

Learning more from the hearing conservation programme's medical surveillance data

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INTRODUCTION

Globally, noise-induced hearing loss (NIHL) is a very common self-reported occupational illness or injury, despite decades of study, workplace interventions and regulations.¹ An even worse reality is facing mining-intensive countries. The Minerals Council South Africa indicates that more than 73% of miners in the country are exposed to excessive noise despite the intensive implementation of hearing conservation programmes (HCPs).²

Hearing conservation programmes (also referred to as hearing loss prevention programmes (HLPPs)) are interventions regarded as the most holistic approaches to the prevention of NIHL, through primary and secondary controls. Primary controls entail activities that are aimed at eliminating or reducing exposure levels to hazardous noise, while secondary controls focus mainly on the use of personal protective equipment (PPE) and employee education and training about the necessary precautions that must be taken in order to reduce noise exposure.³ Also central to the HCP are medical surveillance and thorough record keeping that allow for monitoring and identification of individuals or groups affected by high noise levels.⁴

Regardless of the intensive implementation of HCPs throughout the mining industry, the number of NIHL cases continues to increase.⁵ According to Rand Mutual Assurance (RMA), although acceptance of liability has decreased in recent years, NIHL cases still comprise up to 90% of compensation claims.⁵ Considering that repeated systematic reviews conducted to evaluate the effectiveness and efficacy of HCPs have yielded inconclusive evidence,⁶⁻⁸ it is unsurprising that, worldwide, 16% of disabling hearing loss in adults is attributed to occupational noise.⁹ This poses a serious challenge to the industry to reconsider efforts aimed at NIHL prevention.

Among the list of cited reasons for the failures of HCPs, unclear definitions of HCP activities,⁸ inconsistencies in practices,⁶ inconsistencies in implementation and over-reliance on medical surveillance as a preventive tool,⁷ poor monitoring characterised by limited use of audiometric surveillance data, and over-emphasis on legal compliance were most often mentioned.^{6-8,10}

DATA ANALYSIS BEYOND LEGAL COMPLIANCE

The enactment of the Mine Health and Safety Act (MHSA) of 1996 introduced regulations that led to the formalisation of HCPs in South Africa.¹⁰ Earlier legislation was mainly concerned with regulating compensation, particularly lung diseases (Occupational Diseases in Mines and Works Act (ODMWA), 1973) and general workplace injuries or diseases (Compensation for Occupational Injuries and Diseases Act (COIDA), 1993), with little focus on structured and consistent NIHL prevention efforts.^{11,12} The newly enacted MHSA made significant inroads to improving general safety in mining; however, high levels of noise remained unabated and, as a result, mine workers continue to be at higher risk of developing NIHL than workers in other industries.^{13,14} Serious questions remained unanswered about the success of HCPs in post-apartheid South Africa.

The 2003 and 2014 Mine Health and Safety summits aimed to address some of these concerns regarding the increasing number of NIHL cases. Labour, the regulator/government and employer gathered at the 2003

summit to discuss strategies for the future. Under the theme *The Road to Zero Harm*, leaders agreed on some milestones that needed to be achieved in 10-year periods to reduce the number of compensable NIHL cases.

The first 10 years were a dismal failure. At the subsequent 2014 summit, poor capacity and support, including low levels of buy-in, were identified as key factors in the industry-wide failure to curb the increasing number of NIHL cases, leading to the revision of the milestones.⁶ The second summit had a marked ideological shift, emphasising standard threshold shifts (STS) over traditional percentage loss of hearing (PLH) used in the COIDA of 1993. The targets were that, by December 2016, an employee's STS will not exceed 25 dB from baseline when averaged at 2 000, 3 000 and 4 000 Hz in one or both ears and, by December 2024, the total operational noise emitted by any equipment must not exceed a milestone sound pressure level of 107 dB(A)¹⁴ (down from the target of 110 dB(A) in the 2003 milestones).

The justification for using STS instead of PLH was that STS methodology was more sensitive to minute changes in audiometric thresholds, allowing for a proactive approach to NIHL prevention,¹⁵ as opposed to managing 10% PLH shifts as recommended in the COIDA of 1993. It is unclear how employers intend to achieve the second target when they failed to reach the initial 110 dB(A) target. While it is accepted that audiometry is the gold standard surveillance tool in HCPs, it is also important to note that the second summit was a missed opportunity by the mining industry to be innovative, and to consider using other tools to improve the quality of medical surveillance data that can be used beyond determining grounds for compensation.

Both summits allowed for a concerted focus on the effectiveness of HCPs; however, the 'Road to Zero Harm' approach remains narrow and over-simplified. The chief concern is the limited mono-causal and mono-outcome approach to data management and interpretation in HCPs.^{6-8,10} For example, the first milestone suggests that loss of hearing sensitivity is of no consequence to the employee until it reaches the specified level (STS/PLH shifts)⁷, and only noise exposure can cause a threshold shift.¹⁶ Evidence suggests otherwise. There are other environmental factors that can adversely affect hearing, and effects of noise exposure go beyond hearing loss to include tinnitus, fatigue, stress and anxiety, which may occur before any noticeable change in audiometric thresholds.^{3,8,17} It is, therefore, erroneous to limit the success of HCPs to current medical surveillance systems, specifically, collection and interpretation of audiograms. The goal of collecting medical surveillance data for hearing conservation should go beyond the interpretation of pure-tone results, to understanding the effects of other activities that contribute to the success of HCPs.

Occupational health contexts have always been multifactorial with multi-outcome challenges.¹ As a result, HCPs are complex interventions that require a solid basis in public health theory, with broader preventive aims than legal or medical interventions.^{7,17} Therefore, to allow for proactive interventions, medical surveillance should also be linked to other HCP activities such as noise elimination, noise control, prevention, and education/training,¹⁶ including employee (individual

or group) behaviour change.³ The reduced role of medical surveillance in current HCPs renders them ineffective in combatting the high number of NIHL cases because they do not encourage proactive interventions. On the contrary, evidence indicates that mining companies continue to use HCPs to manage compensation and improve legal compliance instead of prevention, education and behaviour change, regarding noise exposure beyond the workplace.^{6-7,18-20}

There are several reasons for this lack of innovation. The main explanations relate to costs associated with implementation and lack of managerial will.^{2,7,16} Some researchers contend that the issue is more complex. It is not only about the poor engagement with public health theory, as discussed above, it is also about historical legal and political influences that have led to HCPs operating within a particular model. Particularly, this relates to legal controversies that plagued the early days of the development of HCPs, leading to the current cadre of professionals and stakeholders involved in the implementation of HCPs. Hearing conservation programmes were conceived by employers when employee representatives started winning legal claims from their employers' insurance funds for their loss of hearing in the late 1940s and 1950s.²¹ The influence of these legal battles was far-reaching. As a result, current HCPs operate with predefined inputs and outputs that exclude certain issues and govern the way that noise exposure is addressed. According to Hetu,²¹ the HCP is a "black box that serves to define and address the problem of excessive noise exposure in a particular way, with problematic underlying hypotheses".

Already discussed above are the assumptions relating to the effects of noise exposure on the employee. Another persistent assumption is the permanence of noise in the workplace. This is evident in the second target of 'The Road to Zero Harm' milestones which states that noise must be reduced to 107 dB(A) by 2024, which is still excessively high. Basically, hearing conservation must happen despite the presence of excessive noise. Not only is this a contradiction of terms,⁶ but the concept of noise elimination and control is also reduced to a mere probability, with more emphasis on noise management.²¹

It is common knowledge that noise-control engineering has grown as a science and technology over the years. However, the Mining Industry Occupational Safety and Health (MOSH) noise team's attempts to implement the industry-wide Buy and Maintain Quiet Initiative (IBMQI) were met with resistance at best, or apathy at worst, from the employers.²² 'Achievability', 'practicability', and 'economic viability' were argued against any suggestions relating to investments in equipment that does not emit excessive noise. The issue of weighing the value of workers' health, safety and lives against economic demands is in itself abhorrent, as shown by the High Court approval of a R5 billion (\$353 million) class action settlement between gold mining companies and law firms representing thousands of miners who contracted the fatal lung diseases, silicosis and tuberculosis.²³ This case is testament to the fact that mere medical surveillance, legal compliance and promise of compensation is not enough. It is a challenge for employers to make more efforts to preserve the health and the safety of their most valuable asset, the workers.

CONCLUSION

This paper provides a brief discussion of issues about the poor performance of HCPs in the mining industry. While the discussion is not exhaustive, it highlights that practices that characterise the implementation of HCPs continue to be ineffective because of limited use of medical surveillance data and the insistence of adhering to old, traditional legal assumptions and influences. This is demonstrated to be unsustainable by relating the discussion to the current 'Zero Harm' milestones. New evidence and shifts in legal systems pose a challenge for employers to consider reprioritising HCP implementation through investment in innovation.

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