Development and Implementation of the Dutch Hearing Screening tests

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National Hearing Test

- Aim: to develop a screening test by telephone
- Project started around 1998
- Test launched January 2003 (Dutch Hearing Foundation)
- Theo Kapteyn, Tammo Houtgast, Cas Smits
Screening for hearing loss for speech in noise

- Why?
- How?
- Does it work?
- Experiences in the Netherlands
Screening for hearing loss – Why?

Hearing loss is very common but often underdiagnosed and undertreated
- 43% of the adults >60 yrs have a significant hearing loss for speech in noise
- Only 22% of them have hearing aids

*Smits et al. Ear and Hearing (2006)*
Screening for hearing loss – How?

- There is a real need for a screening test
- But how?
- Two general principles:
  - Questionnaires
  - Functional tests
Questionnaires

- Easy, simple, inexpensive, short
- Sensitive? Specific?
- Tendency to underestimate hearing loss, especially in the elderly
- Subgroup of subjects who scored ‘good’ on a short questionnaire

- People who think they don’t have a hearing loss are often wrong!

Screening for hearing loss – How?

- Probably a functional test (by telephone) is a better option than a questionnaire
- A pure-tone test (detection of the hearing threshold) has numerous practical limitations
- Equipment is less critical for a speech-in-noise test
Speech-in-noise test

- Measures the ability to understand speech in noise
- Listeners listen to speech and noise and have to repeat the speech (often sentences)
- The important parameter is the signal-to-noise ratio
- Absolute level is not so critical
Speech-in-noise test


- New screening test (Smits et al., 2004): digit-triplets in noise (e.g. 4 2 8). Delivered by telephone
  - Lists of 23 digit-triplets
  - Adaptive procedure
  - Response is given on the telephone keypad
Validation of the screening-test

- Compare results of the digit-triplet test (telephone) to results of the sentence test (headphones)
- $R = 0.87$
- High sensitivity and high specificity

*Smits et al. Int. J. Audiology (2004)*
Cutoff values based on the sentence test (approx. mean $+2\sigma$)

The National Hearing Test

- Launched January 2003
- Lots of media attention (awareness!)
- 65,000 callers in the first 4 months
- The appropriate population is reached (telephone)

- October 2004: Launch of the internet version of the National Hearing test
Age distribution

![Age distribution graph](image)

- **telephone**
- **internet**

<table>
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<th>Age-group</th>
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Age distribution
Do listeners follow the advice?

- Evaluation of the National Hearing Test by telephone
- Questionnaires send to 2524 participants
- Analyses of 881 questionnaires
The hearing-status category

- good
- insufficient
- poor

GP
hearing aid dispenser
ENT-specialist
Audiological Center
no initiative

Workshop Hearing Screening and Technology, Brussels 28 January 2009

Netherlands

HearCom: UK, Germany, France, Sweden, Poland, Greece

USA

Australia
Conclusions

- Digit-triplet speech-in-noise test is a valid tool (sensitive, specific)
- Administered by telephone (easy, short, inexpensive)
- National Hearing Test is very successful
- 40 to 50 % follow the recommendation
- Test is rolled out (HearCom, US,...)
Thank you for your attention!