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Ototoxicity Monitoring Programs: Addressing Existing Barriers

Irina Linkov Middleton, Au.D.

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Disclosures

- **Presenter Disclosure**: Financial: Irina Middleton is an employee of Jefferson Otolaryngology. She received an honorarium for this presentation. Non-financial: Irina Middleton has no relevant non-financial relationships to disclose.
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Introduction

- Clinical Audiologist with Jefferson Hearing and Balance Center since 2017
- Background:
  - Diagnostics (comprehensive audiologic evaluations)
  - Hearing aid evaluations, fittings, checks, verification
  - Tinnitus evaluations and management
  - Research involvement
  - Audiology Research and Ototoxicity Monitoring Program Coordinator

Learning Outcomes

After this course, participants will be able to:

- Discuss the recommended schedule of ototoxicity monitoring for different drug classifications.
- Identify testing protocols for ototoxicity monitoring as recommended by the American Speech-Language and Hearing Association (ASHA) and the American Academy of Audiology (AAA).
- Describe the importance of ototoxicity monitoring in patients who are scheduled to undergo/are undergoing treatment with ototoxic/vestibulotoxic medications.
- Identify possible existing barriers for ototoxicity monitoring and discuss how to incorporate strategies towards updating existing practices within their own clinical setting.

Ototoxicity

- Toxic medications can directly affect the auditory nerve and/or vestibular nerve. It is important to be cognizant of the various symptoms which may arise while undergoing a treatment plan involving medications with oto- or vestibular toxic properties.
- Ototoxic
  - Any drug that causes damage to the ear.
- Vestibulotoxic:
  - Any drug that causes damage to the vestibular system.

Common symptoms caused by ototoxicity

- Irreversible hearing loss
- Sensation of fullness in the ears
- Tinnitus (ringing/buzzes)
- Hyperacusis
- Dizziness

Importance of Ototoxicity Monitoring

- Aids in early identification of otologic changes.
- Allows for the opportunity for intervention when appropriate to mitigate further damage and improve quality of life post treatment.
- Implementing rehabilitation measures such as amplification and counseling of communication strategies which result from hearing impairment will promote improved quality of life for the patient post-treatment and help mitigate further ototoxic damage resulting from these chemotherapeutic agents.

Ototoxic Drug Classes

Drug Class						
Antineoplastic	Aminoglycosides	Other antibiotics	Loop diuretic	Salicylates & NSAIDs	Antimalarial	Industrial Solvents
Cisplatin* **Carboplatin*** **Oxaliplatin** **Nitrogen-Mustard*** **Methotrexate** **Vincristine*** **Dactinomycin** **Bleomycin**	Gentamycin*** Neomycin*** Kanamycin*** Amikacin*** Streptomycin*** Tobramycin*** Netilmicin***	Vancomycin* Erythromycin*	Furosemide* Ethacrynic acid* Bumetenaide*	Aspirin* Fenoprofen* Ibuprofen* Indomethacin* Naproxen* Phenylbutazone* Sulindac*	Quinine*** Chloroquine***	Tolunene** Benzene Lead*** Mercury** Carbon Monoxide Nicotine***

(*) Ototoxic
(**) Vestibular
(***) Both

Testing Protocols

- Per the American Speech- Language -Hearing Association (ASHA) and the American Academy of Audiology (AAA), testing protocol for toxicity monitoring should be [minimally] inclusive of the following:
  - Tympanometry
  - Distortion Product Otoacoustic Emissions
  - Comprehensive audiologic Assessment
  - High Frequency Assessment (9kHz-16kHz)
- ASHA does suggest the inclusion of click and tone burst auditory brainstem response testing for patients undergoing chemotherapy with platinum derivatives, as indicated. This includes cisplatin and carboplatin.

Testing Schedules

Chemotherapeutic drugs

- Cisplatin
  - Retest with every cycle of chemotherapy
- Carboplatin
  - Retest every two to four cycles of chemotherapy

Aminoglycoside Antibiotics

- Weekly or re-test one to two times per week in extreme cases

If baseline is missed prior to administration of the drug, testing must be completed within 24 hours of the initial dose.

Schedule Outline

Baseline Testing

- Subjects enrolled slated to be treated with chemotherapy with or without radiation meeting inclusion criteria are scheduled for baseline testing
- Testing includes: Tympanometry Distortion Product Otoacoustic Emissions Comprehensive Audiometry Ultra High Frequency Testing (9kHz-16kHz)

During Treatment Monitoring

- Follow up testing scheduled within 24 hours of next cycle of treatment (cisplatin), within 72 hours (carboplatin) through the course of treatment.
- Significant changes immediately reported to referring physician and/or oncologist following ASHA guidelines

Post Treatment Monitoring

- Post treatment testing is completed within six months of treatment cessation.
- Significant changes immediately reported to referring physician and/or oncologist following ASHA guidelines

Research and Audiologist Role within OTM

ARTICLE: Clinical trials, ototoxicity grading scales and the audiologist's role in therapeutic decision making

AUTHORS: King KA, Brewer CC

OBJECTIVES: Define clinical trials and adverse event (AE) monitoring from the perspective of the audiologist. Rationalise the importance of audiology's involvement before, during and after monitoring. Identify strengths and weaknesses in toxicity grading scales, and discuss factors that may influence these.

CONCLUSIONS: The audiologist's role in therapeutic decision making goes beyond collection of the audiogram. Clear communication to stakeholders in ototoxicity monitoring is paramount…

Research and Audiologist Role within OTM

- **ARTICLE: Ototoxicity management: An investigation into doctors' knowledge and practices, and the roles of audiologists in a tertiary hospital**
- **Authors:** Wium A, Gerber B
- Aim: An aim of this study was to determine audiologists role within management of ototoxicity and determine if they should expand the audiologist role to share information with patients and other professionals in ototoxicity management
- Study design: surveyed 90 participants to assess their knowledge of ototoxicity
- Results: 1) knowledge was lacking

  2) ototoxicity risks not fully disclosed due to lack of timing and insufficient knowledge

  3) While Audiologist role determined to be important, few referred to audiology for monitoring
- Conclusion: Expanding Audiologist Role- a must. Expanding role includes provision of continued professional development activities, advocacy of their role in the hospital to raise awareness among physicians of importance of ototoxicity monitoring

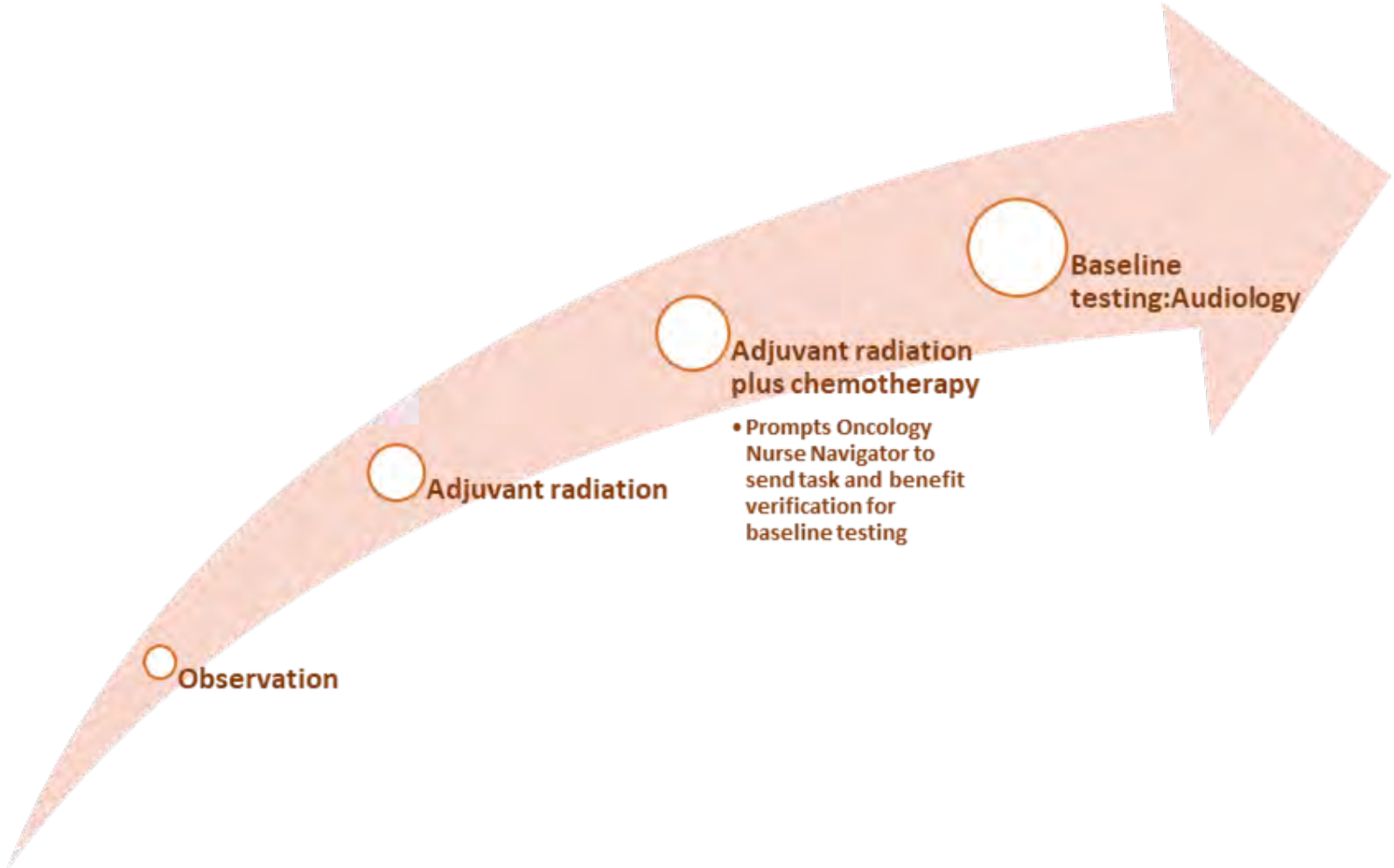
Identifying Barriers

- Variables which interfere will successful adoption/implementation of ototoxicity monitoring
- This can range from location access limitations, staffing, equipment, poor referrals,etc

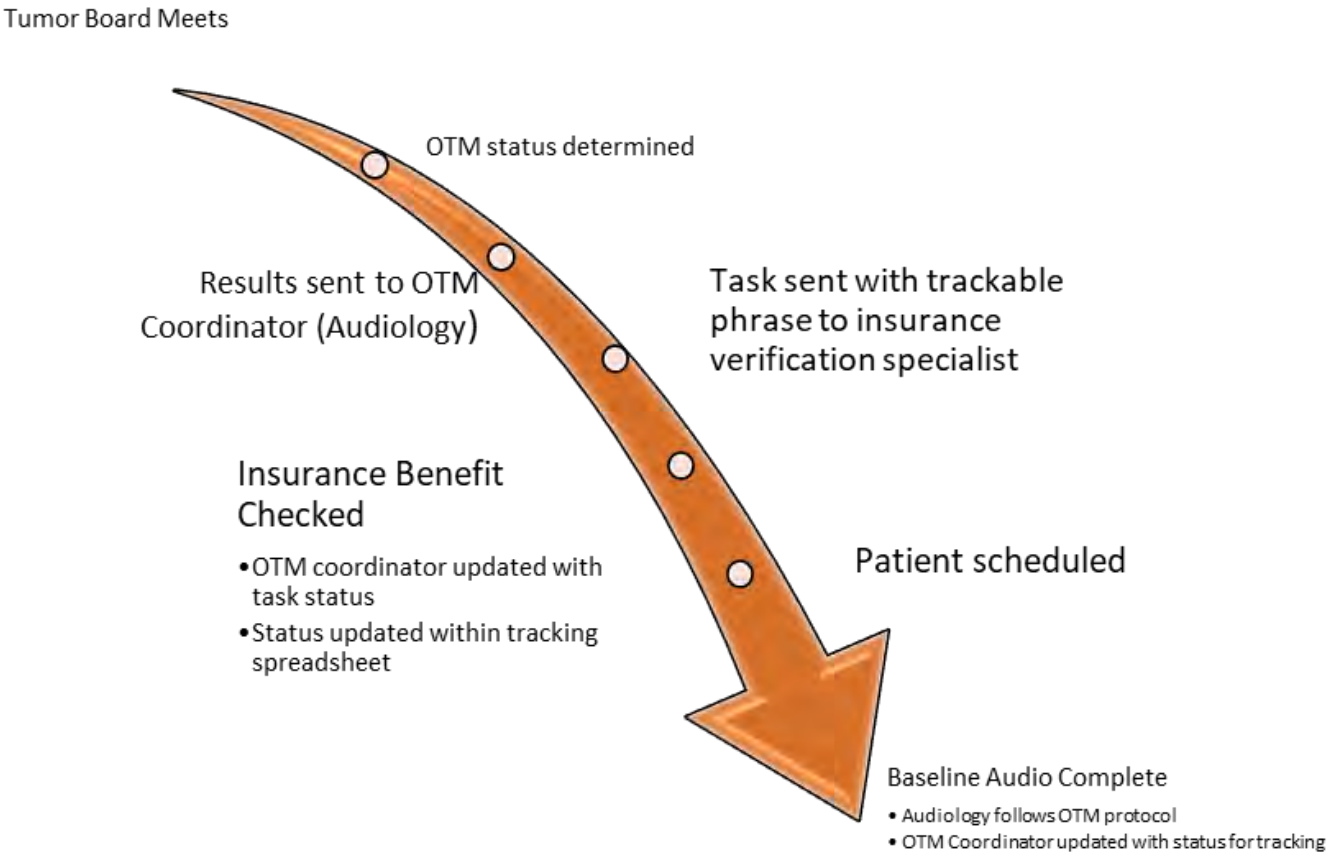
Barriers

- Inconsistent referrals
- Scheduling
- Location
- Space
- Staff limitations
- Collaboration and communication b/t disciplines
- Education of importance of ototoxic implications
- Patient access and education
- Audiology inclusion

Before Addressing Barriers



After Addressing Barriers



Barriers

- Collaboration and communciation b/t disciplines
- Education on importance of ototoxic implications
- Patient Access and education
- Audiology inclusion

OTM Protocol: Acknowedging Barriers

- OTM Protocol developed and adopted- Audiology led
- Inclusion of Audiology in guidance for decision making
- Education on ototoxic properties and importance for monitoring to key stakeholders- Audiology led
- OTM tracking to ensure successful implementation of process- Audiology led
- Patient Access- 6 locations
- Patient education re: ototoxicity

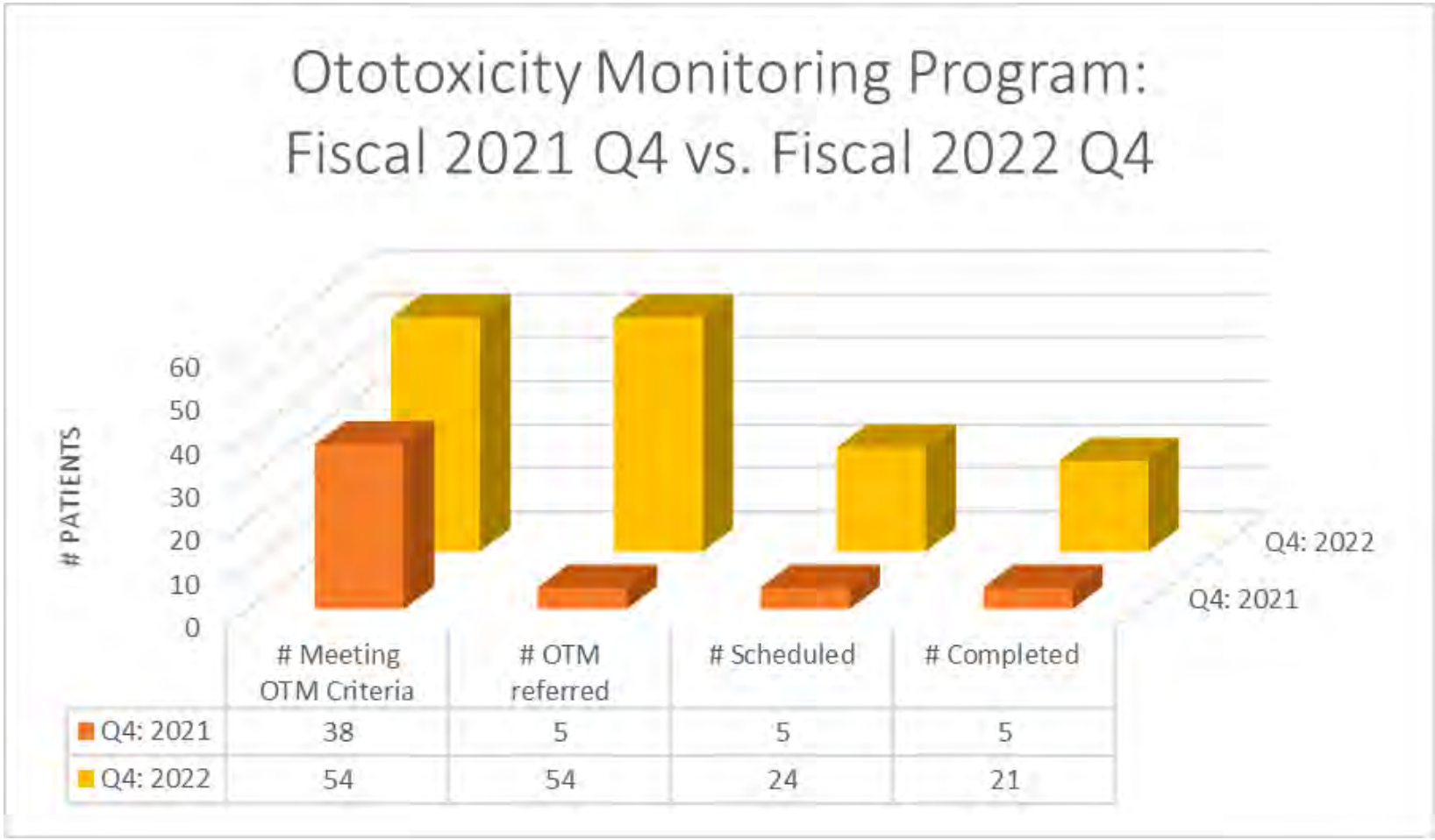
OTM Tracking

- Tumor Board Date
- Patient MRN
- Patient Name
- Referral type/source
- Recommended treatment
- Smartphrase via medical record system
  - Tasking insurance verification specialist to check patient benefits
- Task Sent
- Benefit Verified
- Patient contacted/scheduled

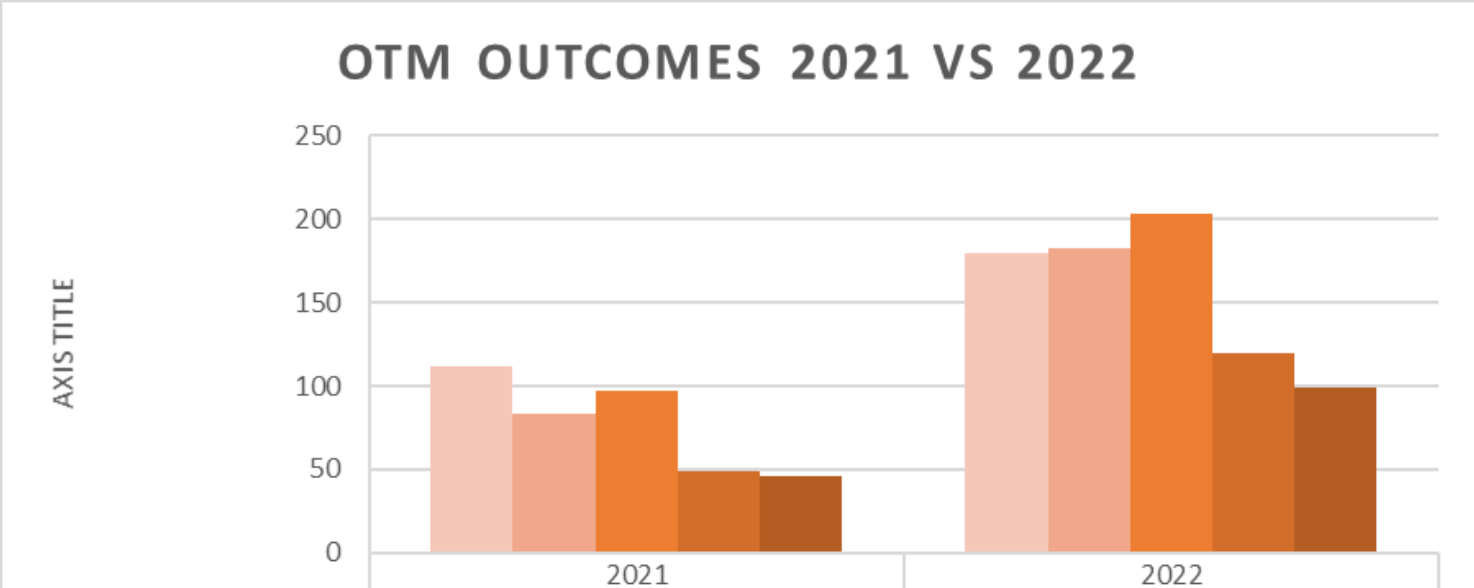
The OTM program is broken down in phases:

- Phase 1: Tumor Board
- Phase 2: Task Verification/ Benefit Check
- Phase 3: Patient Scheduling
- Phase 4: Baseline Testing

Efficacy of OTM Program

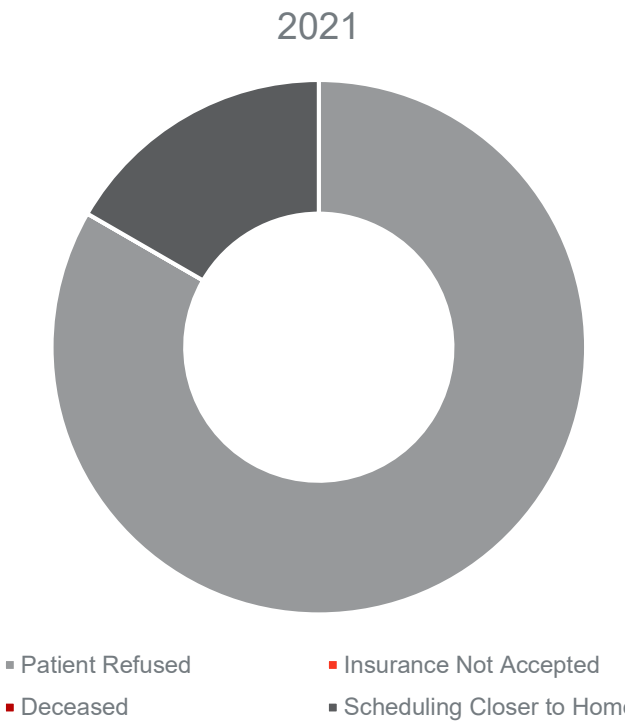


OTM Program: Yearly Glance

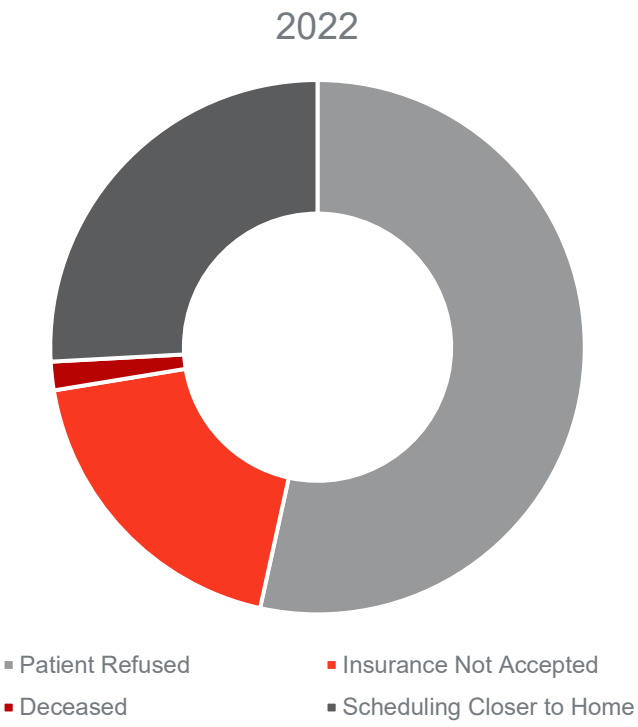


	2021	2022
Referred	112	180
Task Sent (audiology)	83	183
Benefits Verified	97	203
Baseline Scheduled	49	120
Audio Completed	46	99

2021


2021
Patient Refused
Insurance Not Accepted
Deceased
Scheduling Closer to Home

2022


2022
Patient Refused
Insurance Not Accepted
Deceased
Scheduling Closer to Home

Key Points – Summary

- Collaboration
- Communication
- Education
- Accountability
- Weekly follow up of key check points

THANK YOU!

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