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Sustainability and Outcomes of a Standardized Aminoglycoside Induced Ototoxicity Monitoring Algorithm in Patients with Cystic Fibrosis

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Sustainability and Outcomes of a Standardized Aminoglycoside Induced Ototoxicity Monitoring Algorithm

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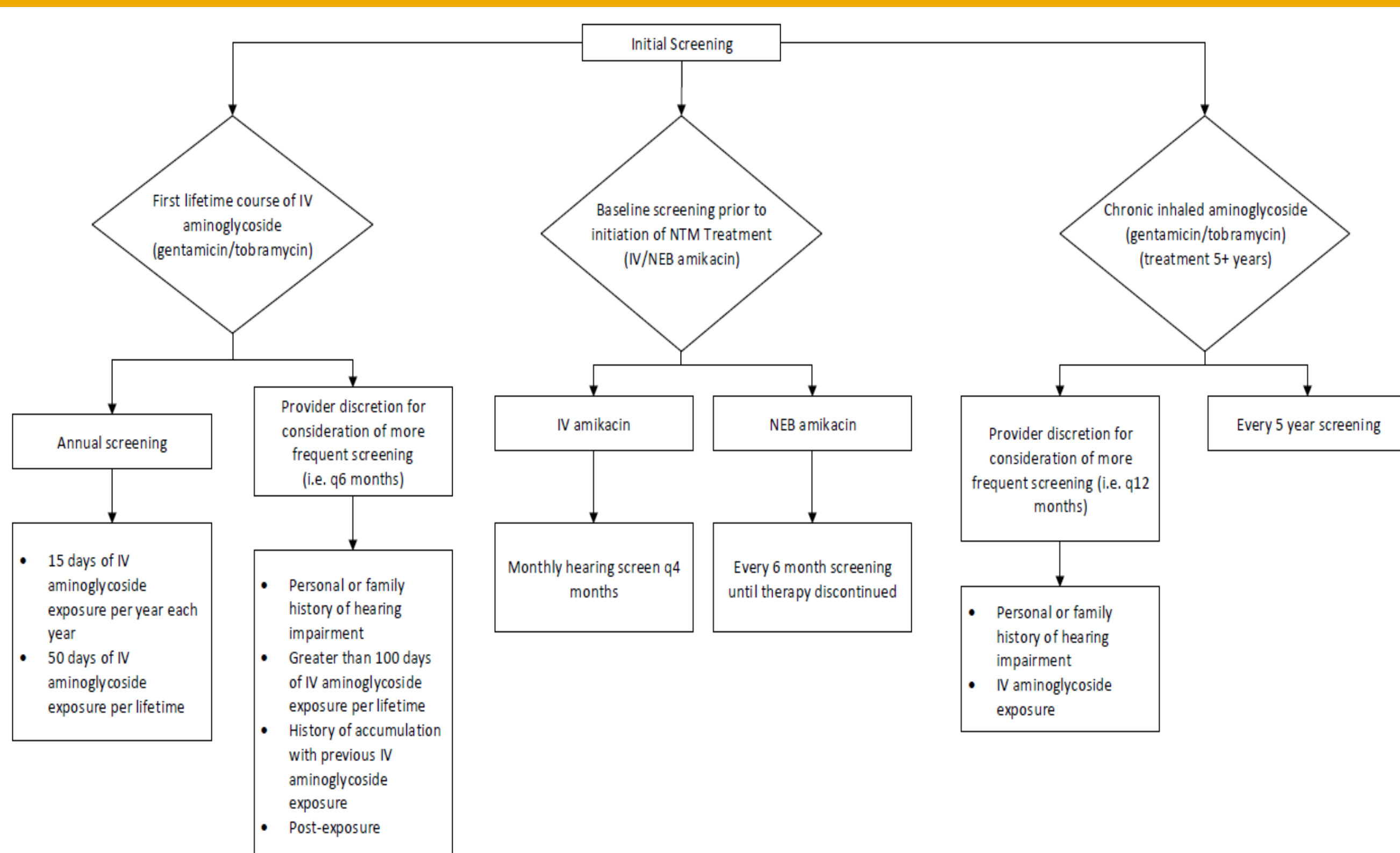
Background

- Aminoglycoside (AG) antibiotics are essential for the treatment of cystic fibrosis (CF) lung infections.
 - Pseudomonas aeruginosa*
 - Nontuberculous mycobacteria
- Monitoring is critical secondary to potential nephrotoxicity and ototoxicity.
- Children's Mercy Kansas City (CMKC)
 - Standardized nephrotoxicity monitoring in 2016
 - Variable ototoxicity monitoring practices
- Prevalence of ototoxicity
 - 2016 CFF Patient Registry
 - 1.1% pediatric patients (≤ 18 years)
 - 2.2% overall population
 - National Institute of Deafness and Other Communication Disorders
 - 13% total US population ≥ 12 years old
- A standardized AG induced ototoxicity monitoring algorithm (AIOA) was developed and implemented at CMKC in 2017

Methods

- Pre-Implementation:
 - Provider Survey
 - Retrospective Chart Review
 - Observational Cohort Analysis
 - Review of Published Literature
- AIOA implementation: 1/1/2017
- Eligible patients identified during pre-clinic huddles and hospitalizations by PharmD and CF Center Coordinator
- Monthly retrospective review of AG prescriptions and inpatient AG orders
- Database developed to track audiograms, therapy modifications, and adherence to algorithm

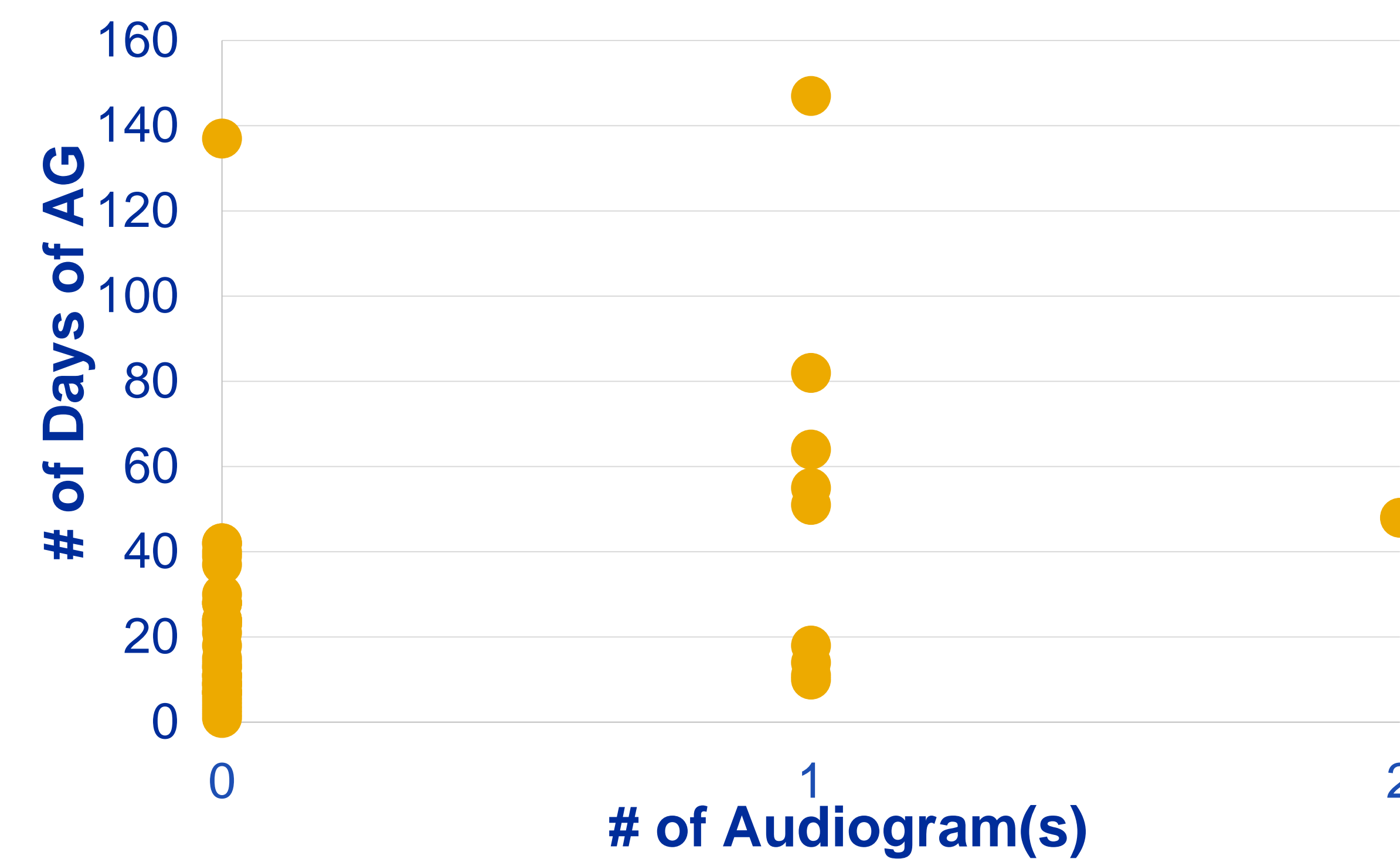
AIO Algorithm



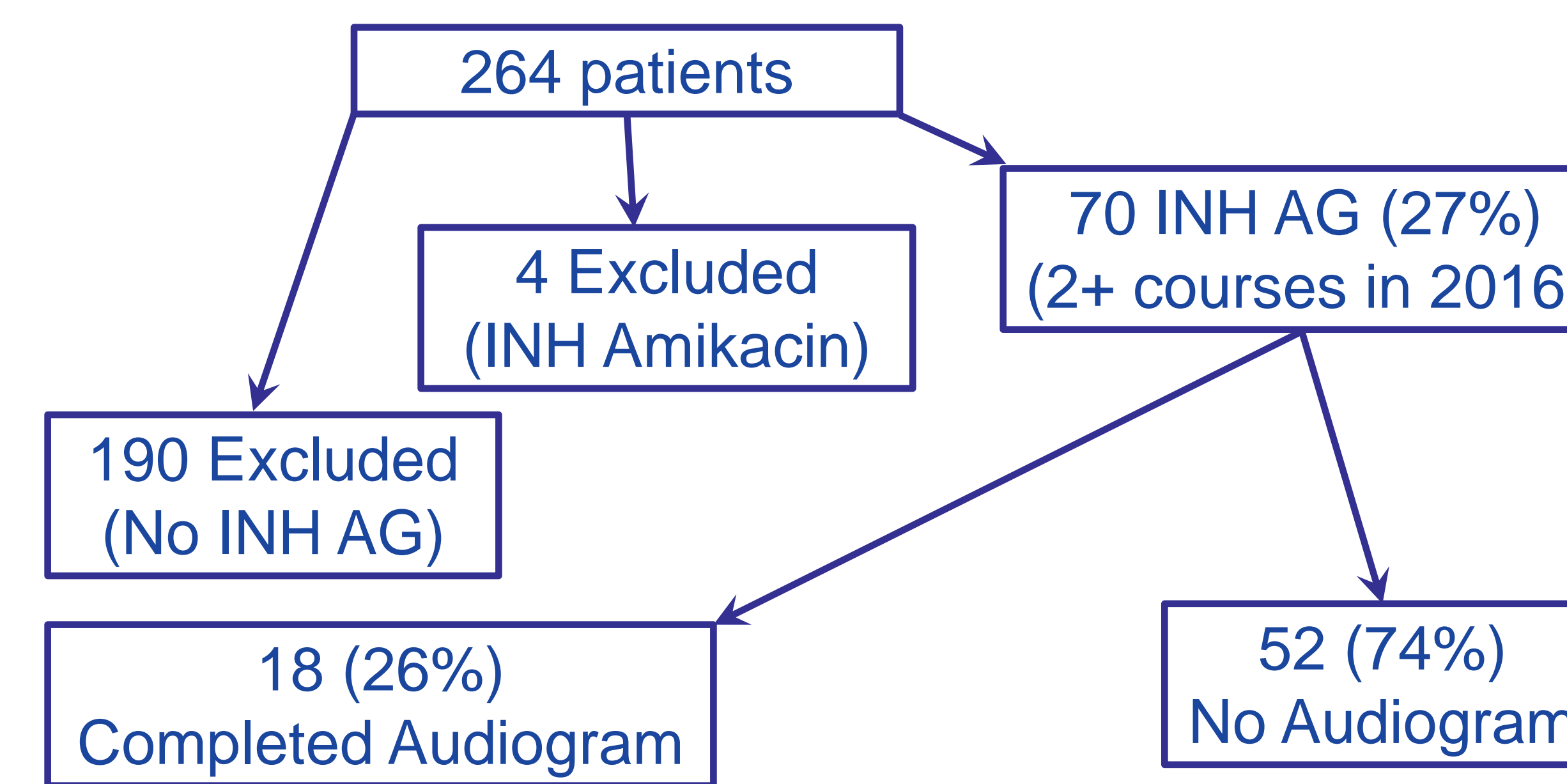
Pre-Implementation Results

- 14 of 52 patients (27%) treated with IV AG between 2014 and 2015 had a lifetime audiogram.
- 18 of 70 patients (26%) treated with 2+ courses of INH AG in 2016 had a lifetime audiogram.

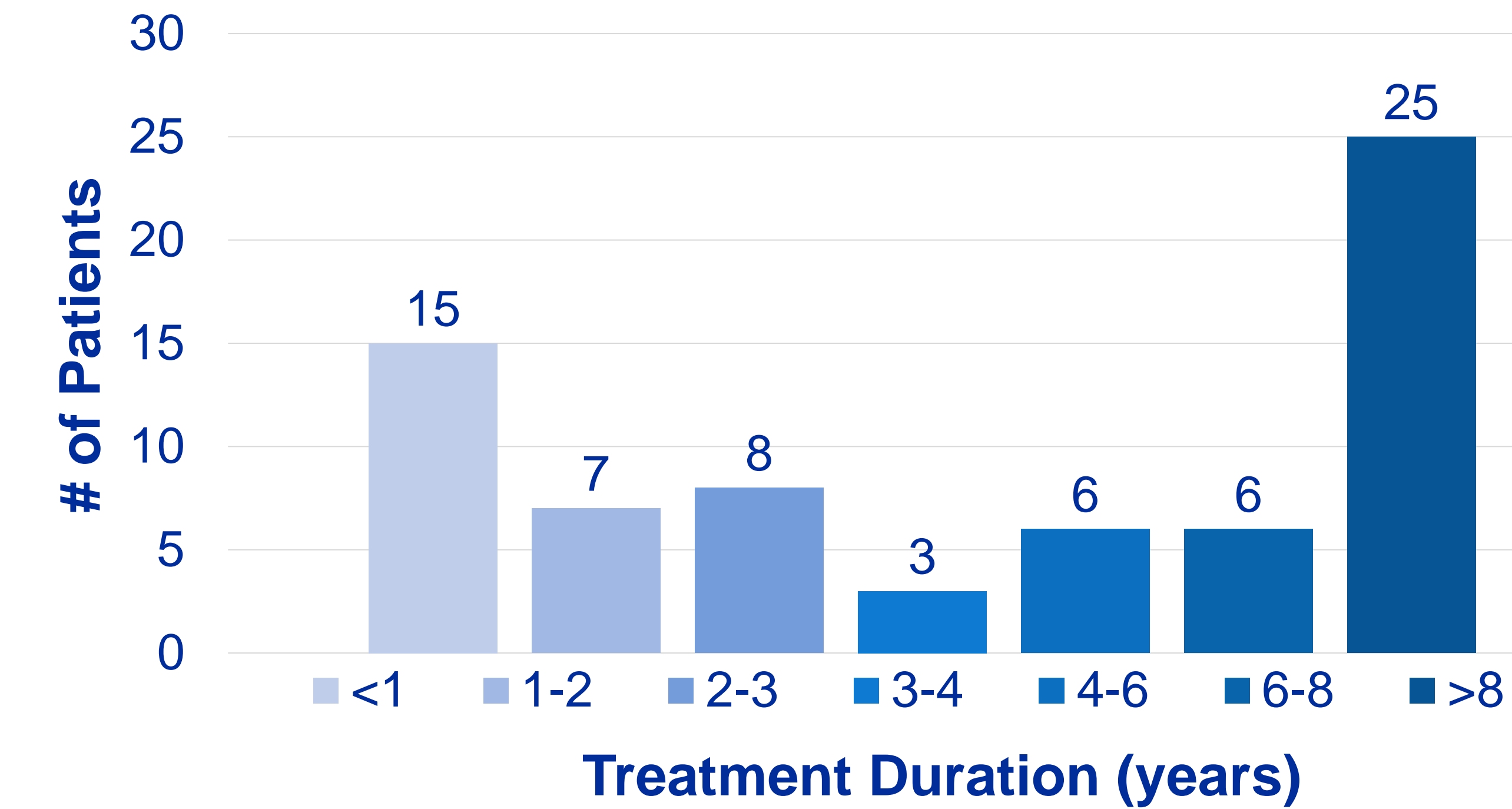
IV Aminoglycoside Days Compared to Audiogram Monitoring



2016 Inhaled Aminoglycoside Observational Cohort Analysis

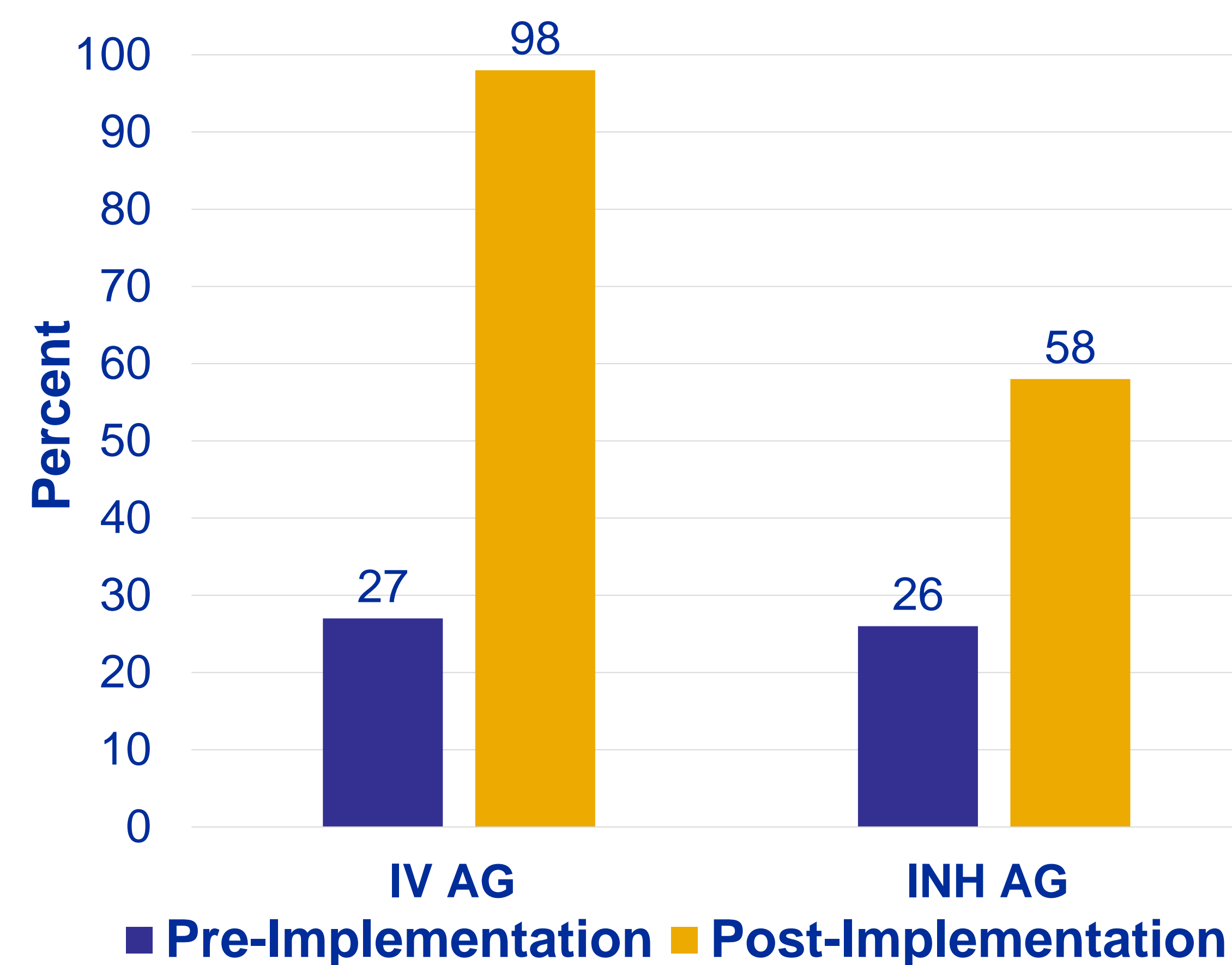


Inhaled Aminoglycoside Duration of Therapy

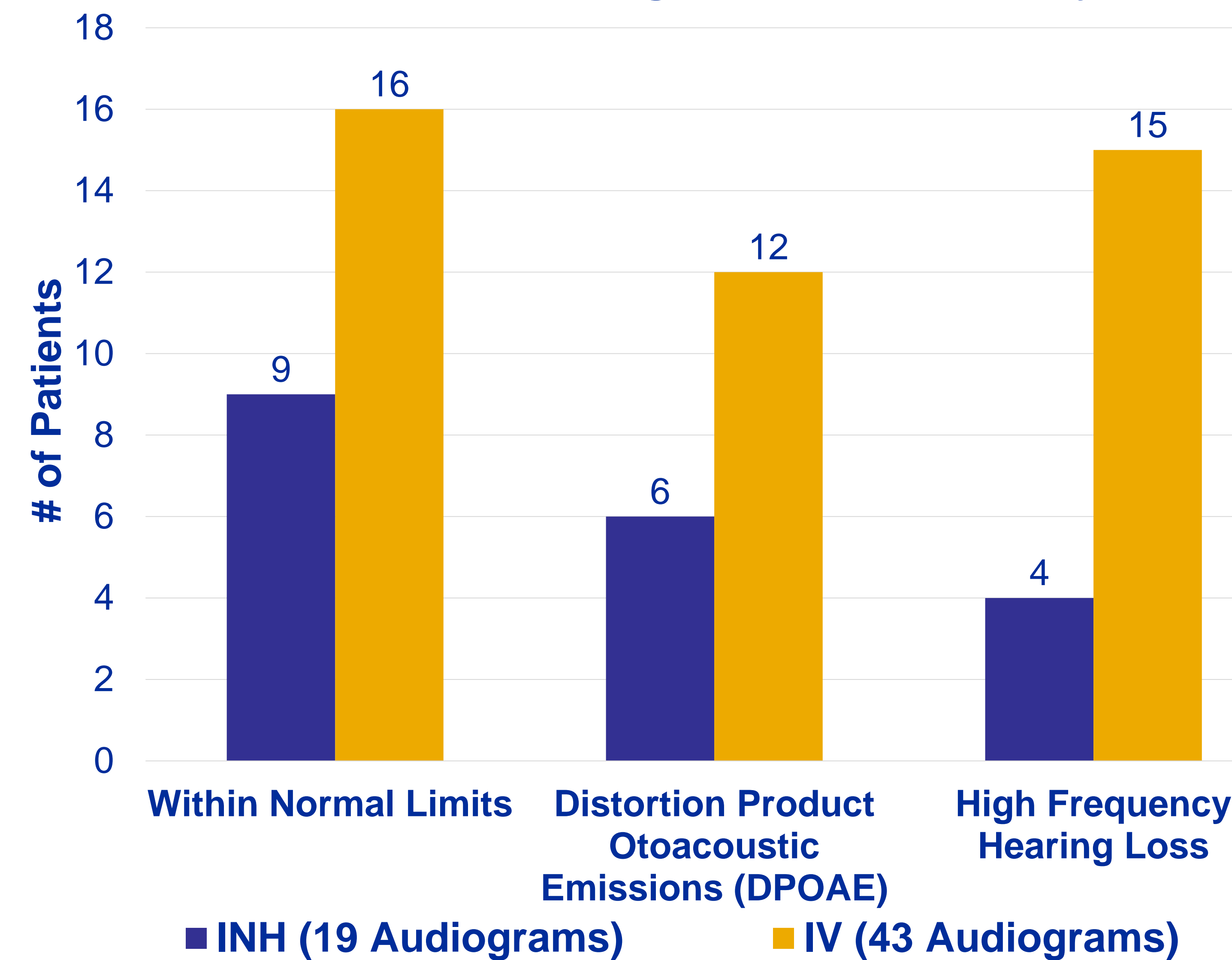


Post-Implementation Results

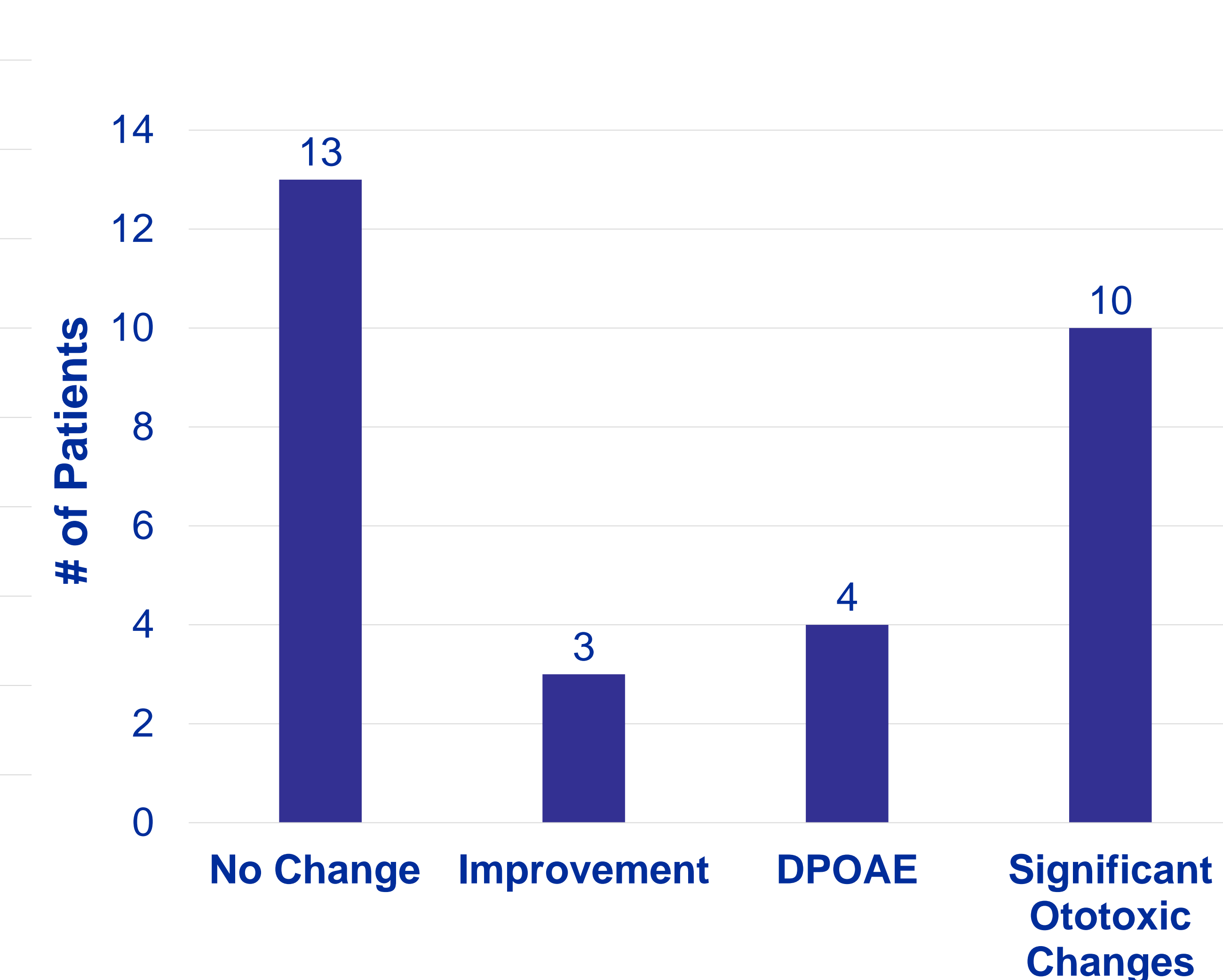
% of AG Exposed Patients Receiving Audiogram



IV and INH AG Audiogram Outcome Analysis



Hearing Changes in Patients with Multiple Audiograms



- 24 months post-implementation, 43 of 44 patients (99%) treated with an IV AG had an audiogram.
- In 2018, 33 patients had received an INH AG ≥ 5 years. Audiograms were obtained in 19 patients (58%).
- Based on audiogram results 12 interventions have been made including: 2 referrals to otolaryngology and 10 pulmonary exacerbation treatment regimen modifications such as adjusting therapeutic drug monitoring goals, selection of alternative antimicrobial agents, and/or utilization of otoprotective agents.

Conclusions

- Implementation of an AIOA increased the frequency of audiograms obtained among patients treated with IV and INH AG.
- The prevalence of hearing abnormalities at CMKC is higher than that reported in the CFF Patient Registry as well as the overall US population.
- In 62 audiograms obtained over 24 months, 37 (60%) had some degree of abnormality in either distortion product otoacoustic emissions or high frequency hearing loss. Among the patients with abnormalities an intervention was made in 12 treatment courses for 4 patients.
- The frequent use of AG among CF patients and the incidence of AG induced hearing loss suggest a need to establish an AIOA nationally.

The authors of have no relevant disclosures