Can You Hear Me?
The Relationship Between Diabetes, Hearing Loss and Depression

Joanne Rinker MS, RD, CDE, LDN
Diabetes Education Recognition Program Coordinator
NC Diabetes Prevention and Control Program, Raleigh, NC
Diabetes and Hearing Loss

- Top health concerns
- 26 Million with Diabetes, at 8.3% of the population (2012 data)
- 36 Million with Hearing Loss (~17%)
- NHANES 1999-2004: 65.5% of U.S. adults (age 20 and above) with diabetes had hearing impairment. Patients with diabetes are twice as likely to have hearing loss than those without diabetes.
- Hearing loss 30% higher in those with pre-diabetes.
Medical Conditions & Hearing Loss

- Diabetes
- Hypothyroidism
- Multiple Sclerosis
- Chronic Renal Disease
- Cardiovascular Disease
- Alport’s Syndrome
- Paget’s Disease
- Cogan’s Syndrome
- Other Medical conditions
Why Diabetes and Hearing Loss?

- Unknown complication
- 95% rarely or never refer patients for hearing screening
- 98% do not use any online screening tools
- 72% of diabetes educator are unaware of the relationship
- 61% willing to promote local hearing screenings
How?

• Extended periods of hyperglycemia causing problems in the auditory system.
• Microangiopathy-disease of the small blood vessels.
• Cochlear microangiopathy-thickening vessels of the cochlea.
How?

• High blood sugar causes tiny blood vessels in the inner ear to break, disrupting sound reception.

• Significant hearing differences were at all frequencies for Type 2 subjects, but for Type 1 subjects, differences were at 1,000 Hz and below, and 10,000 Hz and above

Vasculature of the Ear

Blood Vessels of the Inner Ear

Arteries of the Middle Ear
Other Affects on the Ear

• Nerve Fiber Loss

• Central auditory pathway demyelination and degeneration
Factors Affecting the Auditory System

- History of excess noise exposure
- Ototoxic medications: antibiotics (aminoglycoside), diuretics (Lasix, furosemide), salicylates (aspirin, acetaminophen), chemotherapy, quinine
- Otologic disease
- Diseases affecting central nervous system
- Diseases affecting cardiovascular system
  - CKD and hearing loss
Relationship Between Diabetes and Hearing Loss

Factors increasing risks of hearing loss for the diabetes patient.

- Age (>60 years of age increases the prevalence)
- Duration of diabetes
- Diabetes is associated with hearing loss and could aggravate the hearing loss related to age.
- Increased BM

Case Study

• Diabetes patient: Woman in mid-forties
• Complaints of low productivity at work
• Screening completed
• Hearing Aids
• New outlook on life!
  • Less paranoia
  • More social
  • Better work environment
Poll Question:
Who should do a hearing screening with the patient?

A. Provider
B. Educator
C. Audiologist
D. All of the above
Screenings

• Who? Any medical person in contact with the patient who can make a referral based on the screening results.

• What? Initial screenings. Simple questions

• How? Assessment, class, etc.

• When? ASAP
  • Screen Patient’s hearing when first identified with diabetes
  • Ongoing assessment of hearing levels at least once a year
<table>
<thead>
<tr>
<th>ITEM</th>
<th>YES (4 pts)</th>
<th>SOMETIMES (2 pts)</th>
<th>NO (0 pts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does a hearing problem cause you to feel embarrassed when you meet new people?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does a hearing problem cause you to feel frustrated when talking to members of your family?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you have difficulty hearing when someone speaks in a whisper?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you feel handicapped by a hearing problem?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does a hearing problem cause you difficulty when visiting friends, relatives, or neighbors?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does a hearing problem cause you to attend religious services less often than you would like?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does a hearing problem cause you to have arguments with family members?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does a hearing problem cause you difficulty when listening to TV or radio?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you feel that any difficulty with your hearing limits or hampers your personal or social life?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does a hearing problem cause you difficulty when in a restaurant with relatives or friends?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**RAW SCORE** (sum of the points assigned each of the items)

**INTERPRETING THE RAW SCORE**

0 to 8 = 13% probability of hearing impairment (no handicap/no referral)
10 to 24 = 50% probability of hearing impairment (mild-moderate handicap/refer)
26 to 40 = 84% probability of hearing impairment (severe handicap/refer)

Additional Screenings

• Providers can do a serum creatinine level too as an indirect indicator of how well a patient's diabetes is controlled.
• Increased creatinine levels correlates with increased hearing loss.

Effects of Untreated Hearing Loss

- Embarrassment, fatigue, irritability
- Tension/stress
- Avoidance of social activities
- Withdrawal from personal relationships
- Depression, negativism
- Danger to personal safety
- Social rejection by others
- Impaired memory and ability to learn new tasks
- Reduced job performance and earning power
- Diminished psychological and overall health

http://www.betterhearing.org/press/articles/pr_UntreatedConseq.cfm
Auditory Deprivation

- Inability to hear affects the brain
- Problems understanding speech which may be impossible to regain
- Hearing aids can help
Characteristics of Audiologist Visit

- Patient’s medical history and medications list.
- Discussion of otologic complications
- Consultation with referring primary or specialty care
- Reinforcement of team goals with diabetes educators
- Swift intervention for malignant otitis
Audiologists Testing

- Pure tone comprehensive audiogram
- Tympanogram
- Acoustic reflexes
Hearing in Children by Northern and Downs, fifth edition
Treatment For Hearing Loss

- Hearing devices
- Hearing implants
- Assistive listening devices, alerting devices, communication aids
- Medications (used only 10% of the time-steroids for temporary problems including infections)
- Counseling for hearing loss and depression (referral to psychologist)
- Medications for depression if needed (through primary care physician)
Hearing Aid Costs

• $1,800-$6,800 per pair
• Not covered by Medicare
• Exams with audiologists are covered by Medicare and private insurance companies, if ordered by the physician.
• Covered by some Medicaid plans in certain states
• Rhode Island plans required to include coverage for hearing aids for adults ($700 per hearing aid, per ear every 3 years) and children ($750).
• Connecticut, Delaware, Kentucky, Louisiana, Maryland, Minnesota, Missouri, New Jersey, New Mexico, and Oklahoma—require plans to pay hearing-aid costs for children.
• Other states have no mandate.
• BCBS Federal Employee program: $1,000 per ear plus batteries, every 3 years.
• Supplemental insurance varies.

Resources for Hearing Services

- American Academy of Audiology
- Better Hearing Institute www.betterhearing.org
- Easter Seals www.eastersealsucp.com
- Community Alternatives Program (CAP)
- Vocational Rehabilitation
- Hearing Impaired Services
- Mental Health Services
- Services for the Blind
- Medicaid pays for hearing aids in some states (FL for example)
- Lion’s Clubs
- VA Hospitals
Improved Hearing Leads To:

- Better family relationships and communication
- Less isolation and less prone to depression
- Better job performance
- More energy/less stress
- Better quality of life: involvement in church, family and group activities
Integrating Into Practice

North Carolina State Plan:
Clinical Interventions
• “Improve screening for and management of diabetes by encouraging healthcare providers to follow ADA guidelines, and include oral health and auditory screening as part of baseline assessments for people with diabetes.”

Counseling and Education
• “Raise awareness about diabetes uncommon co-morbidities including hearing loss and sleep apnea.”
New Apps For Hearing Impaired

- Captionfish
- DeafNation
- Sign 4 Me
- My Smart Hands Baby Sign Language Dictionary
- Signing Times Lite ASL
Depression

• Why?
Depression Screening

• 2 Question Screening:
  • During the past month have you often been bothered by:
    • Little interest or pleasure in doing things?
    • Feeling down, depressed or hopeless?
  
  • If they answer “no” to both, screening is negative. If “yes” to either, follow up with PHQ-9.
**PHQ-9 (Patient Health Questionnaire)**

<table>
<thead>
<tr>
<th>Over the LAST 2 WEEKS, how often have you been bothered by...</th>
<th>Not at all</th>
<th>Several days</th>
<th>More than half the days</th>
<th>Nearly every day</th>
</tr>
</thead>
<tbody>
<tr>
<td>little interest or pleasure in doing things?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>feeling down, depressed or hopeless?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>trouble falling or staying asleep OR sleeping too much?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>feeling tired or having little energy?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

PHQ-9

- Total score indicates:
  - Provisional diagnosis
  - Treatment recommendations
  - Treatment plan
STREEEEEETCH!!!!
Healthy Coping

Ask Questions!

• How did you feel when you were first diagnosed with diabetes?
• What does having diabetes mean to you?
• How are you currently handling the concerns of diabetes self-care?
• Do you think the effort of trying to manage diabetes is worth the hassles?

• This section (Slide 29-42) is adapted from the AADE Curriculum: Guiding Patients To Successful Self-Management.
Healthy Coping

Responses

• Shock/Denial
• Anger/Resentment
• Guilt/Self-Blame
• Sadness/Worry/Depression
• Depression/Anxiety
Healthy Coping

Role-Playing Activity

• Problem Solving:
  • Identify the problem
  • Think of possible solutions
  • Identify the thoughts and actions that come with the problem
  • Choose a solution, try it and see how it works out
Healthy Coping

Relapse Prevention

- Plan ahead and anticipate future events.
- Avoid known triggers that can lead to relapse.
- Think about a time that you were in a high-risk situation and how you were able to avoid a lapse. Repeat those positive actions.
- Have a plan B!!
Healthy Coping

Patient Support

• What support will help you with diabetes self-care?
• Describe the things that others do that hinder your efforts to take care of your diabetes?
• How does diabetes affect your relationships?
• How does your diabetes affect your ability to care for yourself?
Healthy Coping

Stress Management

• What situations cause you a lot of stress and what ways does your diabetes self-care change when you feel stressed, depressed or upset?

• Stressors can be positive or negative but the response to them is stress.
Healthy Coping

Symptoms of Stress

- Headache
- Insomnia
- Fatigue
- High blood pressure
- Nervousness
- Sweating
- Hair loss
- Ulcers
- Feelings: Anxiety, anger, depression, irritability, frustration.
Healthy Coping

Stress Management

- Take inventory
- Be aware
- Engage in regular physical activity
- Eat healthy
- Get enough sleep
- Take a break
- Create predictability
- Positive affirmations
- Mind-body techniques
- Progressive muscle relaxation
- Deep breathing/Meditation/Yoga/Tai Chi
- Imagery
- Spirituality
Overall outcomes of intervention

- Improved hearing
- Decreased depression
- Improved blood sugar
- Improved quality of life
Questions?
Joanne Rinker MS, RD, CDE, LDN
jorinker@gmail.com