The views expressed in this presentation are those of the authors and do not reflect the official policy or position of the United States Air Force, Department of Defense, Department of Veterans Affairs, or the U.S. Government.
AGENDA

• Hearing Center of Excellence (HCE) mission
• Scope of hearing loss/auditory injuries in Veterans
• HCE congressional mandate
• HCE organization/governance
• HCE areas of focus and achievement:
  – Prevention and Surveillance
  – Clinical Care, Rehabilitation, and Restoration
  – Information Management
  – Research Collaboration
• Challenges and opportunities
MISSION: 
Heighten readiness and continuously improve the hearing health and quality of life of Service members and Veterans through advocacy and leadership in the development of initiatives focused on the prevention, diagnosis, mitigation, treatment, rehabilitation and research of hearing loss and auditory-vestibular injury.
INTRODUCTION

- Military operations are chaotic
- The ability to hear and communicate is
  - Critical to safety (warrior and unit)
  - Central to effective command and control
  - A vital component for mission accomplishment
  - A key consideration in Force Management
    - Attrition, retrain, replace, recruit
- The capability to prevent is available
  - Education, Training, & Surveillance
  - Hearing Protection Devices
  - Tactical Communication Devices
- Readiness requires both
  - Performance and Prevention
HTTPS://WWW.YOUTUBE.COM/WATCH
H?V=CTYNU7D6TSK
EFFECTS OF NOISE ON MILITARY PERSONNEL

Polytrauma

Improvised Explosive Devises
Conductive/Mixed loss (1-3%)

Combat Arms

Weapon Systems
SNHL (98%)

Combat Service Support
Service Support

Noise

Annual Rate
TTS (11-14%)
PTS (1-2%)

Normal
Mild
Low
Moderate
High
Moderate
Severe
Deaf

25dB 40dB 55dB 70dB >90dB

HEARING CENTER OF EXCELLENCE
AUDITORY INJURY

Magnitude of Injury

- FY 2013 VA Annual Benefits Report: Auditory injuries are the two most prevalent disabilities in Veterans – up 17% from 2012 (222,139)
  - 2.12 M Veterans - compensation for auditory body system conditions (w/ 1,121,709 tinnitus, 854,855 hearing loss)
  - 764K Gulf War Era Veterans w/ hearing loss and tinnitus disability
  - Most prevalent service-connected disabilities for Veterans who began receiving compensation during FY 2013:
    - #1 = tinnitus, #2 = hearing loss
  - Hearing loss is insidious, cumulative, progressive, invisible

- READINESS – Hearing is critical to Military function
- POPULATION HEALTH – Loss is endemic in industrial nations

HCE is UNIQUELY responsible for ensuring total force hearing capability despite a ubiquitous invisible ENVIRONMENTAL THREAT
CONGRESSIONAL MANDATE

- Public Law 110-417 Duncan Hunter National Defense Authorization Act (NDAA) for FY 2009, Section 721:
  - Secretary of Defense shall establish, within the DoD, centers of excellence (CoE) to include a CoE focused on the prevention, diagnosis, mitigation, treatment and rehabilitation of hearing loss and auditory system injury
  - The Secretary shall ensure that the center:
    - **Collaborates** to the maximum extent practicable with the Secretary of Veterans Affairs, institutions of higher education, and other appropriate public and private entities (including international entities)
    - **Collaboratively** develops a registry with bi-directional data exchange to identify and track incidence and care for hearing loss and auditory injury
    - Utilize registry data to **encourage and facilitate** the conduct of research, development of best practices and clinical education
WHAT IS A DOD HEALTH SYSTEM CENTER OF EXCELLENCE?

- Unified around efforts to improve health and readiness, and healthcare outcomes, for Service members, Veterans, and their families.

- CoEs engage in research-, clinical-, educational-, and policy-related activities toward improving and standardizing the system of care for prevention, diagnosis, mitigation, treatment, and rehabilitation of an associated group of clinical conditions.

- Regardless of whether the nation is engaged in combat, the CoEs remain agile and vigilant in their efforts to promote health and readiness across the system of care.
CONCEPT OF OPERATIONS

CENTERS FOR HEARING AND BALANCED CARE
FULL OPERATING CAPABILITY
DECEMBER 2013

HEARING CENTER OF EXCELLENCE
**Vision:** The preeminent authority on, and champion for, the hearing/balance health of our Nation’s Heroes.

**Mission:** To heighten military readiness and optimize quality of life through collaborative leadership and advocacy for hearing and balance health initiatives.

**Core Values:** Selfless Service ~ Integrity ~ Excellence ~ Advocacy ~ Commitment

**Strategic Themes:**
- **Operational Excellence:** Develop, update, and implement processes that lead to effective and efficient execution of programs capitalizing on opportunities and maximizing return on investment. Cultivate an enduring team that leverages human capital to foster joint interagency cohesiveness and collaboration.
- **Effective Communications:** The ability to clearly exchange information to allow for transparent decision making and productive collaboration.
- **Collaborative Relationships:** Develop unbiased mutually beneficial relationships that synchronize efforts and optimize results while considering the needs of all customers and stakeholders.
- **Balance Innovation with Standardization:** Identify and standardize evidenced-based best practices across DoD and VA while fostering continuous feedback from SMEs and operational commanders. Develop innovative solutions to identified gaps and translate the outcomes to the customers.

**Warfighter/Veteran Hearing Health**
- CS 1.0 Improve Customer Satisfaction
- CS 2.0 Improve Stakeholder Satisfaction

**Internal Processes**
- IP 1.0 Enhance Relationships and Partnerships
- IP 2.0 Improve Operational Business Practices
- IP 3.0 Improve Internal/External Communications
- IP 4.0 Improve Knowledge Management & Translation

**People and Tools**
- PT 1.0 Optimize Human Capital
- PT 2.0 Leverage Technology

**Budget**
- B 1.0 Optimize Budget

Feedback May Adjust Resourcing
PREVENTION & SURVEILLANCE
DOD RETENTION & COST SAVINGS

<table>
<thead>
<tr>
<th>Level</th>
<th>Training Cost</th>
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</thead>
<tbody>
<tr>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>Recruitment: $13K Entry Level: $35K MOS: $20K - $2.6M Advanced MOS: $20K - $1.5M Career School: $50K +</td>
</tr>
<tr>
<td>Moderate</td>
<td></td>
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<tr>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td></td>
</tr>
<tr>
<td>Deaf</td>
<td></td>
</tr>
</tbody>
</table>

MOS: Military Occupational Specialty

UNITY OF EFFORT

PERFORMANCE

H1 $160,000 savings
Nuclear Sub Sonar Technician

H2 $200,000 savings
Basically Trained Cryptologic Linguist

H3 $2,600,000 savings
Senior Special Operations NCO

H4 $1,000,000+ savings
Aviation Structural Mechanic NCO
COMPREHENSIVE HEARING HEALTH PROGRAM

Educate
- Develop hearing health education tools
- Integrate hearing health education into formal training & leadership schools
- Global Outreach

Protect
- Develop “Qualified Products List” & funding for hearing protection devices
- Reduce hazardous noise at source thru acquisition best practices
- Total Force Annual HPD fitting/training

Monitor
- Develop & implement policy for annual hearing health surveillance
- Assesses individual hearing & hearing protection fittings
- Individual hearing health education

= CHHP
HEARING AND THE SERVICE MEMBER LIFECYCLE

1. Basic Training Baseline Audiologic Assessment & Education
2. Annual Hearing Health Screen (Indiv Med Readiness) & Education
3. Out-of-cycle Targeted Intervention
4. Exit Audiogram for VA Transition of Care

Fitness for Duty Standard

Operator Hearing Performance (notional)

Deployment
Deployment

Career (Lifecycle)

Periodic Hearing Education & Screen
CURRENT SURVEILLANCE- PROFILING SYSTEM

Pure Tone Audiogram

Speech Reception in Noise Test (SPRINT)
What a Hearing Profile Means...

- H2 profile: 66% of speech is lost
- H3 profile is even worse

Source: DOEHRS-HC
Auditory Fitness for Duty

West Point “engagement skills trainer” evaluate level of intelligibility needed to successfully coordinate a firefight....

Conduct paintball studies to evaluate impact of hearing impairment on dismounted combat

2015
COMPREHENSIVE HEARING HEALTH PROGRAM
HEALTH EDUCATION PRODUCTS
HCE WEBSITE

The Hearing Center of Excellence, or HCE, has produced hearing-related print materials for hearing health providers, audiologists, audiology departments, and medical treatment facilities. The HCE print materials can be downloaded and printed. Or, if you prefer, many of them can be ordered online and shipped to you or your facility.

Audio CDs produced by the Auditory Research Laboratory are also available and can be ordered online.

Quick Fact
Fact #17: Any exposure to 140 dB sound in (e.g., gun shot or a firecracker) can cause immediate damage and actual pain.
POSTERS ADVOCATING FOR HEARING HEALTH ACCOUNTABILITY
TOOLS FOR INDIVIDUAL HEARING HEALTH COUNSELING
Protecting hearing, communications crucial in combat

John Hollis, Staff Writer | Posted: Saturday, September 20, 2014 8:00 am

MARINE CORPS BASE QUANTICO, Va. — It’s not as much a medical issue as it is a critical component to mission effectiveness.

That was the overall message from last week’s Exercise in Communication and Hearing Operations sponsored by the Department of Defense Hearing Center for Excellence. The event, which was held at Marine Corps Base Quantico on Sept. 10, featured telling demonstrations and a subsequent exchange between a number of senior level military and civilian decision-makers about the importance of preserving hearing and effective tactical communications on the battlefield.

The attendees had the opportunity to view dismounted patrols by experienced Special Forces operators and to participate in patrolling and live-fire exercises. The point was to give them an accurate feel of what is being asked of America’s service members on the ground so as to help them make more informed decisions.


“This has been great,” said Army Lt. Col. Kristen Casto, audiology staff officer, Office of the Surgeon General. “It’s one thing to sit up in a board room talking to all these senior-level people about the importance of protected hearing and communications, another entirely to come out here and see its importance first-hand.”
CLINICAL CARE, REHABILITATION, AND RESTORATION
PRIORITY INITIATIVES

- VA/DoD Collaboration
- Clinical Practice Guidelines/Recommendations
- Science and Technology
- Education/Training
- Advocacy/Outreach
VA/DOD COLLABORATION

- Improved Operational Business Practices
  - VA Denver Acquisition and Logistics Center (DALC)
- Expanded use of Remote Ordering Entry System (ROES) by DoD for hearing aids, accessories, batteries, etc.
- Additional contracts for implantable devices
- Streamlined outcome measures for DoD/VA (e.g., International Outcome Inventory for Hearing Aids)
VA/DOD COLLABORATION

• Separation Health and Physical Examination (SHPE)
  – Contribute to policy development on entry/baseline, periodic, and termination audiograms

• VA/DoD sharing agreements for clinical care
  – Progressive Tinnitus Management (PTM)
  – Shared resourcing for clinical services (e.g., Cochlear Implants)

• Improved clinical care resources
  – Alternate Input Method (AIM) form redesign and standardized reporting templates
  – New website content and resources for providers
    • Recorded speech materials, counseling tools, etc.
VA/DoD Working Groups
- Vestibular Clinical Practice Recommendations
- Adult Tinnitus Management Clinical Practice Recommendations
- Clinical coding standardization

Systematic review of clinical care areas
- Contribute to guidance for longitudinal/population-based studies
• Develop standardized equipment guidance
  – Tactical Communication and Protective Systems (TCAPS)

• Data management and sharing solutions
  – Joint Hearing Loss and Auditory System Injury Registry (JHASIR)
  – Enterprise Clinical Audiology Application (e.g., AudBase) planning and adaptation
  – Survey and questionnaire collection
SCIENCE AND TECHNOLOGY

• Identification of gaps and solutions for improved access to and clinical care
  – Mobile solutions related to hearing and balance

• Exploration of emerging technologies for:
  – Improved monitoring/surveillance
  – Tools to extend/augment auditory-vestibular care
  – Boothless/automated technology for connected health
20 – 23% hearing loss sufferers utilize conventional amplification
Hearing aids benefit mild to moderate hearing loss range
Cochlear implants rehabilitate severe to profound losses
Bone anchored systems serve conductive and mixed hearing loss

**Gap**: Hearing aids often do not maximize audibility for individuals with moderately-severe hearing loss.
EDUCATION AND TRAINING

- VA/DoD Auditory and Vestibular Training
  - Web-based and in-person opportunities
- CEU Opportunities
  - AudiologyOnline webinars
  - HCE monthly clinical calls
Advocacy/Outreach

- Support of Comprehensive Hearing Health Program (CHHP)
- Identify clinical care resources for public awareness
- Facilitate partnership development
  - In collaboration with other CoEs
    - May 2015 – Better Hearing and Speech Month & Healthy Vision Month
  - NHCA Spectrum content
  - DiscovEARy Zone

Dangerous Decibels® Jolene
INFORMATION MANAGEMENT
WHAT IS A HEALTH REGISTRY?
(E.G., DISEASE, DIAGNOSIS, CONDITION, PATIENT)

Agency for Healthcare Research and Quality

- “Patient registry uses observational study methods to collect uniform data (clinical and other) to evaluate specific outcomes for a population defined by a particular disease, condition, or exposure, and that serves one or more predetermined scientific, clinical or policy purposes.”

Office of the Assistant Secretary of Defense (Health Affairs)

- “An electronic system that collects, stores, and retrieves individuals’ health data regarding certain diseases, diagnoses, or conditions.
- In general, information collected track individuals with particular diagnoses, conditions, or exposures for the purpose of epidemiologic study, scientific investigation, product surveillance, and/or clinical treatment.”


OASD(HA) Memo, Subject: Guidance for the Management of Registries in the MHS, February 3, 2014
Providing the best care possible to Service members and their family members and Veterans

- Documents outcomes
- Informs evidence-based clinical practices
- Facilitates clinical practice standards (guidelines, recommendations, best practices, etc.)
- Enhances coordination of care
- Justifies healthcare costs

CREDIT: Lt. Quincy Bowles and Aviation Boatswain’s Mate 3rd Class Jason Griffin review weight charts on the flight deck of Nimitz-class aircraft carrier USS John C. Stennis (CVN 74). Stennis is currently undergoing an operational training period in preparation for future deployments. (U.S. Navy Photo by Mass Communication Specialist 3rd Class Ignacio D. Perez/Released)
JHASIR CAPABILITIES

- **Identifies and tracks** personnel with hearing loss and auditory/vestibular injury via clinical diagnosis (ICD9 codes in a watch list)
- **Supports readiness** through monitoring comprehensive hearing health programs
- **Supports clinical providers** with longitudinal data
- Provides bidirectional **data sharing capability** between DoD and VA
- **Improves transition to VA and continuity of care**
- Outlines, monitors and reports on **critical measures of program effectiveness**
- Encourages and facilitates the conduct of **research**
- Facilitates **development of best practices and clinical tools**
CLINICIAN INTERFACE – CAREPOINT
ACHIEVEMENTS

- Functional Requirements Developed
- Auditory Injury Module for DoD Trauma Registry Operational
- DHA Data Use Agreements Approved
- VA Access to DOEHRS-HC Thru Data Transfer Agreement
- DIACAP for Clinical Diagnostic Audiogram
- Collaboration with VA Hearing Loss Repository Developers
- Partnership Established with DOEHRS PO to Correct Defects in the Occupational Audiogram Application
- Complex Hearing-specific Data Analytics Underway
- DHA Funding Certifications and Health IT Approvals Completed/In Progress

Joint Hearing Loss & Auditory System Injury Registry (JHASIR) Development
## ECAA

### System Description

| • Standardizes collection of clinical audiometric data in a computable format |
| • Supports automated comparisons between audiograms for patient hearing loss calculation, epidemiologic research of hearing loss trends and risk factors |
| • Reduces storage requirements |
| • Facilitates electronic data interchange with stakeholder systems, including DoD and VA |
| • Formerly known as AudBase |

### Functionality

| • Allows centralized storing of computable data |
| • Facilitates a standardized process for the collection of clinical audiograms throughout the entire MHS on as an enterprise solution |
DOD TRAUMA REGISTRY: ACOUSTIC INJURY MODULE (AIM)

- Only source for detailed data of inpatient level III and above acoustic trauma injuries in theater

- Inclusion criteria: 480 acoustic and trauma related diagnosis and procedures codes to identify the injured population

- Visible trauma – not hearing tests – potential early indicators – cause of injury

- 2,651 unique patients identified with hearing loss or injury w/ 6,122 documented acoustic related diagnosis and procedures

<table>
<thead>
<tr>
<th>Injury Year</th>
<th>Unique Patients</th>
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<tbody>
<tr>
<td>2001</td>
<td>1</td>
</tr>
<tr>
<td>2002</td>
<td>73</td>
</tr>
<tr>
<td>2003</td>
<td>841</td>
</tr>
<tr>
<td>2004</td>
<td>1263</td>
</tr>
<tr>
<td>2005</td>
<td>1445</td>
</tr>
<tr>
<td>2006</td>
<td>1722</td>
</tr>
<tr>
<td>2007</td>
<td>2247</td>
</tr>
<tr>
<td>2008</td>
<td>1217</td>
</tr>
<tr>
<td>2009</td>
<td>1857</td>
</tr>
<tr>
<td>2010</td>
<td>2790</td>
</tr>
<tr>
<td>2011</td>
<td>2366</td>
</tr>
<tr>
<td>2012</td>
<td>1571</td>
</tr>
<tr>
<td>2013</td>
<td>714</td>
</tr>
<tr>
<td>2014</td>
<td>40</td>
</tr>
<tr>
<td>Total Pt Injury</td>
<td>18147</td>
</tr>
</tbody>
</table>

INPATIENT CARE - OBJECTIVE
Blast Injury
## Registry Analytics

<table>
<thead>
<tr>
<th>Condition</th>
<th>ICD-9-CM Codes</th>
<th>CPT Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensorineural hearing loss</td>
<td>389.10 (sensorineural hearing loss, unspecified)</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>389.11 (sensory hearing loss, bilateral)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>389.15 (sensorineural hearing loss, unilateral)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>389.16 (sensorineural hearing loss, asymmetrical)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>389.17 (sensory hearing loss, unilateral)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>389.18 (sensorineural hearing loss, bilateral)</td>
<td></td>
</tr>
<tr>
<td>Noise-induced hearing loss</td>
<td>388.10 (noise effects on inner ear, unspecified)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>388.11 (acoustic trauma, explosive, to ear)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>388.12 (noise induced hearing loss)</td>
<td></td>
</tr>
<tr>
<td>Significant threshold shift</td>
<td>794.15 (nonspecific abnormal auditory function studies)</td>
<td></td>
</tr>
<tr>
<td>Tinnitus</td>
<td>388.30 (tinnitus, unspecified)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>388.31 (subjective tinnitus)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>388.32 (objective tinnitus)</td>
<td></td>
</tr>
</tbody>
</table>

*The code set and groupings of hearing injury specific diagnoses used in this case definition are a subset of the broader code set used as a “Watch List” for post deployment NIHI and comorbidities.*

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**HEARING CENTER OF EXCELLENCE**
Starting 1 January 2003, every VA claim for hearing loss and tinnitus (now an annual report from VBA) . . .

For the Veteran submitting the claim:
- Social security number and other identifiers
- Branch(es) of Service (enter duty/release from duty)
- Claim entered into system, processed, end result
- If awarded, does Veteran have other awards
- Who are these Service members and Veterans?
- What is their hearing and balance health history?
- Were they in hearing conservation programs?
- What jobs did they have when in the military?
- What sorts of noise exposures did they have?
- How long ago did they separate from military service?
- How did/do they use DoD and VA care?
- How can we shape our prevention and clinical programs to better serve their hearing health needs during military Service through Veteran status?

222,139 new auditory body system disability recipients for FY13

TOTAL: 2.12 million Veterans w/ $ billions estimated
DATA ANALYTICS - EXAMPLES

- Cost-effectiveness of Ordering MRIs for Hearing Loss
- Cost of Hearing Aids vs. Hearing Aid Service in DOD TRICARE Purchased Care Market
- Most Prevalent Hearing-related Injuries in Active Duty
- Hearing Loss & Tinnitus Diagnosis FY 10 - 13
- Areas With Most Benefit from Teleaudiology Services
- $ Saving for DOD Using ROES
- Rates of Auditory Injury – 1st Year of Service

Data Driving Decisions
RESEARCH COORDINATION
# Portfolio Coordination

## Performance
- Service Members

## Prevention

## Acute Care

## Rehabilitation
- Veterans

### Injuries
- Brain
- Psyche
- Vision
- Hearing
- Pain
- Extremity

### Organizations
- MOM
- CCC
- CRM
- ONR
- AFMS
- NIH
- ORD

**Hearing Center of Excellence**
PORTFOLIO COORDINATION AND ADVOCACY

Military Medical Research Investment is Needed for Solutions in Hearing/Balance Across the Continuum of Care

- Epidemiology/Etiology
- Prevention/Protection
- Diagnosis/Screening
- Therapeutics/Rehabilitation

Solutions Needed

Tinnitus mechanisms; prevalence of blast-related neurosensory injuries

Protective devices, strategies, pharmaceutical solutions

Portable, forward, and telemedical solutions

Pharmaceutical, non-invasive, surgical, and alternative therapies

Program Area Opportunities

JPC5 JPC1
JPC5 JPC1
JPC5 JPC6, JPC1
JPC8 JPC1
KNOWLEDGE DISSEMINATION

- Collaborative Auditory/Vestibular Research Network (CAVRN)
  - Pharmaceutical Interventions for Hearing Loss (PIHL)
  - Auditory Fitness for Duty (AFFD)
  - DoD Otology Collaboration
  - DoD/VA epidemiology
- Cross-CoE efforts
  - Allied NeuroSensory Warrior Related Research (ANSW2R/Polytrauma)
  - Chronic Effect of Neurotrauma Consortium (CENC)
  - Joint Steering Committees – (Gap analysis, prioritization, translation)
  - DoD/VA Guide to Collaborative Research
- International Efforts
  - NATO RTO 229
  - Coalition Warfare Program
  - Air and Space Interoperability Council (ASIC) – Aircrew Hearing Protection Project
CHALLENGES

- High prevalence of injuries vs. auditory injuries as functionally significant
- Limited ability to prevent/mitigate injuries and limited protective solutions
- Limited portable/rugged evaluation tools
- Perception of lost situational awareness due to protective equipment
- Non-compliance with protective equipment use
- Limited rehabilitation solutions
- Limited core DoD research funding
OPPORTUNITIES

- Revise DoDI 6055.12, Hearing Conservation Program – anchor CHHP
- Standardize clinical and prevention practices
- Influence policy changes needed related to hearing loss as a population health issue to standardize surveillance and education across Services
- Influence policy changes for readiness
- Develop capabilities to share data between VA and DoD
- Realign HCE under Defense Health Agency
QUESTIONS