SHIFT WORK, NOISE EXPOSURE AND HEARING LOSS

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Non-traditional work shifts such as 12 hours shifts with 3 days on and 2 days off are changing the workplace yet noise regulations use a standard 8 hour shift to evaluate noise. This means that employees with identical long term exposure can have, in the example case, 2 dB different noise exposures. This paper presents the issues both in terms of the difference in measurements but also in terms of the difference in the effect of such shifts on employees' hearing.

More and more industries are abandoning the traditional 8 hour day, 40 hour week in favor of 12 hour shifts, often with 3 days on, 2 days off. Another variation is to work 3 weeks with 1 week off. Although in the long term there is little difference in hours per month or hours per year, the short term effect is a 50% increase in work hours on a particular day.

Ontario and most other jurisdictions now regulate noise exposures based on the exposure during a single day. This means that in order to meet an 8h 85 dBA limit the average sound level over a 12 hour shift must be 83 dBA to allow for the extra 4 hours or exposure. However since we know that hearing loss accumulates over a period of years, their actual exposure according to the equal energy theory would actually be 2 dB lower if their exposure met the 83 dBA limit.

There has been surprisingly little debate on the effect of this extra 2 dB, probably for several reasons. First, 2 dB is a relatively small sound level difference (that is within the measurement error range), and the difference in practice may be hard to measure. Second, we know that people exposed to 8h 85 dBA exposure over 40 years have a 10-15% excess risk of a material hearing impairment and those with an 8h 80 dBA exposure have 0-5 % excess risk[1]. Thus dropping their exposure half way between these two can only reduce the excess risk for those on the longer shifts. Finally, regulators need a practical limit which can be measured relatively quickly and easily. Measuring over a single shift is relatively easy for both regulators and industrial hygienists. Some shift patterns can take weeks or months to repeat, making the effort required to measure longer term exposure much more onerous[2,3].

The picture is even more complicated than this. Two papers (1.2) that appeared in the international journal Noise and Health claim that hearing loss from longer shifts separated by longer periods of rest result in lower threshold shift and, eventually, in reduced risk of hearing loss than those predicted by just using the equal energy theory.

As per the first paper a sample of 218 male workers recruited at a semiconductor factory with no known occupational hazards that affected hearing acuity other than noise worked either in an eight-hour or 12-hour shift. Results from standardized audiometric tests showed that the severity of hearing loss in both ears was significantly lower in subjects who worked a 12-hour shift. In conclusion, working a 12-hour shift followed by a day off is best for workers' hearing.

The second paper also claims that noise-exposed employees working 12 hours a day for two consecutive days followed by two days off, had significantly lower permanent hearing loss than employees working nine-hour shifts from 8 am to 5 pm Monday to Friday.

Obviously, two studies are not sufficient to draw a conclusion. However they might pave the way for more research to determine the use of improved intermittent noise exposure regimes in future design of the noise exposure workday/-week and make future hearing conservation programs more effective.

Meanwhile the debate will continue but it appears that regulating noise exposure on a daily 8h basis is likely providing those working longer shifts with an extra measure of protection.

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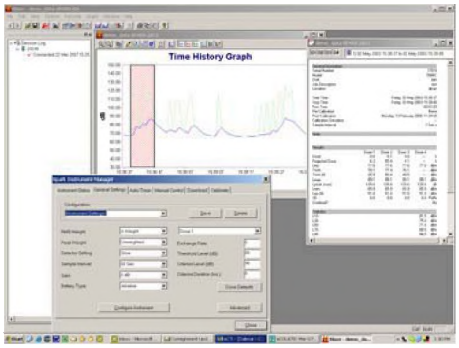

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