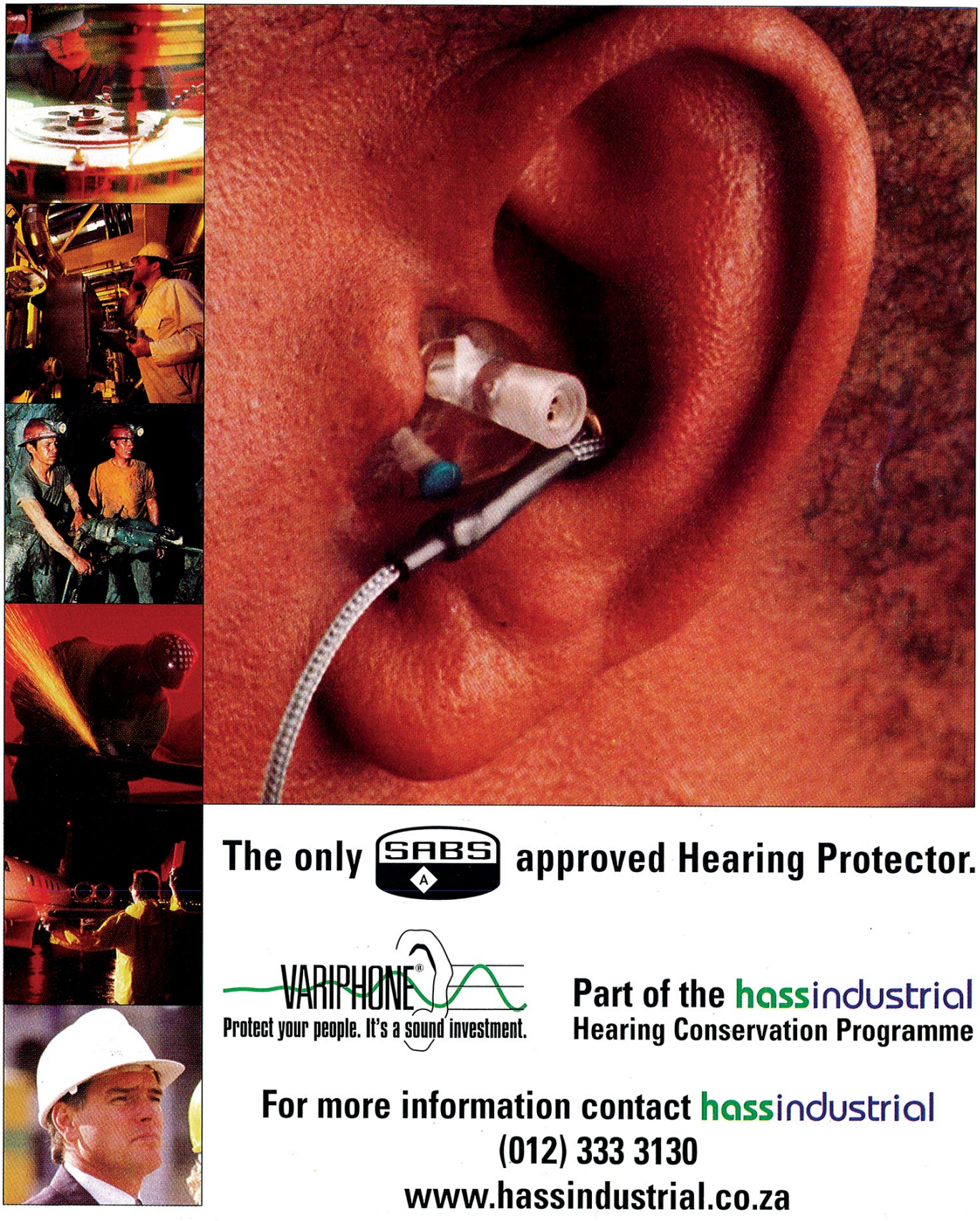
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SOUTHERN AFRICA

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Hearing Conservation

In 2001 draft regulations on noise have been under preparation by both the Department of Labour and the Department of Minerals and Energy (DME). In addition the DME plan to issue a guideline which will require a mandatory Code of Practice on noise. The SABS Standard 083 on hearing conservation is under revision. Instruction 171 from the Compensation Commissioner on Noise Induced Hearing Loss was published in May 2001. In light of all the new regulatory development underway with regard to hearing conservation, this issue focuses on the subject.



Barnes and La Grange discuss the renewed impetus for the prevention and compensation of noise induced hearing loss. They cover in particular the new Instruction No. 171, which repeals Instruction No. 168.

Steenkamp asks the question, "Is hearing protection through custom-made hearing protection devices (CHPDs) the solution?" This is a question that many of those involved in hearing protection will be asking.

Hassall in his paper on noise control discusses the fundamentals of sound and its methods of propagation. Simple examples are provided. It is hoped that occupational health professionals can avoid most of the tears and all of the maths by following a systematic approach based on a clear qualitative understanding of the fundamentals of noise control.

A large amount of useful information on acoustics and hearing conservation can be rapidly accessed via the Internet. The NetPage in this issue focuses on Noise and Vibration web sites. More extensive links can be located via the Noise and Vibration pages of asosh.org and its mirror site asosh.tripod.com. The NetPage is a driving force to extend and update the range of safety, health and environmental links on asosh.org. This appears to be a popular combination as in the period 1 August 2001 to 8 October 2001, asosh.org received visitors from over fifty countries.

Careers

The journal plans a series of articles to provide guidance on careers in the occupational health disciplines. In this edition Murphy discusses careers for doctors in occupational health. Further articles will follow on careers in occupational health nursing and in occupational hygiene.

Permits to dispense medication

Yes this problem is still with us. The confusing state of affairs with regard to nurses and the permit system to dispense medication is covered by Geyer.

Society Web Sites

Society members will be pleased to know that South Africa is possibly the fourth country in the world after the USA, Canada and Australia to have all four core disciplines in occupational health and safety (occupational medicine, occupational health nursing, occupational hygiene and safety management) on the web at their own domains. The web site domains are saioh.org (SAIOH), sasohn.org.za (SASOHN), sasom.org.za (SASOM) and iosm.org (IoSM, Institute of Safety Management).
It is planned that the articles published on careers will be added to the SAIOH, SASOHN and SASOM web sites and hyperlinked to provide simple and rapid access to information on careers in occupational health. A Frequently Asked Questions (FAQ) section on careers in occupational hygiene already exists at saioh.org.

The index to this journal has been saved from the Cannon Medical Media website and added to saioh.org. This index will be updated in the coming months.

The free email discussion groups for SAIOH (occhyg@yahoogroups.com) and SASOHN (ohnp@yahoogroups.com) became active in 1999 and 2001 respectively. It is hoped that the discussion group for SASOM (occmed@yahoogroups.com) will now become active.

Dr. David W. Stanton
Guest Editor

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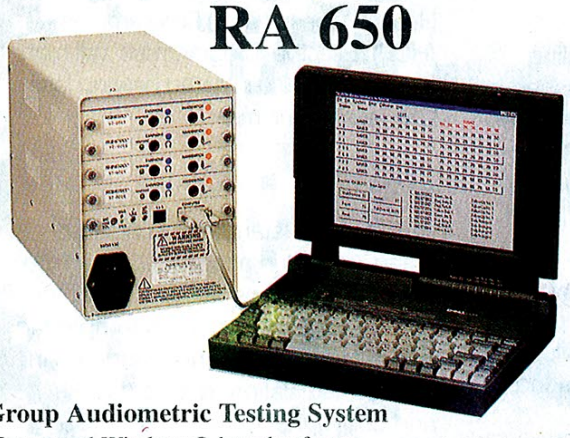
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A renewed impetus for the prevention and compensation of noise induced hearing loss

by D Barnes, M A C La Grange

In 1994 Instruction No. 168 was issued by the compensation commissioner. This was without consultation or evaluation as to financial impact. The Instruction No168, based on the American Medical Association's model, resulted in an immediate fourfold increase in the number of employees becoming compensatable, as the "low fence" required for compensation purposes was lowered from 43dB to 26dB average hearing loss. Apart from the increase in unfunded liability there were resultant increased administrative problems and also a potential for discrimination against employees with existing hearing loss as employers would naturally be reluctant to recruit individuals already entitled to compensation or very close to the "low fence".

The new Instruction No 168 also had the negative effect of further entrenching a system of compensation that failed to encourage preventative measures by employers and employees.

In the midst of court cases a tripartite Technical Committee (TC) was established in terms of the Compensation for Occupational Injuries and Diseases Act, No. 130 of 1993 (COIDA) to review the new Instruction. This TC immediately agreed not only to review the Instruction but the whole statutory dispensation concerning hearing conservation.

Government departments, associations, professional representative organisations, academics and others were consulted. An international review of hearing conservation programmes and compensation systems was also undertaken. Deliberation resulted in an agreement to the satisfaction of all stakeholders and the new recommendations were put to the Compensation Board and approved at the end of 1999.

The process took a long time as tripartite agreement was essential. Furthermore, new legislation had to be put in place in terms of three different Statutes; the Occupational Health and Safety Act (OHSA), the Mine Health and Safety Act (MHSA) as well as COIDA. Fortunately the process is nearing completion. The following new developments are noteworthy.

Instruction No. 171.

This new Instruction, repealing Instruction No. 168, was published in the Government Gazette and is effective from 16 May 2001. Instruction 171 prescribes a system of "baselining", the essence of which is listed below:

All current employees must have a statutory baseline audiogram performed which will be that individual's baseline for the rest of his working career.

Should the individual be entitled to compensation in terms of the old Instruction No. 168 (at baselining) then that person must be referred and compensated according to the old Instruction No. 168. Baselining must be completed within a period of two years.

All new employees must have a baseline performed within 30 days of employment in a noise zone.

The individual's baseline must be recorded and kept in accordance with the OHSA or the MHSA (as applicable) and provided to the individual when he leaves the employer.

An individual will only become entitled to compensation once a further deterioration of 10 percent loss of hearing (PLH) from individual baseline results. PLH is calculated from the tables contained in Instruction No 171.

It is implied that the employer would only be risk rated according to the PLH resultant from exposure at the current work site: The potential for discrimination against job candidates with existing hearing loss is eliminated.

The new Instruction 171 has the effect of encouraging employers to establish Hearing Conservation Programmes (HCP). Effective programmes will manifest as less noise induced hearing loss and less premiums.

SABS 083

The SABS standard on noise is being revised in accordance with the recommendations of the TC and the new Instruction 171. It is attempted to refrain from referencing standards in the new legislation due to access and copyright concerns of SABS standards.

Regulations in terms of the OHSA new draft SABS 083

These have been published for comment by the Department of Labour on 3 August in the Government Gazette. The document unfortunately references the new draft SABS 083 (which is not fully in the public domain) and requires extensive editing.

Regulations and guideline in terms of the MHSA

Regulations prescribing medical surveillance have been approved by the Mine Health and Safety Council for promulgation. A guideline is being finalised which will require a mandatory Code of Practice in terms of the Act.

Hearing conservation guidelines: *The Seven modules*

The seven modules developed by the TC cover all aspects of an HCP including measurement and risk assessment, noise engineering, administrative controls, personal protection, medical surveillance and audiometry, as well as education and training. These modules were developed to assist those involved with the management of noise exposure at the workplace and are an extensive source of information.

To find out more diarise the seminar with training workshops, scheduled for Tuesday 26 February 2002 at the Indaba Hotel where the topic will be covered comprehensively.

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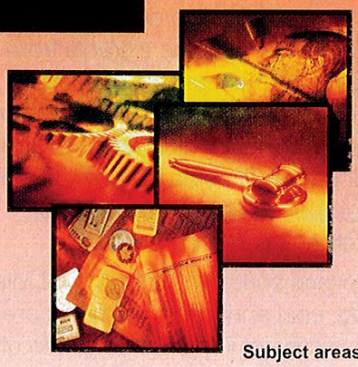
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Is hearing protection through custom-made HPDs the solution?

Prof Rigard Steenkamp,
Head: TQM programme, Centre for Business Management, University of South Africa

All signs are there that custom-made hearing protection devices (CHPDs) are here to stay. The purpose of this exploratory investigation into CHPDs is to determine the general performance, knowledge gaps and unsubstantiated statements regarding the "miracle" of CHPDs. If medical professionals and occupational hygienists can proclaim that CHPDs are the catalyst for quality hearing conservation programmes, then their general effectiveness should be investigated before any further conclusions are made. Another statement made frequently, is the advantages they have on quality of working life (QWL). There are many QWL dimensions and these should be differentiated and empirically measured. This paper is basically a background to the hearing protection problem, it identifies hypothesis and sets the stage for a more comprehensive empirical investigation (eg, on a doctoral level).

Shapiro (1995) reports on "Once your hearing goes, it's gone" (in the bibliography on hearing protection, hearing conservation, and aural care, hygiene and physiology, EAR 82-6/HP version 24, referred to as EAR Cat 1999 in this paper). Noise-induced hearing loss (NIHL) is irreversible and this "silent disease" calls for "switched on silence" (Foster, 1994). Risk managers should stop "whispering to the silent disease". But how can noise be replaced by silence? Are we only destined for the "second defence" (hearing protection)? Why would so many mines invest up to R236 000 per month on CHPDs? Is it because of its scientifically proven success or is it because of its relative newness? A quick scan of the 2524 accredited articles in the EAR Hearing Protection Articles Catalog 1831-1999 shows a dearth of publications about CHPDs. One publication by Tobias (1972) in EAR Cat 1999 seems outdated. This article reports on "Attenuation in Custom-Fitted Earplugs". This comprehensive catalog of research reports, focuses more on the problems of hearing conservation than on solutions. It lists such themes as national strategies needed, improved hearing conservation programmes, earmuff attenuation results, inadequate education, HPD comparative studies (very few on CHPDs), poor real-world HPD performance, double hearing protection (doubling-up), the bad news of hearing loss, protection for the deaf, why workers do not use HPDs, and Gasaway's (1987) thirteen steps to effective hearing protection (EAR Cat 1999). All in all it is still a problem and a major challenge. Topics discussed range from "the use of silly putty as an ear plug" (Muntz, 1995 in EAR Cat 1999) to "Silicon ear wax and Blu-Tack ear plugs" (Mitchell, 1991 in EAR Cat 1999) all of which can be summed up by "the challenge of hearing protection" by Maas (1970) in EAR Cat 1999.

With this background, the report by Veneklasen (1994) (in EAR Cat, 1999) on "highlights for hearing protection" sounds like good news. This and other related matters are described in "Quality hearing conservation: high priority for risk managers in South Africa" (Steenkamp, 1999) as published in the Journal of the South African Institute for Management Scientists (for contemporary research). But the question remains: how good is the news and have we reached a solution to the HPD problem?

Introduction to the problem

The noise control problem remains a complex one. Although management are still somewhat ignorant, nobody can turn a deaf ear to noise-induced hearing loss any more. This awareness is leading to new programmes, HCP upgrades, new types of HPDs, seminars and so forth. One strategy is the large-scale implementation of CHPDs. The initial amounts invested in these HPDs reflect a radical shift based on certain truths and/or perceptions which cause a major problem for those who have yet to be persuaded to convert to CHPDs. This article attempts to ask the unasked questions by reporting on CHPD cases, research results, current work in process research, and future research to be done on CHPDs. This includes extracts from the blue-print document of Anglo Platinum (as implemented by Anglo Platinum mines) which refers to specification requirements for CHPDs and the proposed hearing protection implementation programme.

Several southern African gold, diamond, coal and platinum mines are in the process of implementing "the ultimate hearing protection". Although CHPDs are becoming more popular in industry, several questions remain unanswered. The long list of so-called "quality dimensions" of the different CHPDs seem very impressive and may well contribute significantly to a subjective, non-scientific decision in

favour of large-scale implementation and investment in these PPEs. The real-world performance of the CHPD seems to be still under investigation, and this publication attempts to provide an objective perspective and background to research done and research still required.

How is industry shaping up with NIHL? White (1997) asked this question in the report "Occupational noise: how is industry shaping up?" (EAR Cat 1999). The answer to this question lies in the somber statistical picture (eg, the quality of hearing, NIHL, compensation payments and so forth). From publications such as Sutton's (1982) report "More than 1000 000 ears need protection now" (EAR Cat 1999), one could form the impression that there is a good deal of reactive fire-fighting management going on. In part this could be an overreaction in the form of introducing CHPDs as the putative best solution.

Occupational hygienists, SHE managers and risk managers agree that noise pollution has a major environmental impact. Not much has really changed in the wake of awareness of the problem. As with HIV and Aids a persistent aspect of the problem seems to be the urgent need for effective control measures. NIHL (the 'silent disease') is on the priority list of the World Health Organisation, and other facts are:

- International markets demand quieter products from South African exporters.
- More money is spent on compensation than on prevention of NIHL world-wide.
- More workers in the USA are exposed to potentially dangerous noise levels than to similar levels of any other noxious agent (Rink, 1996).
- Management in South Africa still view hearing conservation as a "safety" matter that can be dealt with in isolation, rather than as a corporate risk management investment.
- Hearing protection is not merely for prevention of hearing damage. The QWL (quality of working life) movement focuses more on hearing conservation as a major dimension for quality of work, motivation and general productivity - it is considered to be more than "for ears and hearing only". Several case studies prove that effective hearing conservation has advantages far beyond hearing protection (Cohen, 1976).
- Hearing protection is ineffective because workers do not apply conventional HPDs effectively. Hearing protection and hearing conservation programmes are not up to standard, and more manufacturers (eg, Samancor, Sappi, Anglo operations, Saldanha steel, Impala Platinum, Corobrick, Ingwe, ABB Powertech, Iscor and many others) commence with the issuing of high quality durable CHPDs.

The "blame the victim" theory of injury causation has been defeated and higher standards are needed. It seems as if Australia sets a few benchmarks in this regard. Worksafe Australia (1993) reports on their "national standard and code of practice for occupational noise" in EAR Cat (1999). Safety is becoming more than rules and only a zero incident rate is acceptable. It is also accepted without question internationally that the end product is not the only criterion. Was the product manufactured with quiet technology or with effective noise control? Some manufacturers are obliged to deliver "silent products".

The result of uncontrolled noise energy

Environmental management by means of international standards (eg, the ISO 14000 environmental management standard) addresses all types of waste and pollutants. Noise pollution is certainly on the priority list if it causes NIHL. Sound cannot be destroyed. It is a powerful energy that must be managed carefully. If this is not done it is a pollutant that harms hearing, general health and productivity. Smith (1997) reports on the other effects of noise (in EAR Cat 1999) and Smyth (1932) was concerned since early days about the effect of noise on hearing and on general health (in EAR Cat 1999).

Noise can be differentiated as steady-state (continuous with an overall variation of not more than 5dB), fluctuating (continuous but levels rise and fall more than 5dB) and intermittent or impulsive (short, transient acoustical events). Besides the immediate irritation and stress, the effect of prolonged noise (above 85dB) on workers is destructive in the long term.

Noise control not for ears only

Schmidt, Royster and Pearson RG (1982) report on the "Impact of an industrial HCP on occupational injuries" (in EAR Cat 1999). Noise may therefore harm the economics of an operation (quality and productivity), general health and hearing.

According to Berger (1996), there is still considerable uncertainty and controversy about the effect of noise (and types of noise) on workers (and types of work), and levels of noise at which adverse psychological effects are produced are high (95 dB); noise affects tasks requiring accuracy rather than speed; noise detrimentally affects demanding tasks, especially those requiring attention to multiple signal sources; however, it may actually improve the performance of monotonous, routine tasks. The value of quality hearing conservation goes beyond hearing protection and, ie. beyond protection against NIHL. Healthy hearing is directly related to good quality of life and QWL. Williams (1992) wrote: "Enjoy, protect the best ears of your life" (in EAR Cat 1999). Suter (1992) reported on the importance of communication and job performance under noisy conditions (EAR Cat 1999). Several deaths occurred due to overprotection.

Overprotection creates a new debate: how do you find the balance between attenuation and speech discrimination. Most HPDs (if properly worn) cause isolation which is overprotection (this is currently a hot audiology topic). The ideal HPD should therefore be able to provide maximum protection (attenuation) and maximum speech discrimination (communication ability and the ability to hear warning signals). These products (usually custom-fitted HPDs with filtering devices) operate differently to pure flow type filter systems for sound control. Noise control is thus not for ears only - it can save lives.

NIHL and compensation related statistics

It is a pity to link money to NIHL. Several reports (eg. Lofgreen,1982. The human and economic benefits of hearing protection) indicate the economic burden of inadequate hearing conservation. In future, most South

African industries with high-impact noise, will have workers with notifiable hearing damage. All indicators show that the hearing-impaired sector of society is growing and the high rate of monetary compensation paid out for NIHL is shocking. Examples are amounts in excess of R100 million paid out by mining houses and a single amount of R10 million which, according to Hunter (1998) of the Department of Labour, tops the list of payouts for NIHL. Relevant facts in this regard are:

- The South African mining industry is taking drastic steps to re-engineer its hearing conservation programmes. A single statistic from the Rand Mutual Assurance Company Limited of amounts paid out for NIHL at one mine during June 1999 - October 1999 was almost R2 million. This statistic is a single example in the mining industry, involving 53 claims in June 1999 (and the amount paid was R1 229 064), 30 claims in July 1999 (the amount paid out was R533 338) and so forth.
- In Sweden 70 percent of construction workers do not have normal hearing (Kuhar, 1996); 70 percent of Germany's population are noise disturbed and one sixth have a 20% higher risk of heart attack; one million use psychotherapy to cope with the effects of tinnitus. In the Netherlands one million of its people's proximity to Schiphol Airport causes suffering from excessive noise; the 30 years' debate on economic growth versus environmental norms continues; noise has contributed significantly to the fact that heart disease doubled and the use of sleeping pills has increased.

Should conventional hearing protection be under fire?

It seems as if most industries remain with basic hearing protection. Although hearing protection is not only done through ear plugs (HPDs), this investigation focuses specifically on HPDs. Most will argue that the HPD is good but the wearer is in error. The question is then if the PPE is truly "personal", why is the wearer in error?

It is clear from Swanson and Miller's (1976) study of seven different HPDs (EAR Cat 1999), the article by Sortine and Weeks (1977) on "comparing hearing protectors (EAR Cat 1999), Zohar's (1980) reports on promoting the use of PPE with the aid of behaviour modification techniques (EAR Cat 1999) and Wilson's (1989) hard look at hearing protectors that the problem remains.

There are several problems associated with conventional HPDs and Watkins (1989) researched the "wearability of hearing protectors" (EAR Cat 1999) and several publications compares HPD types. Webster (1995) refers to "Ear defenders: measurement methods and comparative results" (EAR Cat 1999) and York (1980) describes the properties of hearing protectors (EAR Cat 1999). The message is a need for something new. But what is regarded as new?

In 1952 Zwislocki found "New types of Ear protectors" and reported on "Semiplastic Earplugs" and explored the issue of "protection versus comfort" (Zwislocki, 1955 in EAR Cat 1999). The better the seal, the better the protection but the least comfortable (due to pressured fit or uncustomised sizes).

Conventional HPDs must be under investigation if one considers the major move towards CHPDs. This implies certain criticisms against conventional HPDs and the question is if all of these are justified. A comfortable, custom-fit user-friendly ear plug is needed to cope with the biggest problem, which is comfort.

There is a big performance gap between laboratory tested HPDs (plugs and ear-muffs) and HPD application in industry. Regardless of whatever test report and conformed standard, if the HPD is not comfortable, its application will be compromised. Even if workers wear them, the HPD will not be effective since they will be adjusted to meet the need for comfort. Therefore, the first quality dimension should be comfort (defined in terms of physical comfort, ventilation, sound control, orientation, speech discrimination, localisation and low degree of isolation). This is only possible by CHPDs with a filtering mechanism.

Besides this, conventional HPDs should be under fire because its overall ownership is questioned, its cost-effectiveness (eg, R2,00 per day) is questioned and its hygiene features are also questioned.

Features of conventional hearing protection devices (HPDs)

Regardless of whatever test report and conformed standard, if the HPD is not comfortable, its application will be compromised. Conventional HPDs only seal properly by means of pressure. This causes discomfort which leads to the compromise of proper HPD application because the device will be adjusted for comfort. Therefore, the first quality dimension should be comfort. As mentioned, comfort should be defined in terms of several dimensions.

The ideal is therefore dampers that allow certain sounds, like speech frequencies to get through. There are different types of these HPDs available. Berger (1996:2) refers to "amplitude sensitive insert hearing protectors" that allow soft sounds through and allow muffling to increase as the noise increases. These valve-type mufflers are not suitable for typical uninterrupted industrial noise levels, and users should turn to the latest custom-made products that are suitable for continuous noise. These CHPDs, work on different filtering mechanisms (eg, flow systems or resonant systems). The South African CHPD (Kock, 2000) works on a resonant mechanism which controls noise in such a way that 40 decibels speech discrimination is maintained.

Berger (1996) also refers to a disadvantage of the conventional ear-muff in that it confuses the user about the direction of the source of the sound. In some cases ear-muffs can even aggravate noise. The "bigger is better" school of thought forms the misconception that an ear-muff is more effective than other products. This also relates to "doubling-up" (where two HPDs are worn simultaneously) which raise several questions such as mistrust in noise-reduction rate (NRR) figures and overprotection.

Other problems with conventional noise mufflers are:

- It counters QWL, quality and productivity due to reasons mentioned.
- Multi-sized HPDs cannot fit all head contours, and eyeglasses and bushy hair and ear canals complicate compatibility.
- Air leakages.

• Muffler vibrations generate sound in the inner ear.

• The better the seal, the more uncomfortable the muffler.

• Fitting errors are caused by a limited range of sizes.

• The product cannot be adapted to suit the ear canal or user.

• Mufflers shift position under rough working conditions.

• Effectiveness of mufflers is diminished by wear and tear and misuse.

• Ear infections (otitis externa) are caused by dirty noise mufflers or muffler pressure (which leads to operations/production down-time and medical costs)

• Deterioration and wear-out caused by the disposable nature of the product forces regular inspections, reordering and reissues of HPDs

• Lack of pride and respect. HPDs are regarded as a hassle rather than a self-sustaining, respectable affair.

Hearing protectors are often misused and in general their real-world performance falls far short of the protection that properly-worn and maintained HPDs can provide (Berger, 1996). The Amplats blueprint (see the following section) states that conventional HPDs do not enhance productivity and are hygienically unsafe (Erasmus, 1999). It also refers to discomfort and lack of ownership.

Are custom-made HPDs the solution?

The first positive feature of CHPDs is its truly personal characteristics. Scott (1998) reports on what is believed to be the core success factor of CHPDs, namely, "customized comfort" (EAR Cat 1999). Secondly, Williams and Michael (1991) address the problem of isolation and ventilation in "Maximizing communication ability in the selection of hearing protective devices" (EAR Cat 1999). Most CHPDs have a kind of a filter mechanism which controls speech discrimination. This mechanism can be based on a pure flow system, or on an active resonant component that attenuates sounds selectively.

The search is on for "high quality HPDs" that can understandably, may well become central to a strategy to implement an effective hearing conservation programme (HCP). The question is whether CHPDs are in fact this "catalyst"? Is there any scientific evidence that CHPDs are in fact "better" in terms of ownership, NRR values, NIHL, QWL dimensions and many more? The cases reported in this article confirms certain gaps and that much research needs to be done.

Although CHPDs are extremely successful in terms of aspects that can be regarded as common sense such as comfort, durability, cost-effectiveness and others it is believed that the measurement of several dimensions has not been done with sufficient accuracy to be regarded as representative of the population. What is the overall effectiveness of CHPDs? The fact that the CHPD is more popular, is neatly packed, has filter mechanisms, is more attractive and durable, dwindles into insignificance if hearing damage still occurs. Some other features that need critical scrutiny are its robust nature, non-metal character, hypo-allergenic feature, unlimited product life, the risky impression / mould-taking procedure, and so forth. It is easily assumed by buyers that a "SABS approved" supplier uses trained medical personnel (eg. audiologists, audiometrists) for the impression-taking procedure. Clients/workers run the risk of injury if these personnel lack the necessary medical background. There are much more than meets the eye and there were several unfortunate incidents where workers were injured during this impression-taking procedure, and the obvious question is the extent of the risk involved in the implied custom-fit procedure. Several questions are still unanswered around these issues. Which parts of the CHPD are hypo-allergenic? What is the definition of "hypo-allergenic' and are the users (safety managers, nursing sisters, ventilation managers, SHE managers) duly informed of its real meaning?

The primary quality dimensions of the CHPD

The respondents (Steenkamp, 1999) agreed that the time had come to use durable and comfortable hearing protectors. The quality dimensions which these products have to meet are: filtering harmful amplitudes (high frequencies) and retaining speech discrimination; comfort (obtainable chiefly from custom-made products); cost- effectiveness (which includes safety or muffling potential and durability); user friendliness (maintainability); after-sales service (eg sealing tests, adjustments, corrections) and worker pride. All the quality dimensions foster worker pride.

There is, then, a clear need for personal hearing protection that is radically different from conventional protection products and must have the following dimensions:

a durable and attractive product that instills pride; a uniquely personal, custom-made fitting (that other workers cannot benefit from should it be stolen); for each individual the product must contain the worker's name; the user should also be able to exercise a choice (for ownership) in the custom-made process - personal colour choice is a good example

Differences in CHPDs

Several CHPD products are available on the market. These include imported products from Europe such as Alpine, Tympro Benelux and Variphone. Other examples are products from Denmark, Noise Audiophone and Noise Clipper (South Africa).

Empirical research methodology

Although the combination of personal qualitative measuring instruments (interviews, observation, case studies) applied for this investigation usually provides high validity, the sample can be regarded as somewhat unrepresentative of the CHPD population (CHPD wearers) in the Southern African industry. Detailed field-study medical information is also lacking (eg before-after studies and regular audiogram measurements as compared to base-line audiograms).

The available cases are therefore under-reported and follow-up surveys are difficult to obtain. One valuable owner of a CHPD case study (Ventilation Management of Swartklip Anglo Platinum) regards a follow-up survey as too "product specific" to

form part of a follow-up questionnaire survey. One has to respect this mine's confidentiality, but it has valuable experience in the use of CHPDs. The results reported are therefore primarily based on secondary research sources (eg, the Anglo Platinum CHPD blue print document and literature), cases studies and personal surveys.

Results

General feedback about CHPDs

Most users in the market are very satisfied. Besides the medical risks mentioned earlier and problems such as having workers available for impressions/fitments, fitment errors or incorrect colours issued, CHPDs seem to be the answer. If one starts going deeper into the issue it becomes evident that the feedback is based on general perceptions, management's positive expectations, reliable quality suppliers, and opinion. The limitations are the need for hard measurable facts such as before- after baseline audiogram (BA) information and other QWL (quality of work life) before-after information. Although one user (ABB Powertech in Pretoria) reported a "significant improvement in hearing health and hearing ability", no data could be obtained to support the statement. There are several users (eg, Sappi, Mondi, Consol and Iscor) that are also examples of respondents who are "satisfied". The question is why and in terms of what? Several similar cases clearly indicate the need for a comprehensive empirical survey by an academic research team and Industrial Audiologists.

Comparative large-scale trial runs by Anglo Platinum (Swartklip section and Rustenburg section)

The 1998 SASOM seminar was one example of several discussions about how to combat NIHL via the implementation of a preventative and co-ordinated approach in the South African mining industry (Barnes, 1998). This and known reports such as "Mining occupations with high incidence rates for NIHL" (Valoski, 1991 in EAR Cat 1999) led to Anglo Platinum's decision to investigate CHPDs. The measuring instruments used for the CHPD survey were primarily based on an experimental personal survey done by ventilation managers at two of the mines. Two different types of CHPDs were also compared during the same survey. Almost 1000 workers were issued with CHPDs and a before-after study was monitored over a 12-month period. The results were very positive and the Anglo Platinum blueprint for CHPD implementation to eliminate NIHL, was established as a standard guideline document for all their mines.

Basically, this report describes the necessary quality dimensions of a CHPD and a CHPD service provider. The report supports CHPDs and recommends large-scale implementation. The blueprint stipulates the requirements for comfort, attenuation, CHPD material to be used, ergonomic design and the reference-tracing system for individual CHPDs. Other requirements are acceptance in industry, third-party approvals, back-up service and several guidelines for hearing conservation (eg. base-line audiogram (BA) taken during fitment, awareness, induction, education and training.

Measurable before-after audiogram data was not part of the report. It is assumed that the 12 month period was too short to provide significant base line audiogram information.

Rasimone Bafokeng Anglo Platinum case

This is a relatively new mine and they have taken the decision to issue all workers with CHPD. Only about 300 units are issued per month and it is very early to obtain specific feedback. The general feedback is very positive (Baker, 2000) and workers are impatient to wait for the fitment procedure.

The Impala Platinum case

This major role player in the platinum industry recently commenced with large scale CHPD implementation. They implement almost 600 units per month. The mine is known for its effective health and safety measures and strict environmental policy. Their active support of quality hearing conservation and continuous participation in the Mine Ventilation Society's mission to contribute to the elimination of NIHL led to the support of CHPDs. Although their feedback is very positive (Schophaus, 2001), their concern is also the medium- and long-term measurement of actual real world NRRs (under ground attenuation), audiogram comparisons and NIHL statistics. The mine is considering an offer of support for a combined research team from the University of Pretoria (Department Audiology) and Unisa (Programme: Total Quality Management) to do a comprehensive empirical survey of 1500 CHPD wearers.

Amandelbult Anglo Platinum

This mine is currently implementing the South African designed CHPDs for its 10000 workers in conformity to the "blueprint for CHPDs". Workers are well prepared before the procedure commences. Amandelbult does its own induction (CHPD videos, posters, t-shirts and interaction sessions) before the service provider commences with the lay-out and set-up of medical work stations. The first 1000 workers (250 workers per day) were paraded in a week and three work stations were necessary for impression-taking. This procedure is also quite comprehensive since workers do not want to wait and each operator must be well-equipped (with aids, materials and tools), and must apply strict medical procedures for hygiene, otoscopic investigations, impression-taking, and treatment of clients/patients, as well as administrative procedures (recording of colour choice, recording of names to be imbedded, etc.). Fitments are scheduled after a lead time of three to four weeks. This entails several activities such as BAs, personal fitments and seal tests.

Discussion of the results

Although conventional thinking, resistance to change and cultural forces may still militate against CHPDs, the best hearing protection is the least that management ought to do and should be seen as the minimum standard of hearing conservation. It seems as if CHPDs will become the norm and many manufacturers with noise areas are busy with their own trial runs. Although all questions are not answered, CHPDs offer several advantages.

Cost effectiveness

Increased cost-effectiveness is another factor in favour of CHPDs. Several industries spend up to R3,20 per day per head on conventional hearing protectors. This adds up to approximately R800 per head per year for ineffective hearing protection. Employers can make a once-off personal outlay of ±R350 per worker for a custom-made durable protector which amounts to approximately 28 cents per day over five years, which comes to a saving well worth mentioning (up to 90%)! And that does not even take into account indirect savings such as higher QWL, higher quality output, and improved general health and productivity. The collective impact could also help further cost-effectiveness, provided that the following proclaimed features come to reality: improved communication ability; less isolation and better sound discrimination; high muffling potential; durability; user-friendliness (maintainability); after-sales service (eg. seal tests, adjustments, corrections) and high ownership.

Personal HPDs implies high ownership

A CHPD (such as the South African designed product) provides several features that promote high ownership. These include an attractive product that instills pride, a durable product that lasts, a unique personal custom-made fitting (that other workers cannot benefit from should it be stolen) for each individual, and the fact that the CHPD bears the worker's name. The user should also be able to exercise a choice (for ownership) in the custom-made process (personal colour choice is a good example).

A project management approach

One of the biggest challenges in this business is to match demand and supply - this is the operations management skill referred to as scheduling (resources, material, equipment, time and so forth) to deliver a personal/medical service to each worker. In some instances almost 300 workers are done (impression taking) per day. Depending on the need, a few medical stations are to be set up and the parading of workers can be very tricky. If a large mine with 10 000 workers is to be issued, the scope of work demands a special approach to management. The Anglo Platinum blueprint implies a "project management approach" to a CHPD programme - this is the only logical way to manage this unique scope of work. This refers to accountability (assigned project manager), a committed project team, a temporary project organisation, a detailed statement of work (SOW), work breakdown structure (WBS), the detailed operations scheduling of impressions and fitments (seal tests), work integration, effective communication, project control (time, cost and performance) and project termination.

Recommendation

Hearing conservation is much more than HPDs and hearing protection is also much more than CHPDs if one looks at the information obtained from the mentioned cases. Although the cases indicated several positive signs, a more comprehensive study is necessary.

The limitations of the research were related to audiogram and QWL information, representative sample size, several CHPD features accepted on assumption, the real-world performance in terms of combatting NIHL, and the overall impact of CHPDs. Other unanswered questions are possible trade-offs, real underground NRR performance and ways to improve implementation lead time. The ultimate question that needs to be answered is whether CHPDs are the catalyst of an effective HCP programme. If research and education are the key to preventing hearing loss (Wright, 1980 in EAR Cat 1999), then it seems as if the prevention of NIHL is an almost never ending challenge.

Conclusion

The mining industry (eg. Implats, Anglo Plats, Iscor, Samancor, Ingwe and others) is moving towards unconventional hearing protection and quality hearing conservation. Although PPEs will only form part of prevention of NIHL, it will always play a big role. If noise control is done by "the second defence", then there can be no reason why workers must be issued with second best. CHPDs may prove to be the catalyst of effective hearing conservation and a major component for improved QWL.

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Permits Quo Vadis?

by Neloise Geyer

The permit system has been in place for non-pharmacists and institutions other than hospitals and pharmacies, to acquire, possess, use and supply medication. This system has been fraught with problems mainly due to a lack of clarity on exactly how the system works, opening it to abuse. For these reasons the Department of Health has placed a moratorium on the issuing of permits.

In its health policies the Government has indicated that the nursing/midwifery profession, as the biggest group of health care professionals, should be the practitioners providing primary health care services to the communities. But to do this, they require facilities, sufficient equipment in working order, adequate stock and above all, enabling legislation.

It is extremely concerning that nurses and midwives are currently being exploited as a result of disparities in the system. They are forced to deliver the services without the required legal procedures in place, often without the necessary training to perform these services and in less than ideal circumstances where there is a lack of equipment and insufficient stock. If they refuse to do so, they are often threatened with disciplinary action or told to leave if they do not want to comply or do not like it! If nurses with specialised clinical skills training move from the public sector to a private sector facility, all the legal limitations are suddenly applied and they are not allowed to do any diagnosing, treatment and prescribing.

Seeking clarity

In an effort to get some clarity on this confusing situation, the Department of Health organised a workshop in January 2001 which was attended by various role players. An independent legal expert was requested to analyse the legal framework that exists within which the primary health care services, and specifically the diagnosing and prescribing of medication, could be performed.

Current situation

The legal expert, Adv. Pierre Marais explained in a clear and concise manner, that the laws are quite clear on what is allowed and what is not. What follows is a summary of what he presented and some of the debate that followed after the presentation.

1. Supreme law and subordinate law

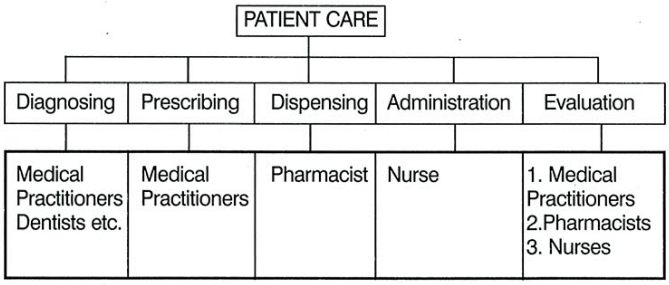
The Constitution of South Africa is supreme law and Parliament is the supreme legislature with regard to certain matters. Parliament makes laws, which have to be in line with the Constitution. These laws provide the framework for the drafting of sub-ordinate legislation (i.e. Regulations which detail the practical implementation of the parent legislation, procedures to be followed and behaviour to be observed by persons to whom the parent legislation applies). Any sub-ordinate legislation in conflict with an Act of Parliament is invalid (i.e. if the Nursing Act does not somewhere indicate that the nurse may prescribe medication, the Director-General can not issue a regulation to authorise nurses to prescribe).

2. Legislation pertaining to health professionals

Legislation pertaining to the practice of the various health professionals indicates the rights and obligations of the practitioners involved. None of these Acts provides guidelines for the handling of medicine - that is done by the Medicines and Related Substances Control Act (Act 101 of 1965) which makes provision for the Medicines Control Council (MCC) which oversees the handling of medicine.

3. General rule

The general rule with regard to medicines which is based on the health professional Acts, is illustrated as follows:



Where exceptions occur, new laws and/or regulations have to be developed. To accommodate special circumstances (which is the exception), section 22 A (12) of the Medicines Control Act makes provision for a concession whereby persons or institutions can apply for a permit to acquire, possess, use and supply medication. In addition, the midwives have a regulation (R 32) related to Act 101

which makes provision for their special circumstances where deliveries have to be done at home and the midwife carries certain drugs with her to enable her to perform these services.

4. Determinations of the health professional acts.

4.1 Health Professions Act (No 56 of 1974)

This Act determines that only persons registered under this Act may, for gain, diagnose and prescribe unless provided for in another Act. A list of these Acts is provided, which includes the Nursing Act. The Nursing Act must therefore make legal provision for these activities.

4.2 The Pharmacist

4.2.1 The Pharmacy Act (No 53 of 1974)

This Act determines that any person who, not registered as a pharmacist and for gain performs any act specially pertaining to the profession of a pharmacist shall be guilty of an offence. Only a pharmacist may sell or supply medicine on the prescription of a medical practitioner. An exception that is provided for, is the keeping of medicines and its supply to patients in hospitals or other institutions for the treatment of sick persons, under the direction of a medical practitioner and in accordance with the provisions of Act 101 of 1965, by any registered or enrolled nurse.

4.2.2 Regulation R1158 Published In Government Gazette No. 21754 dated 20 November 2000:

Acts specially pertaining to the profession of a pharmacist (Regulation 3)

(a) provision of pharmaceutical care, i.e.
- evaluation of patients' medicine related needs;
- dispensing;
- furnishing of information and advice;
- determining patient compliance with therapy and follow-up;
- pharmacist initiated therapy.

(b) compounding, manipulation, preparation or packaging of medicine.

(d) manufacturing of medicine.

(e) purchasing, acquiring, importing, keeping, possessing, using, releasing, storage, packaging, re-packaging, supplying or selling of medicine.

(f) applying for registration or a medicine.

Scope of practice of a pharmacist (Regulation 4) consists of the acts specifically pertaining to the profession of a pharmacist, namely formulation; distribution; repackaging; initiation and conducting of pharmaceutical research; and the promotion of public health.

These regulations define the functions and scope of practice of the pharmacist. Should the pharmacist wish to provide a primary health care service, an additional course has to be completed and a Section 22A(12) permit applied for.

4.3 The Nurse Practitioner

Mr. Marais made the comment that the Nursing Act and its regulations are not clear at all about what nursing is and the scope of the nurse's practice – that it is too wide and non-specific. This statement opens up the debate about the nature of nursing - nursing can never be narrowed down to a list of tasks. In addition, the scope of practice has to be wide to ensure that it makes provision for both the nurse in a high-tech hospital/clinic as well as a rural clinic where the nurse becomes responsible for all the functions normally performed by other practitioners.

4.3.1 Nursing Act (No 50 of 1978)

This Act determines that any person who is not registered as a nurse or enrolled as a nurse or a nursing auxiliary, and who for gain performs any act pertaining to the profession of nursing, shall be guilty of an offence. The Minister may, on the recommendation of the Council, make regulations relating to various issues, including the scope of practice of registered or enrolled persons.

4.3.2 Regulations Relating to the Scope of Practice of Persons who are Registered or Enrolled under The Nursing Act, 1978

The use and definition of the terms 'nursing and midwifery regimen' remains a limiting factor in the legal authorisation of nurses/midwives to diagnose and prescribe medication. The scope of practice of a registered nurse shall entail the following acts or procedures:

(a) the diagnosing of a health need and the prescribing, provision and execution of a nursing regimen to meet the need of a patient or, where necessary, referral to a registered person;

(b) the execution of a program of treatment or medication prescribed by a registered person for a patient;

(c) the treatment and care of and the administration of medicine to a patient, including the monitoring of the patient's vital signs and of his reaction to disease conditions, trauma, stress, anxiety, medication and treatment;

(d) the prevention of disease and promotion of health and family planning by teaching to and counselling with individuals and groups of persons;

4.3.3 Authorisation to prescribe

Section 38 (A) of The Nursing Act (No. 50 of 1978) makes special provision for authorisation of certain nurses to prescribe. A registered nurse:

(a) employed by:
- the Department of Health
- a Provincial Administration
- a Local Authority
- Organisation performing any health service designated by the Director-General: Health.

(b) authorized by:
- Director-General: Health
- Director of Hospital Services of Provincial Administration

- Medical Officer of Local Authority
- Medical Practitioner in charge of Designated Organisation

(c) may in the course of such employment and authority do the following:

- physically examine a person
- diagnose any physical defect, illness or deficiency in such person
- keep prescribed medicines
- prescribe, supply, and administer medicine for prescribed conditions
- promote family planning

(d) only when the services of a medical practitioner or pharmacist, are not available.

Primarily the service deliverer has to prove the need to have nurses authorised to prescribe medication. It is therefore possible for a clinic where there is one medical practitioner, to have a number of nurses authorised to prescribe medication as the one medical practitioner cannot see all the patients visiting the clinic and thus there is a proven need to have additional prescribing practitioners.

Designation of health services takes place within the framework of Section 38A of the Nursing Act {but there also is the opinion that the designation takes place in terms of the Health Act (No 63 of 1977)}. The occupational health services, which are currently mainly situated in the private sector, community based organisations and other private institutions providing a health service, will fall under this category of health services. In addition, the Occupational Health and Safety Act (No 85 of 1993) makes it compulsory for employers to provide an occupational health service where this is indicated by risk assessment. As with any other health service there are not enough medical practitioners available to run these services and the services are run by the nurses.

It is furthermore clear that the nurse in private practice cannot obtain the required legal authorisation to prescribe medication unless some kind of employment relationship with a designated organisation exists. One example of such an employment relationship that currently exists, is the private nurse practitioner that has an agreement with a local authority or provincial department of health to deliver services (mainly immunisation services) on behalf of the authority/department. In this agreement the authority/department provides the nurse with the required medication free of charge on the condition that the nurse will not charge the patient for the medication used and that she will provide the authority/department with the statistics of the services delivered. The authorisation to prescribe the medication is provided by the local authority/ provincial health service as for any of their other employees. All midwives and community health care nurses are competent in the administration of immunisation and the safekeeping of the relevant drugs, and no additional course will therefore be required for the authorisation of the nurse/midwife. The authority/service "pays" for services of the nurse by allowing the nurse to charge a consultation fee for professional services rendered. It is strongly recommended that nurse practitioners obtain a written agreement with the particular authority/service.

4.4 The Right to Sell Schedule 2 - 5 Medicines

Based on the abovementioned discussion, the right to sell scheduled medicines can be summarised as follows:

(a) The GENERAL RULE [SEC 22A (1)]:

- Pharmacist
- Pharmacist intern
- Pharmacist assistant under supervision

(b) The EXCEPTIONS:

- Medical practitioners, dentists, or veterinary sur geons for their own patients;
- Employee of a manufacturer or wholesaler for the purpose of sale to a medical practitioner, pharmacist, dentist or veterinary surgeon;
- Pharmacist for Schedule 5, 6 & 7 without a script in an emergency; and
- Veterinary assistant on the prescription of a veterinary surgeon.

(c) SPECIAL DISPENSATION:

- Permit in terms of Section 22A (12).

4.5 The Medicines and Related Substances Control Act (101 of 1965)

Section 22A (12) of Act 101 determines that the Director-General may issue a permit:

1. to any person or organisation performing a health service.
2. authorising them to acquire; possess; use; and supply medication.
3. for SPECIFIED Schedule 1-4 substances only.
4. Subject to such conditions as the Director-General may determine.

It must be noted that the permit only allows for the practitioner to supply the medicine and not to sell it. The permit will also only make provision for certain schedule 1 – 4 drugs included in the Essential Drugs List (EDL) of the Government.

Right to freely engage in economic activity - the constitutional court's approach

But what about one's constitutional right to choose one's profession and to freely engage in economic activity? These rights are never unconditional and without obligations and the constitution makes provision for the limitation of certain rights. The professional in a regulated industry in fact consents to restrictions being placed upon him/her by the regulatory authorities.

Implications for health professionals

1. Irrespective of the objective of the individual or organisation to provide services and the needs of the community for such services, if the Department of Health issues permits to persons who do not qualify under the current legislation, they may be held jointly liable if any problem should arise.

2. The Director-General of Health cannot make regulations authorising the health care practitioner to diagnose and prescribe medication if the legislation pertaining to the practitioner does not make provision for these two functions. The Nursing Act and its regulations do not make provision for the nurse to diagnose and prescribe, except for section 38A. Section 38A of the Nursing Act only makes provision for the registered nurse (not even the midwife which has Regulation 32 related to the Medicines Control Act) and no other health care practitioner. Prescribing of medication without the required authorisation, is a criminal offence and practitioners can be reported to the relevant Professional Council or the Department of Health.

3. Even though a nurse has successfully completed a course in clinical skills, she does not have the right to be authorised to prescribe, or to obtain a section 22A (12) permit. A permit is only provided for special circumstances and remains a concession.

4. Removal of Section 38A from the Nursing Act before the 1997 amendment to Act 101 or SAMMDRA Act becomes operational, will prove to be disastrous because it will remove the only legal determination according to which at least some of our nurses can be authorised to diagnose and prescribe. Some very fancy footwork will be required to ensure that the profession does not loose the little we have in the process of transforming the nursing profession and its Act and regulations.

5. Any health care practitioner, who keeps and supplies scheduled medication to clients without the required 22A(12) permit, is guilty of an offence. If in possession of a legal permit, the practitioner may not sell medication, but only 'supply' it.

6. Suppliers selling scheduled medication to a health care professional who does not have the required legal permit are guilty of an offence.

7. The lack of legal provision for nurses who have to provide district health services and home visits for psychiatric patients and for palliative care, will not be addressed by the current legislation.

8. Step-down facilities are a new type of health care facility which are increasing in number. One of the main concerns is the handling of medication in these institutions where there usually is no permit to acquire, keep, use and supply medication. Within the above mentioned legal framework, it is advisable that the client be discharged from the hospital with a T.T.O. (prescribed medication to take home) and kept by the client who becomes responsible for taking his own medication in the step-down facility.

Way forward

1. All health care practitioners and institutions have to comply with the current legislation and steps have to be taken to do so.

2. The Department of Health will re-evaluate the permit application procedures to ensure that they are in line with current legislation. These will be available from the Department of Health.

3. Employers of nurses who are responsible for delivering a health service that requires nurses to be authorised, must apply to the Director-General of Health to have the service designated as a health service/ organisation.

4.The Statutory Councils must identify the skills, training and accreditation of programmes required to enable the professions to deliver the required services.

5. Registers have to be initiated and kept current by the Statutory Councils to indicate who have been authorised to prescribe and/or dispense medication. Authorisation should be based on specifications.

6. Strategies have to be developed in the long term to ensure enabling legislation for nurses and midwives in South Africa. The SANC has requested with the Nursing Amendment Bill that Section 38A be replaced with a clause that will make provision for registered nurses and midwives, in both public and private sector, to prescribe medication. In the meantime the Department of Health has been requested to ensure that the current practice of nurses be regularised as a matter of urgency.

Conclusion

The complexity of the situation, mainly due to a lack of enabling legislation and rapidly changing health service delivery needs, is clear. The legislative framework has to be changed to enable nurses to deliver the services. In the meantime, all practitioners have to comply with the current legislation.



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Careers for doctors in occupational health

by Jim Murphy

Businesses and organisations in South Africa will continue to undergo transformation and changes that include smaller and multiskilled workforces, greater use of sub-contractors and more mechanisation.

Occupational health services must add value to stakeholders, be they workers, employers, the community or the State. This requires a greater level of expertise.

Careers that are pursued by doctors in occupational health include:

Full time: Private and public sectors, academia and research

Part-time: Private and public sectors.

Legislation

In South Africa there is no specific or over-arching legislation to promote the development of worksite health services as opposed to many European countries which have a legal requirement for the provision of occupational health, e.g. in Portugal there is a legal requirement to provide occupational health services for private and public workplaces employing more than 250 workers, and in the Netherlands, an occupational health service is required for companies with more than 500 employees (Harrington et al[1]).

Medical surveillance and evaluation of the work environment is required under the Occupational Health and Safety Act (OHSA) of 1993 and its Hazardous Chemical Substances and Lead Regulations, and the Mine Health and Safety Act (MHSA) of 1996.

Section 22(a)12 of the Medicines and Related Substances Control Act of 1965 allows permits to be issued to nurses at workplace clinics authorising them to dispense certain scheduled medicines.

Educational requirements

General practitioners who consult to industry should have a Diploma in Occupational Health (DOH).

The Diploma in Occupational Health (DOH) may be obtained from any of the following universities: Cape Town, Free State, Natal, Pretoria, Stellenbosch and Witwatersrand (in conjunction with the National Centre for Occupational Health – NCOH). The diploma course is generally a part-time programme of 8 x1 week blocks of didactic training over a 2 year period with lectures, research projects, industrial site visits and examinations.

Doctors wishing to specialise should consider obtaining the Fellowship through the Division of Occupational Medicine of the College of Public Health of the College of Medicine of South Africa (CMSA). The Health Professions Council (HPCSA) last year approved the stand alone speciality in Occupational Medicine. The members of the Occupational Medicine Group (OMG) [2] which is comprised of representatives from Departments of Community Health, National Centre for Occupational Health, SASOM and other stakeholders are to be commended for their efforts in making occupational medicine a stand alone speciality. What follows is an outline of the OMG's recommendations on the Occupational Speciality Examination, and the competencies and skills required.

The regulations for the Fellow of the Faculty of Occupational Health (FFOH) consist of:

- Syllabus for Part 1 examination as for Part 1 Community Health
- Conduct of Part 1 examination:
  - (a) Three written papers
    - (i) Communicable and non-communicable health-related conditions
    - (ii) Management/administrative theory and health-related social science
    - (iii) Epidemiology theory, biostatis tics and demography.
  - (b) Oral examination
- For admission to Part 1 of the examination, the candidate must have completed a minimum period of one year of training in an approved post in Community Health or Occupational Health.
- Admission to Part 2

  The candidate must have:
  - Passed Part 1 and
  - Completed a minimum period of three years training in Occupational Health

- Submitted a dissertation on an approved research project.

• Part 2 examination

(a) Three written papers on Occupational Medicine, Occupational Hygiene and Occupational Health Management

(b) Practical and oral examinations.

The competencies and skills required by the occupational medicine specialist hinge around maintaining the quality of life of workers at the highest possible level, and include being able to:

- Practice with an interdisciplinary or holistic perspective
  - Ability to integrate perspectives and skills from a variety of disciplines in medicine, public health, management, low and social sciences, in problem solving at individual, group or organisational level.
  - Ability to work effectively with a range of occupational health professionals.
- Is a sound clinician with a special knowledge of Occupational Diseases
- Is an expert in Medical Surveillance and Biological Monitoring
- Is an expert in Health Risk Assessment
- Is an expert in Occupational Health Service Design and Audit
- Is an expert in setting up provincial, regional and district occupational medicine services
- Is an expert in Occupational Health and Safety Law
- Is an expert in fitness, impairment and disability assessment and workplace accommodation
- Is an expert in Public Policy in Occupational Health
- Is an expert in ethics in occupational health
- Has a sound knowledge of Health Promotion and management of common community and lifestyle diseases in the workplace.
- Has a sound knowledge of epidemiology and research method and practices their basics.
- Is familiar with the discipline of Occupational Hygiene, practices its basics and is able to communicate with experts
- Is familiar with discipline of toxicology
- Is familiar with the discipline of ergonomics, practises its basics and is able to communicate with experts
- Is familiar with the discipline of safety management
- Has an understanding of industrial relations
- Is a competent manager of operations
  - ability to plan, organise, staff, finance, monitor and control an occupational health service or other operating unit
  - ability to write and revise strategic and operational plans, including budgets and procedures for occu pational health services
- Is knowledgeable of health care delivery systems and benefits management
- Is able to use and put in place information systems
- Is a competent communicator
- Is able to contribute to environmental management
- Is able to contribute to disaster management

Current practices of occupational health in South Africa

1. Private sector

During 1999 there were 1321 workplace clinics registered with the Department of Health.

PROVINCE	WORKPLACE PERMITS	
	Number	**%**
Eastern Cape	78	5,9
Free State	43	3,3
Gauteng	502	38,0
KwaZulu Natal	336	25,4
Mpumalanga	33	2,5
Northern Cape	12	0,9
Northern Province	58	4,4
North West	39	3,0
Western Cape	221	16,6
TOTAL	**1 321**	**100**

As can be seen from the above table, the majority of clinics are located in Gauteng, KwaZulu Natal and Western Cape, where major industries are located.

These clinics, together with the services provided by mine hospitals, make up occupational health services in the private sector.

The doctors and nurses may be employed by the company or business directly (in-house), or else as part of a contracted out service provided by an agency. These clinics provide both occupational health and primary medical care. It should be remembered that the combination of providing both primary health care and occupational health at workplaces occurs in many other developing countries. The World Health Organisation VIII General Programme of Work for 1990-1995 called for the extension of primary health care to the underserved working population in developing countries and provided guiding principles for this in the workplace (Rantanen[4]).

Factors that influence an organisation to have a worksite clinic/occupational health service include:

- Size of workforce : it is more cost-effective with a large number of employees
- % of employees on medical aid. The service is of special benefit to those who do not belong to a medical aid scheme, although medical aid members are seen in cases of emergency
- the type of industry
- the availability of other service providers in the area, and
- DOES THE SERVICE ADD VALUE :
  - A healthier and more productive workforce
  - Legislative compliance

- Reduction in costs

The functions of the occupational medicine practitioner include:

- Clinical occupational health
  - Pre-placement assessments
  - Health surveillance and biological monitoring
  - Advice on fitness to work
  - Disability and ill-health retirement assessments
  - Treatment of Minor ailments
- Workplace and Risk assessments

  This is done in conjunction with other professionals. One of the most important attributes of an occupational medicine practitioner is to be able to improve the work environment, and prevent disease.
- Leadership and Support

  Leadership and support must be given to the occupational health nurse who is the backbone of the on-site health service
- Health Promotion Initiatives

  Encourage workers to adopt a healthy lifestyle.
- Managing Stress and Substance Abuse in the workplace
- Helping the company with legal compliance, improving workplace conditions and disaster planning

It should be remembered that HIV/AIDS is far more of a strategic business issue than occupational health, and doctors will be required to assist organisations in the implementation of an AIDS strategy that includes prevention as well as care and treatment for people living with HIV/AIDS.

2. Public Sector

Whilst most health departments and/or local authorities provide a general medicine service to their employees, the occupational health aspect of these services would appear to be underdeveloped. However, specialist occupational medicine services for public sector patients are present in Gauteng, Kwa-Zulu Natal and the Western Cape (Jeebhay[3]). These clinics are located at tertiary hospitals and mainly see referral workers.

3. Union linked work

Although the majority of full or part-time doctors working in industry are employed by management, a number advise and are employed by trade unions. The Industrial Health Research Group (through its Workers' clinic) and the Industrial Health Unit (through its Workers' Health Centre) pioneered clinics that serve workers in the metropolitan areas of the Western Cape and KwaZulu Natal.

4. Academia/Research

South Africa presents many opportunities for research in all areas of occupational health, particularly occupational lung diseases, chemical exposures and musculo-skeletal. A number of research projects are in progress in the mining industry in conjunction with the Safety in Mines Research Advisory Committee (SIMRAC)/SIMRAC Project Support Services (SIMPROSS) and academic institutions.

Doctors in academia work at the major universities as well as the National Centre for Occupational Health and are involved in both teaching and research.

Future of occupational health

The demand for occupational health practitioners will depend on:

- Economic growth of the country
- Calibre of service providers
- Commitment from employees
- Commitment from government
- Pressure from interest groups

Economic Growth

As a generalisation, countries with a growing economy, a high Gross Domestic Product and per capita income, employ a greater proportion of occupational health personnel even though occupational disease burden is greater in less developed nations. Where there is a conducive economic climate, there is both local and foreign investments with job creation and growth. The State in turn recives more income from individual and company taxation that can be allocated to:

- occupational health services for its employees
- an inspectorate to enforce health and safety legislation
- funding for institutions such as the National Centre for Occupational Health and the Medical Bureau for Occupational Diseases

South Africa as a developing country is still heavily reliant on its primary industries such as mining and mineral beneficiation as well as secondary industries, i.e. manufacturing as engines of economic growth. With globalisation, this country must compete internationally for financial and human capital.

Calibre of Occupational Health Practitioners

Doctors who enjoy credibility with both employers and employees have the following attributes:

- caring
- competent and keep up-to-date
- ethical
- team players along with nurses, hygienists, safety engineers, risk managers and counsellors
- proactive and energetic
- strive for best practice
- focus on prevention
- communicate health performance to stakeholders (employees and employers).

Many occupational health services survived economic

downturns because the staff had the above attributes. Conversely, many an occupational health service has been discontinued as staff were perceived as uncaring or did not communicate how they added value. Occupational health services compete with other scarce resources, be they in the public or private sectors.

Commitment from Employers

Organisations that view a healthy and productive workforce as a competitive advantage, and respect the dignity of the individual, see the value of occupational health services.

The world of work is, however, changing with the trend towards smaller workforces with multiskilled employees, greater use of subcontractors and mechanisation.

Commitment from Government

Health and Safety legislation needs to be enforced by a competent inspectorate, and to ensure the businesses including small and medium enterprises do not flout the law. In the United Kingdom, the Health and Safety Executive – HSE enforces legislation and has physicians amongst its ranks of inspectors. There has been an increased demand for doctors with occupational health qualifications in some European countries since the introduction of EU directives on health and safety. The situation in Europe varies from country to country, e.g. in Austria there is a legal requirement to employ company doctors for companies with 100 or more workers, whilst in the Netherlands an occupational health service is mandatory for companies with more than 500 employees. The Scandanavian countries have admirable occupational health cover, e.g. Finland has a National Institute for Occupational Health in Helsinki, with satellites in other regions, whose activities include research, training and investigative services. Also in Finland, all employers are required to provide occupational health services for their workers (Harrington et al[1]).

There would obviously be a massive demand for doctors in occupational health, should similar legislation be enacted in South Africa.

Pressure from Interest Groups

Poor workplace conditions and practices are less and less tolerated by workers and their unions, e.g. the National Union of Mineworkers – NUM – placed health and safety high on its agenda during the 1980's and 1990's, and made important input to the Leon Commission on Health and Safety in the Mining Industry.

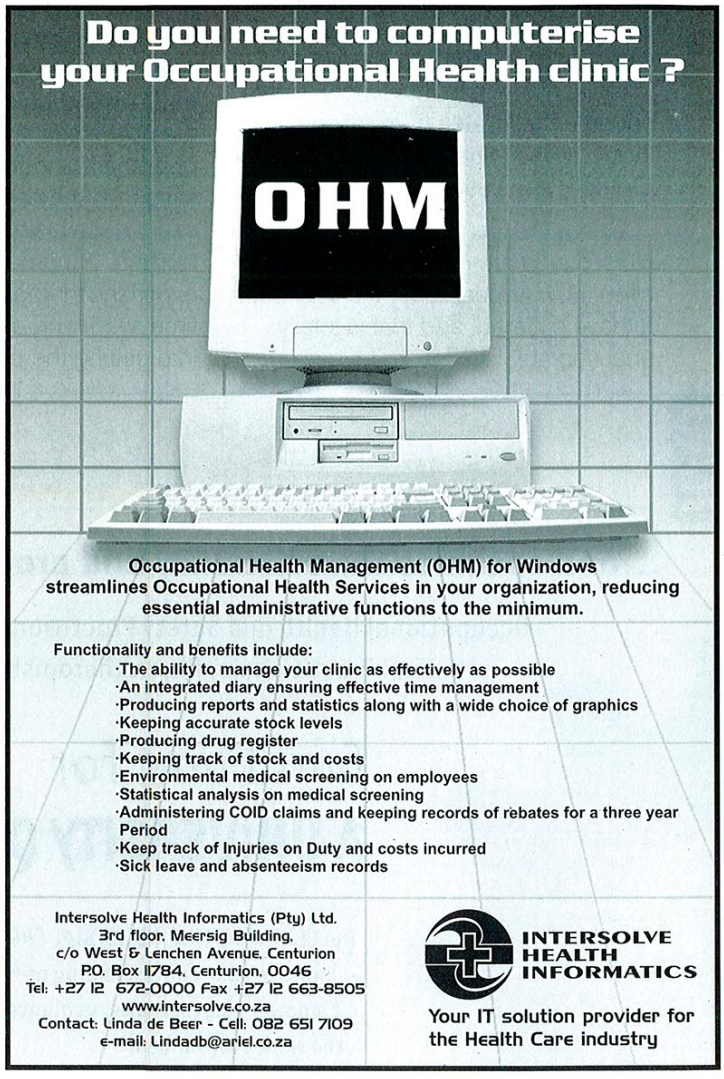
Environmental health is coming to the fore with local communities becoming concerned about workplace emissions that may affect their health.

Conclusion

To quote Professor Coetzee[5] " ….. the moral of the story is that opportunities for occupational medicine abound if one just looks for them. In my experience there can hardly be a more satisfying field of endeavour to make things better than the discipline of Occupational Medicine."

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As a past editor, albeit in a very limited capacity, would you allow me to add comment to some of the potential concerns which will no doubt become prevalent as the new format of the Journal unfolds?

While I still am unable to comprehend why it failed in the first place, I am not convinced you (and possibly others) have all the answers.

Also, added to the demise, in some ways there has to be a link to the horrible fact that the very people we so badly needed to support our initiative at the start, have now experienced unbelievable humiliation by losing all their financial endeavours to promote and sustain the Journal!

Sadly, the Occupational Health Nurses who are (were?) our greatest allies, now appear to be the very ones to have suffered, and that is totally unacceptable!

The latest Journal presents a new 'magazine' slant, which makes me very uncomfortable, and while you will always have my personal loyal support, I am sorry to say but I think you are heading for trouble. Or is it another example of . . . the more things change . . .?

Dr Chris van Selm

I was delighted to receive the new "Occupational Health Southern Africa" and have enjoyed reading it. I must extend my congratulations to the new editor, the editorial board, the publishers and the Safety First organisation. To the casual observer, it may seem quite a simple task to put together a journal; but from past experience I know a great deal of time, work and effort has been placed into getting the publication going again after the previous publishers went into liquidation.

I believe the journal fulfils an important role in the country in disseminating information and educating the professionals involved in the field. As the occupational health community is relatively small, it is vital that as many practitioners should participate by writing articles, letters etc. There is so much practical knowledge out there that could be of benefit to others. At the same time the advertising revenue is important not only to produce the journal, but also to inform the readers about new products in the marketplace. Thus the participating societies members should promote the journal to potential advertisers whenever possible.

Good luck and may the journal go from strength to strength.

Dr Mike Baker

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Fundamentals of occupational noise control - without tears or maths

John Hassall

For the occupational health professional concerned with the reduction of potentially damaging noise in the workplace, it can be a daunting prospect to have to deal with all those strange parameters loved by the noise control specialist - frequencies, spectra, weighting curves, noise exposure exchange rates and decibel (dB) scales, (can 90dB + 90dB really be 93dB?). This short article is an attempt to de-mystify the matter and suggest an approach to noise control which will enable every occupational health professional to make and implement the decisions necessary to improve the noise climate of their workplace with minimal effort and cost.

Fortunately the occupational health professional can avoid most of the tears and all of the maths by following a systematic approach based on a clear qualitative understanding of the fundamentals of sound and its method of propagation.

Let us consider the basic situation of a typical noise source, i.e. a vacuum cleaner, and compare it to something with which we are all familiar, a heat source, e.g. an electric heater. See Fig 1.

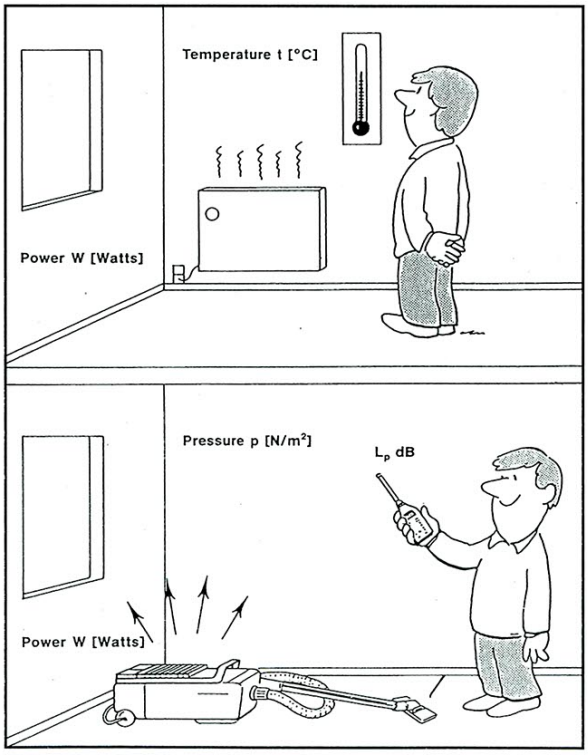


Figure 1

The sound produced by the noise source is the result of a large number of different noise generating mechanisms within the vacuum cleaner which add together to produce a fundamental characteristic noise level of the machine which never changes, regardless of where the machine is operated. This we call its sound power. It is directly comparable to the power of an electric heater, say 1 kilowatt. If you turn the vacuum cleaner on the sound power is always the same, just like the heater, which always emits 1 kilowatt, and you can therefore compare one machine (or heater) with another by comparing their sound powers (or heating power). International regulations require that new machinery be supplied with a declaration of its sound power, so it should be easy for the occupational health professional to compare them and, where practicable, choose the quietest.

There is an important difference between our two examples, however. The heater is designed to produce heat, and it does this very efficiently. Virtually 100% of the electricity powering a heater will appear as heat. On the other hand, the vacuum cleaner is designed to do work and the noise is an unwanted side effect of this process. A 1 kilowatt vacuum cleaner may only emit 1 milliwatt (one millionth!) of its consumed power as sound. If it does, it will be unbearably noisy. So you see that the noise control engineer (and the occupational health professional) is up against it, as tiny amounts of undesired sound energy produce a very loud noise.

The sound power of vacuum cleaner, via radiation of noise into the room, produces a sound pressure at any point in the room which can be measured by a sound level meter. Similarly, the heater produces a temperature which can be measured by a thermometer. Both these are scalar quantities, i.e. they have no direction. We can measure in any direction at the same point and get the same value. However, unlike the sound power (or heating power) which remains CONSTANT, the sound pressure and temperature depend on a number of external influences, which mean that we must be very careful when drawing conclusions about the sound (or heat) source from these secondary measurements. For the sound case, the distance from the noise source, intervening barriers, and sound absorption within the room, all affect the sound pressure level, and in the case of the heater, the size of the room, its heat insulation, the ventilation volumes, and the

external temperature affect the temperature which can be achieved at a particular point by the available heating power.

The sound pressure level then, like the temperature, depends on the environment, and not just the power of the device. The power, however is absolute and unchanging. To achieve noise reduction in the workplace, we thus have at our disposal, three primary strategies, which can be represented as in Figure 2.

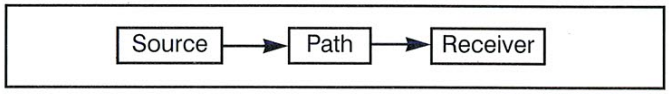


Figure 2. Classical noise control problem

1) Reduce the sound power of the machine at source, which is the current route preferred and encouraged by European and North American legislation, because it fundamentally reduces the ability of any machine to generate noise, whatever the external situation.
2) Attenuate the propagation path to reduce the noise by barriers, absorbents, enclosures, or active noise control.
3) Reduce noise at the receiver's ear by personal hearing protection devices, which is regarded as the least preferred route and an admission of failure by current European and North American legislation.

Of course, in practice a typical industrial situation is much more complicated than Figure 2 suggests, and looks much more like Figure 3, with a number of sources, paths and receivers, sometimes easy to determine, and sometimes masked by the overall effect.

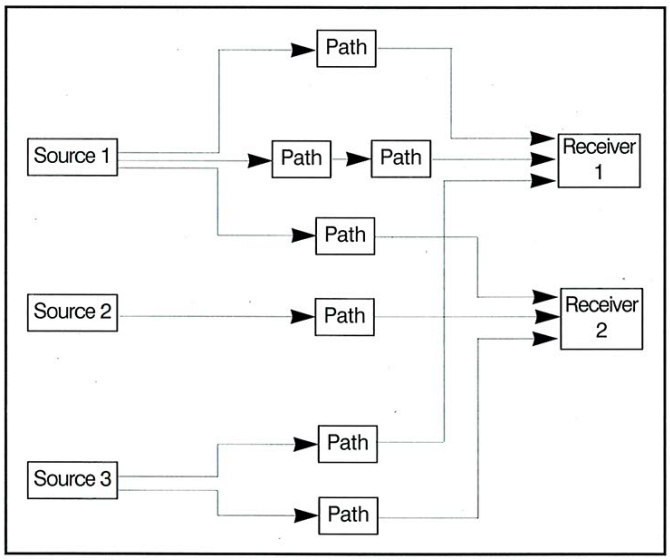


Figure 3. Actual noise control problem

There are always a number of sources, many of which may be on the same machine and they may be due to a variety of noise-producing mechanisms, which require different approaches. In general this an area characterised by research and development by the equipment manufacturer. However, there are many easily understood basic principles which the occupational health professional can apply routinely. A number of the more common and useful of these are covered:

1. Reduce the sound power of the machine at source

Clearly, this is the route preferred by the regulation authorities, if cost and the available technology allows, i.e. best practicable means are utilised.

A few basic principles:

Machine Power: Most of the noise which is produced in industrial premises is a by-product of a necessary manufacturing process using power to perform a task. In general, wherever there is power developed or converted, a miniscule proportion of it is emitted as sound power. So the more powerful the machine, the noisier it usually is. Reducing the power of a machine to perform a given task therefore invariably reduces the noise of the machine. A happy relationship where energy saving and noise reduction can well go hand in hand.

Speed of the Task: Noise always occurs when there is a change of force, pressure or velocity, which are due to the application of energy. The principle is that the quicker the change, the louder the noise produced. In the example of Figure 4, the same result, i.e. bending the bracket can be performed quickly and noisily by a few impacts of a hammer or slowly and quietly by using a tool to apply continuous force over a longer time.

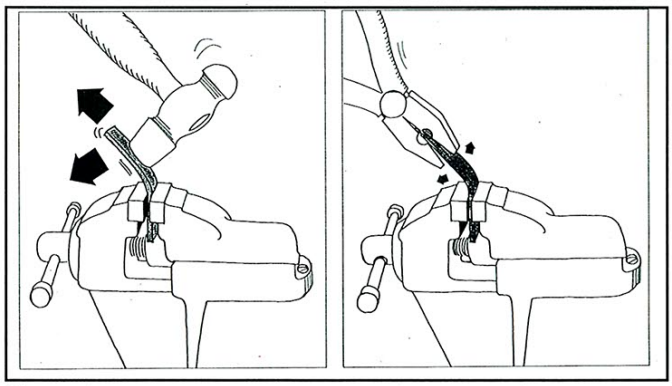


Figure 4

The difference is in the speed at which the energy required to perform the task is applied. Other common examples of this principle are using screws instead of nails for fastening timber, and bolts instead of rivets for fixing metal plate.

Loudspeaker effect: Small vibrating objects, such as pumps or motors are relatively poor radiators of sound because their small size means that their vibrating surfaces are not in touch with a large area of air and therefore do not transfer their vibration energy efficiently to it. If the area

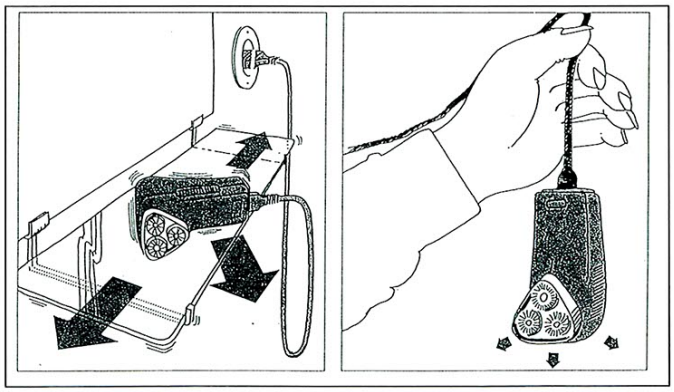


Figure 5

in contact with the air is increased, by fixing the motor rigidly to a panel, often part of a machine, the effective area which is vibrating and in contact with the air is far greater and transmits the vibration into the air more efficiently to produce a much louder sound, as in the example of Figure 5.

Precisely the principle of the tuning fork and the loudspeaker. To minimise this problem, all vibrating components must always be effectively vibration isolated from the rest of the equipment.

Damped structures: Where large vibrating panels caused by vibrating components as described above are unavoidable, such as on vehicles or large machinery, both the length of time they resonate after receiving an impact and the maximum noise they produce can both be reduced by damping the structure using a composite panel or applying a damping material. The affect of this is shown in Figure 6.

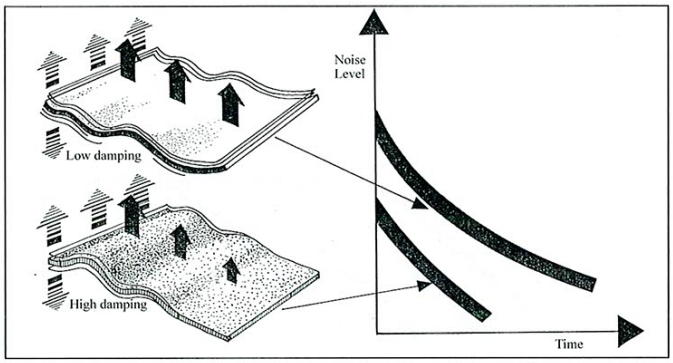


Figure 6

Although the affect is particularly obvious for impacts, the continuous noise generated by the panel is also reduced significantly, because damping works especially effectively on the resonant peaks of the spectrum. The application of damping panels is especially useful for temporarily damping work-pieces where sawing or riveting is a significant part of the production process. See Figure 7.

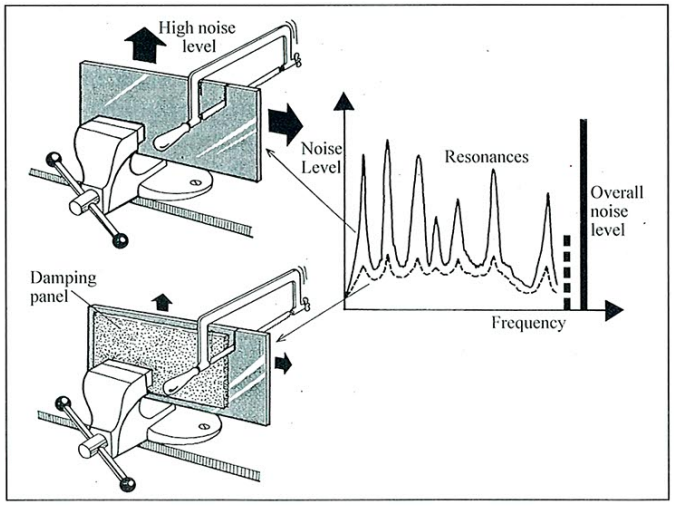


Figure 7

Vibration Isolation: As mentioned above under 'Loudspeaker effect' vibrating components must be isolated from the equipment, but all equipment should be isolated from the building structure, both to prevent the transmission of that vibration, and the subsequent noise, throughout the building, and to increase the life of the machine itself. This means that the machine's weight must be carried on vibration isolators with a static deflection suitably large to isolate against the lowest frequency generated, which is usually the rotation speed of the machine. There is a simple rule here. The greater the static deflection of the mountings under the machine, the lower the frequency which is isolated, and the better the isolation of all frequencies above that value. But what is often forgotten is that all the pipes and other services to the machine must also be fixed to the structure using flexible mountings along their entire length, otherwise the vibration isolation under the machine is bridged and loses its overall effectiveness. This is illustrated in Figure 8.

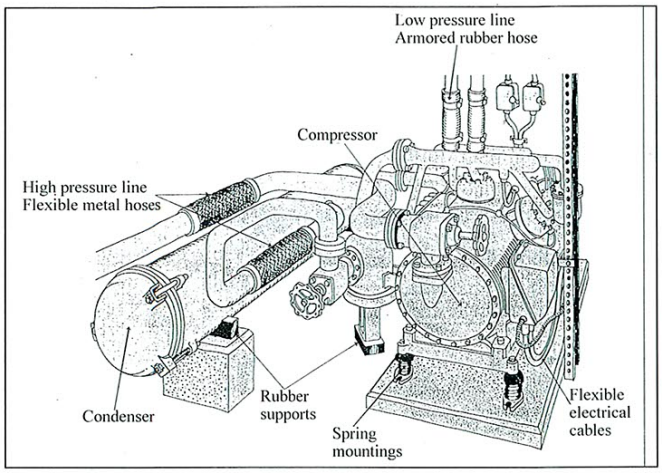


Figure 8

Whistles from rotating parts: The flow of gas produces noise by a number of different mechanisms, the most pertinent of which for industrial noise control purposes, because they can generate high levels of high pitched noise, are the flow of air over rotating machine parts and the exhaust of gases or compressed air. Many machines which do work on external materials, such as planers and saws produce whistles either by the action of air passing over a cavity, just like blowing across the top of a bottle, inducing a resonance in the air within the bottle by the Helmholz effect, or by generating a disturbance in the air at an edge in the airflow as vortices leave the edge at a regular frequency. Often it is difficult to be sure which mechanism is producing the noise but in general it can be stated that cavities and sharp edges in machinery of this type must be avoided where possible. A practical example of one solution to this problem is shown in Figure 9.

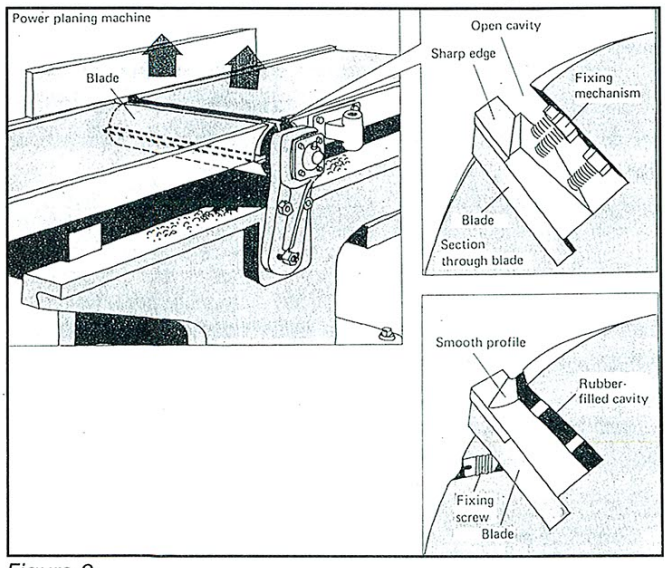


Figure 9

Exhaust Noise: Noise arises from the turbulence caused by the mixing of high speed exhaust gases or compressed air with the stationary ambient air, the primary problem we are all aware of with traditional jet engines. Laminar (i.e. smooth with no turbulence) air flow is best from the noise viewpoint. If turbulence is already present in the exhaust air due to objects in the flow, abrupt changes in cross-section of the pipe or duct, or uncontrolled bends, then the noise can be greater by up to 15dB, as shown in Figure 10.

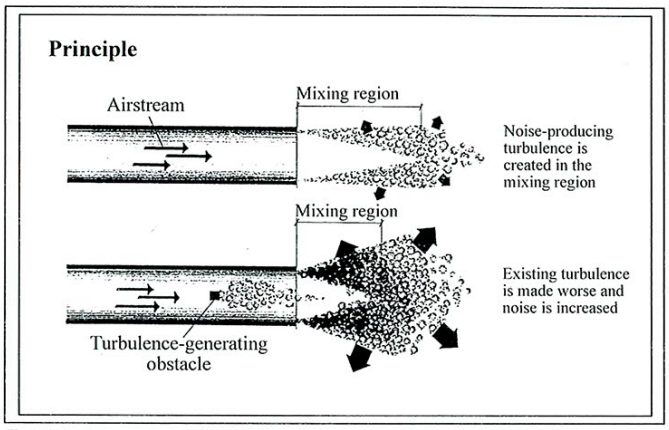


Figure 10

There are two simple golden rules to be observed here. Firstly, turbulence-inducing objects in the air flow are to be avoided at all costs and the velocity of the exhaust should be as low as possible. Halving the flow velocity and avoiding turbulent flow can both reduce the noise generated by up to 15dB! The same rules also apply to low speed flow in ductwork and air-conditioning systems, though the benefits here are not usually quite so dramatic.

2. Attenuate the propagation path

If the possibilities of practicable reduction of the sound power at source is exhausted then it is time to consider the introduction of sound reduction measures into the path of the noise from source to receiver in the form of barriers, enclosures, or absorbents, or a combination of the three.

A few basic principles:

Sound Insulation or Sound Absorption?: One thing which has to be made clear is the difference between the sound insulation and the sound absorption of a material. Sound insulation is that property of a wall which prevents sound penetrating it, i.e. the difference between the sound levels measured on the source and the receiver sides of the wall. The sound absorption of a material is the proportion of the sound incident on the material which is not reflected by the material back to the source. These two physical properties have nothing to do with each other in practical situations, and must never be confused. For example, a closed window is a good sound insulator and reflector, but a poor absorber, whereas an open window is as good an absorber as you can get, because none of the sound energy is reflected back. It all escapes to the outside, and of course therefore provides zero insulation.

Surface density or air gap determine the sound insulation: High sound insulation can be attained by a heavy single wall or a combination of two or more lightweight panels separated by an air gap. Combination of high surface density (the mass per surface area of the wall or panel) and wide air gaps gives the ultimate in sound insulation. The gap of course is free, so air is the noise control engineer's chief ally in the search for cost-effective sound insulation. Therefore, the heavier the wall and/or the wider the air gap, the higher the sound insulation.

Sound Insulation depends on the frequency: As a result of the physics of sound transmission, the sound insulation of a single wall or panel increases as the frequency increases, so bear in mind that it is almost always more difficult to insulate against low frequencies than against higher frequencies.

The above two simple rules can be combined into a convenient curve as shown in Figure 11 relating the sound insulation of a wall or panel to the product of the surface density and the frequency or frequencies of interest.

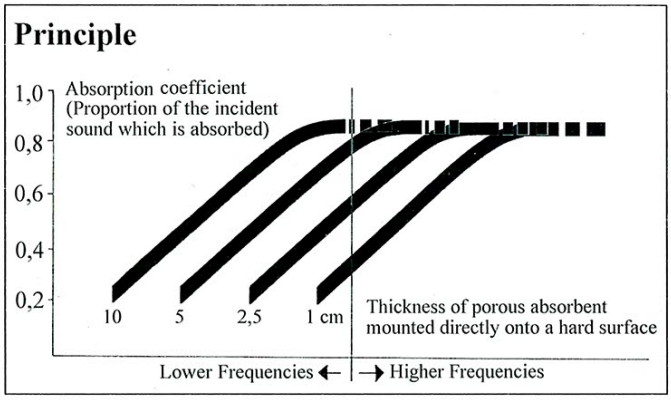


Figure 11

Screens and barriers have limited attenuation: Because sound can pass over or around an outdoor noise barrier or indoor screen as well as through it, there is a limit to the useful surface mass of a screen depending on its height and width compared with the position of the noise source. 20dB(A) is the practical limit for a screen, however great its mass, so it does not need to be very heavy to be an efficient screen. However, absorbent on the screen surface and absorbent surroundings in a room improve its effectiveness significantly. A typical example of a practical industrial problem where this approach provides a successful solution is shown in Figure 12.

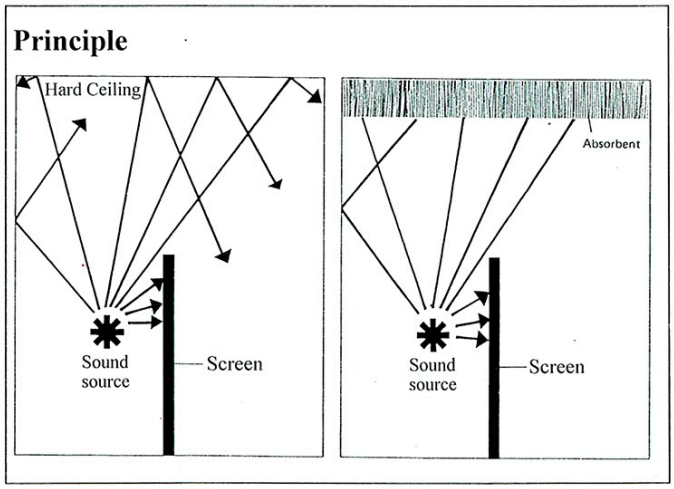


Figure 12

Thicker absorbents are effective to lower frequencies: The thicker an absorbent material, the better it absorbs the lower frequencies. This is because the absorption of a material depends on the proportion of the wavelength of the sound which can be contained within it. The thicker the material, the longer this wavelength, and the lower the frequency which can be absorbed. See Figure 13.

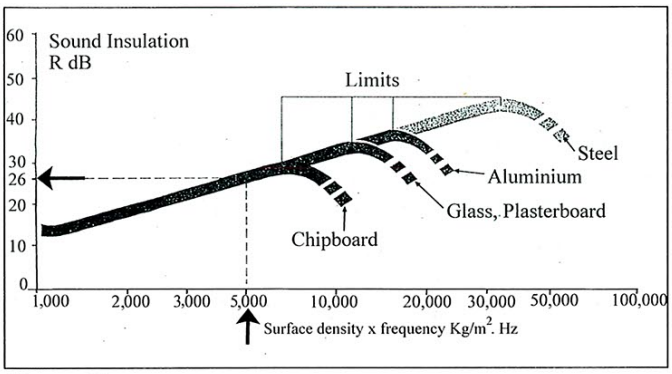


Figure 13

If the frequency is high enough that a quarter or more of the wavelength of the sound can fit into the thickness of the material, almost complete absorption can occur. This is a further reason why low frequencies are more difficult to deal with than high frequencies.

3. Reduce noise at the receiver's ear

As mentioned in the introduction, it is to be hoped that the necessity for personal hearing protection devices, which is regarded as the least preferred route and an admission of failure by current European and North American legislation, can be ultimately avoided by adhering to the simple engineering approaches as outlined above. The final prize for achieving this is the elimination of noise-induced hearing loss, costs of personal protective devices, regular audiometric examinations, and all the collateral costs of setting up and managing the procedures and workplace zones.

References

- Ingemansson, S., Noise Control – Principles and Practice (Swedish), Arbetarskyddsfonden. (The Swedish Work Environment Fund) Gothenburg, Sweden.
- Hassall, J. R. Noise Control - Principles and Practice, English Translation, Bruel & Kjaer 2nd Edn, 2nd Impression 1986. Copenhagen, Denmark.

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Noise and Vibration Sites

This NetPage (eleventh) provides a listing of sites providing information on noise and vibration. Additional links are included on the Noise and Vibration pages of ASOSH.ORG and its mirror site ASOSH.TRIPOD.COM.

The next issue of the NetPage will focus on Disability and Compensation. Health Physics – Non-ionising Radiation, Industrial Psychology and Toxicology sites will now be covered in future issues of the NetPage. For rapid access to SHE/ EHS information check out SiteSearch at the ASOSH sites.

Society

Acoustical Society of America (ASA) (http://asa.aip.org/)

American Academy of Audiology (http://www.audiology.com/)

American Academy of Otolaryngology - Head and Neck Surgery (http://www.entnet.org/)

Patient info (http://www.entnet.org/patient.html)

American Speech-Language-Hearing Association (ASHA) (http://www.asha.org/)

Hearing Loss (http://www.asha.org/hearing/disorders/)

Council for Accreditation in Occupational Hearing Conservation (CAOHC) (http://www.caohc.org/) USA

DEAFSA (http://www.deafsa.co.za/) South Africa. Umbrella organization which facilitates services to the South African deaf and hard of hearing communities

European Acoustics Association (EAA) (http://www.eaa-fenestra.de/) Germany

European Federation of Audiological Societies (EFAS) (http://www.efas.org/) Finland

National Hearing Conservation Association (NHCA) (http://www.hearingconservation.org/) USA

Related Links (http://www.hearingconservation.org/links.html)

Institute of Noise Control Engineering of the USA (INCE) (http://users.aol.com/inceusa/ince.html)

International Institute of Noise Control Engineering (I-INCE) (http://users.aol.com/iince1/)

I-INCE Member Societies (http://users.aol.com/iince1/iincedir.html)

Surf the 'Net for News on Noise (http://users.aol.com/iince1/noiseart.html)

International Institute of Acoustics and Vibration (IIAV) (http://www.iiav.org/) USA

Military Audiology Association (MAA) (http://www.militaryaudiology.org/) USA

Southern African Acoustics Institute (SAAI) (http://saai.ctech.ac.za/) South Africa

The International Commission for Acoustics (ICA) (http://www.sao.nrc.ca/ims/ica/) Canada

Member Societies (http://www.sao.nrc.ca/ims/ica/memsocs.html)

Vibration Institute (http://www.vibinst.org/) USA

National

Chapter 12 – Noise (http://www.vl28.dial.pipex.com/chap12.htm) TUC Hazards at Work, UK

Chapter 20: Hazards from hand tools (http://www.vl28.dial.pipex.com/chap20.htm)

Hazards at Work – Noise (http://www.hse.gov.uk/pubns/noisindx.htm) Health & Safety Executive, UK

Hazards at Work – Vibration (http://www.hse.gov.uk/pubns/vibindex.htm)

Health Standards for Occupational Noise Exposure (http://www.msha.gov/1999noise/noise.htm) Mine Safety and Health Administration, U.S. Department of Labor

Resources Page (http://www.msha.gov/1999noise/noiseresources.htm)

A Guide to Conducting Noise Sampling (http://www.msha.gov/1999noise/ig32.pdf)

Laborers' Health & Safety Fund of North America (http://www.lhsfna.org/html/noise_home.html) USA

Noise related links (http://www.lhsfna.org/html/links.html)

Noise (http://www.osh.dol.govt.nz/order/catalogue/index2.html) Safety Net, New Zealand

Noise and Hearing Loss (http://isis.nlm.nih.gov/nih/cdc/www/76txt.html) NIH CDC, USA

Noise - Basic Information (http://www.ccohs.ca/oshanswers/phys_agents/noise_basic.html) Canadian Centre for Occupational Health and Safety

Vibration (http://www.ccohs.ca/oshanswers/phys_agents/vibration/)

Noise Induced Hearing Loss (http://www.randmutual.co.za/level2.asp?page=medical&subpage=noise) Rand Mutual Assurance Company Limited, South Africa

Noise Pollution Clearinghouse (NPC) (http://www.nonoise.org/) USA

NPC Online Library (http://www.nonoise.org/library.htm)

Hearing Loss and Occupational Noise Library (http://www.nonoise.org/hearing.htm)

Noise and Hearing Conservation (http://www.osha-slc.gov/SLTC/noisehearingconservation/index.html) Occupational Safety and Health Administration (OSHA), U.S. Department of Labor

Noise and Vibration (http://www.safetyline.wa.gov.au/sub30.htm?) SafetyLine, WorkSafe Western Australia

Noise Control (http://www.nohsc.gov.au/OHSInformation/OHSSolutions/noise/contents.htm) National Occupational Health & Safety Commission, Australia

National Code of Practice for Management and Protection of Hearing at Work [NOHSC:2009(1993)] (http://www.nohsc.gov.au/OHSInformation/NOHSCPublications/fulltext/toc/h3-19.htm)

Occupational Noise and Hearing Conservation (http://www.cdc.gov/niosh/noise2a.html) NIOSH, USA

Noise and Hearing Loss Prevention (http://www.cdc.gov/niosh/noise/noisepg.html?)

Other Noise and Hearing Loss Prevention Related Links (http://www.cdc.gov/niosh/noise/noisepgd.html)

Occupational Vibration Hazards (http://www.nps.gov/riskmgmt/Occvibs.html) National Park Service, USA

USACHPPM Environmental Noise Program (http://chppm-www.apgea.army.mil/enp/enp.htm) U.S. Army Center for Health Promotion and Preventive Medicine

USACHPPM Technical Guides (http://chppm-www.apgea.army.mil/armydocs.asp?pub_type=TG)

WISE EARS! (http://www.nidcd.nih.gov/health/wise/index.htm) National Institute on Deafness and Other Communication Disorders (NIDCD), USA. National campaign to prevent noise-induced hearing loss

International

Environment: Noise Policy (http://www.europa.eu.int/comm/environment/noise/home.htm) EU

Noise (http://www.who.int/peh/noise/noiseindex.html) WHO

Noise and Vibration (http://www.ilo.org/public/english/protection/safework/hazardwk/noise/) ILO

University

Acoustics and Vibration Animations (http://www.kettering.edu/~drussell/Demos.html) Kettering University, USA

Hearing and Hearing Disorders (http://www.mankato.msus.edu/dept/comdis/kuster2/audiology.html) Minnesota State University, Mankato, USA

Hereditary Hearing Loss Homepage (http://dnalab-www.uia.ac.be/dnalab/hhh/) University of Antwerp, Belgium

Noise Exposures in the Construction Industry (http://www.staff.washington.edu/rneitzel/index.htm) University of Washington, USA

Occupational Hearing Conservation (http://facstaff.uww.edu/bradleys/ohc/home.html) University of Wisconsin-Whitewater, USA. Links to on-line resources in occupational hearing conservation

Other links

Acoustics and Vibrations WWW Virtual Library (http://www.ecgcorp.com/velav/) Edge Consulting Group, USA

Acoustics.eu.com (http://www.acoustics.eu.com/) General resource on acoustics

Acoustics FAQ (http://www.faqs.org/faqs/physics-faq/acoustics/) Internet FAQ Archives

Acoustics FAQ (http://www.campanellaacoustics.com/faq.htm) Campanella Associates, USA

Audiology Awareness Campaign (AAC) (http://www.audiologyawareness.com/) USA. Helping persons with hearing loss

AudiologyNet (http://www.audiologynet.com/) USA. Audiology and hearing healthcare information

Better Hearing Institute (BHI) (http://www.betterhearing.org/) USA

Childhood Deafness (http://www.boystownhospital.org/parents/info/index.asp) Boys Town National Research Hospital, USA

Ear and Hearing Related Brochures (http://www.sinuscarecenter.com/) Sinus Care Center of Jackson, USA

Ear Infection Topic Center (http://www.drgreene.com/ear.asp) Dr. Greene's HouseCalls, USA

Glossary of Audiological Terms (http://www.siemens-hearing.com/questions/faq/glossary.htm) Siemans, USA

NoiseNet.org (http://www.noisenet.org/) NoiseNet.org Ltd., UK. Noise and vibration information

Searchwave (http://www.searchwave.com/search/searchwave.cgi) USA. Search engine for audiology, hearing loss, hearing aids, and the ear

Tech Support (http://www.e-a-r.com/html/industrial/tech01.asp) Aearo Company, USA. Useful links

EARLog Series Numbers 1-21 (http://www.e-a-r.com/html/industrial/earlog.htm)

Tinnitus FAQ (http://www.bixby.org/faq/tinnitus.html) USA

Vibration Terminology (http://www.vibinst.org/vglos_a-e.htm) Vibration Institute, USA

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Launch of the new look Occupational Health Southern Africa

The new look Occupational Health Southern Africa journal was launched on 3rd August 2001. The event was sponsored by Sasohn, Sasom, Saioh, Amtronix, Aventis and the Safety First Association.

Occupational Health Southern Africa is grateful to these companies for their sponsorship and their on-going support of the publication.

Amtronix

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The team from Amtronix, Steve Geier, Elaine Bernberg, Ken Southcott, Colin Samson



Fiona Robinson, Editor of the Journal with Louwna Pretorius, President of Sasohn



George Browse, Chairman of The Safety First Association, Ray Strydom, Executive Secretary of the Safety First Association with Dehlia Muller, Secretary of Sasom



Editorial board members Bev Hoggins, Jenny Edmonds and Dehlia Muller, Secretary of Sasom



David Stanton talking to Jenny Edmonds, Bev Hoggins and Neloise Geyer



David Stanton, Lettie le Grange, and Charles Mbekeni from The Chamber of Mines



Dale Joynt from Aventis, Cas Houtman and Shirley Hall from Occupational Health Services

by Ferdie Smith

The Health of your Business: A Management Guide to Employees' Health

Edited by David Koh and Lee See Muah

Publisher: SNP Publishing Pte Ltd, Singapore

ISBN 9971 0 0834 3

Every doctor involved in Occupational Health has experienced the frustration of having to deal with the management of an undertaking which views occupational health as an unavoidable expense that must be cut to the barest minimum.

This book, edited by two very experienced Occupational Health practitioners and written by a number of experienced OH practitioners, gives us some very convincing arguments to present to management.

The book was written by practitioners in Singapore for the conditions prevailing in that country, and is directed at management and addresses the need for the health needs of the company to be managed in the same way as production, supplies, equipment and finances. Most of the content however, is generic and can be regarded as applicable to our own situation to a large extent.

The book addresses the management of health in a company in the broadest sense, giving attention to aspects like the management of medical aid funds, case management, health-care costs, and managed care. A whole chapter is devoted to choosing the right company doctor. Other topics that are addressed in detail are sickness absence, health promotion, business travel and jet lag.

Part four of the book addresses legislation as it applies to Singapore. In the light of the "globalisation" of labour legislation under the guidance of the ILO, the legislation is remarkably similar to our own legislation.

Occupational Health for Health Care Workers: A Practical Guide

Editors: HM Hasselhorn, A Toomingas, M Lagerström

Publisher: Elsevier, 1999

ISBN 0 444 50335 8

Occupational risks to which health care workers are exposed on a daily basis are often regarded as less serious. Why would a person working in a health care institution be exposed to any risk to his or her health? Stelman[1] however made the remark that: "If you ever wondered how people can manage to work with the sick and always stay healthy themselves, the answer is they can't!"

At the second International conference on Occupational Health for Health Care Workers held in Stockholm in 1994 the Scientific Committee of the International Commission for Occupational Health (ICOH) uncovered the need for a concise book covering the broad range of occupational hazards facing health care workers. This was the first step in the production of the present book.

The book is intended to give guidance and advice to those dealing with occupational health issues in the health care sector and is especially written for occupational health practitioners such as physicians, nurses and safety engineers. It may also be useful to health and safety advisors, health care administrators, managers and medical students.

The book consists of short, concise and very practical chapters on biological hazards, addressing the most important conditions individually. Chemical hazards causing dermatosis, disinfectants, cytotoxic drugs, anaesthetic gases and ethylene oxide are specifically covered.

Physical hazards are covered in four chapters and include musculoskeletal disorders, ergonomic risks, radiation and noise. Psychosocial hazards are discussed in a further five chapters and include the very topical aspects of work-related stress, violence, substance abuse and mental disorders. Special problems like night and shift work, reproductive health hazards, hazards in the laboratory environment and the management of hospital waste is also addressed.

This book to which a host of occupational health practitioners have contributed their expertise is an example of international collaboration in occupational health and the sharing of scientific information. It is state of the art in the protection and promotion of the health of health care workers. Every occupational health practitioner involved with the care of the health care worker cannot afford to be without a copy of this compact reference guide. The book succeeds admirably in achieving the goals set by the scientific committee of the ICOH in 1994.

1. Stelman JM. Woman's work Soman's health: Myths and realities. New York: Pantheon, 1976

SABS - Hearing protection - safety an imperative

Companies which utilise personal hearing protectors to prevent workers from noise induced hearing loss should consider using only those products which carry the SABS mark of approval, cautions the SABS chief executive Eugéne Julies.

"South African companies must take more preventative measures in ensuring the safety of their workforces. For too long now local companies have got away with introducing the bare minimum when it comes to safety measures."

One such area is the control of noise and the prevention of noise induced hearing loss, which results in occupational deafness.

"Occupational deafness ranks amongst the top three places on the list of occupational diseases in most of the industrialised countries", says Mr Julies.

"Statistics show that on average, 30 percent of the active population is exposed to high noise levels of which one third will suffer from occupational deafness at the time they retire.

"This will result in increased claims for noise induced hearing loss compensation which companies will have to pay.

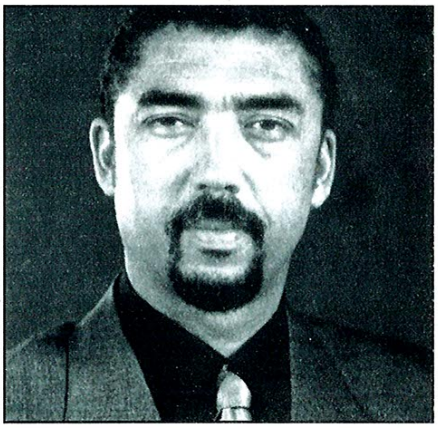
"Companies that are not investing in long term hearing protection programmes due to financial and technical constraints are being penny wise and pound foolish" says Mr Julies.

Companies, who take short cuts with their hearing protection programmes - be they personal devices or measures taken in the working environment - to reduce noise levels are not taking the hidden costs into consideration.

Says Julies: The 'hidden' costs associated with exposure to high noise levels in addition to noise induced hearing loss include:

- High noise induced stress levels that could result in increased accidents and reduced productivity
- Impaired communication that could lead to miscommunication of instructions or the inability to detect warning signals, the results being a safety risk.
- An increase in accident risk in the workplace.
- Increased compensation payments due to noise induced hearing loss and the expense of audiological tests and hearing aids having to be replaced every four to five years.

Companies worldwide are spending millions on hearing protection, which is often inadequate and most often without proper investigation into the appropriateness of the hearing protection device for the task at hand. Many of these purchases will not bring the long-term benefits that these companies are seeking and could still expose them to noise induced hearing loss claims.



"There are a few hearing protection device manufacturers in South Africa who are going through the process of getting SABS approval certificates, however, to date, there is only one hearing protection device (including earmuffs and earplugs) in the world that has been given the SABS mark of approval, says Mr Julies.

Variphone, a product manufactured by H.A.S.S. Industrial a whole owned South African company, was given the SABS mark of approval in December 1999.

Mr Julies advises companies that are investing in hearing protection devices to ensure that the products supplied to them not only adhere to SABS standards, but actually carry the SABS Approved Performance Mark. This ensures that the products that companies are investing in will do the task they are actually supposed to do and meet the rigid standards set out by the SABS.

Julies cautions that there are some hearing protection device suppliers misleading the industry by deliberately confusing buyers and safety officers with SABS 'tested' vs SABS 'approved' products.

He explains that there is a substantial difference. "Safety officers should insist in seeing the SABS mark of approval certificate as well as the distinctive SABS mark on the product or container, to ensure that they purchase a product which will meet the requirements."

Part of the SABS Mark of Approval requirements is the regular auditing of the Mark holder's quality management system and technical abilities.

Says Mr Julies: "The constant monitoring of the company's production processes is extremely important and ensures that the quality of the product and most importantly, the quality of the fitment services provided by the consultants, is maintained".

In the case of Variphone, the hearing conservation programme representatives also require annual SABS certification as to their competence - a first for the SABS - and an important aspect in the "total quality control" that H.A.S.S. stands for.

Mr Julies further cautions safety officers when checking the authenticity of the SABS mark of approval certificates, to ensure that the certificate is current and legitimate, as constant monitoring of products is undertaken. Should the SABS find fault with the quality of the product or the service at any given time, the SABS can, and does, prevent the company from using the SABS mark of approval certificate.

Says Pieta van Deventer, H.A.S.S. Industrial's Director Hearing Conservation: "The Variphone per-

sonal hearing protector is part of a total Hearing Conservation Programme (HCP) and the only programme that prevents noise induced hearing loss by controlling the noise in the ear of the user and monitoring the efficiency and effectiveness of the hearing protector (Variphone) on an annual basis.

"This is done systematically and involves management, the workforce and H.A.S.S. The HCP includes:

- training which involves management, safety officers and the work force
- the provision of the Variphone hearing protection device
- an annual service to ensure continued adherence to SABS specifications
- audits and control including management information data via the computerised Attenuation Control System (ACS).

"The most important, but by no means only feature of the Variphone hearing protection device is the fact that it is custom made for the individual and it has a 'leak-tight' fit.

"The unit provides optimum attenuation and optimum communication, both which are important safety features. The higher the attenuation, the lower the communication. The Variphone is the only device, which through its adjustable static valves offers these important safety features. The SABS Mark of Approval underlines the effectiveness of the product.

"The Variphone product is internationally recognised. Some of South Africa's leading companies such as Anglo Platinum, Iscor, Mossgas, Eskom, Harmony Gold Mines, Gold Fields, South African Airways and many others, have between them deployed more than 60 000 pairs of Variphone units which is an example of their commitment to the protection of workers' hearing," says Mr Pieta van Deventer.

For further information contact Pieta van Deventer, HASS Industrial Tel: (012) 333-3130

Occupational Health Screening

There are a number of important reasons for in-house occupational health screening and the money and time initially spent is well worth the investment. Occupational health screening equipment fulfills a vital role in the screening, placement and monitoring of new and existing employees.

Law requires **audiometric monitoring/screening** in industry and if used correctly is an invaluable tool that indicates the efficacy of your hearing conservation programme. Audiometric screening used in conjunction with a locally developed management programme will assist you in obtaining statistics in numerous fields including the following areas namely: company, department, risk area and occupation. The programme will also assist you in the management of individuals required for yearly and twice-yearly testing, as well as education and diagnostic evaluation.

Vision screening is as important when it comes to the safety of employees involved with equipment or vehicles in motion. The immeasurable cost of life and the high cost of vehicles makes the need for vision screening a must. With the correct vision screener the following tests can be performed: colour perception, peripheral vision, stereo depth, night vision and a number of other important functions. These tests are of vital importance in the testing of drivers, forklift operators, crane operators, etc. The use of a Snellen chart is limited to acuity only and is of little value to drivers who should be tested for depth perception and peripheral vision.

Lung function screening in industry has the advantage of providing the occupational health practitioner with vital information regarding the condition of employees' lungs. Ambient conditions may have varied effects on individual's respiratory system and spirometric screening can assist the practitioner in the detection and management of respiratory illnesses. There are numerous types of spirometers ranging from portable hand-held units to compact units with onboard printers and PC communication capabilities.

For further information contact Amtronix (011) 622-1743, e-mail: amtronix@iafrica.com

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GUIDELINES FOR AUTHORS

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Official Journal of the **SA Society of Occupational Health Nurses (SASOHN)**, the **SA Society of Occupational Medicine (SASOM)** and the **Southern African Institute for Occupational Hygiene (SAIOH)**

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Articles may be submitted in the following categories:

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These should follow the format of: Introduction, methodology, results, discussion and references. The length should be between 2 000 and 2 500 words.

- Original and review articles must include a short abstract of less than 150 words and will be refereed. Manuscripts will be submitted to referees as confidential without naming the author and all referees shall remain anonymous.

• **Opinions or short reports**

These are short reports, with a length of less than 1000 words

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Less than 1000 words

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Less than 400 words

Factual accuracy

Authors are solely responsible for the factual accuracy of their work and that their work does not infringe copyright

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• **Layout**

- Manuscripts should be typed double spaced, using only one side of the paper
- Pages should be numbered consecutively and leave wide margins
- A word count should be included
- Scientific measurements should be expressed in S.I. units.
- Abbreviations and acronyms should only be used if absolutely necessary and must be defined on first use.
- Illustrations, tables and graphs should be submitted on separate sheets as black and white prints. They should be clearly identified. Tables should carry Roman numerals, I, II, III etc and illustrations should use Arabic numerals, 1,2,3 etc.
- X-ray films should not be forwarded, but glossy prints submitted

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Examples

1. Zwarenstein M, Barron P, Tollman S, et al. Primary Health Care Depends on the District Health System. S Afr Med J 1993;83:558.

Book references

1. Thompson L.A. History of South Africa. Newhaven and London: Yale University Press, 1990.

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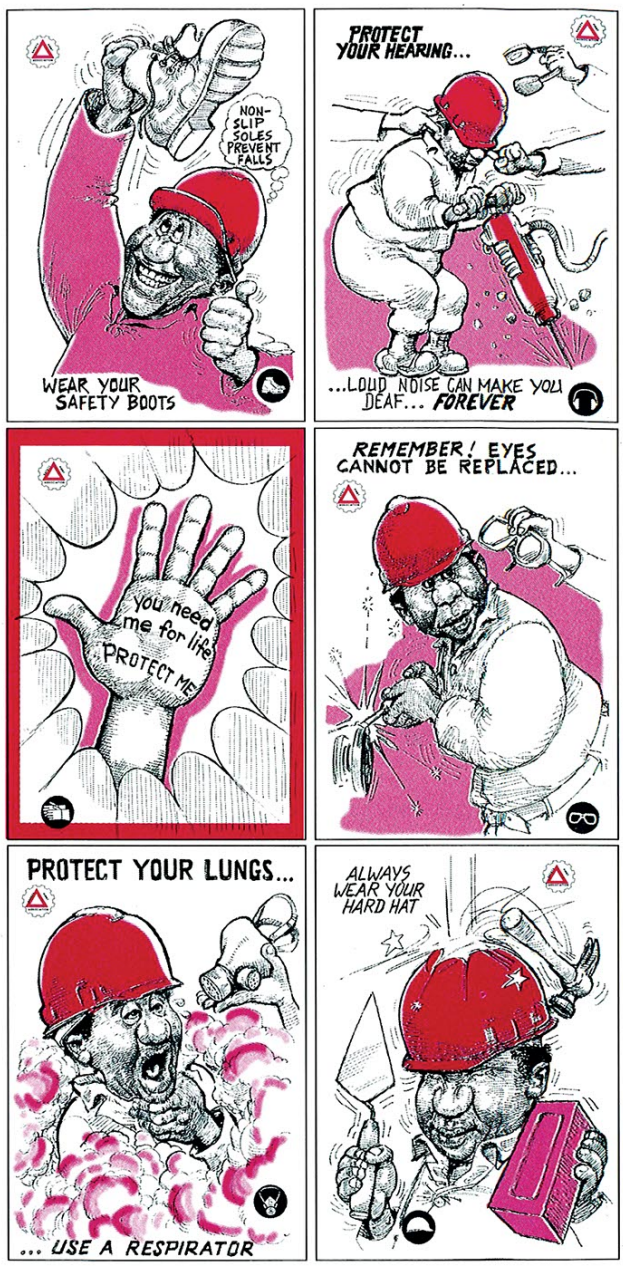
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