Early Detection of Health and Developmental Problems in Young Children

Newborn Hearing Screening in Victoria

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What is screening?

- "…a strategy used in a population to detect a disease in individuals without signs or symptoms of that disease."
- "The intention of screening is to identify disease in a community early…"

http://en.wikipedia.org/wiki/Screening_(medicine)
Accessed March 7 2010

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Screening matrix

		SCREEN RESULT	
		POSITIVE	NEGATIVE
DIAGNOS-TIC RESULT	POSITIVE	True Positive "Hit"	False Negative "Miss"
	NEGATIVE	False Positive	True Negative

A 'positive' screening test = increased likelihood of having the condition; further investigation required to determine whether disease or condition is present.

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Evaluating screening tests

Property	Evaluation	
True positive rate	higher = better	
True negative rate	higher = better	
False positive rate	lower = better	
False negative rate	lower = better	
Sensitivity	higher = better	actual positives who get a positive screen result
Specificity	higher = better	actual negatives who get a negative screen result

All screening tests can do harm – overdiagnosis, false sense of security

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Principles of Early Disease Detection

(WHO, 1968)

Condition
- The condition should be an important health problem.
- There should be a recognisable latent or early symptomatic stage.
- The natural history of the condition, including development from latent to declared disease should be adequately understood.

Test
- There should be a suitable test or examination.
- The test should be acceptable to the population.

Treatment
- There should be an accepted treatment for patients with recognised disease.

Screening Program
- There should be an agreed policy on whom to treat as patients.
- Facilities for diagnosis and treatment should be available.
- The cost of case-findings (including diagnosis and treatment of patients diagnosed) should be economically balanced in relation to possible expenditure on medical care as a whole.
- Case-findings should be a continuing process and not a 'once and for all' project.

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Principles & characteristics of screening

- screening test should be acceptable to the population
- follow-up must be available after a positive result on a screen (i.e. diagnostic services)
- there must be an agreed policy on who to treat
- condition being screened for should be an important health problem
- a screening test is not diagnostic: it is designed to identify those who are AT HIGHER RISK
- all screening tests will have a certain number of false positives and false negatives

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Why screen for hearing loss in newborns?

Importance of Early Identification

- Deafness, without screening, is detected late
- Hearing impairment has no visual indicators
- The most important period for speech and language development is 0-6 months of age ("critical period")
- The average age of identification in the absence of screening is over 12 months of age – i.e. **too late**

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Options for hearing screening of newborns

1. targeted screening of children who are born with risk factors for hearing impairment, or
2. universal screening of all newborns

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Why universal newborn hearing screening for newborns?

- At risk testing only picks up 50% of cases of permanent congenital hearing impairment (PCHI) at most
- Technology is available to screen neonates universally; quick, easy, painless
- Diagnosis, early intervention and support services are available
- Potential to relieve enormous burden of disability caused by
  - language delays and deficits
  - academic delays and disadvantages
  - social impairments
  - economic disadvantages (i.e. vocational)

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Congenital Hearing Loss - background

- 0.9 – 1.3 per 1000 births: congenital, bilateral, moderate or greater degree*
- 0.6 – 1.0 per 1000 births: unilateral or mild hearing loss
- Evidence base that UNHS leads to reduced age at diagnosis & commencement of intervention post diagnosis

* "target condition" of UNHS

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International and interstate

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

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NHS Nationally

State/ Territ'y	Screening protocol	State population coverage	Identification rate per thousand (bilateral hearing impairment)
Vic	Double AABR	Currently 64% 100% end 2010	1.1
NSW	Double AABR	>95%	1.12
Qld	Double AABR	98.7%	1.37
TAS	Double AABR	Approx. 94%	2
NT	Double AABR	>97% @ RDH	
ACT	Triple AABR	>97%	1.4
SA	Double TEOAE, AABR	97%	0.8
WA	TEOAE, AABR	46% +	0.9

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Joint Committee on Infant Hearing (2000 & 2007)

Benchmarks for key components of the UNHS/EHDI process

Age (months)	Benchmark
1	Screen by 1 month of age
3	Diagnostic audiological evaluation by 3 months for infants at risk
6	Enrolment of infants with HI into early intervention by 6 months

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VIHSP – at CCCH since 1992

- risk-status ascertainment
- behavioural screening via distraction test (7-9m)

Both of these groups referred for diagnostic audiology assessment

VicNIC 2003 – 2005 (CCCH)

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

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VIHSP UNHS Expansion Schedule

2005-2007	7 hospitals 30% of Vic births
2008	+ all remaining public metro hospitals 57% of Vic births
2009-10	+ all regional hospitals 80% of Vic births
2010	+ all remaining metro private hospitals & home births 100% of Vic births

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VIHSP 2005 - 2010

Year	% of population risk factor screening	% of population universal screening	Expected number referred	Expected number diagnosed	Referrals: diagnoses ratio
Pre 2005	100%	0%	3500	70	50:1
2005 (Phase 1)	70%	30%	2660	70	38:1
2008 (Phase 2)	43%	57%	1904	70	27:1
2009-10 (Phase 3)	20%	80%	1260	70	18:1
2010 (Phase 4)	0%	100%	700	70	10:1

Based on a 70,000 pa birth rate, 5% refer rate from RF program, and 1% refer rate from NHS

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The VIHSP Newborn Hearing Screen

A hearing screen is one of the routine health checks babies have soon after birth. This is a quick and simple way to check the hearing of newborn infants.

Parents are given an information brochure '**Your baby's hearing screen'** during one of their antenatal visits.

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Generally, the hearing screen will be done whilst mum and baby are still in in hospital.

A hearing screener will do the screen at the bedside.

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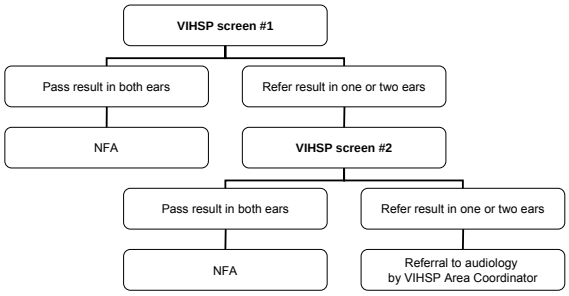
The screen is quick and painless.

Most babies are not unsettled by the screen and most stay asleep in their cots whilst the screen is being carried out.

The hearing screen can be done whilst a parent is cuddling their baby, or while a baby is being fed.

The screener gives the results of the screen straight away.

The VIHSP NHS Process



How we are performing

For Sep – Dec 2009

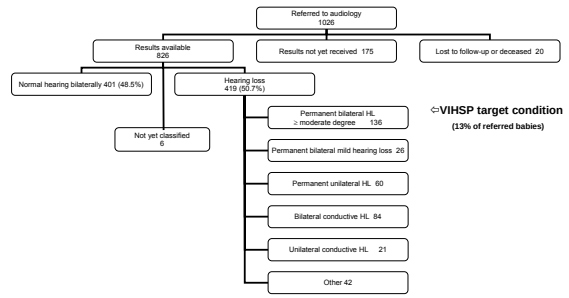
	Births	Eligible	Declined[a]	Missed (lost contact)[a]	Screened (total)[a]	Screened as an intpatient [b]	Passed Screen[b]
n	**11,633**	**11,547**	**60**	**36**	**11,318**	**10,422**	**11,215**
%			**0.5%**	**0.3%**	**98%**	**92.1%**	**99.1%**
Target	--	--	--	--	**>95%**	--	**<4%**

[a] Percentages based on number of eligible babies
[b] Percentages based on number of screened babies

In the period Feb 28th 2005 to Feb 28th 2010:

Number of infants screened by VIHSP: 127,000
Number of infants referred for diagnostic assessment: 1026
Refer rate: 0.8%

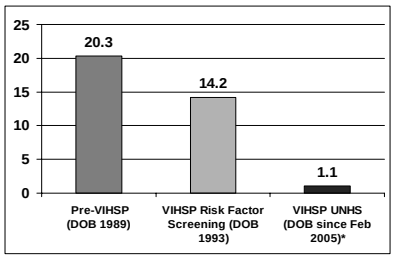
Diagnostic results for VIHSP referred infants



Figures from Feb 28 2005 to Feb 28 2010

Current detection rate: 1.07 per thousand

Median Age at Diagnosis (in months) – Victoria



*for those children exposed to VIHSP UNHS

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New initiatives

- **Family Support services post-screen**
  - currently being established statewide; some services already available
- **Online resources for professionals**
  - focus on post-diagnosis period; information on hearing loss, diagnostic process, intervention aims and options, supporting parents

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Recent achievements: NHS on the "radar"

- **Media Release** from the Office of the Prime Minister, 29 June 2009:
  Hearing Screening for all Australian Babies
  > "The Australian Government will seek a commitment from States and Territories to deliver newborn Hearing Screening for all Australian babies from 1 January 2011".
- Inclusion of Neonatal Hearing Screening for first time in ***A Picture of Australia's Children 2009*** (AIHW)
- **Neonatal Hearing Screening Working Group** established (by Screening Subcommittee of the Australian Population Health Development Principle Committee)

i.e. UNHS now a **federal** interest with **national** approach

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Challenges and Opportunities

The screening pathway: cross agency and cross-sector

	DH	DEECD	LGA	Hospi-tals	Pvt Sctr/ Philan-thropic	Federal
Screening	✓			✓		
Family Support	✓	✓	✓		✓	
Diagnosis	✓			✓	✓	
Targeted surveillance		✓	✓			
Habilitation/ intervention		✓				✓

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Future endeavours

- Evidence base for effectiveness of NHS in promoting language development
  - currently lacking (Wolff et al 2010); SCOUT project nearing completion
- Common assessment tools for outcome tracking and evaluation
  - Statewide? Across conditions? National? International?
- Standards, benchmarks, common reporting framework
  - Neonatal Hearing Screening Working Group
    - minimum standards for screening & post-screening
    - national quality and reporting framework
    - national approach to data collection/data sharing

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Thank you!

Further Information
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