

# The End of NIOSH’s Hearing Loss Prevention Program: Setback or Opportunity?

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## Abstract

The recent staff layoffs and defunding of the United States’ National Institute of Occupational Safety and Health’s Hearing Loss Prevention Program are perceived by many occupational hearing loss professionals and stakeholders as an unsettling setback. This Commentary explains how and why ending this federal governmental program’s research agenda—even if it is temporary—should not stop progress by the private sector toward secondary prevention of noise-induced hearing loss by leveraging the overabundance of under-utilized raw audiometric data already collected for compliance purposes. The resources needed to accomplish this objective include metrics and statistical methods that transform raw audiometric data into risk-based population analytics, optimization of program delivery, and selective prioritization of cost-effective technology and basic research. Integrating population-based audiometric database analysis into routine business practice will give employers the valuable business intelligence they need to continuously measure the actual effectiveness of and return on investment from their hearing conservation programs. Private sector stakeholders who stand the most to benefit—employers, insurers, and suppliers—can pragmatically implement this solution framework to more efficiently manage noise-related worker health risk for relatively little additional cost compared to what employers already pay to conduct audiometric testing and basic compliance reporting. Government agencies’ otherwise traditionally reactive enforcement role can concomitantly evolve into a proactive, risk-reducing resource that enhances their role in regulation and technical support.

**Keywords:** Noise-induced hearing loss, audiometry, secondary prevention, National Institute for Occupational Safety and Health

## THE PROBLEM

Noise-induced hearing loss (NIHL) remains the world’s most prevalent, permanent, and preventable occupational disease despite over forty years of governmental noise regulations and research.<sup>[1]</sup> Employers in the United States (US) alone spend billions of dollars annually on regulatorily-mandated hearing conservation programs (HCPs), including audiogram collection and administration, yet the overall effectiveness of HCPs in preventing NIHL remains uncertain and unquantified.<sup>[2]</sup> This paradox exists in every nation where workplace noise is regulated.

The highly visible reduction in capacity at the US National Institute of Occupational Safety and Health (NIOSH) in 2025 included the elimination of its longstanding Hearing Loss Prevention Program staff. Many American occupational safety and health professionals perceive this as a subversion of an essential governmental safeguard against

NIHL.<sup>[3,4]</sup> Even though this NIOSH program’s funding has just recently been restored, this debacle presents heretofore unrecognized opportunities for the private sector to address gaps more effectively in governmental programs.

While NIOSH’s scientists, audiologists, and engineers have successfully developed and promoted primary prevention methods to reduce excessive workplace noise exposure,<sup>[5]</sup> they have not made a commensurate impact on secondary prevention as demonstrated by population outcomes of audiometric testing data aggregated at the company, industry or occupation level.<sup>[2]</sup> NIOSH’s numerous

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epidemiological research publications estimating the prevalence of NIHL and its economic burden have repeatedly confirmed that NIHL is a widespread problem, yet NIOSH has continued recommending the HCP compliance model without objective audiometric evidence of its effectiveness.<sup>[6,7]</sup> NIOSH field studies likewise have promoted audiometric screening without objectively demonstrating reduced population-level, audiometrically defined NIHL outcomes after noise exposure interventions.<sup>[8]</sup> After years of collecting over 12 million audiograms from thousands of workplaces across the US,<sup>[9]</sup> NIOSH has not produced any population-based audiometric database analysis methods or tools for employers<sup>[1,10]</sup> nor has it developed predictive metrics that ameliorate the Standard Threshold Shift (STS), a nonspecific, lagging indicator of NIHL.<sup>[2,8-11]</sup> Similarly, after two decades (1991–2011) of effort, the American National Standards Institute S12.13 Standard Committee has not produced a validated audiometric database analysis methodology.<sup>[2]</sup>

Consequently, private sector stakeholders who have the audiometric data, access to workers, and the channels to take action continue doing nothing more with their audiometric data beyond making one-person and one-test at-a-time STS compliance determinations.

## AUDIOMETRIC DATA ANALYTICS: A BUSINESS INTELLIGENCE SOLUTION

Transforming raw, individual audiometric compliance data into actionable, population-based business intelligence will enable employers and industries to objectively inform their strategic and operational risk management decisions around noise. With such methods and tools, they can more efficiently target and measure the impact of exposure control interventions, and objectively measure their return on investment for direct and indirect (e.g., employee productivity, retention, and disability) costs. Compared to how much money these employers already spend to simply conduct audiograms and report STSs, this approach adds substantial marginal value to the *status quo* “regulatory compliance” model.

### Private Sector Resources

Integrating audiometric database analysis into the standard delivery of HCPs is practical, affordable, and attainable with specific resources from private sector stakeholders.

### Metrics and Statistical Methods

A method is needed to transform individual audiometric data into a sensitive and specific numerical metric(s) that accurately summarizes NIHL-specific audiometric hearing loss progression at the ear- and subject (two ears)-level.<sup>[2,12]</sup> Statistical analysis of these metrics is applied to measure hearing loss trends specifically *toward* NIHL in similarly

exposed groups (SEGs) of workers in company-, industry-, or occupation-specific populations. Risk for audiometric NIHL can thereby be predicted, and comparative individual employee risk determinations can be made. These metrics and methods must be sufficiently robust to surmount the inherent complexities of (nondiagnostic) screening audiometric data interpretation.<sup>[2,13,14]</sup>

### Strengthen Program Delivery

Secondary prevention succeeds when audiometric surveillance is paired with timely, enforced, and measurable corrective action. Occupational health and audiology providers need to do what neither NIOSH nor the US Occupational Safety and Health Administration (OSHA) has done: centralize audiograms, standardize metadata (e.g., SEG, noise and ototoxicant exposure classification, hearing protection use) and continuously deploy and report risk-oriented analytics. These programmatic and behavioral practices do not require NIOSH labs or research—just commitment and measurement.

### Be Selective and Pragmatic about Technology and Basic Research Priorities

More government research on NIHL prevalence or associations between noise exposure and adverse health outcomes<sup>[6,8,15,16]</sup> *isn't* needed to drive realistic, cost-effective solutions.

### Stakeholders

Adopting or enforcing audiometric database analysis by modifying longstanding noise regulations is unlikely to occur in the US or in the other industrialized nations with noise regulations and agencies that mandate audiometric testing but which do not systematically collect and meaningfully analyze aggregated audiometric data at the population level.<sup>[2]</sup>

Instead, a new framework of private-public sector cooperation is needed to effect the practical integration of audiometric database analysis into the standard delivery of HCPs. The private sector stakeholders with the most to gain—employers, insurers and suppliers—have a compelling business case for utilizing aggregated audiometric data analysis as business intelligence. Agencies like NIOSH and OSHA would utilize the aggregated analytics to enhance and refine their capabilities for providing technical support and regulatory oversight.

### Employers

Employers should commit to contracting for outcome-driven audiometric testing services that tie vendor payments to standardized audiometric database analysis which measures population NIHL risk and demonstrates the effectiveness of engineering controls, personal protective equipment, and

training. Buy-Quiet procurement policies should include hearing loss metrics in supplier scorecards.

### Insurers

Employers are required by law to carry workers' compensation insurance (either privately or publicly funded). Insurers' traditional role is largely reactive: adjudicating individual hearing loss claims, well after prevention has failed. Insurers can and should have a *proactive* role in prevention by incentivizing insured companies' participation in data analytics through premium differentials. Industry consortia can aggregate de-identified data (linkable to job/exposure metadata) from a centralized audiometric database(s) to measure industry-level trends and objectively manage and predict population-level risk.

### Suppliers (Audiometry, Occupational Health, Safety, and Industrial Hygiene)

Data integration from audiometers, proprietary databases, and electronic health records into a standardized, centralized audiometric database should be a mandatory contract requirement. Audiometric hardware and software vendors can then readily export audiometric data at the company level into a fit-for-purpose, third-party information management platform designed to streamline and automate the process of managing dynamic audiometric data and logistics (e.g., scheduling, collection, analysis, reporting) without having to redesign internal databases, rewrite code, or otherwise disrupt their existing business models.

### Government

With access to a centralized, deidentified private sector audiometric database(s) and population analytics on an ongoing basis, governmental agencies will have a novel opportunity to evolve their traditionally reactive enforcement posture into a more proactive, risk-reducing resource while ensuring transparency and accountability for the industries they regulate.<sup>[2]</sup> NIOSH, in its research role, can apply this information to better understand the distribution and determinants of NIHL, and thereby more accurately evaluate the effectiveness of noise exposure controls and encourage necessary activities across private sector businesses and industries. OSHA and other regulatory agencies can leverage aggregated analytics to encourage, commend and reward companies and industries based on actual outcomes, and target industrial hygiene and other technical support where risk is highest (the "carrot"), rather than merely punitively enforcing noise regulations based on reported complaints (the "stick"). Aggregated data and population analytics do not need to be confined to national borders, as a global public health entity such as the World Health Organization could participate and support international cooperation toward a shared solution.<sup>[17]</sup>

## CONCLUSION

The (temporary) elimination of a US government agency's international leadership in researching causes and strategies for prevention of NIHL paradoxically presents a unique opportunity for the private sector to step up progress in the *secondary* prevention of NIHL surveillance by efficiently utilizing the audiometric data it already has available. Integrating practical, evidence-driven tools and technologies for population-based audiometric analytics into the routine delivery of HCPs represents a paradigm shift for achieving the elusive public health goal of prevention of hearing loss in workers, while simultaneously reducing risk and cost for employers—in the US and in all industrialized nations.

### Author Contributions

The author is solely responsible for conceptualization, intellectual content, literature search, manuscript preparation and editing. The opinions raised in the article are those of the author and do not represent the views of the journal or UCSF.

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### Conflicts of Interest

The author is an occupational and environmental medicine physician whose USA-based private company has developed, validated, patented and commercialized audiometric data analytics for secondary prevention of noise-induced hearing loss. This technology was a finalist in the 2016 OSHA- and NIOSH-sponsored international Noise Challenge to solicit new occupational hearing loss prevention technologies from the private sector.

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