Age-Related Hearing Loss: Research → Clinical Practice

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DISCLOSURE STATEMENT

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LEARNER OBJECTIVES

1. Define Age-Related Hearing Loss (ARHL)
2. Identify 5 medical risk factors for ARHL; describe the supporting research per risk factor
3. Identify 3 lifestyle risk factors for ARHL; describe the supporting research per risk factor
4. Describe 4 strategies to promote hearing health
5. Produce and modify case history form with new information learned.
6. Design 3 ways to modify your clinical practice.
OUTLINE OF PRESENTATION

1) Age-Related Hearing Loss (ARHL)
   - Definition, Prevalence, Rationale for Services
2) Federal and professional mandates/guidelines - elder care
3) Risk Factors for ARHL
   - Discuss risk factors individually – research findings
   - Clinical implications - assessment & management of HL
4) Framework for promoting hearing health
5) Clinical strategies in audiologic clinical service
   - Include risk factor analysis

AGING & AGE-RELATED HEARING LOSS

Aging is a natural, biologic process that results in global changes within a species as time advances.
   - "Older adult" = persons over 65 years of age

Not disease, which is:
   - Process including abnormal changes and pathology
   - Significant decrements in functional skills

Aging is universal, predictable, and follows a natural evolution and maturation

ARHL = broad and modern term
   - Hearing loss associated with growing older
   - Includes cochlear degeneration

Influenced by intrinsic and extrinsic factors, e.g.,
   - Cardiovascular disease
   - Diabetes
   - Noise exposure
   - Poverty

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Prevalence of Hearing Impairment

- 90% for adults over the age of 80 years
- 31%-46% of adults, mean age = 68 years
- 53% of baby boomers reported mild hearing loss
- Rate of HL increased starting at 40-50 years of age - specific freqs

WORLD HEALTH ORGANIZATION (WHO)
ESTIMATES OF DISABLING HEARING LOSS, 2012

- 360 million people have disabling hearing loss (DHL)
  - 91% are adults
  - Males - 56%
  - Females - 44%

The prevalence of DHL is greatest in adults over 65 years:
- And is highest in South Asia, Asia Pacific, and Sub-Saharan Africa

HEALTHY PEOPLE 2020:
OBJECTIVES FOR OLDER ADULTS

HP - US federal initiative implemented with goals for a 10-year period
- to better serve the overall health of the population by preventing disease and promoting health

OA-2 states:
- “Increase the proportion of older adults who are up to date on a core set of clinical preventive services”

OA-4 and OA-6:
- “Increase proportion of adults with reduced physical or cognitive function who engage in leisure time physical activities”
ARHL: Research to Clinical Practice
SHAA Convention 2018

**INTRINSIC RISK FOR ARHL**

ARHL is more than just hereditary factors:
- Comorbidities
  - Chronic conditions

**CARDIOVASCULAR DISEASE (CVD)**

Compromises blood supply to cochlea

Relation of HL & 5 Risk Factors for CVD:
- Blood pressure & hypertension
- Serum total cholesterol, triglyceride, & lipoprotein levels
- Diabetes mellitus
- Smoking
- Overweight: BMI > 25 is risk factor for CVD

Friedland et al., (2009) found a significant association between:
- LF HL and CVD risk factors
- LF presbycusis and intracranial vascular pathology
- Peripheral vascular disease, coronary artery disease, history myocardial infarction

Patients with LF HL are at greater risk for cardiovascular events and should be informed.

**DIABETES MELLITUS**

<table>
<thead>
<tr>
<th>Prevalence:</th>
<th>Diabetic</th>
<th>Non-Diabetic</th>
</tr>
</thead>
<tbody>
<tr>
<td>of hearing loss (HL) overall</td>
<td>16%</td>
<td>4%</td>
</tr>
<tr>
<td>of mild or greater HL in poorer ear (low/mid freq)</td>
<td>21.3%</td>
<td>9.4%</td>
</tr>
<tr>
<td>of mild or greater HL in poorer ear (high freq)</td>
<td>54.1%</td>
<td>32%</td>
</tr>
</tbody>
</table>

Bainbridge et al., 2008
DIABETES

Progression of HL:
70% in diabetics vs.
48% in non-diabetics
(Mitchell et al., 2009)

[NHANES 1999-2002 data]
- Increased odds of hearing loss: OR=2.0
- Worse thresholds at
  500-1000 Hz and 3-8 kHz
- No age effect

Agrawal et al. (2009)

HYPERTENSION & VISION IMPAIRMENT

- Patients with hypertension have greater increase in hearing threshold versus those without hypertension
- Hearing loss prevalence increased with more severe HPT: 40% in Grade 2 and 54% in Grade 3 patients with HPT.

(Agrawal et al., 2013)

- Blindness in one eye: 18% of adults > 70 years
- Dual sensory impairments (hearing & vision): 8.6%
- 16.6% in adults >80 yrs
- Greater difficulty with ambulating, preparing meals, and going outside
- Decreased socialization:
  - 63% vs. 74% in those without sensory loss
  - One consequence: Higher mortality in women
(Crow & Campbell, 2004; Lee, 2007)

COGNITIVE STATUS/ABILITY

The poorer the score on test of mental status, the greater the likelihood of HL in older adults.
- (Helzner et al., 2005)

Age was moderately correlated with cognitive functions in German older adults
- Cognitive Tests Included functions related to:
  - memory, speed of processing, reasoning, knowledge
(Lindenberger & Baltes, 1994)
DEMENTIA

Senile Dementia (SD)

- Syndrome that describes the pattern of symptoms that can result from different brain diseases
- SD is commonly caused by Alzheimer’s
- The incidence is 1.5% in 65+ and 50% in 80 yr

HL & Dementia explored - BLS:

- Baseline: no dementia; n=639
- after 12 yrs: N=58 had dementia; 37 due to AD
- Pts with HL - greater risk for dementia
- Risk of Incident Dementia by baseline hearing >25 dB HL increased with more severe hearing loss
- Corroborates previous research
- Patients with dementia had more significant HL

(Tin et al, 2011)

TINNITUS

In study of older adults,
Incidence of Tinnitus:

- 5.7% at year 5
- > in men than women
- 12% at year 10
- 37% at baseline had tinnitus (self report)
- Incidence decreased with age - only 18% at year 5 testing
- (Gopinath et al, 2010)

EXTRINSIC RISK FACTORS

FOR ARHL

- Lifestyle Choices
- Medications
- Other Factors
SMOKING

Relation between HL and smoking

Heavy smokers
• >1 pack/ day
• Increased odds of hearing loss (OR=1.5)
• 4-5 dB poorer hearing level than nonsmokers at 4000-8000 Hz

Secondhand Smoke
Those living with a smoker are more likely to have HL.

Self reported (SR) hearing difficulty was greater in baby boomer smokers (37.5%) and young smokers (18%) vs. nonsmokers.

Specificity of SR:
• poorer/lower in BBS (67%) vs. BBNS (92%)

SMOKING – EVOKED POTENTIAL FINDINGS

The Auditory Middle Latency Response (AMLR) and acute smoking effects

Higher AMLR amplitude after smoking a cigarette (acute condition) vs. nonsmokers.

ALCOHOL ALONE + ALCOHOL AND SMOKING

Moderate alcohol intake
• inversely correlated w/ hearing loss

Successful aging predictors
• Absence of HL based on self-reported hearing as:
  • good, fair, poor, deaf
• Moderate alcohol consumption, i.e. 4-30 oz (120-900 ml) per month versus never or greater amounts
• Increased odds of successful aging

Combined Alcohol & Smoking
• Nonsmokers with moderate alcohol use less likely to have hearing loss (p = 0.03)
• Those with <2 drinks/day had reduced likelihood for severe HL
• Interaction between smoking and moderate alcohol use on hearing loss
  • not significant (p = 0.73)
• Additive effects of smoking and alcohol on HL prevalence
• Drinkers (smokers & nonsmokers)
  • more likely to have hearing loss than non-drinkers

Fransen et al., 2008; (Snowbridge et al., 1996) (Coupinoth et al., 2010)
Exercise & Fitness

- Exercise impacts cognitive abilities in people 55+ years
- Increased physical activity benefits women, esp. on HRT > men
- Interaction of fitness with age
- Declines in the brain gray and white matter with age, reduced in adults with cardiovascular fitness

Medications

Vitamins/Nutrition

- Aldosterone- hormone (Robert D. Frisina)
  - Levels decrease with age
  - Influences potassium levels in inner ear
  - Inner ear is especially sensitive to any disruption in potassium levels
- Folic Acid- B vitamin (Durga et al., 2007)
  - Supplement slowed the decline in hearing of the speech frequencies in older adults

Ototoxicity

- Partial list of ototoxic medications
  - salicylates, NSAIDs, antibiotics, loop diuretics, quinine, chemo meds, cardiac and hypertensive meds
- Ototoxic medication accelerates ARHL (Ison, et al., 2010)
- Loop diuretics – tinnitus
- Quinine and Aspirin in large quantities
  - Temporary SNHL
- Progestin in HRT – poorer auditory function in women

NIHL & Interaction with Other Factors

- Noise interacts with age, ethnicity, gender, smoking, and education level to impact incidence of ARHL
- Black males had significantly better HF hearing vs. white males
  - but significantly poorer LF hearing
- Race was an important influence on hearing thresholds for both groups
- Race was significant in determining susceptibility to NIHL and ARHL

Strass et al., 2013
**ACTIVITY #1**

The color paper in front of you corresponds to the Medical Comorbidity and Lifestyle Choice listed below. Create 5 potential questions about this comorbidity and 5 questions about this lifestyle choice that could be included on a questionnaire targeted for older adults.

- Cardiovascular disease; Smoking
- Diabetes Mellitus; Exercise
- High Diastolic Pressure (Hypertension); Noise Exposure
- Cognitive dysfunction; Vitamins and Nutrition
- Tinnitus; Alcohol Consumption

**OTHER EXTRANSC CONSIDERATIONS**

**Economic status**

In adults 65 years and older, disabling hearing loss prevalence decreases exponentially as income increases (WHO, 2012)

- 22% of married SS recipients and 47% of single recipients aged 65+ depend on SS for 90% or more of their income

(National Council on Aging via SSA)

Average SS income = $433/month (SSA)

**Health literacy and access to healthcare**

- Findings of National Assessment of Adult Literacy (NAAL) survey in 2003: (cited in Riggs et al., 2016)
  - 36% of adults had only basic or below basic health literacy (BHL)
  - "skills necessary to perform simple and everyday literacy activities."
- Adults 65 and older - lower average health literacy vs. younger adults
- Adults aged 60 years and older:
  - 71% have difficulty using print materials,
  - 80% have difficulty using documents such as forms or charts,
  - 68% have difficulty interpreting numbers and performing calculations.
- Estimates suggest 2/3 older adults are not able to understand information received about their prescription medications.
OTHER EXTRINSIC CONSIDERATIONS

Federal and State Policies

- One objective of Healthy People 2020 is to increase the access to health care services

- 3 barriers for lack of access to healthcare:
  1. Lack of availability
  2. Cost
  3. Lack of insurance coverage

HEARING HEALTH PROMOTION

- Framework
- Clinical Strategies

APPROACH TO HEARING HEALTH CARE FOR OLDER ADULTS

1. Demographic Factors
2. Disease and disability
3. Cognitive abilities
4. Medications and health-related devices (includes vitamins & supplements)
5. Lifestyle choices
6. Environmental risks e.g., noise exposure, chemicals, water

Need comprehensive assessment
### APPROACH TO HEARING HEALTH CARE FOR OLDER ADULTS

Characteristics & Conditions related to hearing loss

1. Age
2. Race
3. Medical history
4. Ototoxic medications
5. Lifestyle factors
   - HL develops faster in men - early as 30 years
   - 3-4 kHz showed the largest gender difference

### HOW CAN HEARING HEALTH PROMOTION BE ACHIEVED?

Combine Activities from Categories
- Education
- Organization
  - Various levels
- Environmental
- Economic
  - Access to healthcare

Role of audiologists
- Develop and implement professional activities
  - based on categories
- Address specific factors linked to hearing loss
- Target specific areas...

### HEALTH PROMOTION STRATEGIES: EDUCATION

Goal
- to increase general knowledge in the community so that progression of hearing loss is slowed, prevented, or managed to best available current standards

Current patients and the local community at-large should:
- receive educational information about hearing function and how it interacts with chronic conditions, medications,
- Lifestyle choices impacting general health and hearing
HEALTH PROMOTION STRATEGIES: EDUCATION

Lectures/workshops
- local community venues
- Senior centers/retirement villages
- Local businesses/chambers of commerce

Flyers/pamphlets
- Info about hearing health
- Meds, lifestyle choices, noise exposure, etc.
- Develop your own or use AAA/ASHA

“Lunch and Learn”
- Raffle off hearing aids
- Ask local HA manufacturer representatives

HEALTH PROMOTION STRATEGIES: EDUCATION

- Continuing Education Lectures
  - Local physicians
  - Nurse practitioners
  - Geriatric specialists

- NOT the Whisper Test

- Self Report Measures
  - HHIE or other questionnaire

- Welch Allyn, Inc.
  - Audioscope 3

- Interdisciplinary Medical Outreach Events
  - Hearing Screening Day

HEALTH PROMOTION STRATEGIES: ORGANIZATIONS

Hearing loss organizations that promote hearing health for the aging population

- Local/Public e.g.,
  - Rotary Club, Lions Club, Senior Centers
  - We can provide info on effective comm., leave handouts, give presentations, demonstrate hearing instrument care

- State
  - ALAA
  - Dept. of Rehab. Services
HEALTH PROMOTION STRATEGIES:
ORGANIZATIONS

National/Professional
- HLAA
- ASHA
- AAA
  - Provides useful and quick information on preventing and managing hearing loss

International
- WHO
  - Helps assist in developing hearing care programs integrated into the primary healthcare system
  - Provides international statistics on hearing loss

HEALTH PROMOTION STRATEGIES:
ENVIRONMENTAL

Excessive noise exposure
- Distribute hearing protection at presentations and local businesses
- OSHA/NIOSH recommendation handouts

Noise ordinances
- States, counties, and cities - own policies
- Advocate for legislation in your area

Smoking/Second-hand smoke exposure
- Environmental considerations
- Ordinances
- Community awareness

HEALTH PROMOTION STRATEGIES:
ECONOMIC

Multidisciplinary “Student Run Free Clinic” with a local college/university

Free Screenings
- Baseline information

Group Audioling Rehabilitation services
- Teach how to cope with their HL even if they can’t afford amplification devices
- Communication strategies
- Group Discussions

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HEALTH PROMOTION STRATEGIES: ECONOMIC

* Consider each patient’s social standing, economic background and current status, education level with a community’s access to healthcare professionals in order to improve a country’s commitment to addressing ARHL nationally.

* Lions Club
  * "Affordable Hearing Aid Project"
  * http://www.lcif.org/

* Starkey’s Hear Now program
  * Application-based program that provides help to low-income Americans
  * https://www.starkeyhearingfoundation.org/Hear-Now

ACTIVITY #2

Specific to your own community, develop/write down one Hearing Health event or strategy corresponding to each health promotion category below:

1. Education
2. Organizations
3. Environmental
4. Economic

Questions?
References


