NCRAR Workshop

Ototoxicity Early Identification & Monitoring

VA Rehabilitation Research & Development
National Center for Rehabilitative Auditory Research

Site by CDR Marketing Group

Outline

I. Learner Outcomes
II. Overview: Basic Principles
III. Tinnitus Monitoring
IV. Ototoxicity Monitoring in Adults
V. Objective Monitoring
VI. Ototoxicity Monitoring in Children
VII. Establishing Program

VII. Establishing Ototoxicity Monitoring Program

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VA RR&D
NCRAR

Enlisting Support

- Health Care Providers
  - Primary Care Physicians
  - Oncology and Infectious Disease Physicians
  - Nurses (!!!)
- Hospital Administrators
  - Medical Policy Committee
  - Other

Enlisting Support

- Program is worthwhile, feasible, affordable
- Should be standard of healthcare b/c fits WHO definition for screening test
- Support of National Organizations
  - ASHA, AAA
- Support of healthcare providers
  - oncologists, nurses
- Other hospitals do it

Key Questions

- Purpose for identifying Ototoxic change
  - Early Identification, Hearing Loss prevention
- Target patient population
- Tests you will use
  - Sensitivity/Specificity
  - Test-retest reliability
  - Speed of test & its analysis
  - Cost of equipment
- Level of training needed
  - Audiologist
  - Nurse
  - Technician
- Program management costs

Prevention is the BEST form of Rehabilitation

Major Components

- Patient identification
- Patient status
- Equipment
- Patient Communication
- Serial Monitoring
- Behavioral/Objective measures change criteria
- Test protocol adapted to the patient (flowchart)
- Patient counseling
- Report to primary care provider (PCP)

Patient Identification

- Coordinated effort between the audiologist and health care team
- Medical staff
  - Oncologist / PCP
    - Consults
  - Nurse Practitioners
  - Pharmacist
    - Drugs dispensed and hospital formulary
- Computer generated pharmacy lists
- At Risk Patients:
  - Drugs with high ototoxicity incidence rates (see table)
  - Children
  - Elderly
  - Co-morbidities
  - Multiple ototoxic agents (including radiation)

Ototoxic Medications

Antineoplastic Drugs	*Aminoglycosides*	*Loop Diuretics*
Cisplatin Carboplatin Oxaliplatin Nitrogen mustard Methotrexate* Vincristine Dactinomycin Bleomycin	Gentamicin* Neomycin* Kanamycin Amikacin Streptomycin* Tobramycin* Netilmicin	Furosemide* Ethacrynic acid* Bumetanide*
Other Antibiotics	*Antimalarial Drugs*	*Salicylates*
Vancomycin See handout	See handout	See handout

**vestibulotoxic*

Patient Status

- Outpatient vs Inpatient
- Responsive vs non-responsive
- Booth vs Ward
- Good vs poor hearing

Patient Status

- Responsive:
  - Alert and Oriented x 4 (person, place, time, purpose)
  - Does not fatigue easily
  - Adults and older children
- Limited Responsive:
  - Alert and Oriented x 3-4
  - Fatigues easily
  - Adults and small children
- Non-responsive:
  - Alert and Oriented x 0
  - Pt sedate or Confused
  - Adults and infants
- Can oscillate between categories

Patient Status

Ward Testing Considerations

- Patient Safety, Mobility issues
  - Patient in ICU
  - Sedated
  - Isolation
  - Monitoring: Telemetry, Sugars, etc.
  - Physical limitations: Bedrest, Non-ambulatory, etc.
- Discuss with responsible attending physician or nurse
- Sound level meter recordings
- Maintain consistent test conditions

Patient Status

Good vs. Poor Hearing

- OAE particularly useful if hearing is good
  - Puretone Thresholds < 50 dB HL
- ABR if hearing loss precludes OAE use
  - Puretone Thresholds >50 dB HL at all test frequencies between 1 kHz and 10,000 Hz
  - Use if patient presents with fluctuating middle ear pathology

Test Equipment

- Audiometer / high-frequency headphones
- Immittance system
- OAE system &/or ABR system
- Maintain consistent conditions / document
- Calibration

Patient Communication

- Reasons for ototoxicity monitoring
- Prevalence of and risk factors for ototoxic hearing loss
- Possibility of late or progressive onset of hearing loss
- Realistic expectations

Serial Monitoring

- Baseline evaluation
  - ~platinum patients 1 week before or within 24 hours
  - antibiotic patients within 72 hours
  - 24 hour recheck evaluation
- Monitor evaluations
  - Performed periodically throughout treatment
  - ~platinum patients: *prior to each dose*
  - Antibiotic patients: 1-2 times per week
  - Re-test if significant changes are noted
- Post-treatment evaluations
  - Immediate post-drug evaluation
  - 1, 3, & 6 month follow-up evaluation
  - Continue to test if ASHA-significant changes are noted until hearing stabilizes

Deciding When to Monitor

- According to drug regimen
  - Chart review
  - Chemotherapeutic: Review hem/onc chart note for specific treatment regimen (i.e. Day 1, 8, 22, 29)
  - Antibiotics: Typically infused every day, sometimes 2-3 times per day (i.e. BID or Q12)
- When patient subjectively reports any difficulties
  - hearing difficulties, tinnitus, fullness, vertigo, etc…
- Audiologist responsibility to track/coordinate

Change Criteria

- ASHA Ototoxic Change Criteria
  - ≥20 dB shift at one frequency
  - ≥10 dB shift at 2 consecutive test frequencies
  - “Response” shifting to “no response” at 3 consecutive test frequencies
- Change confirmed by retest
- DPOAE Ototoxic Change Criteria
  - ≥ 6 dB shift
    - If worried about over referrals, make more stringent by requiring two consecutive test frequencies
  - Change confirmed by retest
  - Verify YOUR own test-retest reliability

EACH SUBJECT SERVES AS THEIR OWN CONTROL

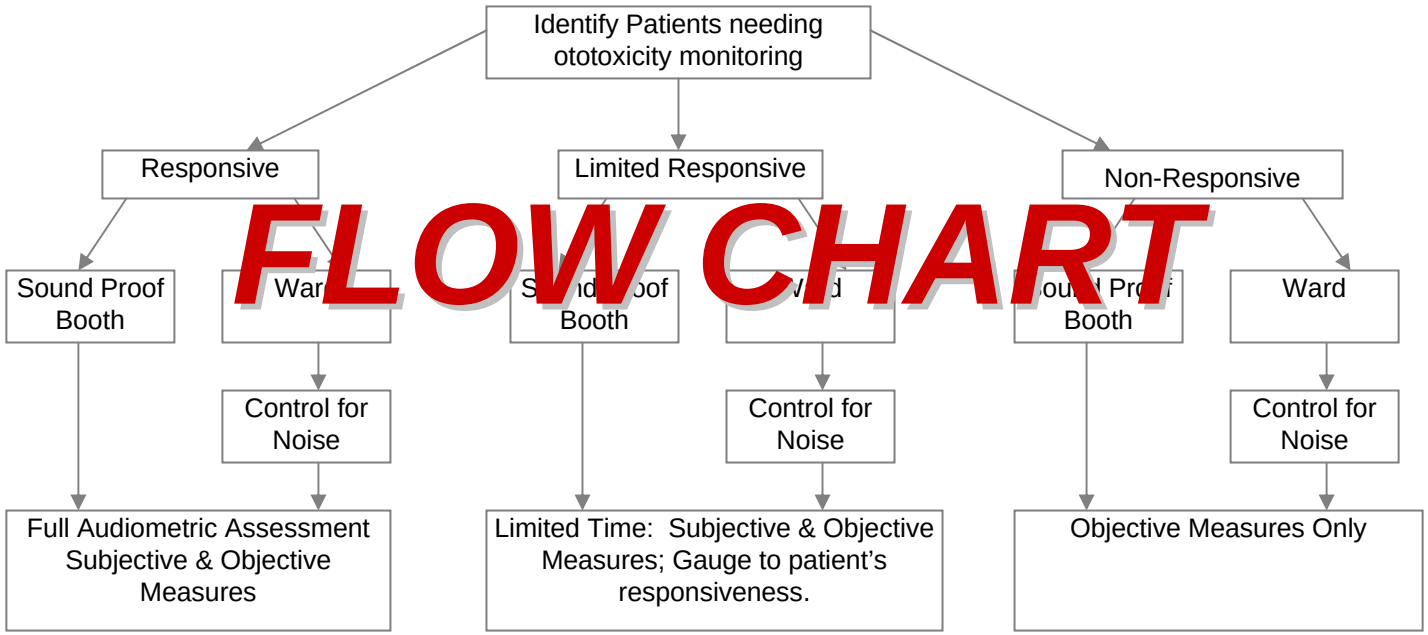
Patient Counseling

- Hearing loss
  - Potential recovery
  - Permanent
  - Realistic expectations
- Other symptoms (tinnitus, dizziness)
- Noise potentiation
  - Use ear protection
  - Up to 6 months
- Amplification
  - Caution against over-amplification
  - Work with dispensing audiologist

Report to PCP

- Test results
  - Type of test
- Behavioral hearing change noted
  - ASHA significant criteria
  - Frequencies demonstrating ototoxic change
  - Confirmed by re-test
- Objective hearing change noted
  - Exceeds established (published) test-retest reliability, which has been validated in your clinic
  - Confirmed by re-test
- Other symptoms
  - Dizziness
  - Tinnitus

Testing Protocol



Conclusion

- Ototoxicity causes high burden disorders
  - Hearing loss, tinnitus, dizziness
  - Incidence may justify cost
  - Individuals at high risk can be targeted
- Test procedures exist that reliably identify ototoxic hearing loss
- Identifying ototoxicity can improve outcome of care

http://www.ncrar.org/home.htm