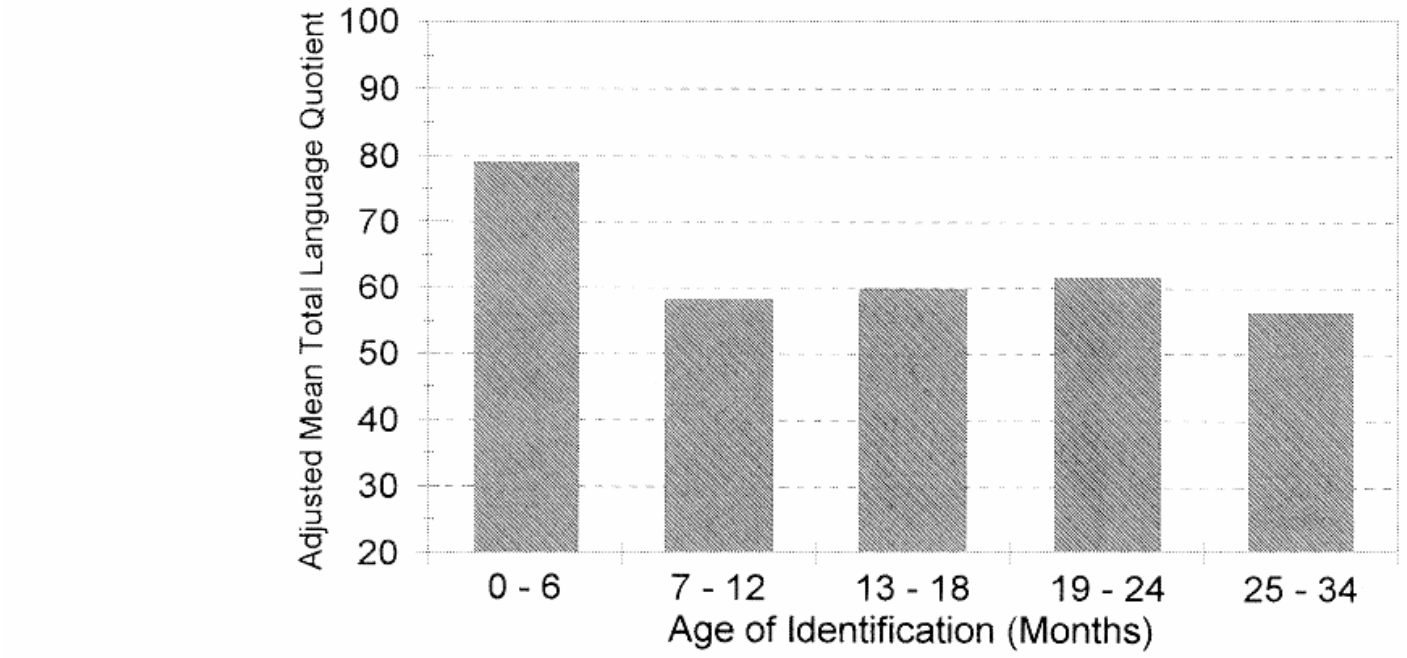


- Baby with normal hearing: 700 words at 36 months
- Baby with hearing loss detected at birth: 400
- Baby with hearing loss detected at 6 months: 280
- Baby with hearing loss detected at 24 months: <50

VIHSP

Why screen for hearing loss in newborns?

Comparison of groups based on age of identification of hearing loss



Pure Tone Average:	63	62	80	72	64
Cognitive Quotient:	88	74	82	76	71

VIHSP

Why screen for hearing loss in newborns?

- Potential to relieve enormous burden of disability caused by problems with
  - cognitive development
  - language
  - communication
  - social skills
  - academic achievement
  - economic potential (ie vocational)

consequences on quality of life

Why screen for hearing loss in newborns?

Why screen every baby?

- Risk registers at best could only detect 50% of infants with hearing impairment (in practice, far fewer)
- Universal screening is the **only reliable method** for early identification in the **whole** population
- Technology to screen neonates - quick, easy, painless
- Diagnosis, early intervention and support services are available

VIHSP

Incidence

Frequency per 100,000 births:

- Congenital hearing Loss detectable at birth 100
- Cystic fibrosis 50
- Hypothyroidism 25
- Hemoglobinopathy 13
- Phenylketonuria (PKU) 10
- Galactosemia 2

- Most common disability in newborns, higher incidence than Down syndrome and severe mental retardation

VIHSP

International and interstate scene

- Pre-discharge hearing screening the international standard of care
  - mandated in most states in the USA
  - UK screen close to 100% of their 600K annual births
  - all Australian states now have at least partial pre-discharge hearing screening
  - effectiveness established – UNHS here to stay?!

VIHSP

The Victorian Infant Hearing Screening Program (VIHSP)

VIHSP – from 1992

- risk-status ascertainment
- behavioural screening via distraction test (7-9m)
- more hearing aids fitted early
- lowered median age of diagnosis for severe HI

VicNIC – from 2003

- pre-discharge AABR screening of all babies in NICU and associated SCN

VIHSP – from 2005

- newborn hearing screening (pre-discharge)
- risk factor ascertainment
- distraction test screen (discontinued)

VIHSP

VIHSP pre-discharge hearing screening

Since 28th Feb 2005

Screening all babies born at or admitted to

- Royal Women's Hospital
- Royal Children's Hospital
- Mercy Hospital for Women
- Monash Medical Centre
- Frances Perry House
- Jessie McPherson Private Hospital

Inpatient screening + outpatient clinics

VIHSP

VIHSP

Automated Auditory Brainstem Response (AABR) screening

- AABR: measures the response from the hearing nerve and lower brainstem
- Conducted by trained screener in the ward/unit
- 3 small electrodes on baby's head
- small ear muffs over the baby's ears
- clicking sounds played into ears
- computer measures how well the baby's hearing nerve responds to the clicking sounds
- Results: "PASS" or "REFER"

VIHSP

AABR

If **pass** on first screen

⇩

NFA

If **refer** on first screen

⇩

re-screen with AABR

If **refer** on second screen

⇩

diagnostic audiology

Automated Auditory Brainstem Response (AABR) screening unit

VIHSP

Screening process

- Parents advised pre-natally, on admission, or by screener just prior to screening
- Written consent obtained
- Baby will stay in the ward during the screen
- Baby needs to be asleep during the screen
- Screen itself takes 2-10 minutes
- Not painful or uncomfortable
- Results available immediately
- Includes NICU/SCN babies, though those who are on ventilation won't be screened

VIHSP

Screening process

- Results noted in
  - baby's history
  - Child Health Record
  - Brochure given to parents
  - VIHSP Database
- Follow–up diagnostic ABR testing arranged by VIHSP Area Coordinator for all babies who get a refer result on their second screen

What happens after a pass result?

- Parents receive brochure explaining next steps/further information
  - hearing can get worse over time for some babies
  - screening doesn't always detect mild loss
  - if any concerns about their child's hearing to arrange another hearing test
  - can refer to the checklist on developmental hearing milestones (CHR Information Booklet)

Talk to VIHSP Area Coordinator if concerned

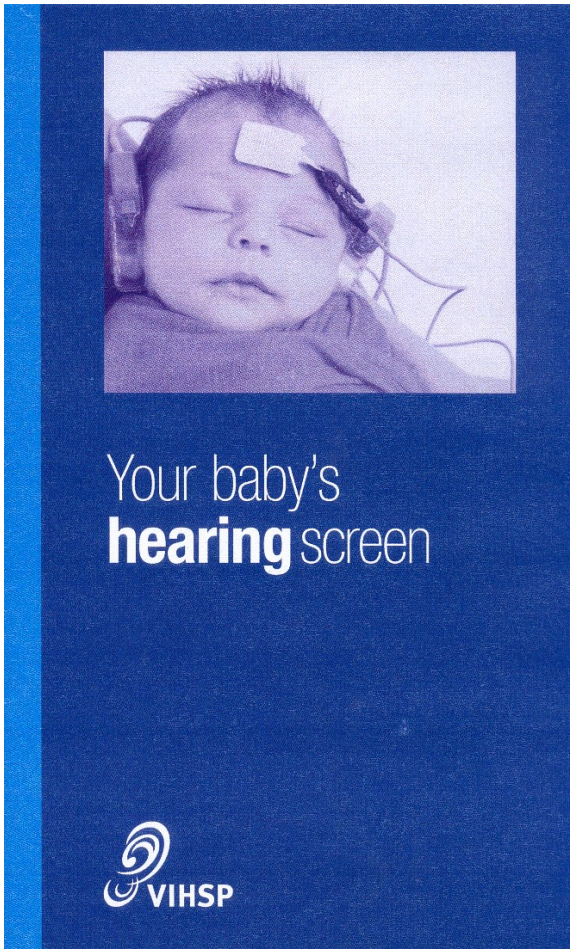
VIHSP

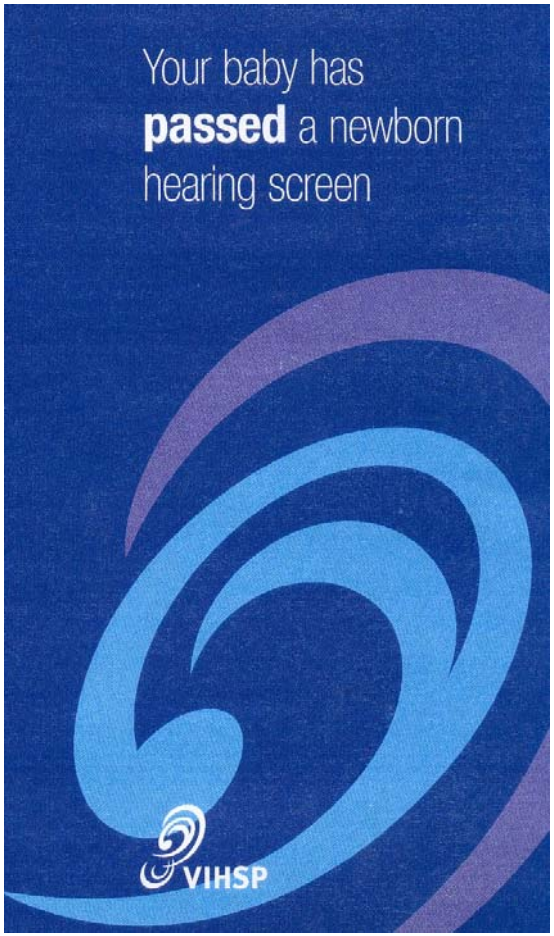
What happens after a refer result?

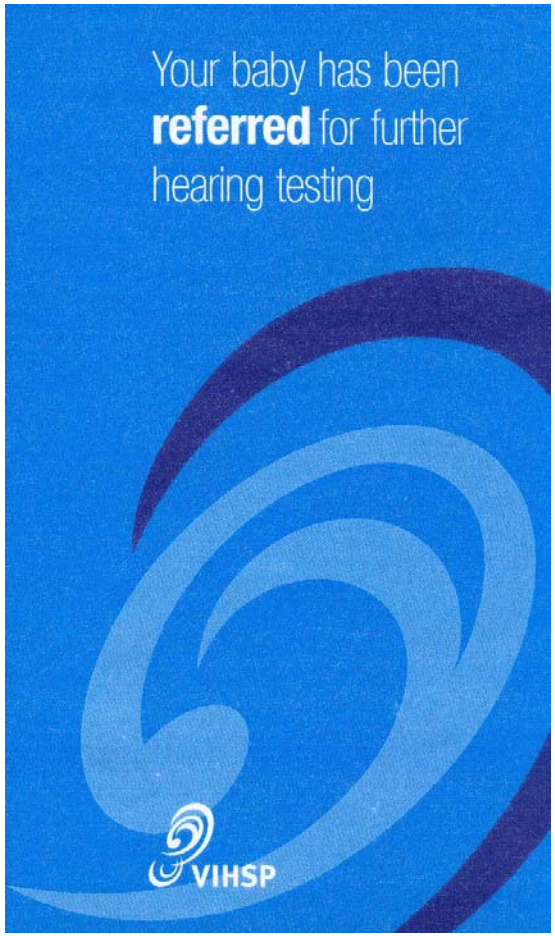
- Parents receive brochure with results recorded
- Parents will be given screen results immediately (if present at the time), and any questions answered
- Ward/unit staff will be informed of which babies need further testing
- Diagnostic ABR testing will be arranged by VIHSP at preferred/closest Audiology Centre

VIHSP

Written information







VIHSP

From screening to diagnosis

- The hearing screen is NOT a diagnostic test
- The screen identifies babies who require further testing
- Diagnostic tests investigate whether there is any hearing loss, and then the degree and type of hearing loss

VIHSP

Progress @ February 2006

- Commenced Feb 28 2005
- >400 births a week
- ≈ 1500 screens per month
- >98% coverage
- Very few parents declining screen (0.5%)
- Refer rate low (<1%)
- 20 babies detected so far with moderate or greater bilateral SNHL
- Detection rate approximately 1.3 per thousand

VIHSP

What about those babies not born in a VIHSP screening hospital?

Risk factor ascertainment → **refer to diagnostic audiology**

- Family history
- Developmental delay
- Parental concern
- Head injury
- Maternal CMV, toxo, rubella
- Admitted to NICU
- Admitted to SCN >48hrs

- Birthweight <1500g
- Severe jaundice (SBR >400)
- Exchange transfusion for jaundice
- Apgar <4 at 5 min
- Congenital head/neck abnormality
- Meningitis/encephalitis

Referrals made by M&CH nurses, paeds, nursery staff

VIHSP

Diagnostic Audiology for infants

- Auditory Brainstem Response (ABR)
- Auditory Steady-State Response (ASSR)
- Oto-acoustic emissions (OAE)
- Tympanometry

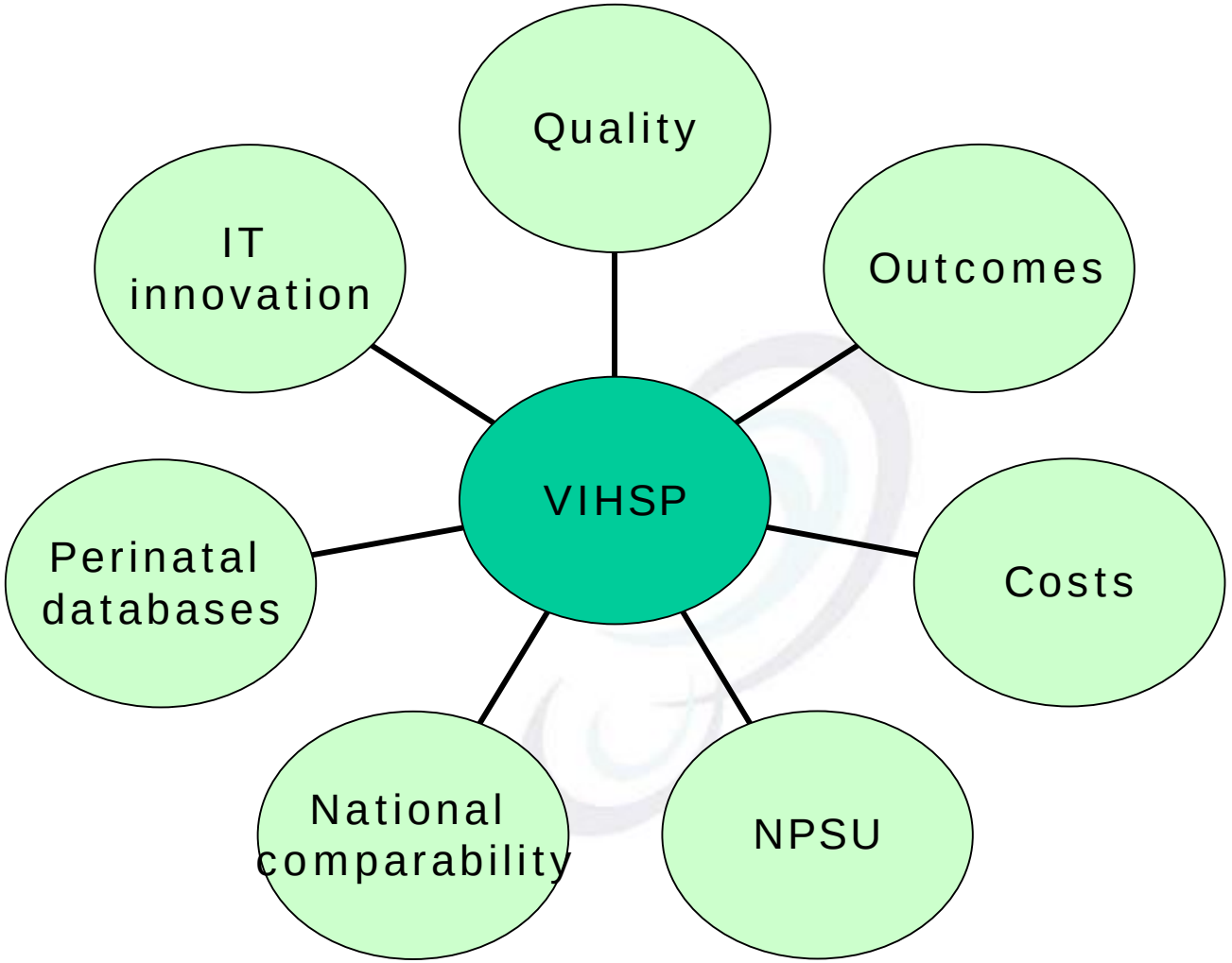
VIHSP

Parallel research activities

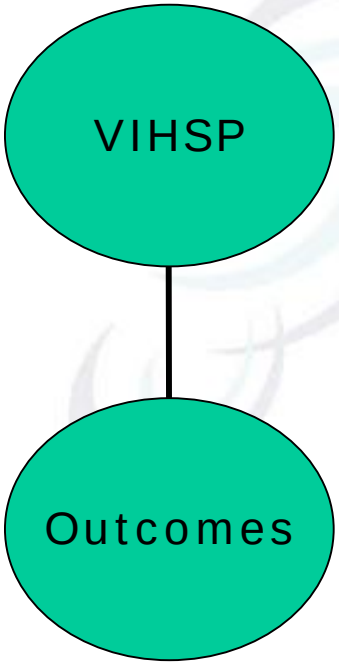
- Quality
  - Population program evaluation
  - Impact of false positive referrals (risk factor, distraction test)
  - Evaluations of VIHSP modifications (risk factor, VicNIC)
  - Screening parameters at *population* level
- Epidemiology
  - Congenital hearing loss (prevalence, characteristics)
  - Slight/mild hearing loss (prevalence, genetics, outcomes)
- Outcomes: Children with Hearing Impairment in Victoria Study (CHIVOS)
  - Predictors of population outcomes
  - Multi-wave longitudinal study, commenced before UNHS
  - Diagnosis; 7-8 years; 12-13 years

VIHSP

Vision for the future



Vision for the future



Outcomes

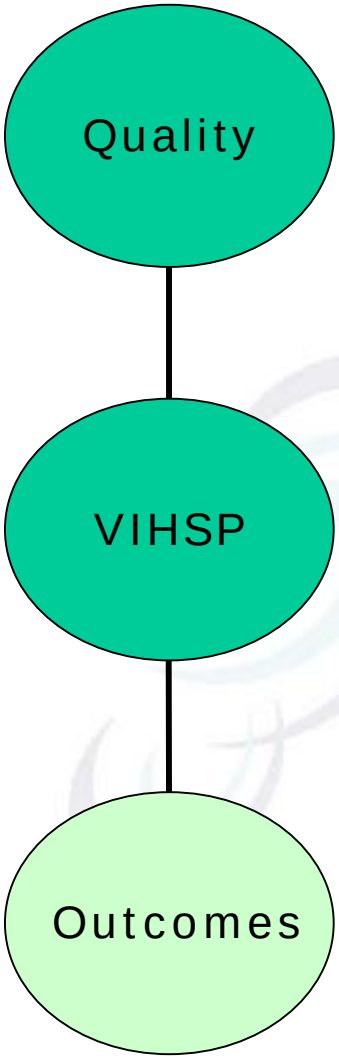
1, 2, 3 years:

- Speech & language
- Health-related quality of life
- Parent outcomes

Comparative developmental data for hearing children

- ELVS (Early Language in Victoria Study)
  - 1900 infants recruited vis MCH nurse aged 8mth
  - Rich source of normative data at 1, 2, 3 & 4 years
- Longitudinal Study of Australian Children
  - 5000 infants, 5000 4 year olds – seen bi-ennially
  - Limited measures of vocabulary and language
  - Health-service utilisation (Medicare, PBS)

Vision for the future

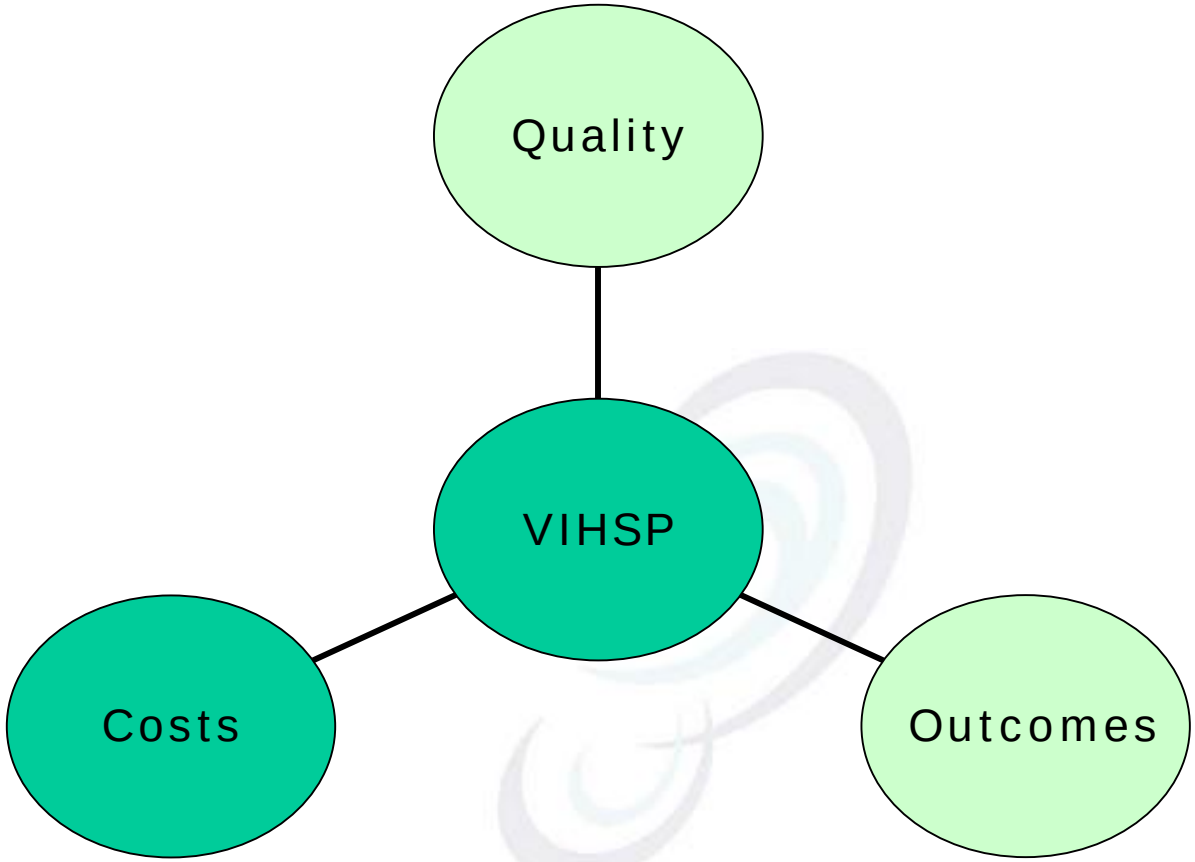


Quality

- Tracking and management
- Benchmarks (JCIH 2000)
  - Capture rates >95%
  - Refer rates <4%
  - >95% audiological follow up of refer results
- Quality indicators
  - 1-3-6 (months at screen, diagnosis, EI)
  - % screened during inpatient admission
  - Detection rate ~1 per 1000
  - Refusal rate (0.5%)

VIHSP

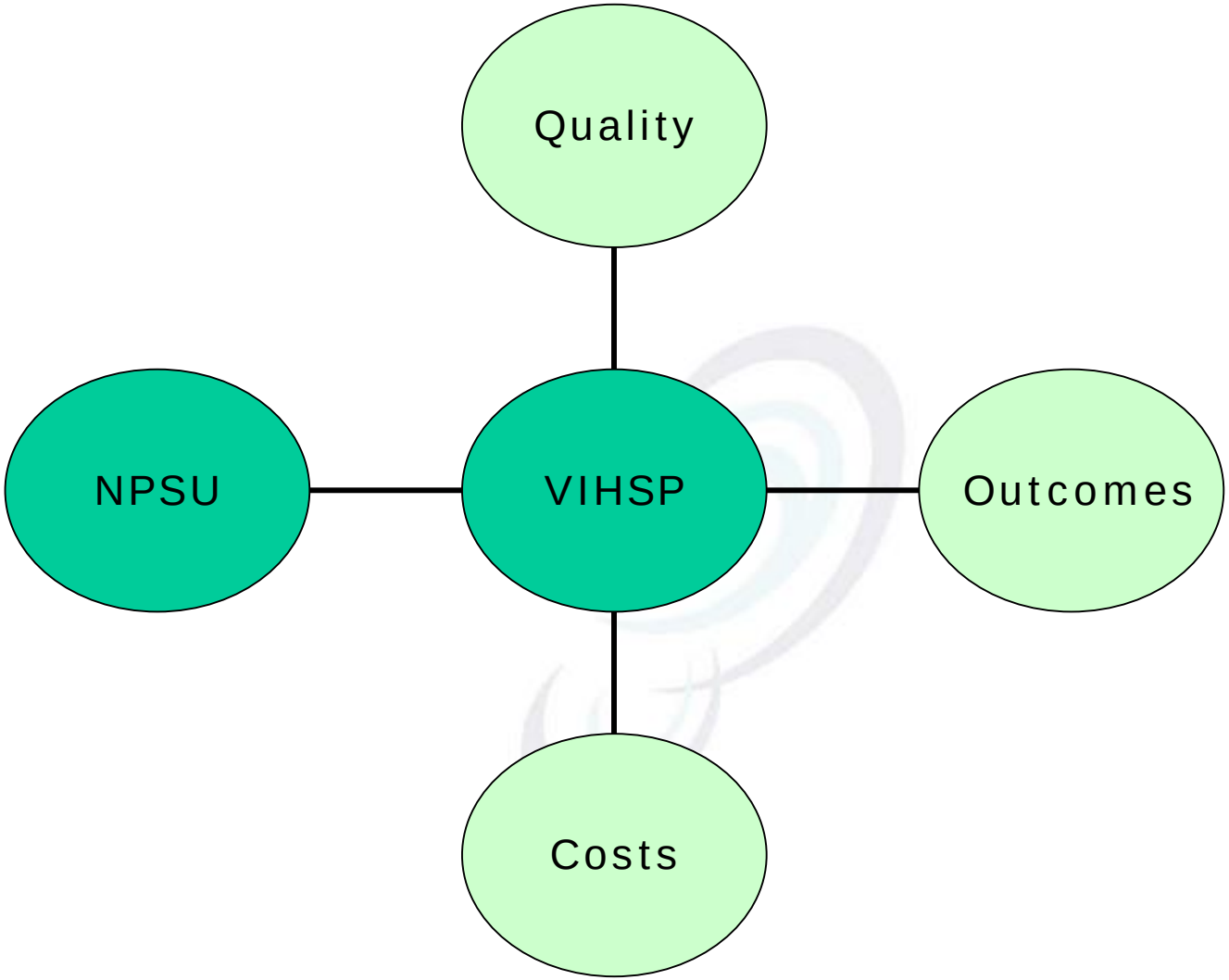
Vision for the future



Costs

- 1, 2, 3 years:
  - General health-service utilisation (Medicare, PBS)
  - Service-reported costs (eg aids, early intervention)
  - Parent-reported
    - out-of-pocket expenses
    - travel
    - time
- Health system and societal perspectives
- On our wish list!!

Vision for the future

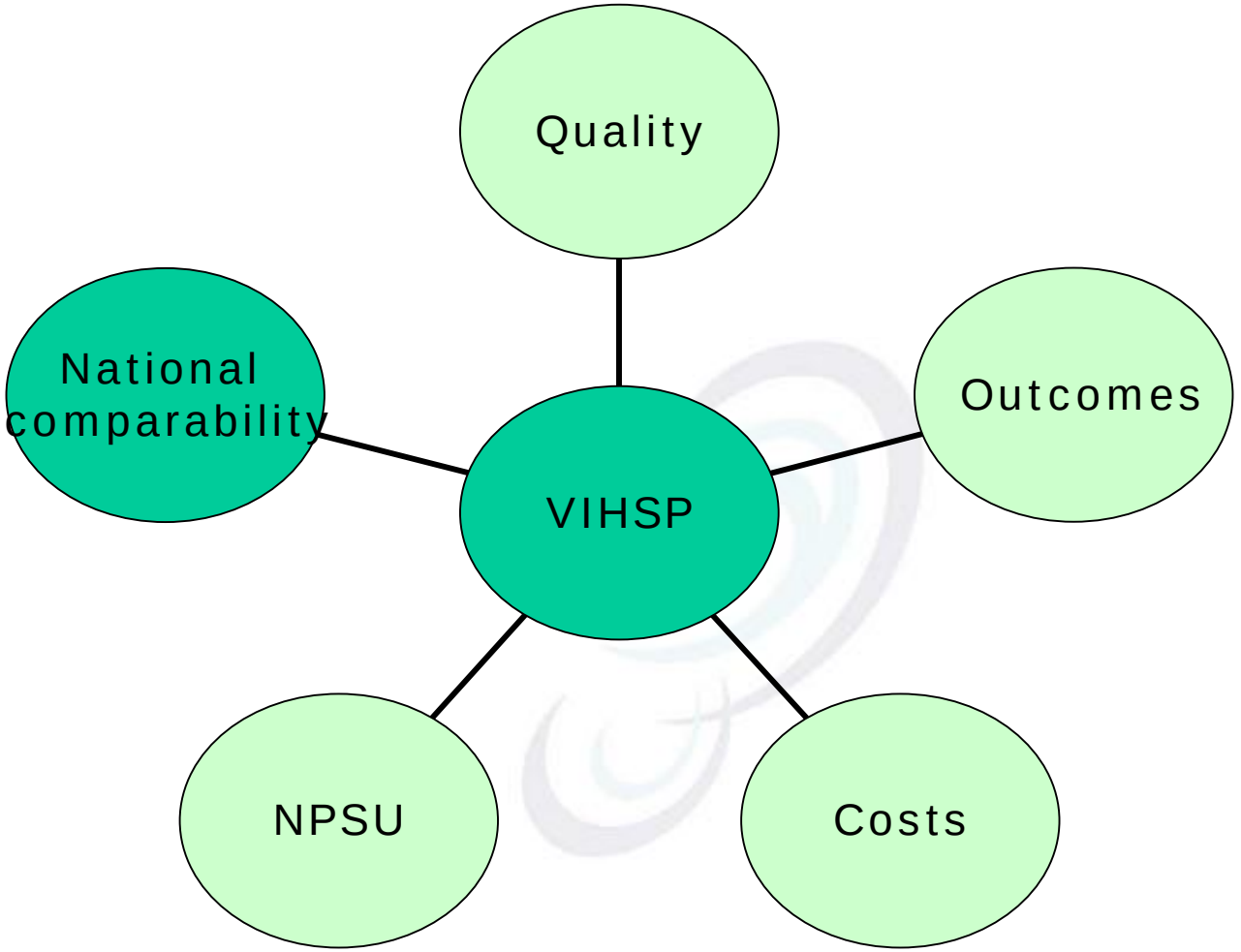


National Perinatal Statistics Unit (NPSU)

- Monitors/interprets national data in perinatal morbidity
- Each state contributes data from perinatal database
- Publications based on all births in Australia, including major congenital malformations
- Potential coordinator for national newborn hearing screening statistics

VIHSP

Vision for the future

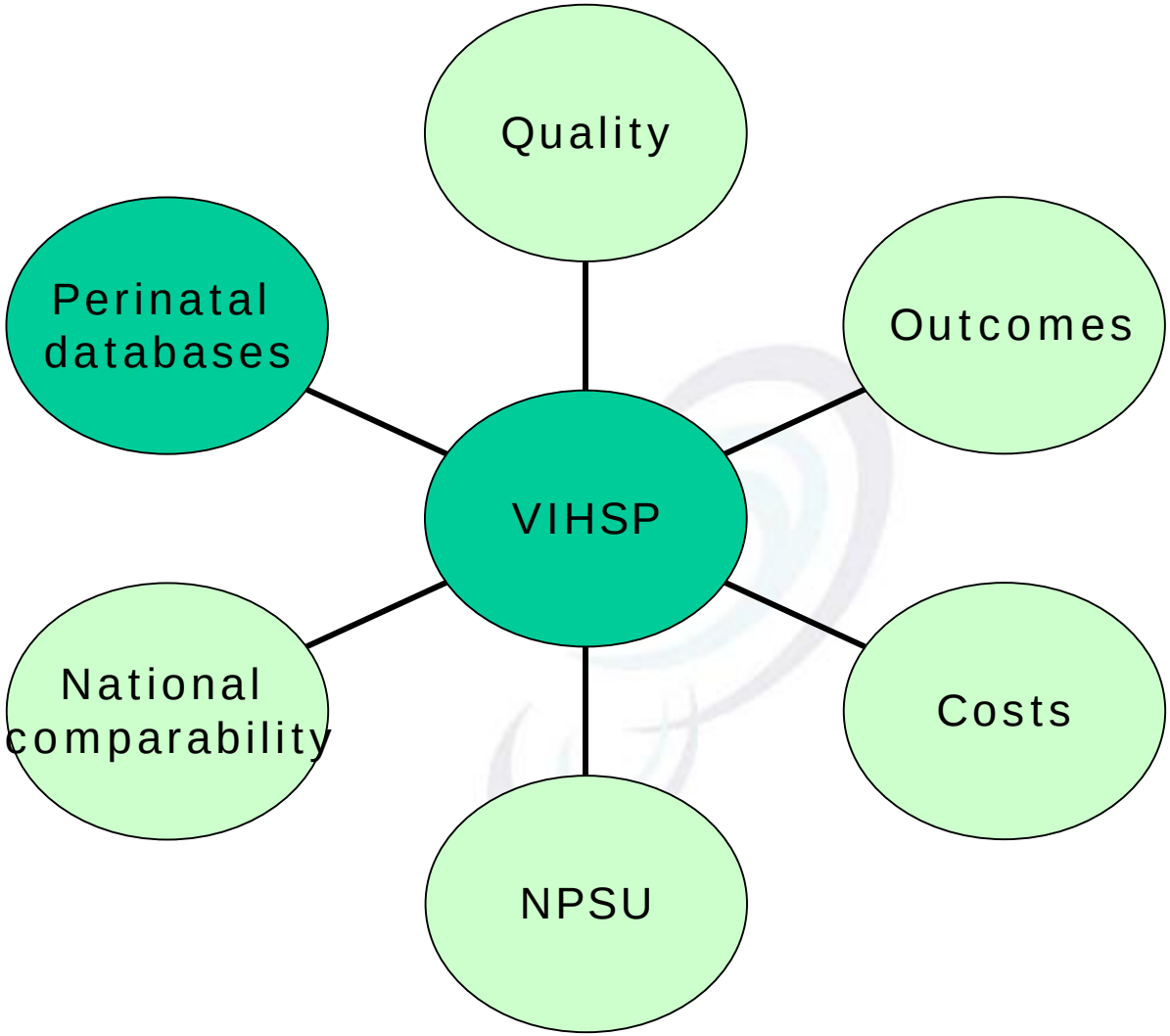


National comparability

- National (?Australasian – including NZ)
  - National Newborn Hearing Screening Committee
  - national benchmarks and quality initiatives
  - formalise information-sharing
- Australasia has several superb examples of national networks (eg ANZ Neonatal Network)
  - contribute audit data
  - quality improvement activities
  - systematic review/research

VIHSP

Vision for the future

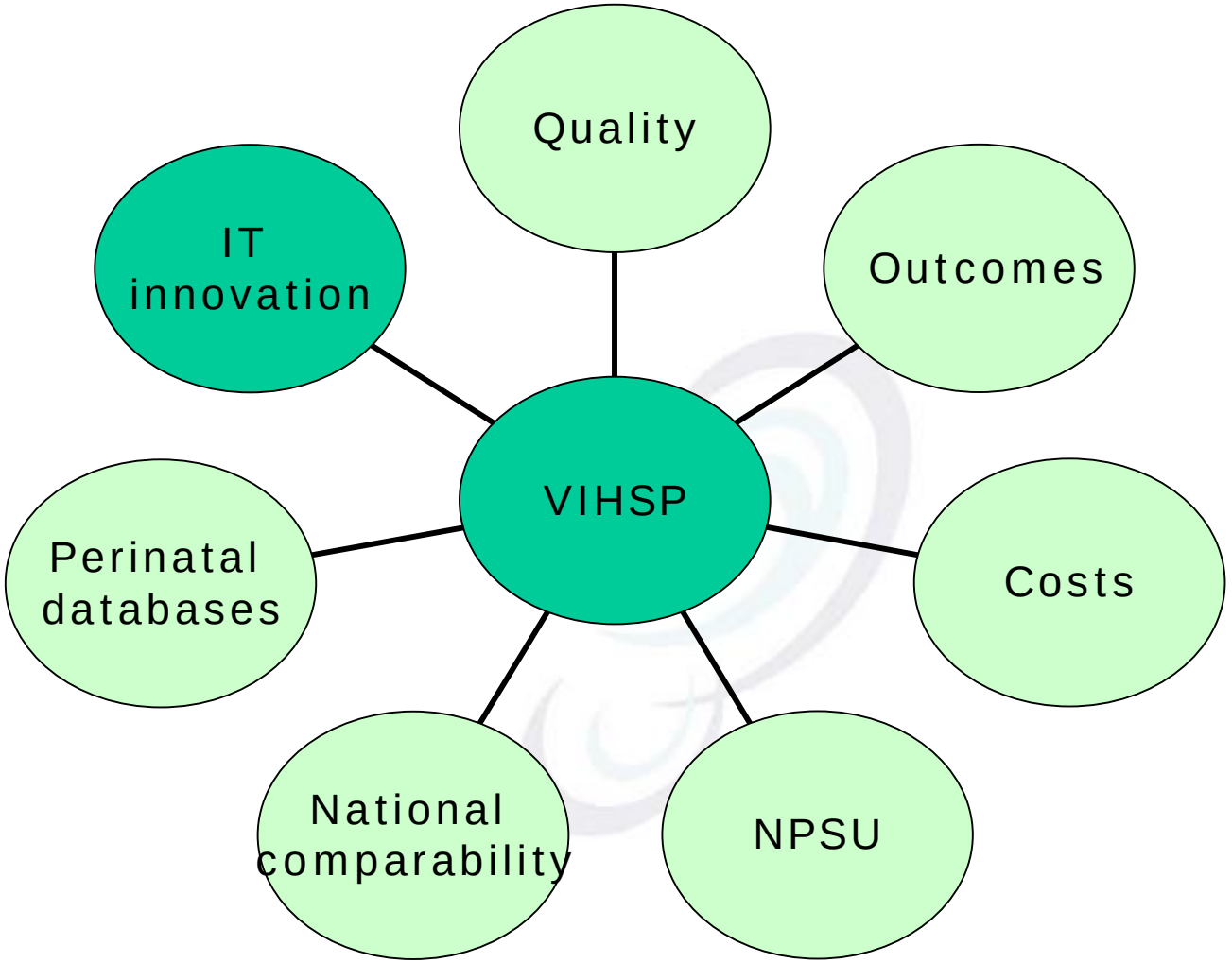


Other databases

- Victorian Perinatal Database
  - Data received for nearly 100% of infants
  - Strongly supports data linkage
  - Rich source of ante & perinatal data (risk factors)
- Victorian Birth Defects Register
  - Must notify all defects detected by age 1 yr (planning to change to 2 yr)
- Australian Hearing
  - Prospective national database from time of diagnosis of hearing loss requiring amplification

VIHSP

Vision for the future



IT innovation

- Using Oz eSP to full functionality
- Value magnified through capacity for data linkage

VIHSP

Further information

- VIHSP @ WRHS

  Chris Fulton WRHS Obstetric Unit 6051-7251 or 6051 7255

  Carol Matthews Mercy Hospital for Women (03) 8458 4684 cmatthews@mercy.com.au

- VIHSP Area Coordinators

  Royal Women's Hospital - Bernie McCudden (03) 9344 3323

  Mercy Hospital for Women - Carol Matthews (03) 8458 4684

  Monash Medical Centre - Elizabeth Stewart (03) 9594 5415

- VIHSP Central Office phone: (03) 9345 4941
- VIHSP email: email.vihsp@rch.org.au
- VIHSP website: www.vihsp.org.au

VIHSP

Acknowledgements

- VIHSP team
- Victorian government
  - Acute Health (Dr Mary Turner)
  - Public Health
  - Office for Children
- Prof Richard Dowell & the School of Audiology
- Australian Hearing
- Victorian State Working Party
- M&CH service
- Victorian audiologists
- Centre for Community Child Health
- The Royal Children's Hospital & participating hospitals

VIHSP

Resources

- www.rch.org.au/VIHSP
- www.Vicdeaf.com.au
- www.deafchildrenaustralia.org.au
- www.betterhearing.org
- www.aussiedeafkids.com (Parent support)
- www.hearing.com.au (Australian Hearing)
- www.cochlear.com.au (Cochlear Implant)

VIHSP