

Occupational health

Vol 14 No 6 November/December 2008

SOUTHERN AFRICA

**Burden of skin disease
in South African mines**

**Burden of injury at a
beverage manufacturing
company**

**Workplace health promotion
in South Africa: An
exploratory study**

**Geo-epidemiology of
hepatocellular and
oesophageal carcinomas in
southern Africa using gold
mining industry records**





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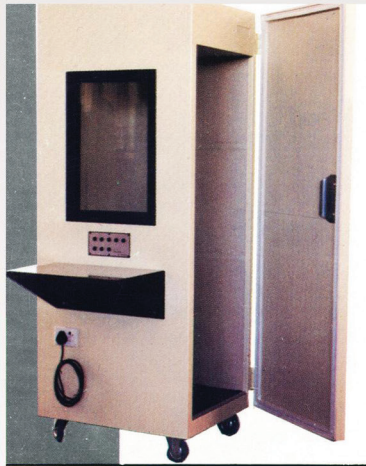
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CONTENTS

Scientific papers

The burden of skin disease in South African mines	4
Burden of injury at a beverage manufacturing company	12
The geo-epidemiology of hepatocellular and oesophageal carcinomas in southern Africa using gold mining industry records.....	20
The state of workplace health promotion in South Africa: An exploratory study	26

Regulars

Substance abuse in the workplace	17
The critical evaluation of medical literature on diagnostic tests Part 4	33
Achievements in 2008.....	35
SASOHN 2008 Conference report-back	36
SAIOH President's report.....	37
Upcoming events	40

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This journal is on the list of Approved South African Journals, and authors qualify for a subsidy for their affiliated tertiary institutions.

From the Editor...



Linda Grainger, Editor

As the year draws to a close, it is time to look back and critically reflect on the successes and failures with respect to occupational health in South Africa. A framework for such reflection is provided by Adams, Morar, Kolbe-Alexander and Jeebhay.¹ Using the five principles of the World Health Organization's Global Plan for Action on Workers' Health,² they identified key problems and areas for action. Published this time last year, there appears to have been little in the way of substantive progress. Interestingly, the selection of research articles in this issue also relate to a number of these areas.

A key area advocated by WHO is stated as follows: *"National policy frameworks for workers' health should be formulated taking account of the relevant international labour conventions and should include: enactment of legislation; establishment of mechanisms for intersectoral coordination of activities; funding and resource mobilization for protection and promotion of workers' health; strengthening of the role and capacities of ministries of health; and integration of objectives and actions for workers' health into national health strategies"*.² Adams *et al.*¹ point out the problems that South Africa must address in these areas. The need for a single regulatory OH & S authority; the provision of adequate numbers of properly trained OH personnel in OH services, especially in the inspectorates; and the extension of good quality OH services to all workers are most notable. They recommend that such services be mandatory in high-risk employment sectors – prophetic words indeed, given the recent focus on construction workers' deaths. The deaths of two health care workers due to arena virus infection contracted during their work also underscores the importance of extending OH services to all workers – health care workers are commonly overlooked.

Fundamental to the effective functioning of any health system, or part thereof, is good health information. However, we lack a nationally co-ordinated OH & S research strategy and an effective reporting system.¹ Consequently, we are unable to accurately assess the impact of occupational injuries and diseases, let alone that of the OH interventions that are in place. In a small way, two papers in this issue address our lack of knowledge on the burden of occupational injuries and diseases in South Africa. They are baseline studies and should serve as a starting point for future studies. They certainly highlight the paucity of health information. Kruger, Carman, Bello, Page-Shipp and Phohleli describe a study to determine the burden of occupational skin diseases in the mining sector. Although they were only able to survey two mines, it is useful in that it has provided a period prevalence for all skin diseases and made sound

recommendations regarding the management of such conditions in the OH setting. Chetty, Jelsma and Maart investigated the burden of injury in a beverage manufacturing plant. They demonstrated how factors can predict time off work due to injuries in a particular workplace, thereby aiding the development of targeted prevention programmes. McGlashan and Harington describe the novel use of occupational health information gleaned from goldminers' records for research into cancers in countries without cancer registries. They aptly demonstrate that OH services are an important part of the national health system and that a large set of OH data made a substantial contribution to understanding wider public health problems – certainly a success for OH.

The WHO recommended actions to protect and promote health at the workplace, including the primary prevention of occupational injuries and diseases and not only programmes directed at non-occupational health problems.² Despite health promotion being regarded as an important facet of any OH service, there is a lack of published South African studies on the topic. In recognition of this, Mchunu and Uys conducted an evaluation of such programmes. Their article describes the exploratory phase of the research. Not surprisingly, they found that the few resources available for health promotion were largely devoted to HIV/AIDS programmes.

Although I have drawn attention to a number of failures, this is in no way meant to minimise the value of the efforts of our members. Frequently these have been performed under difficult circumstances and with little appreciation. Examples of their successes have been recounted in every issue of the journal this year. Furthermore, the journal would not exist were it not for our members' acknowledgement of the importance of good quality, evidence-based practice.

So on that note, the members of the Editorial Board, the Presidents of the societies and I would like to thank you for your support over the past year. May the coming holiday season leave you refreshed and renewed, ready to meet the challenges of 2009!

REFERENCES

1. Adams S, Morar R, Kolbe-Alexander T and Jeebhay M. Ch. 7. Health and health care in the workplace. In: Health Systems Trust. South African Health Review 2007. Durban: HST; 2007.
2. World Health Organization. Workers' Health: Global Plan of Action. Geneva: WHO; May 2007. Accessed on 12 November, available at http://www.who.int/gb/ebwha/pdf_files/WHA60/A60_R26-en.pdf

A handwritten signature in cursive script that reads "Linda Grainger".



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Applications for the 2009 Discovery Foundation Awards are now open until 15 January 2009. More information about the key principles, application process and selection criteria is available at www.discovery.co.za/foundation

The burden of skin disease in South African mines

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ABSTRACT

A survey to determine the period prevalence of occupational skin diseases (OSDs) was undertaken in a gold and a coal mine, by means of a medical record review and a clinical patient review. The prevalence of any skin disorders indicated a significant burden of disease in the primary health-care setting (31% of all employees presenting to the two operations' health services had a skin disorder during the period under review i.e. 1 July 2005 – 30 June 2006). Whilst the role of HIV could not be demonstrated, it is widely acknowledged to be a significant risk factor.

The establishment of the rate of OSD and its risk factors was prevented by the small number of cases of severe and chronic skin disease such as those caused by occupational hazards in the working environment. Firm data on OSD prevalence will require a wider study. Results demonstrated a poor awareness of OSD and its definition in mine healthcare services, diagnosis is difficult, and the compensation process is unclear and onerous. There is a need to educate mine healthcare workers, and industry guidelines would be of value. Generic workplace assessments for potential skin hazards were found to be impractical and their inclusion in routine risk assessments is advised against.

INTRODUCTION

Mine healthcare workers report that skin diseases in South African mineworkers are common. They are however seldom linked to a causative agent in the workplace i.e. are rarely diagnosed as an occupational skin disease (OSD). Given the diversity of mining and processing operations, and exposures to known skin irritants and allergens, it is surprising that there is not a higher rate of OSD than documented. Of further concern is that compensation claims for OSD in the South African mining industry have decreased from 1.8 to 0.5 per 10 000 mine employees between 2000 and 2005.¹ Whilst this decline is similar to trends in international compensation data^{2,3} and could be attributed to improved

working conditions, many healthcare workers and authors in the field believe that OSD is unrecognised, underreported, and inadequately researched.⁴

The Mine Health and Safety Council therefore mandated a project to develop guidelines and educational materials to improve the diagnosis, treatment and processing of OSD, including compensation and risk reduction processes in the workplace. In developing the guidelines, the project team was required to review the international and South African literature and data on occupational skin disease and conduct a prevalence study that would assess the burden of occupational and other skin disease in miners, and current practices in the management of OSD. The results of the review were



published in the July/August 2008 issue of this journal.⁴ This paper presents the findings of the prevalence study.

It is important to note that skin disease is a common manifestation of HIV infection⁵⁻⁷ and it is suspected that many patients with compensable occupational disease are not being diagnosed on the assumption that the disease is HIV-related. As a significant confounding factor it was necessary to structure the research in a way that would take HIV into account.

DEFINITIONS

The definitions were published in the first paper on this study.⁴ However, it is further noted with respect to occupational contact dermatitis (OCD) that the literature⁸ shows that:

- the most important occupational risk factors for irritant contact dermatitis (ICD) are water (wet work), detergents and cleaning agents, hand cleaners, cutting fluid chemicals and abrasives;
- the most important causes of occupational allergic contact dermatitis are epoxy resins, rubber chemicals, plastic chemicals, metals and antimicrobials; and
- individuals with a history of atopy run a greater risk of developing OCD when exposed to occupational hazards.^{9,10,11}

Although OCD and occupational vitiligo (or "chemically induced leucoderma") are the only OSDs listed as compensable in Schedule 3 of the Compensation for Occupational Injuries and Diseases Act of 1993,¹² all cases of skin disorders that can reasonably be attributed to or aggravated by work-related causes, and that have caused significant disfigurement and/or disablement should be submitted to the Compensation Commissioner to be assessed for compensation.

RESEARCH METHODOLOGY

Study preparation

1. Literature and South African compensation data review conducted⁴
2. Survey of mine medical officer and occupational hygienist practices

Two questionnaires were developed to survey current practices in the management of OSD.

The Occupational Hygiene survey was circulated by e-mail in June 2006 to 11 occupational hygienists working in South African mines and works. It asked if any OSDs and/or the hazards that cause them had been identified, by what process they had been quantified and how the risk was controlled. Only one responded, which gave insufficient information to assess current practices in the control of workplace hazards.

The Medical survey was piloted then circulated by e-mail to 53 practising members of the Mine Medical Officers Association in June 2006. Of the 48 surveys successfully distributed, 10 were returned completed, a 20% response rate (5 from the gold sector, 3 from platinum, 1 from coal, and 1 from diamonds).



Irritant contact dermatitis (photo: H. Carman)

Due to the low response rate and risk of self-selection (results are biased towards over-reporting as only those professionals that have something to report are likely to volunteer for the survey), no conclusions can be drawn from the survey. However, some observations follow:

- seven operations have occupational medical surveillance programmes that should screen for OSD, although one respondent doubted that this is happening in practice;
- respondents felt that the proportion of outpatient cases presenting with ANY skin problems (including athlete's foot) is on average 19.4% (range <1–40%);
- 56.7% (range 1–90%) of skin problems are estimated to be HIV-related;
- nine had previously suspected OSD, reporting an average of 3.8 cases per annum (range <1–17 cases per annum), with suspected causative agents being hot / wet / humid

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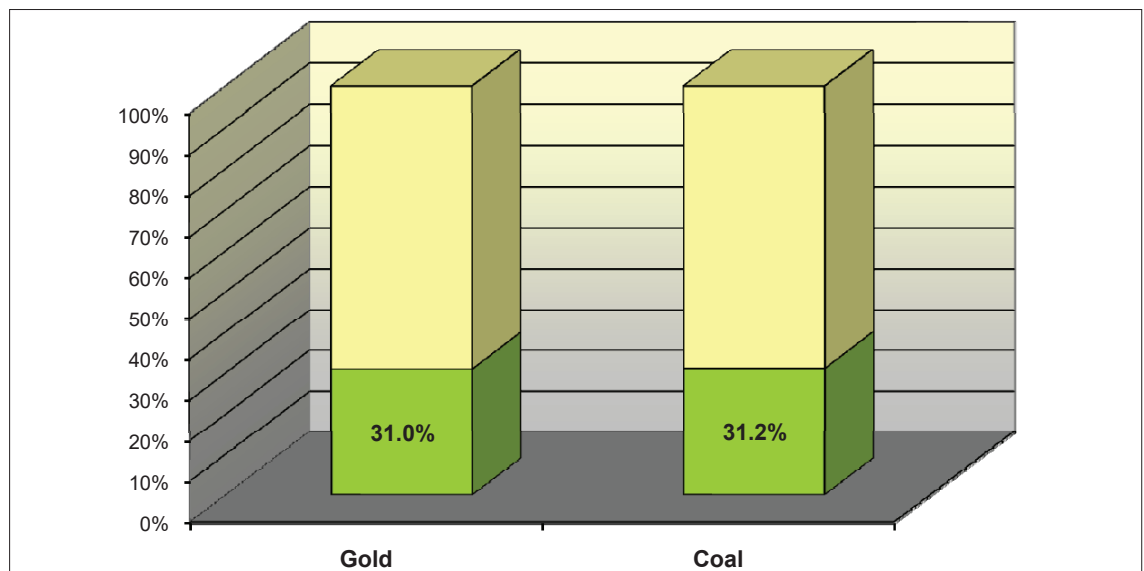


Figure 1. Burden of any skin disease recorded by healthcare facilities in a gold and a coal operation in the period 1 July 2005–30 June 2006

Table 1. Types of skin disorders diagnosed in the gold company record review

Diagnosis	%
Allergic skin reaction / itchy rash / pruritis / urticaria	25.37
Abscess / abscess formation / cellulitis (all complications of prior documented skin disorder)	14.43
Athletes foot / tinea pedis	13.43
Dermatitis / eczema / seborrheic dermatitis / septic dermatitis	8.46
Heat rash	5.47
Fungal infections (not related to the feet)	3.48
Folliculitis / impetigo / pustular rashes / sores	2.99
Rashes of all descriptions on various body parts (maculopapular, painful, scaly, red, tiny, etc.)	22.39
Other (including chicken pox, herpes, Kaposi's sarcoma, undefined excoriations, unspecified)	3.98
Total	100.00

working conditions, rubber and latex in particular, as well as nickel, epoxy, formaldehyde, oil and petroleum; and

- the compensation process has its problems because (a) it is "difficult to prove the diagnosis" or "the cause"; (b) the "HIV situation (makes it) difficult to know whether (it is) directly occupational or not" as "most skin diseases are ... attributed to HIV"; (c) "general medical awareness" of OSD is poor; and (d) "the attending dermatologists neglect ... completion of derm report". It was evident that the definition of OSD is not consistently interpreted, nor is the issue of which OSDs are compensable well-understood.

Prevalence study

The aims were (1) to investigate the burden of skin diseases among mine employees working in the South African mining industry, particularly occupational, and (2) to investigate the means to improve the management of OSD in the South African mining population and the means to improve the occupational environment in South African mines such that OSDs are prevented.

The study protocol was developed with advice from researchers at the National Institute for Occupational Health (NIOH) on study design. A dermatitis questionnaire was modified from one used at the NIOH specialist Dermatology Clinic.

The University of Witwatersrand Medical Human

Research Ethics Committee gave ethical approval. Introductory letters were sent to operations managers at participating mines and permission to work with their health and safety units, unions, human resource departments and healthcare services, and to access employee records was granted.

The study design was a medical record review to determine the period prevalence of any skin diseases, followed by a cross-sectional clinical patient review and workplace assessment to find possible OSDs. The study settings were record-keeping facilities and primary health clinics of mining health services of a gold mine in Gauteng and a coal mine in Mpumalanga. Study limitations narrowed the scope of the study to gold and coal operations only. The study population was 9 179 and 507 employees respectively in the gold and coal operations that are eligible to use the in-house health services.

The number of employees at the gold operation necessitated a sampling process and a statistically representative sample size of 376 was calculated. Company numbers for all 9 179 employees were electronically randomised and the medical records (a paper-based system) were drawn for the first 560 employees listed (oversampling to compensate for missing records). Of these, 22% (n=121) could not be found leaving a study sample of 439 employee records. These were reviewed for reported skin diseases

“The 31% period prevalence of all skin diseases...supports the

opinion of healthcare workers...that there is a significant burden of disease”

in the 12 months from 1 July 2005 to 30 June 2006.

Given the small size of the study population (507) at the coal operation and that their medical records are kept electronically it was possible to review the medical history of all employees without having to sample. A database search was used to shortlist the records of those employees that had been diagnosed with a skin-related condition during the period under review.

The project leaders developed standard procedures and data collection sheets for the gold operation and trained the research assistant in these procedures, which included retrieval of records from the medical station filing room, tracing of missing records where possible, screening medical records for skin-related entries, and completion of datasheets.

Variables on the datasheet included the following, which were later captured onto an Excel database:

- date of presenting skin disease;
- patient identifier (e.g. company number) to correlate repeated episodes of skin disease and to cross-reference information required from other data systems;
- type of skin disease diagnosed;
- treatment and amount of sick leave given; and
- date and result of the most recent HIV test if available.

The same information was available on the coal database and was retrieved by means of an electronic search.

The protocol required that patients with significant episodes of skin disease be identified (defined as two or more episodes of skin disease during the year under review; any episode requiring referral; or any episode that appeared on record to be work-related). Additional information sourced for them from human resource databases was:

- race, gender and year of birth (to factor in host variations in susceptibility to skin disorders);
- job-grade and level of education (socio-economic risk factors for skin disease);
- workplace on the mine (environmental risk factors for skin disease); and
- length of service in current section (duration of risk exposure).

In both operations, employees identified on medical record review with severe and recurrent skin disease were recalled to the medical centre and invited to be examined for the study. The dermatologist and research assistant obtained informed consent; administered a dermatitis questionnaire; undertook a clinical assessment, including laboratory tests if necessary; and requested a workplace risk assessment by the team's occupational hygienist for any cases of suspected occupational skin disease.

Data analysis was performed with STATA 9 computer software (StataCorp, 1984-2007, Texas, USA). The main


statistical analysis carried out was the estimation of the period prevalence of skin disease with 95% confidence intervals using Poisson regression.

RESULTS

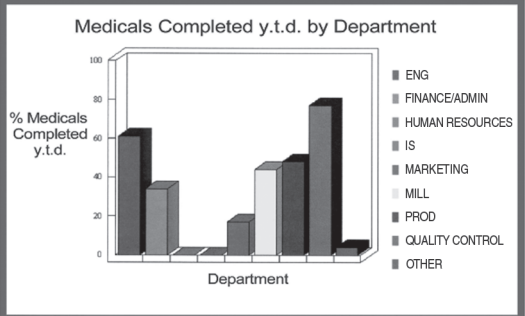
Prevalence and description of skin diseases

In the gold company, 439 medical records were reviewed for the period 1 July 2005 to 30 June 2006. The period prevalence of any skin disorder (n=136) was estimated at 31.0% (95% CI 26.7-35.5%) of the workforce using the mine healthcare facility (see Figure 1). Being paper records, a diverse range of skin conditions were described which made for interesting reading but questionable data, other than the assurance that a skin disorder has been diagnosed. Broad, speculative categories, based on the predominant diagnostic term used, are presented in Table 1.

Treatment was largely topical, with oral antibiotics where indicated, occasionally supported by oral antihistamine, analgesic or vitamin. Sick leave was not given in 78.1% of visits and one day's sick leave was given in 19.9%. The remaining 2% were given two or more days off.



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Department	% Medicals Completed y.t.d.
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MILL	50
PROD	75
QUALITY CONTROL	15
OTHER	5

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Based on inter-reviewer agreement by two reviewers, 28 of the worst-affected employees (based on clinician evaluation of chronicity, severity and possible cause) were recalled for clinical assessment. Eleven presented themselves, only three of whom had a skin disorder that could possibly be occupational i.e. tinea pedis, which is regarded as trivial and easily treated (see Table 2). None were compensable.

At the coal company, 507 medical records were reviewed for the same period. The period prevalence of any skin disorder (n=158) was estimated at 31.2% (95% CI 27.2-35.4) of the workforce using the mine healthcare facility (see Figure 1). As these were electronic records using a modified ICD10 diagnostic code, skin conditions ranged from

large numbers of generic diagnoses to rare (and perhaps creative) diagnoses (Table 3).

Prescribed treatment was erratically recorded. Sick leave was not given in 27.1% of visits and one day's sick leave was given in 11.6%. The remaining 61.4% were given two or more days off. This coal company allowed employees the use of external service providers, provided that a report is brought back to the in-house health service to capture the information. Two problems resulted: treatment given by external service providers is seldom reported (only the diagnosis) and external health service providers are less conscious of company production pressures and therefore more lenient in issuing sick leave. To demonstrate this point:

Table 2. Types of skin disorders diagnosed in the gold company clinical review

Gold miner Case	1	2	3	4	5	6	7	8	9	10	11
Age	38	30	28	36	44	34	24	33	23	Not known.	48
Job	Special team leader.	Fire patrol.	Borer.	Rigger then stopper.	Machine operator.	Machine operator.	General labourer.	Machine operator.	Loco driver.	Not known.	Winch driver.
Surface/ underground	Under-ground.	Under-ground.	Under-ground.	Under-ground.	Under-ground.	Under-ground.	Under-ground.	Under-ground.	Surface.	Surface.	Under-ground.
Length of service	10 years.	3 years.	Not known.	9 years.	Not known.	13 years.	2 years.	Not known.	Not known.	Not known.	Not known.
History	Recurrent episodes of tinea pedis. Clear for many years.	Recurrent episodes of tinea pedis.	Heat rash Nov 05.	Boils on face, chest, axillae since 1997.	2004 PTB. Cellulitis 2005. Dermatitis 2005. Fungal infection 05.	Multiple abscesses 2006. Folliculitis 2007. Treated with doxycyclin. Works with oils.	Rash on neck for 2 days.	Heat rash Oct 05. Resolved after one month.	Urticaria 2006. Tinea pedis 2006.	Herpes zoster 2003.	TB treated in 2005, allergic rashes on thighs, arms abdomen.
Examination findings	No abnormality at present.	Scaly rash on feet.	No abnormality.	Acne vulgaris face only.	Ichthyosis, emaciation. Healed boils.	Extensively distributed folliculitis.	Mild rash.	No rash.	No rash.	No rash.	Papulo-nodules elbows & knees. Interdigital tinea pedis.
HIV status	Not known.	Sept 06 negative.	Not known.	HIV positive since 2002.	HIV positive.	HIV tested: result unknown.	Not known.	Not known.	Not known.	HIV negative Jan 07.	HIV positive. CD4 614 in Mar 06.
Diagnosis	Tinea pedis recurrent.	Recurrent T pedis. Trichophyton tonsurans cultured.	No disease.	Acne vulgaris, maybe aggravated by heat & sweating.	HIV/AIDS.	Folliculitis; could be oil induced.	Trivial non-specific dermatitis.	No skin disease at present.	Tinea pedis in the past.	Herpes zoster 2003.	Rash probably HIV related. Needs biopsy.
OSD?	Yes, not compensable.	Yes, not compensable.	No.	Unlikely. HIV may play a role.	No.	Possibly oil acne or HIV folliculitis.	No.	No.	Mild tinea pedis in the past.	No.	Tinea pedis culture negative.
Treatment	No follow-up required.	Antifungal preparations.	None required.	Long term antibiotics. ART when indicated.	Requires ART.	Requires follow-up.	Cortisone cream.	None required.	None required.	None required.	Canalba cream. Follow up for biopsy. ?ART.

Table 3. Types of skin disorders diagnosed in the coal company record review

Diagnosis	%
Infective skin conditions (unspecified infections of the "skin and subcutaneous tissue", abscess/furuncle/carbuncle, impetigo, folliculitis, cellulitis, ulcers, etc.)	62.0
Dermatitis (unspecified, atopic, allergic contact, irritant contact, seborrheic, infective)	25.3
Urticaria	3.7
Other (acne, corns, nail disorders, photoallergy, scleroderma, lupus, psoriasis, etc.)	9.0
Total	100.0

**“... HIV is widely acknowledged ...
to be a significant risk factor.”**

Table 4. Types of skin disorders diagnosed in the coal company clinical review

Gold miner Case	1	2	3	4	5	6	7
Age	49	49	46	48	48	34	47
Job	Clerk.	Fitter.	Shuttle car operator.	Fitter.	Clerk.	Driver coal loader.	Driver coal cutter.
Surface/underground	Surface.	Surface.	Surface.	Underground.	Surface.	Underground.	Underground.
Length of service	25 years.	25 years.	25 years.	13 years. Before this at petrochemical company.	13 years.	10 years.	18 years.
History	Scaly rash forearms & legs. No contact oils or chemicals.	Rashes since 1985 hands, neck, body & legs. Better last 3 yrs.	No skin problem.	Had swelling of hands & legs. Not a skin rash. Resolved on treatment.	Minimal dry skin on forehead. No other rashes.	Blistering eruption palms 2005 when changed from pigskin to nitrile gloves. Patch tests - positive PPD. No atopy.	Infected eczema on feet & hands 2005. Started at home. Patch tests negative. No atopy.
Examination	Dermatitis forearms & legs mild.	Minimal dermatitis. Linear areas depigmentation.	Normal skin.	Normal skin.	Normal skin.	Better since changing to leather gloves.	No rash, better.
HIV status	Negative 2007.	Negative 2007.	Positive Feb 06. On treatment.	Negative 2006.	Positive, on treatment.	Negative May 06.	Negative 2005.
Diagnosis	Non specific dermatitis.	Leukoderma. Minimal dermatitis.	No skin problem.	No skin problem.	No skin problem.	Dermatitis due to heat and sweating.	Dermatitis worse at home. Better now, whilst in work.
OSD?	No.	Not now. May have been in the past.	No skin problem.	No skin problem.	No skin problem.	Problem resolved while in work.	Problem resolved while in work.
Treatment	Steroids, emollients.	None required.	None required.	None required.	None required.	Steroids.	Steroids.

22.7% of those with 0-1 sick days saw an external service provider, whereas 76.6% of those with 2 or more days saw an external service provider.

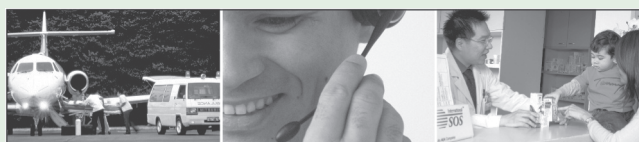
Nine of the worst-affected employees were recalled for clinical assessment to evaluate the presence of OSD. Seven presented themselves, none of whom had an OSD (see Table 4).

The prevalence of OSD could not be estimated at either research site.

Risk factors

The researchers were unable to determine the role of risk factors in causing OSD. A generic workplace risk assessment was proposed instead of a targeted one and was tested at the gold operation, where personnel exposed to known skin allergens and/or irritants were asked to participate. Skin exposure testing was undertaken using sampling pads taped onto these individuals. The test procedure was found to be impractical, inaccurate and subject to multiple confounding factors, with a limited range of detection.

A statistically significant estimate of HIV as a risk factor for any skin disorders could not be obtained due to the lack of recorded data on previous HIV test results. Historically, testing was often anonymous or results were not recorded because of issues around confidentiality, stigma and discrimination.



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Discussion

Reliability

Since the actual sample at the gold operation exceeded the required sample and all the records at the coal operation were screened, the final period prevalence of 31.0% and 31.2% respectively are reliable indicators of the burden of skin disease in the workforce accessing the in-house health services of these companies.

Generalisability

Generalising the outcomes to the entire mining industry is confounded by disease risk factors that may vary between geographical regions and the processes for mining different commodities. Study constraints prevented the countering of this by conducting research in a wide range of commodities and provinces, and by analysing the commonest predictors of disease in both the host (age, race, HIV, socio-economic status) and the environment (heat, wet work including humid conditions and "sweat" labour, dry and dusty conditions, hazardous chemicals). So whilst the prevalence rate of 31% can only be generalised to other gold and coal operations, the similarity of their rates could nevertheless be indicative of similar rates in other commodities.

Bias

Occupational groups often have lower total mortality and disease rates than the general population as the latter includes people unable to work due to illness or disability. Therefore, any group of workers is likely to be healthier than the population as a whole, a phenomenon known as the "healthy worker effect".¹³ Due to this, the study may not have detected employees with intractable skin disease who have left the company. It could explain why no significant numbers of OSD were found.



Acute cement dermatitis of the legs
(photo: H. Carman)

CONCLUSIONS AND RECOMMENDATIONS

The 31% period prevalence of all skin diseases in the mines researched supports the opinion of healthcare workers in the field that there is a significant burden of disease in their primary healthcare setting. Whilst the role of HIV was not demonstrated, it is widely acknowledged in the literature reviewed and by the medical officers surveyed to be a significant risk factor. Therefore, an effective HIV/AIDS disease management programme must underpin any protocol on the management of occupational or other skin diseases. The small number of cases of severe and chronic skin disease such as those caused by occupational hazards in the working environment, prevented the determination of the OSD rate or its risk factors. Firm data on the prevalence of OSD will require a wider study that includes systematic physical examinations by personnel trained in the diagnosis of skin disorders.

However, this is unlikely to change the way that OSD should be managed in the industry. The study has demonstrated adequately the uncertainty that prevails amongst practitioners in the field in dealing with OSD or any other skin disease, that there is a particular need to educate mine healthcare workers, and that industry guidelines would be of value. The range of hazards that can potentially cause skin conditions is large, apparently rarely causes intractable disease, and



Allergic contact dermatitis due to epoxy resin (photo: H. Carman)

“... uncertainty ... prevails amongst practitioners in the field

in dealing with OSD or any other skin disease ...”

Occupational leucoderma
(photo: H. Carman)



is difficult to screen for in the workplace. So it is unrealistic to insist that exhaustive risk assessments be conducted in mining operations.

The onus is on the healthcare worker to identify cases of occupational skin disease, to make a rigorous case for compensation, and to initiate targeted risk assessments and controls in the workplace. This does not preclude the employer from providing a safe working environment, educating employees about potential hazards and ensuring the competence of mine healthcare workers. It also does not preclude government from providing compensation and enforcing safer workplaces.

REFERENCES

1. Begley A, Moodley S. Rand Mutual Association Co. Ltd. Personal Communication. Unpublished information.
2. Emmett EA. Occupational contact dermatitis I. Incidence and return to work pressures. *Am J of Contact Dermatitis* 2002;13:30-34.
3. Emmett EA. Occupational contact dermatitis II: Risk assessment and prognosis. *Am J of Contact Dermatitis* 2003;14:21-30.
4. Carmen H and Kruger P. Occupational skin disease: A review of international and South African literature and data. *Occupational Health Southern Africa*. 14(4):12-17.
5. Coopman SA, Johnson RA, Platt R, et al. Cutaneous disease and drug reactions in HIV infection. *N Engl J Med*. 1993;328:1670-1674.
6. Mignard M, Spira RM, Morlat P, Dabis F, Doutre MS. Correlation of skin disorders with CD4 lymphocyte counts in patients with HIV/AIDS. *J of Am Ac of Dermatology*.1998;39(2):298-299.
7. Morar N, Dlova N, Mosam A, Aboobaker J. Cutaneous manifestations of HIV in Kwa Zulu Natal, South Africa. *Int J of Dermatology*. 2006;45:1006-1007.
8. Diepgen TI, Kanerva L. Occupational skin diseases. *European J of Dermatology* 2006;16:324-329.
9. Rystedt I. Hand eczema and long-term prognosis in atopic dermatitis. *Acta Derm Venereol (Stockh)* 1985;117(suppl):1-39.
10. Rystedt I. Prognostic factors in atopic dermatitis. *Acta Derm Venereol (Stockh)* 1985;65:206-213.
11. Rystedt I. Work related hand eczema in atopics. *Contact Dermatitis* 1985;12:164-171.
12. Department of Labour, South Africa. Compensation for Occupational Injuries and Diseases Act, No. 130 of 1993, as amended by the

Compensation for Occupational Injuries and Diseases Amendment Act No. 61 of 1997, including Schedule 3 (Government Gazette, 30 April 2004, 466(26302):3). Accessed on 10 November 2008 at <http://www.labour.gov.za/legislation/acts/compensation-for-occupational-injuries-and-diseases/compensation-for-occupational-injuries-and-diseases-act>

13. International Labour Organisation. Encyclopedia of occupational health and safety. Geneva:ILO;1998.



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Burden of injury at a beverage manufacturing company

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ABSTRACT

The burden of injury at a South African beverage manufacturing company was evaluated by retrospective analysis of the records of all employees who reported to the occupational health clinic with occupational injuries during the six-month review period. Records included compensation records of occupational injury, insurance claims and accident reports. The type, anatomical site, mechanism of injury and factors predictive of the number of sick days taken off work were examined using descriptive and inferential statistics. Department and gender were significant predictors of days taken off work. Incorrect manual handling accounted for 64.6% of strain injuries. More employees were injured in the administrative support department than in the workshop department. Recommendations include the implementation of aggressive health promotion and injury prevention strategies to reduce the burden of injuries, more studies at different types of companies as well as the standardisation of data collection to provide reliable epidemiological information on occupational injuries.

Keywords: Injury, burden, manufacturing company.

INTRODUCTION

The prevalence of occupational injuries and the burden associated with it is growing not only in developed countries but also in the developing world. Despite advances in rehabilitation management, occupational injuries and the mortality rates associated with these injuries are not on the decline.¹ In the United States of America (USA) it is estimated that some 160 000 employees die each year due to occupational injuries and approximately 50.1 million occupational injuries require medical treatment.² In South Africa, the three sectors recorded the highest number of fatalities due to occupational injuries during the financial years 2006-2007, reporting 389 incidents in total. They were the manufacturing (186 or 48%), construction (65 or 17%) and community and social (57 or 15%) sectors. In the same period, the manufacturing sector reported 38 fractures out of a total of 64 (59%), 29 amputations out of a

total of 41 (71%) and 19 cases of suffocation out of a total of 23 (83%).³

Occupational injuries can lead to both temporary and permanent disability resulting in pain, suffering and grief for those injured employees. This places an additional burden on both their friends and family.⁴ When an injury occurs, the entire company is affected as both the company and the injured employee may lose part or all of their productivity potential. Losses in productivity for the company may include financial losses mainly due to sickness absence and disability pension payouts⁵ and for an injured employee they may include lost wages and accompanying fringe benefits, as well as the limited ability to perform activities of daily living.⁶

Occupational health (OH) promotion and injury prevention strategies have been found to impact positively on the injury and mortality rates,^{7,8,9} whilst occupational rehabilitation can reduce the financial burden of injury by between 25%-40%. This is a significant reduction considering that Finkelstein *et al.* reported in 2006 that the cost of medical treatment associated with occupational injuries, even for less severe injuries, could exceed \$80.2 billion dollars.²

There is a paucity of reliable and comparable information about the main causes of injury and disease in companies which is critical in determining priorities in the OH sector. Traditional sources of information about the descriptive epidemiology of diseases, injuries and risk factors are generally incomplete, fragmented and of uncertain reliability and comparability.¹⁰ The lack of a standardized measurement framework has impeded comparative analyses between different companies. As a consequence the impact of injuries and diseases in the workplace has been poorly acknowledged, often leading to a lack of OH investment.¹

Most companies focus more on improving productivity and protecting the company whereas good OH is more about protecting the employees from injury and only secondarily about protecting the company's productivity.¹¹ Consequently,



limited attention is being placed on the burden of injury and associated risk factors. The burden of injury for the purpose of this study was defined as the total number of mean days taken off work due to the a) mechanism and b) type of injury. By investigating the burden of injury, a shift in the focus of companies towards a more cost-effective approach to the prevention, control and management of occupational injuries can be achieved.¹²

GENERAL AIM

The general aim of this study was to evaluate the burden of injury at a beverage manufacturing company in South Africa.

Procedure

Permission to conduct the study was obtained from senior management and the employees' union representatives. Informed consent to access the OH clinic records were obtained from all employees included in this study. All clinical records, compensation records of occupational injuries, insurance claims and accident reports were analysed. The injury data extracted included the age, gender, department, mechanism of injury, type of injury, anatomical sites, number of reported cases and days off work. In order to ensure reliability and accuracy of the injury data extracted, all information was validated by a second reviewer.

“Limited attention is being placed on the burden of injury and associated risk factors.”

SPECIFIC OBJECTIVES

The specific objectives were to determine:

1. the factors and coefficients that predicted the number of sick days taken off work for occupational injuries;
2. which type of injury determines the most number of sick days taken off work for occupational injuries;
3. the relationship between mechanisms of injury and type of injury;
4. the relationship between anatomical site and type of injury; and
5. the relationship between department and injuries sustained.

METHODOLOGY

Research setting

This research was conducted at a beverage manufacturing company within the greater Durban, South Africa area. At the time of the study this company employed 327 employees making this study feasible. The company consisted of several sites involving the production and storage of alcoholic beverages. This included seven permanent departments (plant box, administration, workshop, medical centre, waste, risk control and stores) and four contractual departments which have a 3-year renewable lease (laundry, catering, mail holding and forwarding services and technical services i.e. electrical services, carpentry services, air conditioning services).

Ethical approval

The study received ethical clearance from the University of Cape Town Medical Ethics Committee.

Research design

A retrospective design was used, in which injury data over a six-month review period was reviewed.

Sample

The population consisted of all employees, regardless of age, gender, work experience or language spoken, who reported to the OH clinic with occupational injuries during the six-month review period. As all 72 employees were included in the study, sampling was unnecessary.

Data analysis

The data was analysed using the Statistica 7 package and presented descriptively. Probability calculations were determined and set at a 0.05 significance level. Correlations were deemed strong if the r-value was greater than 0.80. An r-value of greater than 0.70 was considered to be moderately strong. Dummy variables were created (male=1, female=2; administrative=1, workshop=2; intrinsic injury=1, extrinsic injury=2) and entered into multiple regression analysis to identify which of these factors were predictive of the number



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of sick days taken off work by those who had injuries. The burden due to the mechanism of injury and each type of injury was calculated by multiplying the number of cases (n) of each injury by the mean days taken off for this injury. Cross tabulations were used to determine the relationship between mechanism of injury and type of injury and the relationship between anatomical site and type of injury. A chi-square test was used to determine the relationship between department and injuries sustained.

RESULTS

Demographic data

The 72 employees who reported to the OH clinic with injuries constituted 22% of the 327 employees. The mean age of this group was 39.9 years (SD=6.4) and the range was 22 to 51 years. There were 42 males and 30 females which denotes a 58:42 ratio. Most employees spoke English (n=49, 68%). The remainder spoke Zulu (n=19, 26.4%) while only four employees spoke Afrikaans (5.6%). The mean number of working years at this company was 5.9 years (SD=4.36) and the range was 1 to 17 years. All subjects (n=72) were employed full-time.

Objective 1: Factors and coefficients that predicted the number of sick days taken off work for occupational injuries

Department, gender and whether the injury was intrinsic (strain) or extrinsic (injury caused by trauma) were entered into a multiple regression model as depicted in Table 1. The fit was poor, as the adjusted r^2 was only 0.18. In other words, the model explained only 18% of the variance. However, department and gender were significant predictors of days taken off work, with employees in administration taking 2.2 extra days than those in the workshop and males taking off 3.6 extra days.

Table 2 depicts how these coefficients can be used to predict the time taken off work. It can be seen that of those who were injured, a male employee employed in the workshop and who had an intrinsic injury took off a mean 3.8 days. A female employee with the same injury who worked in the administrative department took off a mean of 2.5 days.

Objective 2: Type of injury that determined the most number of sick days taken off work for occupational injuries

It can be seen that although injury due to machinery was responsible for the longest time off work, manual handling demands, chemical spills, poor work posture and being struck by an object resulted in the greatest burden because there were many cases reported as depicted in Table 3.

Similarly, Table 4 depicts the proportion of each injury as a percentage of the overall burden of injury. It also indicates

Table 1. Factors used to predict sick days taken off work

	B	SE [†] of B	T (68)	p-level
Intercept	0.2	1.2	0	0.90
Department (Administration)	2.2	0.9	2	0.02
Gender (Male)	3.6	0.9	4	0.00
Cause (Intrinsic)	-0.9	0.7	-1	0.18

[†] Standard error

that although not severe in terms of the mean number of days taken off work, strains contributed to the greatest number of days off work.

Objective 3: Relationship between mechanism of injury and type of injury

Manual handling demands (n=31, 64.6%, $p<0.05$) and poor work posture (n=16, 35.4%, $p<0.05$) accounted for a significant number of strain injuries. Being struck by an object accounted for a significant number of bruises (n=9, 100%, $p<0.05$) and lacerations (n=6, 100%, $p<0.05$). It would appear that strains due to manual handling demands and poor work posture contributed 56.5% of the burden of days off work.

Objective 4: Relationship between anatomical site and type of injury

Back (n=31, 100%, $p<0.05$) and neck (n=16, 100%, $p<0.05$) injuries accounted for a significant number of strain injuries. Arm injuries accounted for a significant number of bruises (n=5, 55.6%, $p<0.05$), fractures (n=2, 22.2%, $p<0.05$) and lacerations (n=2, 22.2%, $p<0.05$).

Objective 5: Relationship between department and injuries sustained

A chi-square test indicated that significantly more employees ($p=0.00$) were injured in the administrative support department than in the workshop department.

DISCUSSION

It is of concern that 22% of employees in this organisation had sustained an occupational injury during the six-month period of the study. Overall the burden was 208.8 days. These are large amounts and in view of the type of losses discussed in the introduction, likely to have been costly for both the employer and employees. The percentage of injured employees in this study may be conservative because not all occupational injuries may have been reported to the OH clinic. There are several reasons an employee might decide not to report an injury, ranging from fear of reprisal and social stigma to a lack of knowledge of the reporting requirements to the OH clinic.^{13,14} The occupational injury statistics produced by the Department of Labour (DoL) are outdated and are a serious underestimate of actual rates.¹⁵ A health and demographic survey in South Africa indicated that 4.5% of respondents who had worked in the 12 months prior to the survey reported injuries related to work, 2.6% reported diseases related to work and 4.8% reported having been absent from work as a result of conditions (injury/disease

Table 2. Coefficients used to predict sick days taken off work

	B-Weight	B-Weight
Department	Workshop 0.0	Admin 2.2
Gender	Male 3.6	Female 0.0
Type	Intrinsic -0.9	Intrinsic -0.9
Intercept	0.2	0.2
Predicted	2.8	1.5
-95.0%CL [†]	1.8	0.4
+95.0%CL [†]	3.8	2.5

[†] Confidence level

“Traditional sources of information ... about injuries and risk factors are generally incomplete, fragmented and of uncertain reliability and comparability.”

or unknown) related to work.¹⁶ However, comparisons of injury between companies may not be reliable as there may be variances in the data collection, analysis and methods of reporting injuries from company to company resulting in poor data quality.^{1,10}

The department and the gender of the employee predicted the number of sick days taken off work for occupational injuries. Being able to make such predictions is useful for developing specific preventative strategies. Males in the administrative support department recorded the most number of injuries with males taking more time off for their injuries compared to females in the same department with the same injury. This finding is consistent with other studies as most of the subjects that were injured were male¹⁷⁻¹⁹ and younger.²⁰⁻²³ This higher incidence of injuries in males could be due to negligence or reckless behaviour.²⁴

Strains, burns, fractures, unconsciousness and amputations determined the most number of sick days taken off work. The role of health promotion and injury prevention interventions in the management of these conditions has been well documented.²⁵⁻²⁷ However, it must be noted that although burns, fractures, unconsciousness and amputations accounted for a significant amount of sick days, only a few cases were reported in each type of injury. Therefore the OH team must continue to be involved in the prevention of these injuries but should legitimately concentrate mostly on strategies to prevent or reduce strain injuries.

There was a significant relationship between incorrect manual handling and poor work posture with strain injuries.

Several other studies²⁸⁻³⁰ have reported similar findings. Steenstra in 2003, highlighted the need to educate employees on proper manual handling techniques and correcting poor working postures to eliminate or reduce strain injuries. Although appropriate handling techniques are important, if the loads being moved are excessive then employees will still be required to adopt awkward postures and the risk of injuries remain high. Thus workplace adjustments are necessary in order to suit the capabilities of the employee to the job.³²

As with other studies³³⁻³⁵ there was a relationship between back and neck injuries (anatomical site) with strain injuries (type of injury). There is strong scientific evidence on the role of physiotherapy and applied ergonomics in the treatment of back and neck injuries.³⁶⁻³⁸ Employees that are at risk of developing low back pain and associated neck problems must be identified using a scientific approach based on anatomical, physiological and psychological considerations³⁹ to reduce the burden of such injuries at the workplace.

Interestingly, there was a significant difference in the number of injuries sustained between the administrative support department compared to the workshop department with more injuries being documented in the administrative support department. More injuries in the administrative support department imply that static, sitting work might lead to more problems than the tasks that the general employees do. As such, increased attention should be paid by both senior management and the OH team to employees in the

Table 3. Burden due to each mechanism of injury

Mechanism of injury	Mean days off	Number of cases (n)	Days off SD [†]	Burden (days*n)
Manual handling	2.9	31.0	0.30	98.9
Chemical spill	9.3	3.0	4.62	27.9
Poor work posture	1.6	16.0	0.50	25.6
Struck by object	1.4	16.0	3.65	22.4
Fall	6.3	3.0	2.89	18.9
Caught between machinery	12.0	1.0	0.00	12.0
Poison fumes	8.0	1.0	0.00	8.0
In reach distance	2.0	1.0	0.00	2.0
All groups	6.17	72.0	2.90	208.8

[†] Standard deviation

Table 4. Burden due to each type of injury

Type of injury	Mean days off	Days off SE [†]	Days off -95.00%	Days off +95.00%	n	Burden (days*n)	% Burden
Strain	2.45	0.09	2.3	2.6	48	118.0	56.5
Laceration	0.97	0.27	0.3	1.4	6	5.8	2.8
Burn	12	0.46	11.1	12.9	2	24.0	11.5
Inhalation	8	0.66	6.7	9.3	1	8.0	3.8
Sprain	3	0.66	1.7	4.3	1	3.0	1.4
Bruise	0.33	0.22	-0.1	0.8	9	3.0	1.4
Fracture	8	0.46	7.1	8.9	2	16.0	7.7
Unconsciousness	15	0.66	13.7	16.3	1	15.0	7.2
Splash	4	0.66	2.7	5.3	1	4.0	1.9
Amputation	12	0.66	10.7	13.3	1	12.0	5.8
Total	6.17	0.48	5.62	7.51	72	208.8	100.0

[†] Standard error

administrative support department in order to reduce the total number of sick days taken off work. Even though this study concentrated only on the physical aspects of injury, it is important to acknowledge that psychosocial factors, such as work satisfaction, occupational stress, fatigue and boredom⁴⁰ can also influence sick leave that is taken.

CONCLUSION

This study has revealed a high incidence of injury at this company and consequently a significant burden in the administrative department. This has implications for the quality of life following an employee with an occupational injury due to the increased burden being placed on limited OH staff and financial resources. This study has only addressed the physical burden on an employee following an occupational injury. However, because of the multivariate nature of occupational injuries, the burden due to emotional and psychological assaults needs further investigation.

More robust studies are required at different types of companies in order to provide reliable epidemiological information on the burden of occupational injuries that could lead to effective preventative strategies. It is strongly recommended that the collection of epidemiological data is standardized to allow for comparison between different companies.

REFERENCES

1. Lopez AD. The evolution of the Global Burden of Disease framework for disease, injury and risk factor quantification: developing the evidence base for national, regional and global public health action. *Globalization and Health*. 2005; 1;5. Accessed on 3 November 2008 at <http://www.globalizationandhealth.com/content/1/1/5>
2. Finkelstein EA, Corso PS, Miller TR. Incidence and economic burden of injuries in the United States. New York: Oxford University Press; 2006.
3. South Africa: Department of Labour. World Day for Safety and Health at Work. Speech given by Minister Mdladlana. Pretoria: Department of Labour; 2008; p. 1-6. Accessed on 3 November 2008 at <http://www.info.gov.za/speeches/2008/08060511451007.htm>
4. National Safety Council. Injury Facts: 2005-2006 Edition. Itasca, IL: NSC Press; 2006.
5. Kankaanpää E, Suhonen A, Valtonen H. Promoting prevention with economic arguments – The case of Finnish occupational health services. *BMC Public Health*. 2008; 8(1):130.
6. Health protection: Occupational safety and health. *Public Health Rep*. 1983; Sep-Oct Suppl:69–80.
7. Bekker-Grob EW, Polder JJ, Mackenbach JP, Meerding WJ. Towards a comprehensive estimate of national spending on prevention. *BMC Public Health*. 2007; 7(1):252.
8. Stout N, Linn H. Occupational injury prevention research: progress and priorities. *Inj Prev*. 2002; 8(Suppl 4):9–14.
9. Higgins D, Casini V, Bost P, Johnson W, Rautiainen R. The Fatality Assessment and Control Evaluation program's role in the prevention of occupational fatalities. *Inj Prev*. 2001; 7(Suppl 1):27-33.
10. Azaroff LS, Levenstein C, Wegman DH. Occupational injury and illness surveillance: conceptual filters explain underreporting. *Am J Public Health*. 2002; 92(9):1421–1429.
11. Dovlo D. Wastage in the health workforce: some perspectives from African countries. *Hum Resour Health*. 2005; 3:6.
12. Frantz JM. Physiotherapy in the management of non-communicable diseases: Facing the challenge. *SAJP*. 2005; 8-10.
13. Thompson A. The consequences of underreporting workers' compensation claims. *CMAJ*. 2007; 176(3):343–344.
14. Rosenman KD, Gardiner JC, Wang J, Biddle J, Hogan A, Reilly MJ et al. Why most workers with occupational repetitive trauma do not file for workers' compensation. *J Occup Environ Med*. 2000; 42(1):25-34.
15. Department of Health, South Africa. Health and demographic survey 1998. Pretoria: DoH; 1998. Accessed on 6 November 2008 at <http://www.doh.gov.za/facts/1998/sadhs98/chapter10.pdf>
16. Ryan A. Occupational health and safety profile. Durban: WAHSA southern Africa. Project Report 2.1.10; 2007. Accessed on 6 November 2008 at <http://www.wahsa.net/Uploads/PROJECTS/SAprofile%20final.pdf>
17. Henderson R, Nancy E. Injuries and injury risk factors among men and woman in combat medic advanced individual training. *J Military Med*. 2000; Sept.:2-5.
18. Lewis RJ, Cooper SP. Effects of drug abuse on work-related injuries. *J Occup Med*. 1989; 31:23-28.
19. Oordt H, Aardt M. Safety for the people. *J Safety Mgt*. 1994; 12-18.
20. Deveney S. Offsetting inexperience with a special ability to relate to workers. *Aust Sporting News*. 2003; p. 500.
21. Frings SC. Managing a difficult employee. *Greenberg: Med Lab Observ*. 2001; p. 54-59. Accessed on 4 November 2008, available at http://findarticles.com/p/articles/mi_m3230/is/_ai_78057548?tag=artBody;col1
22. Konar M. Commission on the future of health care – Work experience training. Ottawa: Comm Action; 2002. p. 18-30.
23. Ralske J. The office work experience. Bulgaria: All Movie Guide; 1999. p. 69.
24. Flouri E, Buchanan A. The role of work-related skills and career role models in career maturity – Special section: Career development. Northern Ireland: Career Devel Quart; 2002. p. 14-18.
25. McKinney LA. Early mobilisation and outcome in acute sprains of the neck. *BMJ*. 1989; 299(6706):1006–1008.
26. Nguyen TT, Gilpin DA, Meyer NA, Herndon DN. Current treatment of severely burned patients. *Ann Surg*. 1996; 223(1):14–25.
27. Helen HG, Madhok R. From evidence to best practice in the management of fractures of the distal radius in adults: working towards a research agenda. *BMC Musculoskelet Disord*. 2003; 4:27.
28. Turner JA, Franklin G, Fulton-Kehoe D, Kathleen E, Wickizer TM, Lymp JF, et al. Prediction of chronic disability in work-related musculoskeletal disorders: a prospective, population-based study. *BMC Musculoskelet Disord*. 2004; 5:14.
29. Cole DC, Ibrahim S, Shannon HS. Predictors of Work-Related Repetitive Strain Injuries in a Population Cohort. *Am J Public Health*. 2005; 95(7):1233–1237.
30. Saik Y, Özcan A. Work-related musculoskeletal disorders: A survey of physical therapists in Izmir-Turkey. *BMC Musculoskelet Disord*. 2004; 5:27.
31. Steenstra IA, Anema JR, Bongers PM, Henrica DHCW, Mechelen WV. Cost effectiveness of a multi-stage return to work program for workers on sick leave due to low back pain, design of a population based controlled trial. *BMC Musculoskelet Disord*. 2003; 4: 26.
32. McLean AK. Applying ergonomics in post-press operations: Ergonomically friendly setups keep employees safe and productive. St Louis: Am Printer; 2001. p.32.
33. Sim J, Lacey RJ, Lewis M. The impact of workplace risk factors on the occurrence of neck and upper limb pain: a general population study. *BMC Public Health*. 2006; 6:234.
34. van den Heuvel SG, Ijmker S, Blatter BM, Korte EM. Loss of productivity due to neck/shoulder symptoms and hand/arm symptoms: Results from the PROMO-Study. *J Occup Rehabil*. 2007;17(3):370–382.
35. Pengel LHM, Herbert RD, Maher CG, Refshauge KM. Acute low back pain: systematic review of its prognosis. *BMJ*. 2003; 327(7410):323-327.
36. UK BEAM Trial Team. United Kingdom back pain exercise and manipulation (UK BEAM) randomised trial: cost effectiveness of physical treatments for back pain in primary care. *BMJ*. 2004; 329(7479):1381.
37. Hsieh LLC, Kuo CH, Lee LH, Yen AMF, Chien KL, Chen THH. Treatment of low back pain by acupuncture and physical therapy: randomised controlled trial. *BMJ*. 2006; 332(7543): 696–700.
38. Andrew ML, Kathryn MR, Christopher GM, Jane L, Rob DH, Gwendolen J, James HM. Efficacy of manipulation for non-specific neck pain of recent onset: design of a randomised controlled trial. *BMC Musculoskelet Disord*. 2007; 8:18.
39. Hurwitz EL, Morgenstern H, Chiao C. Effects of recreational physical activity and back exercises on low back pain and psychological distress: Findings from the UCLA Low Back Pain Study. *Am J Public Health*. 2005; 95(10):1817–1824.
40. Rynk P. The value of a healthy attitude – How faith, anger, humour and boredom can affect your health. Los Angeles: Vibrant Life; 2003. p. 200.

Substance abuse in the workplace

INTRODUCTION

Substance abuse in the workplace is a challenge for the occupational physician and requires special knowledge in the pharmacology of abusable drugs, knowledge of the legal aspects of testing, patient confidentiality and reporting requirements, understanding and recognition of the unique clinical presentation (symptoms) as they appear in the workplace or patients. Because substance abuse disorders are usually accompanied by a steady decline in social and occupational functioning, the employer has the advantage in detecting this decline in an individual or group's daily functioning. There are three reasons for this advantage. Firstly: The drug user spends one-third of his daily time at work. Secondly: The workplace has clearly defined expectations on attendance, work performance and behaviour. Thirdly: The workplace is less influenced by the emotional ties that family and friends of the substance abuser must confront in dealing with a substance abuser's dysfunctional behaviour.

THE SOCIAL ACCEPTANCE OF ALCOHOL ABUSE

Alcohol and alcohol residue is still our number one substance of abuse and studies have shown that 70% of industrially-related accidents were associated with alcohol usage. Loss of productivity and alcohol-related medical problems (particularly on Mondays) is not uncommon. The early identification of alcohol misuse and addressing the situation can limit accidents in the workplace. Table 1 illustrates the causes of fatal injuries when driving under the influence of alcohol, drugs or both.

DRUGS AND THE ABUSE OF DRUGS

Employees who use and abuse psychoactive drugs including stimulants, antidepressants and perceptual substances in the workplace are more likely to request time off and three to six times more likely to be involved in a workplace accident.

CANNABIS (MARIJUANA/DAGGA/POT/WEED)

How many times have we actually condoned the usage of dagga, making statements like "Dagga is derived from the earth and is therefore a natural product" or "My child can

rather use dagga than stronger drugs"? Dagga however, is extremely dangerous. It hampers the physical development of a child and can lead to psychological defects. The greatest danger of dagga is that it is a forerunner for hard-core drugs usage, it is known as the "Gate Way Drug".

Cannabis is well known in South Africa and surrounded by various myths. One of these – the therapeutic aspects – have frequently been quoted, verified and generally accepted, although its use has not been endorsed by the medical community:

- anti-emetic effect;
- anticonvulsant effect;
- analgesia; and
- glaucoma.

Dagga is a light depressant and when it is smoked the effect thereof will be felt within minutes. It reaches its peak after about three minutes and will hold the effect on the body for a period of two to three hours. The stronger the dose of dagga that is taken, the longer and more intense the so-called "Trip" will be. Dagga has the effect of speeding up an individual's pulse rate and drastically dropping the blood pressure. It also causes a dry mouth and in certain cases it causes hallucinations. A serious thirst, an increase in appetite especially for something sweet (which is called "Munchies"), aggression, light headedness and forgetfulness in certain users are caused, especially when it is used together with alcohol. Cases of synaesthesia have been reported, where music is seen and colours heard.

OPIATES (CODEINE/MORPHINE/HEROIN)

Opiate abuse in the workplace is not uncommon. It is generally prescribed for medical reasons as a general narcotic analgesic. The danger of such patients developing opiate dependency caused by the metabolism of codeine to morphine during their courses of medical treatment can present a special challenge to the occupational medicine specialist. Often these patients need simultaneous treatment both for their medical condition and the opiate dependence.

It is important to note that both heroin and codeine are metabolised to morphine by the body, which can result in the dependence on these substances. Codeine is the most widely used, naturally occurring narcotic in medical

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Table 1. Test results for 1052 fatally injured drivers

Result for drugs or alcohol	Percentage	Breakdown of positive results	
Negative	51%	-	
Positive	49%	Alcohol	56%
		Drugs	22%
		Drugs of abuse	13%
		Drugs and alcohol	9%
		Total	100%

treatment in the world. This alkaloid is found in opium in concentrations ranging from 0.7 to 2.5 percent. However, most codeine used in the United States is produced from morphine. Codeine is also the starting material for the production of two other narcotics, dihydrocodeine and hydrocodone. Codeine is medically prescribed for the relief of moderate pain and cough suppression. Compared to morphine, codeine produces less analgesia, sedation, and respiratory depression, and is usually taken orally. It is made into tablets either alone or in combination with aspirin or acetaminophen (i.e. Tylenol with Codeine®). As a cough suppressant, codeine is found in a number of liquid preparations. Codeine is also used to a lesser extent as an injectable solution for the treatment of pain. Codeine products are diverted from legitimate sources and are encountered on the illicit market.

SEDATIVE HYPNOTICS

These agents consist mainly of the barbiturates and the benzodiazepines. The typical sedative abuser is usually a middle-aged patient who has a history of previous or concomitant alcohol abuse, such as a family history of alcoholism. This profile clearly fits a large number of workers in most industries. Historically, people of almost every culture have used chemical agents to induce sleep, relieve stress, and allay anxiety. While alcohol is one of the oldest and most universal agents used for these purposes, hundreds of substances have been developed that produce central nervous system depression. These drugs have been referred to as downers, sedatives, hypnotics, minor tranquilisers, and anti-anxiety medications. Unlike most other classes of drugs of abuse, depressants are rarely produced in clandestine laboratories. Generally, legitimate pharmaceutical products are diverted to the illicit market. A notable exception to this is a relatively recent drug of abuse, gamma-hydroxybutyric acid (GHB). A number of toxic central nervous system effects are seen with chronic high-dose benzodiazepine therapy, including headaches, irritability, confusion, memory impairment, and depression. The risk of developing over-sedation, dizziness, and confusion increases substantially with higher doses of benzodiazepines. Prolonged use can lead to physical dependence even at doses recommended for medical treatment. Unlike barbiturates, large doses of benzodiazepines are rarely fatal unless combined with other drugs or alcohol. Although primary abuse of benzodiazepines is well documented, abuse of these drugs usually occurs as part of a pattern of multiple drug abuse. For example, heroin or cocaine abusers will use benzodiazepines and other depressants to augment their "high" or alter the side effects associated with over-stimulation or narcotic withdrawal.

There are marked similarities among the withdrawal symptoms seen with most drugs classified as depressants. In the mildest form, the withdrawal syndrome may produce insomnia and anxiety, usually the same symptoms that

initiated the drug use. With a greater level of dependence, tremors and weakness are also present, and in its most severe form, the withdrawal syndrome can cause seizures and delirium. Unlike the withdrawal syndrome seen with most other drugs of abuse, withdrawal from depressants can be life threatening. The alcohol effect on driving impairment has been well established. However, therapeutic doses of some sedatives can also impair driving. The effects of chronic therapeutic doses compared to the consumption of alcohol are illustrated in Table 2. It indicates the blood alcohol concentration equivalencies of various therapeutic doses.

STIMULANTS

Stimulants are one of the most used drugs to help us cope with the challenges of day-to-day life, such as those associated with long working hours, sport and academics. Caffeine was the most used, until more potent stimulants like pseudoephedrine (better known as a slimming agent) were produced. Manufacturers have recently been recalling these slimming agents, and they can now only be bought with a doctor's prescription. Stimulants, sometimes referred to as "uppers," reverse the effects of fatigue on both mental and physical tasks. Two commonly used stimulants are nicotine, which is found in tobacco products, and caffeine, an active ingredient in coffee, tea, some soft drinks, and many non-prescription medicines. Used in moderation, these substances tend to relieve malaise and increase alertness. Although the use of these products has been accepted socially, the recognition of their adverse effects has resulted in a proliferation of caffeine-free products and efforts to discourage cigarette smoking.

Designer drugs are produced in an industry that strives to design a drug with all the positive acceptance of stimulants, without the serious side effects. Up to now this has not been very successful, but it led to the development of 'Ecstasy' an amphetamine derivative. Amphetamine is a fully synthetic artificially manufactured narcotic made from pseudoephedrine. There are various structures diverging from the basic chemical composition of the amphetamine molecule, and those are referred to as derivatives of amphetamine. The most important derivative at present is MDMA (Ecstasy or XTC). It is possible to obtain large numbers of varied amphetamine chemical structures by alteration. This is why these drugs are known as designer drugs. It should be noted however that it is very difficult to spot the symptoms of XTC abuse in a person. After the effects have worn off, the user regularly returns to a normal life style and the symptoms cannot be detected. One should however be diligent in looking for more than basic symptoms if suspicion is aroused surrounding possible XTC abuse. In a workplace, amphetamine abusing workers are more likely to show acute hyperemia and mydriasis. Acute amphetamine abuse is associated with

severe psychosis, characterised by motor agitation, intense paranoia and violence. This drug of abuse is on a very steep increase, mainly due to the fact that corporations pressure employees to perform.

COCAINE (ROCK/SNOW/FLAKE/BLOW)

Cocaine a hard-core drug very seldom used in the workplace. It is snorted, from where it is absorbed very fast by the soft mucous tissues of the nose and then through to the blood vessels. Two things then happen to the body:

- firstly, the blood pressure rises drastically because of the excessive secretion of dopamine in the body, which is the body's natural stimulant.
- secondly, the heart rhythms are seriously disturbed and usually the heart starts beating faster.

This creates the feeling of hyper-activity for the user and causes the energy levels to rise markedly. There are also certain psychological changes that take place in the user, such as experiencing a feeling of satisfaction and a lack of inhibitions.

The most dangerous effect of cocaine use is the extreme increase in the blood pressure. It can cause death in cases of overdosing due to the user's blood pressure rising too much resulting in a serious heart attack or stroke. This usually happens when a cocaine user is familiar with the strength of a certain dosage and he or she suddenly uses a dosage that is mixed stronger. Cocaine addicts sometimes use this substance for days on end (known as "Binging") which can lead to overdosing.

Characteristics of a cocaine user are:

- runny nose;
- bleeding nose;
- he/she sniffs continuously;
- weight loss;
- hyperactivity;
- paranoia;
- somnolence;
- aggression;
- nervous disorder;
- excessive self confidence; and

- anxiety attacks and hallucinations.

PCP (ANGEL DUST/KILLER WEED)

Phencyclidine was developed in 1959 as an anaesthetic, but due to extreme side effects, use on humans was discontinued. It was used only in veterinary medicine until 1978 when it was banned due to increasing abuse. Today, PCP and various analogs of PCP are manufactured illegally in underground labs and sold on the street as angel dust, dust, killer weed, embalming fluid, green, love boat, and over 50 other street names.

Methods: In its pure form, PCP is a white crystalline powder. It is dissolved in water, applied to a leafy material and smoked. PCP is also available in pill and liquid form. PCP can be injected, but this route of delivery is rare.

The effects are variable and unpredictable. The user may experience auditory and tactile hallucinations, dissociation, distorted image perception, numbness, paranoia and feelings of impending doom, impaired speech, impaired motor function, agitation, feelings of extreme heat, and unpredictable episodes of violence.

DRUG TESTING

Testing in many industries has become compulsory, which in turn has led to the validation and accreditation of drug screening and confirmation tests. Testing on a subject is conducted pre-employment, randomly, after an accident or when a suspicion exists of drug misuse.

CONCLUSION

Remember that for some workers the abuse of drugs may be part of their lifestyle and altering this addiction will take a lot of time, dedication and the willingness of the employer and employee to change these habits. One important role of the occupational medicine physician is to help develop and monitor a return-to-work agreement that outlines the employee's obligation to participate in recovery.

Table 2. Drugs and driving impairment – Alcohol 0.05 g/100 ml

Blood alcohol concentration equivalencies of therapeutic doses of sedatives	
Less than 0.05 g/100 ml	– lorazepam, fluoxetine, flunitrazepam, pseudoephedrine zopiclone
0.05 – 0.1 g/100 ml	– diphenhydramine, clemastine, triprolidine
More than 0.1 g/100 ml	– diazepam, barbituates, flurazepam, loprazolam

REFERENCES

1. Waldron HA, Edling C. Occupational health practice. 4th Ed. 1997. Oxford: Butterworth-Heinemann; 1997.
2. Haddad LM, Shannon MW, Winchester JF. Clinical management of poisoning and drug overdose. 3rd Ed. Philadelphia: W.B. Saunders Co.; 1998.
3. Baselt RC. Disposition of toxic drugs and chemicals in man. 6th Ed. Foster City, CA: Biomedical Publications; 2002.
4. LaDou J. Current occupational and environmental medicine. 3rd Ed. Philadelphia: McGraw-Hill Companies; 2004.

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The geo-epidemiology of hepatocellular and oesophageal carcinomas in southern Africa using gold mining industry records

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ABSTRACT

Over 33 years, the labour force statistics of the employees of a single occupational group in the gold mining industry have provided invaluable examples of constructive and analytic studies using stochastic and specialised cartography, based upon some 6000 cancer cases and a population-at-risk of 13 million man-years of gold miners' labour. Two examples are provided here; one in the temporal mode showed consistent and unchanging distributions of hepatocellular carcinoma over time. Second, in a comparative mode, distributions of oesophageal cancer provided evidence that both resident and gold miner fatalities came from similar home areas. Such mapping had practical utility in providing viable hypotheses for the causes of hepatocellular carcinoma in Mozambique and oesophageal cancer in the Eastern Cape (formerly the Transkei) of South Africa. At the time of this work, these cancers occurred in these localities at rates among the highest in the world and so explanation of international significance might be expected.

INTRODUCTION

In terms of statistics, the epidemiology of cancer research in the less developed world has traditionally been hampered by the absence of even the most basic numerical data on births and deaths. Even in countries with recorded knowledge of births, cause-specific information on mortality has been lacking as has information on the occupations of individuals. Researchers on cancer occurrence have therefore needed to fall back on other approaches to data collection.

A major step forward was recognised when occupational statistics for black gold miners from several disparate countries and regions across southern Africa (Figure 1)

were first used by researchers such as Beyers¹ in 1927, Fischer² in 1932 and Berman³ in 1935. Such studies rely on the cooperation of major employers of labour who agree, possibly for paternalist reasons, to make available for humanitarian research their records of the numbers, ages, occupations and dates of employment of all their employees and then, at a later stage, the ill health record of each employee compiled by professional medical staff.

In this present review of studies published from 1964 to 1996, the gold mines' industry of South Africa employed only men (until very recently) so that no information was forthcoming on female cancers. Black recruits were often attracted from rural home areas. Even then two difficulties were encountered. Most frequently, they had no firm record of date of birth, in which case estimated age had to be utilised. Second, a man diagnosed with potentially lethal cancer often preferred to forsake his employment to return to die among his own folk. In such cases, these men were included in lists of mortality.

Against these disadvantages, two counter points should be made. Diagnoses were made and recorded via some of the best medical and hospital services in the country and recruits came from far-flung territories represented by several distinct population or ethnic groups.

The purpose then of this paper is to present comparative findings of 33 years of studies of cancer among one particular, but enormously numerous, body of employees – almost 13 million man-years – in one well-recorded occupation. The cumulative information from these studies led to greatly increased understanding of cancer occurrence



“... the gold miners’ patterns of cancer mortality provided surrogate measures of what can be expected to occur in the residents of their respective homelands.”

across southern Africa and may serve as a pattern for similar employment-related research in those territories where health information systems including occupational health statistics are still scanty or even totally deficient.

CANCER AMONG THE LABOUR FORCE OF THE GOLD MINES

Much was already known in the 1960s of the numbers of men employed and their territories of origin since the discovery of gold in 1886.⁴ Miners usually worked for an average of 9–12 months of each contract before taking leave at home. Their employment records each year became the data for the population-at-risk which were compiled in Johannesburg by the Employment Bureau of Africa, the central organisation for recruitment for all of southern Africa. Excellent continuing medical care was assured and almost all cases of cancer recorded were histopathologically confirmed.

In the earliest study of these employees Robertson *et al*⁵

found 925 cancers of all sites in the five years from 1964 to 1968. This established a starting point for study and found that of all the cancers, 52.6% were hepatocellular carcinoma (HCC), 13% were oesophageal cancer and 5% cancer of the bladder. The dominant position of HCC was no surprise, as liver cancer had already been recognised as extremely common in African patients, regardless of their occupation. Similarly, the high incidence of oesophageal cancer among men from the Eastern Cape (formerly Transkei) was not unexpected.

The next major advance in defining cancers in the gold mining industry was by Harington *et al* in 1975 for the period 1964-71.⁶ They also reviewed the causes and consequences for epidemiological study of the uncertainty caused by an absence of birth certificates among the populations of sub-Saharan Africa. This affected their ages both at recruitment and at diagnosis of cancer. Estimates of age, mainly by European officials, might well be in error by up to ten years, either over or under. Add to this, the uncertainty



Figure 1. Map of major and minor territories of recruitment (place names as in use during the studies)

(in 1975) about the quality of diagnoses of HCC used in earlier studies that led to the view that over-diagnosis had been occurring fairly generally. In contrast, it was now claimed that the diagnoses were correct for most cases included in this study.⁶ Of all the cancers, 710 (52.8%) were HCC, 162 (12.1%) oesophageal cancer, 73 (5.4%) respiratory and 65 (4.8%) bladder, proportions well concurring with Robertson's earlier work.⁵ At that time, 23.9% of the total labour force were recruited from Mozambique, a proportion to be severely reduced (for political reasons) to 9.8% by 1979.⁷

Studies of men in this single broad occupation group were extended, eventually to 33 years, with ever-increasing clarity regarding both geographical distributions and aetiological implications. For some sites of cancer there were increases over the period and for some decreases. For some territories, most notably Mozambique and Transkei with their high numbers of recruits, gross numbers of diagnoses for HCC and oesophageal cancer permitted analysis by home area down to magisterial district (or Mozambican equivalent). Moreover, these spatial variations were mapped by significance under the Poisson distribution for rational investigation of potential environmental causes. A logical start was to seek aetiology in the home areas, whether this would prove elusive or obvious. For less common or rare sites of cancer it would take over thirty years for numbers of deaths to build⁹ and even then these did not suffice for analysis.

Out of this huge body of occupation-based mortality data (Table 1) two numerically major examples are provided to illustrate in greater detail two specific facets of these analyses; consistency of place through time and comparisons of place between places of miners' recruitment and the resident male non-miners' populations.

LIVER CANCER IN THE MINES' LABOUR FORCE

It had long been established that hepatocellular carcinoma was a major scourge in some of the populations of southern Africa.¹⁰ Now researchers demonstrated a major difference in susceptibility to liver cancer between black gold miners from Mozambique, where rates were significantly high and

men from southern Africa's other recruitment areas, where they were much lower. This disparity had already attracted international attention¹⁰ because of the rarity of the condition in Western countries and the unusually large number of Mozambican cases. Indeed it was eight times more common in black residents of the capital city of Mozambique, than it was in Johannesburg.¹⁰

Figure 2 provides an example in the temporal domain and compares two similar data sets, hepatocellular cancers (HCC) in migrant male gold mine workers absent from their residential homeland in southern Mozambique. In two time periods up to 25 years apart, 687 cases occurred in 16 years and 65 in 8 years respectively. Eighteen locations show areas whose crude incidence rates are individually similar over time at a correlation coefficient of $r = 0.48$ and a significance level of $p < 0.05$. This clearly supports an hypothesis of causative factors being constant through time with, especially, the high incidence areas clustering among miners recruited from the coastal regions of south-eastern Mozambique. The maps also illustrate a major and lasting contrast of HCC occurrence with high case numbers to the east, changing to low in the west at or near to the mouth of the Limpopo River — a feature yet to be explained.

These findings have led to useful follow-up. Van Rensburg *et al*,¹¹ basing their field studies on the 1975 geographical indicators,⁶ later reported that the ingestion of aflatoxins, powerful hepatocarcinogens in poorly stored mouldy groundnuts, a staple food, was a telling cause of liver cancer in Mozambique. This agent is also strongly associated with chronic endemic HBV hepatitis.^{12,13} By 1996, a striking decrease in liver cancer had taken place among miners from Mozambique¹³ — 78.1 cases per 100 000 in 1964-68 to 16.9 in 1989-96. More recent evidence from the cancer registry in Maputo concurs that HCC is decreasing in formerly endemic areas in Mozambique. Similarly, the incidence of HCC in Shanghai¹⁴ and Singapore,¹⁵ both formerly high-risk regions, has declined by about one-third over the last two decades, perhaps due to decreasing exposure to dietary aflatoxin. Possibly some progressive decrease in activity of one or other of the co-determinants of HCC, or in their interaction has occurred.

Table 1. Temporal analyses of major cancers in black gold miners from 1964 to 1996 by crude incidence rate (CIR)

Period	Population-at-risk (in man-years of employment)	Number of cancers diagnosed	CIRs* of major cancers			
			Liver (HCC)	oesophagus	respiratory	bladder
1964 – 71 ⁶	2 926 461	1344	24.3	12.1	2.5	2.2
1972 – 79 ⁷	2 910 506	903	14.1	6.2	3.5	0.8
1980 – 89 ⁸	4 405 949	1704	8.8	8.0	4.4	1.8
1989 – 96 ⁹	2 561 720	1745	8.7	7.7	9.4	0.8
TOTAL	12 804 636	5696				

* Crude incidence rates per 100 000 years of employment.

† In this final analysis, 235 cancers related to HIV infection had a pooled CIR of 9.2, second by rank only to respiratory cancer among the 31 site-specific cancers listed (see Reference 9).

An alternative explanation might be, in some unrecognised way, connected with the AIDS epidemic.⁹ One would expect that the number of children or young people dying would reduce life expectancy and thereby, possibly by competition between diseases, reduce the numbers liable to suffer from HCC. This might equally apply if an increase of deaths were to be occurring from malaria or other infectious diseases, particularly pneumonia known to be endemic among the young.

That some major naturally-occurring act of prevention

clues for preventive action in other countries in sub-Saharan Africa and the Far East.

CANCER OF THE OESOPHAGUS AMONG THE MINES' LABOUR FORCE

This cancer in the Eastern Cape (previously known as Transkei) experienced a remarkable increase first recognised among the Xhosa people in Johannesburg in 1951⁹ and then elsewhere. An even greater increase was reported in 1962 by Burrell in the former Transkei.^{16,17,18} Some areas in

“Gold miners from widely differing areas of recruitment work under conditions of similar environment and yet experience quite various sites of cancer.”

has taken place contemporaneously with times of severe disruption marked by 30 years of war, massive population displacement, famine and flood¹³ seems beyond doubt. All these disasters occurred in a country where the life expectancy of both males and females is 40 years. To identify the cause(s) of this major decrease in HCC locally could provide

southern Africa had by 1964 witnessed an increase over a 12-year period that appeared to be greater than that in lung cancer over the half-century.¹⁰ The most secure evidence of the increase had come from data concerning the black gold miners.^{6,9} In the 1975 study,⁶ 67% of cases of cancer of the oesophagus came from miners from Transkei, and just as

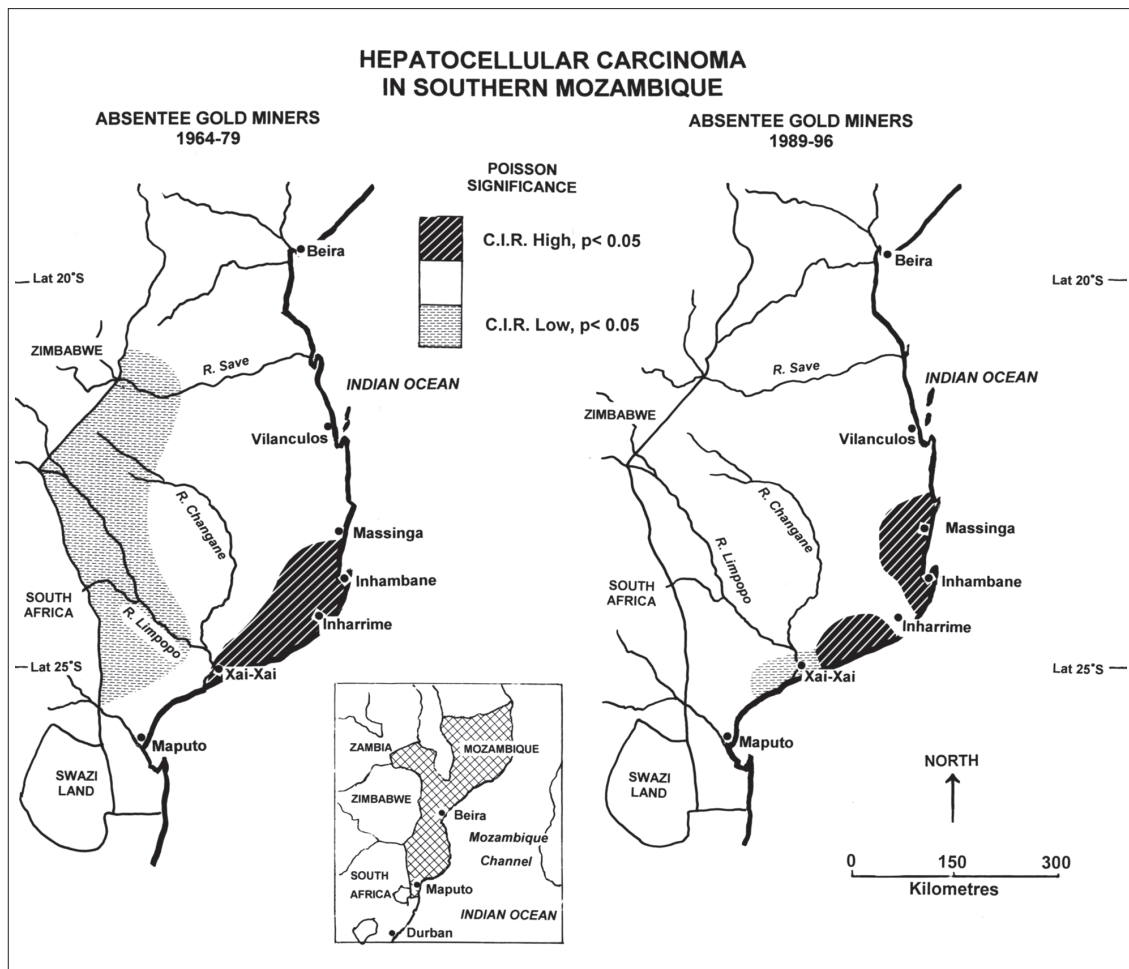


Figure 2. Significant variations of hepatocellular carcinoma among absentee gold miners from home areas in Mozambique at contrasted time periods^{7,9}

the causes of liver cancer were demonstrated to occur in Mozambique, so it was in Transkei that the aetiology of oesophageal cancer was later to be detected.

Figure 3 compares the incidence of confirmed cases of oesophageal cancer among the absentee gold miners in the period 1964-79 with those among the resident male populations in the 26 locations of Transkei. The numbers of deaths portrayed, 154 in the miners against 884 in the residents, underlines why there is a greater number of areas reaching a significantly high or low level of case numbers in the residents in the period under review. The correlation of crude incidence rates (CIR) values by location at $r = 0.71$ ($p < 0.01$) supports the contention that the overall distribution of this cause of mortality is extremely unlikely to have occurred by chance. This, in turn, was the basis for the claim that the gold miners' patterns of cancer mortality provided surrogate measures of what can be expected to occur in the residents of their respective homelands. This is of especial usefulness in territories that have no available cancer registry.

This similarity of pattern between the resident non-miners and the gold miners also showed clearly that mining as an occupation has little to do with the causes of this disease in the miners. The origins needed to be found in the environment from which the miners had been recruited.

The spatial analyses of oesophageal cancer over 1964-71,⁶ and 1982⁷ and later confirmed in 2003⁹ showed little change and led to independent field studies.^{19,20} These showed that the customary use of home-grown

and commercial pipe tobacco, especially in the form of hand-rolled cigarettes, was a principal causative determinant of the disease in both males and females, young and old. A much lower correlation was found with the drinking of either home-brewed beer or spirits.^{19,20} The most compelling finding was that the effect of both habits together was multiplicative, with relative risk raised by six- to eleven-fold. A Johannesburg case control study of oesophageal cancer patients some 20 years earlier had found much the same, although multiplicative effects had not then been tested.¹⁰

The consistent pattern of this neoplasm in peoples of the Eastern Cape may reflect the effect of deeply held cultural customs with regard to alcohol and tobacco abuse which are very difficult to combat even in the face of well-known understanding of their ill effects. This extends to the local name, *umhlaza wombiza*, (the sore that does not heal) for the early stages of the disease and its invariably lethal outcome.¹⁷

CONCLUSIONS

This series of studies in a single industry's multi-ethnic labour force ran, in total and on a consistent basis, for 33 years and analysed records of nearly 6000 cases of various sites of cancer among nearly 13 000 000 man-years of mining labour. In territories where clear records of date of birth and/or of cause of death are not yet routinely and nationally recorded, the records of other major occupations should be similarly reviewed. In Africa, for example, these might include the major copper industry of Katanga

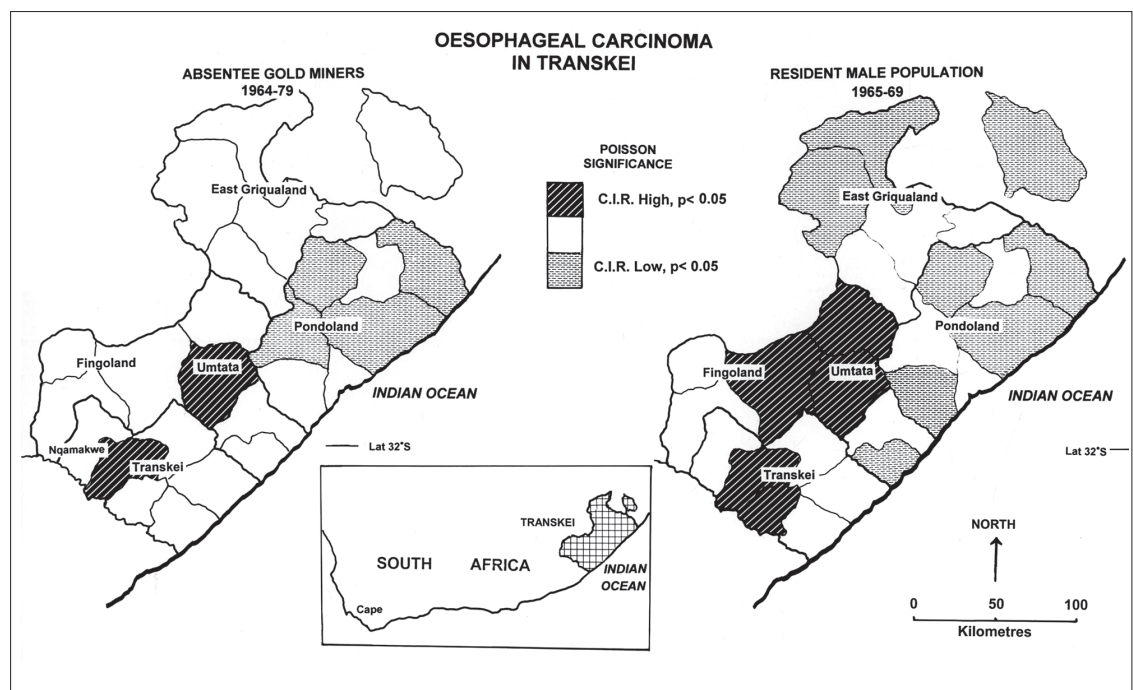


Figure 3. Significant variations of oesophageal carcinoma from locations of Eastern Cape (formerly Transkei) contemporaneously compared between absentee gold miners and resident male populations^{7,18}

or the sugar industry of Zimbabwe. However, the potential for the use of National Cancer Registries both in South Africa and in the recently independent countries to the north cannot be sufficiently emphasised.

The geographical distributions of liver and oesophageal cancer in miners from Mozambique and the Eastern Cape respectively serve as surrogate or substitute patterns of the same cancers in the home areas of the miners. This further suggests that, in the absence still of cancer registries in many of the home territories examined, the occupational data of site-specific cancer as assessed by the gold miners' distribution for those same distributions in their homeland provide authorities locally with valuable practical information (and their only guide) to cancer occurrence in the males, and sometimes also the females, of their home territories.

At the outset of these studies⁶ it had been expected that gold mining might provide evidence of excess numbers of occupation-specific cancer. In fact, as the data accumulated,⁹ it became clear that the place or area of recruitment carried greater risks than those related to mining employment. Gold miners from widely differing areas of recruitment work under conditions of similar environment and yet experience quite various sites of cancer.

Since the Chamber of Mines no longer keeps employee records in the pre-1996 form, the possibility of continuing analyses of these changing patterns and of utilising them to afford clues to aetiology is now closed off. Far-reaching changes in the make-up of the labour force and different bases of information are now forthcoming on matters of health.

This review therefore brings to a close a comprehensive investigation of cancer incidence among the black employees of the gold mines in southern Africa. The present article, based on routine industrial labour statistics, highlights both enduring and new geographical and temporal patterns of cancer experience. These offer fresh aetiological opportunities for several different cancers in different areas that have been shown to be of particular concern, and invite further explanatory study of the distributional patterns shown.⁹

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REFERENCES

1. Beyers CF. Incidence of surgical diseases among the Bantu races of South Africa. *J. Med. Assoc. S. Afr.* 1927;1:606-612.
2. Fischer WO. A preliminary report on 1402 consecutive autopsies on native mine workers. *J. Med. Assoc. S. Afr.* 1932;3:511-516.
3. Berman C. Malignant disease in the Bantu of South Africa and the Witwatersrand gold miners. *S. Afr. J. Med. Sci.* 1935;1:12-30.
4. Harington JS, McGlashan ND, Chelkowska EZ. A century of migrant labour in the gold mines of South Africa. *J. S.A. Inst. Mining and Metallurgy.* 2004;104:65-71.
5. Robertson MA, Harington JS, Bradshaw E. The cancer pattern in African gold miners. *Brit. J. Cancer.* 1971;25:395-402.
6. Harington JS, McGlashan ND, Bradshaw E. A spatial and temporal analysis of four cancers in African gold miners from southern Africa. *Brit. J. Cancer.* 1975;31:665-678.
7. Bradshaw E, McGlashan ND, Fitzgerald D, Harington JS. Analyses of cancer incidence in black gold miners from southern Africa (1964-79). *Brit. J. Cancer.* 1982;46:737-748.
8. McGlashan ND, Harington JS. Cancer in black gold miners, 1980-89 and 1990-94: the Chamber of Mines of South Africa's records of cancer. *S.A. J. Sci.* 2000;96:249-251.
9. McGlashan ND, Harington JS, Chelkowska EZ. Changes in the geographical and temporal patterns of cancer incidence among black gold miners working in South Africa, 1964-1996. *Brit. J. Cancer.* 2003;88:1361-1369; 89:777.
10. Oettlé AG. Cancer in Africa, especially in regions south of the Sahara. *J. Nat. Cancer Inst.* 1964;33:383-439.
11. Van Rensburg SJ, Cook-Mozaffari P, Van Schalkwyk DJ, Van der Watt JJ, Vincent TJ, Purchase IF. Hepatocellular carcinoma and dietary aflatoxin in Mozambique and Transkei. *Brit. J. Cancer.* 1985;51:713-726.
12. Kew MC. Hepatitis viruses and hepatocellular carcinoma. *S. Afr. Med.* 1994;84:550-556.
13. Harington JS, McGlashan ND, Chelkowska EZ. Significant decline of hepatocellular carcinoma from 1964 to 1996 in black gold miners from Mozambique working in South Africa. *S.A. J. Sci.* 2002;98:601-603.
14. Tu JT, Gao RN, Zhang DH, Gu BC. Hepatitis B virus and primary liver cancer in Chongming Island, People's Republic of China. *Nat. Cancer Inst. Monogr.* 1985;69:213-215.
15. Guan R, Oon CJ, Wild C, Motesano R. A preliminary survey on aflatoxin exposure in Singapore. *Ann. Acad. Med. Singapore.* 1986;15:201-205.
16. Burrell R JW. Esophageal cancer among Bantu in the Transkei. *J. nat. Cancer Inst.* 1962;28:495-514.
17. Warwick GP, Harington JS. Some aspects of the epidemiology and etiology of esophageal cancer with particular emphasis on the Transkei, South Africa: a review. *Adv. Cancer Res.* 1973;17:81-229.
18. Rose EF, McGlashan ND. The spatial distribution of oesophageal carcinoma in the Transkei, South Africa. *Brit. J. Cancer.* 1975;31:197-206.
19. McGlashan ND, Bradshaw E, Harington JS. Cancer of the oesophagus and the use of tobacco and alcoholic beverages in Transkei, 1975-6. *Int. J. Cancer.* 1982;29:249-256.
20. Bradshaw E, McGlashan ND, Harington JS. The use of tobacco and alcoholic beverages by male and female Xhosa in Transkei in relation to cancer of the oesophagus. Occasional Paper No. 27. *Inst. Social and Econ Res. Rhodes University, Grahamstown, South Africa;* 1983. 46 pp.

The state of workplace health promotion in South Africa: An exploratory study

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ABSTRACT

This study aimed to explore the current situation of health promotion in the workplace in small, medium and large workplaces in Durban, South Africa. An exploratory case study approach was used, whereby data was gathered with both quantitative and qualitative methods. Six organisations and 258 participants participated in this phase of the three-phased study. Quantitative data and qualitative data were analysed using the computer based Statistical Package for Social Sciences and the NVivo computer package respectively.

The findings showed that despite some of the participating organisations offering some health promotion activities, none emerged as entirely health promoting workplaces. Those offering employee health promotion/wellness programmes mainly focused on individual health programmes and none provided comprehensive holistic programmes aimed at providing healthy work environments.

Recommendations include an emphasis on a more comprehensive approach to health promotion programmes, stakeholder involvement and educational preparation of occupational health professionals for this component of their role.

Key words: Health promotion, workplace health promotion, employee health, employee wellness.

INTRODUCTION

Health promotion has been identified as a very powerful tool in the primary prevention of diseases.¹ Primary prevention comprises those preventive measures that forestall the onset of the illness or injury before it occurs.² The worksite has been identified as an ideal location for health promotion efforts as it is a defined community with access to social support and has economic reasons for improving health and productivity.³ Workplace health promotion (WHP) has been applauded as one of the holistic approaches, which addresses both individual risks and the broader organisational and environmental issues.⁴ WHP can address lifestyles, workplace hazards,

work organisation, professional competence of employees and early detection of disease.⁵

Section 12 of the Occupational Health and Safety Act (OHS Act) (Act 85 of 1993 as amended) states that every employer should identify the work related hazards and risks in the workplace and prevent the exposure of employees to such hazards or to minimise exposure.⁶ It further suggests that occupational hygiene programmes, biological monitoring and medical surveillance should be carried out to minimise work-associated risks. What is evident is that even though the importance of health promotion for the employees is mentioned, it is not prescribed. Different organisations have therefore responded to the OHS Act by implementing some health promotion interventions regarding employee health, such as employee assistance programmes (EAP), HIV/AIDS programmes, and continuous employee health surveillance.⁷

Studies evaluating WHP have been conducted in other countries.^{8,9,10,11} However, no similar published South African studies were identified. In South Africa, studies focusing on health promotion programmes have been conducted in settings such as schools and hospitals.^{12,13,14} There was therefore a need for a baseline study to evaluate WHP health promotion in the South African context. A three-phase multiple case study was conducted, and this paper describes Phase One of the study.

LITERATURE REVIEW

Relevant literature on the concepts of health promotion, wellness and wellbeing were explored as these are sometimes



used interchangeably. Literature regarding workplace health interventions was also explored. Several authors^{4,5,8,9,10,11,15} recommend that WHP should deal with the following aspects:

Relevance: Addresses individual and organisational level priorities for health promotion as identified through employee

METHODOLOGY RESEARCH DESIGN

This was a multiple case study that was exploratory in nature. Both qualitative and quantitative methods were used to gather descriptive information about the characteristics of an organisation and its health promotion activities.

“... employee characteristics such as educational level had no discernible influence on their involvement in health promotion programmes.”

participation. All stakeholders, including trade unions have to be involved in the planning, implementation and evaluation of the programme.

Scope: Programme activities flow from clearly stated theory/model/rationale, while having an explicit link to the arena(s) of practice to which they apply.

Attributes: Aims to create opportunities for choice, sustainability and empowerment, achieved at any level or combination of levels from the individual to the organisational level.

Context: The context, such as employee characteristics, organisational size and type, medical aid benefits and risk level will determine the WHP activities offered. The programme should appreciate the fact that WHP is embedded in a larger health promotion context.

A comprehensive approach to WHP, which incorporates the levels of awareness, lifestyle change and supportive environment, is likely to succeed.¹⁶ Table 1 provides details of the components of these levels.

PURPOSE

The purpose of the study was to explore the current status of health promotion programmes in small, medium and large workplaces in Durban, South Africa. The findings of this study were used to develop policy guidelines for health promotion in the workplace.

RESEARCH OBJECTIVES

1. Describe the current situation of workplace health promotion programmes in small, medium and large worksites, in Durban.
2. Describe workplace characteristics which influence health promotion activities.
3. Determine the process involved in the implementation of health promotion interventions.

CASE PROTOCOL

The case protocol included (a) an overview of the case study project, (b) project objectives, (c) data collection procedures, and (d) guide for the report.¹⁷ A case in this study was a workplace or an organisation, with all its embedded health promotion activities. There were multiple cases with several units of analysis embedded in each case, namely the staff profile, organisational characteristics and the process of health promotion programmes.

SAMPLING

The sample was drawn from workplaces in Durban, as these were easily accessible to the researcher. Sampling was conducted to select organisations as cases and then participants within these cases. Six cases were selected, representing three groupings, namely the private sector, the parastatals and the health sector. Organisations were further categorised according to the number of employees, into small (<100), medium (100 – 500) and large (>500). The selection of cases with these characteristics was based on the study assumptions that the characteristics of an organisation would have some influence on the process of health promotion programmes.^{5,8,15}

The KwaZulu-Natal Top Business Portfolio¹⁸ was used to derive the sampling frame for private organisations. The parastatal organisations were purposively sampled based on their size and proximity to the researcher. To sample the health sector, the researcher used a list of all hospitals in the Ethekwini health district of KwaZulu-Natal, taken from the *Hospital and nursing yearbook for southern Africa*.¹⁹ These institutions were divided into public sector, private sector and public/private sector strata. It was hoped that the health sector would represent the public sector and that they would be more willing to participate due to the nature of the research

Table 1. Levels of a comprehensive WHP programme¹⁶

Level 1: Awareness	Level 2: Lifestyle change	Level 3: Supportive environment
Special events	Smoking cessation	Employee ownership
Fliers	Physical exercise	Corporate policies
Posters	Stress management	Corporate culture
Brown bag lunch seminars	Healthy diet	Ongoing processes and structure
Meetings	Weight loss	
Newsletter		

topic. In the end only one hospital, in the private sector was willing to participate.

In total, 258 participants were selected. In all six cases convenience or volunteer sampling was used whereby employees were recruited via notices sent by management and unions.

Management was sampled using theoretical sampling. The researcher started with a few eligible study participants, usually the risk managers or the human resources manager (whichever was applicable in the organisation). Purposive sampling was used to select occupational health nursing practitioners (OHNPs). For labour organisations, participants were selected using convenience sampling. Shop stewards of different labour unions in each organisation were identified through human resources or the organisation's contact person. The shop stewards on duty during that day were approached and if they were willing to participate they were interviewed. A summary of the sample is provided in Table 2.

DATA COLLECTION PROCEDURES AND INSTRUMENTS

Quantitative data was collected from employees via questionnaires. Qualitative data was obtained through focus group interviews with labour unions, and individual interviews for management and OHNPs. Employees were asked questions relating to their demographic characteristics. Management and OHNPs provided information regarding organisational characteristics. All participants were asked questions relating to the existence of health promotion activities and policies in their workplaces, and their involvement in such activities. All instruments had an attachment where concepts such as policy, health promotion, health promotion programmes, health promoting workplace and safe physical environment, were defined.

DATA ANALYSIS

The data collection process occurred simultaneously with data analysis. Data from the first case was analysed and then the researcher moved to the next case, continuing in this manner

until all data was analysed. Quantitative data was analysed using the computer based Statistical Package for Social Sciences software package where it was coded into different variables. Only descriptive statistics were used in analysis and presentation of this data. For qualitative data analysis, the NVivo computer package was used. Interpretational analysis was used where the researcher found constructs, themes and patterns. Data was segmented to meaningful units and coded into categories. Relationships among categories were then established. Cross case analysis for all findings was done and presented in matrices. Pattern matching was performed from the emerging data.

QUALITY OF RESEARCH DESIGN

To establish the quality of empirical research such as case studies¹⁷ four tests are conducted namely, (a) construct validity (b) internal validity (c) external validity and (d) reliability. To enhance the quality of the research design and of the study as a whole, the researcher addressed these requirements for both the study and the instruments.

ETHICAL CONSIDERATIONS

Ethical approval for the study was obtained from the University of KwaZulu-Natal's Ethics Committee. Permission letters were sent to identified organisations. Letters of information were written for individuals and organisational representatives explaining the conditions of participation in the study. Participants gave written consent to participate in the study.

RESULTS AND DISCUSSION

The **context** included such characteristics as demographic characteristics (staff profile), organisational characteristics and stakeholders. The staff profile included age, educational level and gender of participants, while organisational characteristics include such attributes as health promotion programmes and policies. The context was explored in relation to stakeholder awareness of health programmes and their involvement in the planning and implementation of workplace health promotion programmes. The **process** was

Table 2. Summary of sample

Case number	Description of organisations in sample			Participants in sample				Total
	Type of organisation	Sector	Approx. number of employees	Employees	Managers	OHNPs	Labour unions	
1	Large, manufacturing	Private	1200	39	2	1	5	47
2	Medium, food blending	Private	200	38	2	2	-	42
3	Small, heavy engineering, using heavy iron materials	Private	100	31	1	-	5	37
4	Large, heavy engineering, mechanical	Parastatal	1400	44	2	1	11	58
5	Large, academic institution	Parastatal	1400	39	1	2	-	42
6	Medium, hospital	Health (private)	480	30	1	-	1	32
Total	-	-	-	221	9	6	22	258

programme structure, health promotion approach/model and programme objectives.

CONTEXT

Staff profile

Age of participants

In all six cases the majority of respondents in the employee category were in the age group 20 to 30 years. Involvement in the health promotion programme was higher in both the young employees (20–30 years) and the middle age group (31–40 years) than in the older age group.

Gender of participants

Male participants constituted 61% of the sample, and females only 39%. The only organisations that had more female employees were Case 5 (30%) and Case 6 (32%).

Educational level

The majority of participants with tertiary education qualifications

were in Cases 4 and 5, with 80% and 90% respectively.

Based on the findings of previous studies,⁷ employee characteristics were expected to have a significant influence on employee involvement in health programmes. Participants in such programmes were expected to be younger, well educated, female, non-smokers and white collar workers.⁵ The findings of the study however showed that employee characteristics such as educational level had no discernible influence on their involvement in health promotion programmes.

Organisational characteristics

HIV/AIDS programmes existed in all cases, whereas programmes such as smoking cessation, weight control programmes and women's health were not offered in any of the cases (Table 3). Physical fitness programmes were offered in all cases, except in Case 3. Of these, only Case 1 had a formal physical fitness programme with a biokineticist on site, while in other sites the fitness programmes were informal programmes.

“... activities were, however, largely influenced by management and OHNPs, while labour unions and other employees were not fully involved ...”

Table 3. Participants' explanations of the activities within their WHP programmes

Case number	OHNPs	Employees	Management	Labour unions
Case 1	HIV/AIDS EAP Health education Physical fitness	HIV/AIDS (24%) EAP (9%) Health education (3%) Physical fitness (9%) Disease management (6%) No programmes (58%) (n=33)	HIV/AIDS EAP Physical fitness Medical surveillance	HIV/AIDS Physical fitness Drug and alcohol rehabilitation No programmes
Case 2	Newsletters Information brochures HIV/AIDS	Health and safety (31%) Health screening (3%) No programmes (63%) (n=35)	Medical surveillance	–
Case 3	–	HIV/AIDS (7%), Health and safety (3%) No programmes (87%) (n=30)	Drug and alcohol rehabilitation	No programmes
Case 4	HIV/AIDS EAP TB/DOTS	HIV/AIDS (27%), Health and safety (2%) Stress management (2%) Disease management (5%) Health screening (5%) Health education (5%) No programmes (61%) (n=41)	HIV/AIDS Drug and alcohol rehabilitation Medical surveillance	EAP HIV/AIDS Health days Health education
Case 5	HIV/AIDS Physical fitness	HIV/AIDS (8%), Physical fitness (3%) Health and safety (8%) Health education (5%) No programmes (77%) (n=39)	HIV/AIDS Hearing conservation	–
Case 6	–	HIV/AIDS (62%), Health and safety (3%) Weight control (2%) Back care (31%) Stress management (24%) No programme (31%) (n=29)	HIV/AIDS Wellness	No programmes

Stakeholder awareness of health promotion programmes

In Case 6 the majority, 70% of employees, were aware of health promotion programmes. Only 5% of employees in Case 3 and 9% in Case 5 were aware of the health promotion programmes.

Differences in employee awareness on existing health promotion programmes were found by job type. Employees in non-management job levels were not aware of any health promotion policies and programmes and were hence not involved in such programmes, whereas the majority of participants in medium and lower management positions were aware of health policies and programmes (Table 3).

Different stakeholders in these organisations were expected to strongly influence the needs and goals of an organisation.⁷ Health promotion activities were, however, largely influenced by management and OHNPs, while labour unions and other employees were not fully involved in such processes as workplace health policy development.

Organisational size

Larger organisations had more health promotion programmes and provided these on site through their occupational health services. Even though all workplaces indicated that they had formal health promotion policies, none had "a written document based on the philosophy of the organisation, which stipulates the guidelines on how health promotion programmes/activities are implemented in the workplace" as defined in the study (Table 4). As such, when asked to describe the policy, participants pointed at the OHS Act or their health and safety policy, which had a section referring to health requirements for their employees.

PROCESS INVOLVED IN IMPLEMENTING HEALTH PROMOTION INTERVENTIONS

Cases 3 and 6 had no OHNPs, hence health promotion programmes were not offered. In Cases 1 and 2, which were both private organisations, a comprehensive structure was used in the execution of health promotion programmes. Cases 4 and 5, which were parastatal organisations, had targeted structures. A comprehensive programme structure is defined as the one that includes a well-planned, well funded programme, with long range objectives and wide participation.⁵ The targeted programme on the other hand is one which targets one programme at a time, for example the organisation offering either an HIV/AIDS management programme or an EAP. Comprehensive health approaches to health promotion would have a strong emphasis on organisational and psychological factors.²⁰⁻²²

All cases, except for Case 3, had HIV/AIDS prevention programmes in place. These programmes were exclusively for the prevention and management of HIV/AIDS, and excluded employees with other health needs (Table 3). This finding demonstrated that the participating organisations had resources that were available for the wellbeing of employees, but that such resources were used exclusively for HIV/AIDS programme at present, owing to the priorities of the country.

Table 4 provides a summary of the study findings with respect to the context and process of WHP.

CONCLUSIONS

There is still an urgent need for research focusing on health promotion in different settings, as identified in the settings approach to health promotion. This study could play a role in providing a starting point for evaluation research focusing on employee wellbeing.

The situation amongst the six cases studied was that they all had some health promotion/wellness activities in place, although they were not well organised in the form of policies. This was a positive finding because the existing health promotion activities could provide a good starting point for implementing more organised and effective wellness programmes. Health promotion interventions mainly focused on individual health and hence the health promotion activities did not provide a comprehensive holistic approach. As such, one health problem in particular, namely, HIV/AIDS, was targeted rather than focusing on disease prevention in general. Larger organisations however seemed to have a more comprehensive approach compared to smaller ones. This focus on a specific public health problem was attributed to the pressure from the public for all sectors to address the AIDS epidemic with whatever resources they have. Organisations are in the process forced to utilise their



“ ... participating organisations had resources that were available for the wellbeing of employees, but ... were used exclusively for HIV/AIDS programmes ... ”

limited resources in dealing with this epidemic, which is threatening the human capital.

Employees, as stakeholders were not involved at different levels of WHP implementation. It came out strongly that there was a lack of

employee involvement in decisions that affect their health. This was a concern since different stakeholders can influence the health needs and goals of an organisation including health policy.

Table 4. Summary of findings for context and process of workplace health promotion within the organisations

	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Type	Private manufacturing	Private production	Private engineering	Parastatal engineering	Parastatal academic	Health private
Size	Large	Medium	Small	Large	Large	Medium
Risk level	Medium	Low	High	High	Low	Low
Medical aid benefits	Yes (Optional)	Yes (permanent staff)	Yes (optional)	Yes (optional)	Yes (optional)	Yes (optional)
Programme coordination	Part of organisation	Partially outsourced	None	Part of organisation	Part of organisation	Outsourced
Policy awareness (Employee)	Yes: 23 (59%) No: 16 (41%) n=39	Yes: 27 (73%) No: 10 (27%) n=37	Yes: 3 (10%) No: 28 (90%) n=31	Yes: 24 (55%) No: 20 (45%) n=44	Yes: 11(28%) No: 28(72%) n=39	Yes: 19 (63%) No: 11 (37%) n=30
Policy existence (Managers)	OHS ACT	OHS ACT HIV/AIDS	None	OHS ACT HIV/AIDS	OHS policy Hearing conservation	HIV/AIDS
Policy existence (Unions)	Online HIV/AIDS Drug and alcohol rehab. OHS ACT No awareness	—	None	Yes Fragmented HIV/AIDS OHS ACT No awareness	—	No policy
Policy existence (OHNP)	Health and safety HIV/AIDS EAP	Health policy HIV/AIDS	—	Drug and alcohol rehab.	HIV/AIDS	—
Programme awareness (Employees)	Yes: 20 (51%) No: 19 (49%) n=39	Yes: 14 (38%) No: 23 (62%) n=37	Yes: 5 (16%) No: 26 (84%) n=31	Yes: 18 (40%) No: 26 (60%) n=44	Yes: 9 (23%) No: 30 (77%) n=39	Yes: 21 (70%) No: 9(30%) n=30
Programme awareness (Unions)	HIV/AIDS Physical fitness Rehabilitation No programme	—	None	Health days Health education HIV/AIDS EAP	—	No
Involvement	Yes: 3 (8%) No: 35 (92%) n=38	Yes: 5 (14%) No: 32 (86%) n=37	Yes: 0 (0%) No: 31 (100%) n=31	Yes: 6 (14%) No: 37 (86%) n=43	Yes: 1 (3%) No: 38 (97%) n=39	Yes: 5 (17%) No: 25 (83%) n=30
Importance of programmes	Very important	—	Very important	Very important	—	Important
Availability of infrastructure (Management)	Supportive information Resources	Resources (budget) PHC clinic	Supportive information	Supportive information Resources PHC clinic	Busy with programme PHC clinic	Supportive information

RECOMMENDATIONS

- Organisations need to implement health promotion activities that are appropriate to their staff profile. This can be achieved through conducting employee needs assessments. Programmes that address employee health needs may increase employee participation.
- Employers need to start involving employees and labour organisations in decision-making pertaining to their own health. In that way employees will have a sense of self-reliance and programme ownership.
- It is important that organisations put in place comprehensive health and safety programmes that address a wide range of health and safety issues equally. One way of implementing such programmes would be to employ a health and safety coordinator who is qualified in both fields or to have a coordinator for each programme.
- Organisations need to work on developing formal health promotion policies, which will guide the implementation and evaluation of employee wellness programmes.

REFERENCES

1. WHO. Ottawa Charter for Health Promotion: First International Conference on Health Promotion. Ottawa, Canada, 17-12 November. Geneva: WHO; 1986. Accessed 13/11/2003 via <http://www.who.int/hpr/archive/docs/ottawa.html>
2. Cottrell RR, Girvan JT & McKenzie JF. Principles and foundations of health promotion and education. 3rd ed. San Francisco: Pearson Benjamin Cummings; 2006.
3. O'Donnell MP. Health promotion in the workplace. 3rd ed. Delmar, USA: Thompson Learning; 2002.
4. Chu C, Breucker G, Harris N, Stitzel A, Gan X, Gu X et al. Health promoting workplaces – international settings development. Health Promotion International. 2000;15(2):155-167.
5. Peltomaki P, Jahansson M, Ahren W, Sala M, Wesseling C, Brenes F et al. Social context for workplace health promotion: Feasibility considerations in Costa Rica, Finland, Germany, Spain and Sweden. Health Promotion International. 2003;18(2):115-126.
6. Republic of South Africa. Occupational Health and Safety Amendment Act, No. 181 of 1993. Pretoria, 1993. Accessed 21/01/2007 via <http://www.info.gov.za/acts/1993/a85-93.pdf>
7. Huiskamp AA. Health promotion in the workplace. Occupational Health Southern Africa. 2003;9(2):4-6.
8. Linnan L, Bowling M, Childress J, Lindsay G, Blakey C, Pronk S, Wieker S & Royall P. Results of the 2004 National Worksite Health Promotion Survey. American Journal of Public Health. 2008;98(8):1503-1509.
9. Xiangyang T, Lan Z, Xueping M, Tao Z, Yuzhen S & Jaguszyn M. Beijing health promoting universities: practice and evaluation. Health Promotion International. 2003;18(2):107-113.
10. Johansson M & Partanen T. Role of trade unions in workplace health promotion. International Journal of Health Services. 2002;32:179-193.
11. Novak B, Bullen C, Howden-Chapman P & Thornley S. Blue collar workplaces: a setting for reducing heart health inequalities in New Zealand. N Z Medical Journal. 2007;120(1261):2704.
12. Coulson N. Health promotion in South Africa. Health Systems Trust Newsletter. Durban: Health Systems Trust; 2000. Accessed 15/06/2004, available at <http://new.hst.org.za/pubs/index.php/381>
13. Promtussananon S & Peltzer K. The development of a health promoting hospital model: a case-control study in the Limpopo Province, South Africa. A conference paper presented at the 50th anniversary conference. Primary Health Care: learning from the past and looking to the future, 21-24 July, 2003. Durban, South Africa.
14. Vergotine H. (2003). The management of occupational health services at the provincial, regional and district level in South Africa. Durban: South African Institute of Environmental Health; 2003. Accessed 28/06/2003 via <http://www.saieh.co.za/Vergotine.doc>
15. Lahtinen E, Koskinen-Ollonqvist P, Rouvinen-Wilenius P, Tuominen P & Mittelmarm MB. The development of quality criteria for research: A Finnish approach. Health Promotion International. 2005;20(3):306-315.
16. O'Donnell MP. How to design workplace health promotion. 5th ed. American Journal of Health Promotion; 2000.
17. Yin R. Case study research. 3rd ed. Thousand Oaks: Sage; 2003.
18. Dhasiar-Ventura L (Publisher) KwaZulu-Natal Top Business Portfolio, 2004.
19. Alex White Holdings (Publishers) 2005/6 Hospital and nursing yearbook for southern Africa. Johannesburg: Alex White Holdings; 2005.
20. Lusk SL, Kerr MJ, Ronis DL & Eakin BL. Applying the health promotion model to development of worksite intervention. American Journal of Health Promotion. 1999;13(4):541.
21. Collins BS. Worksite wellness program. Nursing Management. 1991;27(12):19-21.
22. Aust B & Ducki A. Comprehensive health promotion interventions at the workplace: Experiences with health circles in Germany. Journal of Occupational health psychology. 2004;9(3):258-270.



The critical evaluation of medical literature on diagnostic tests

PART 4

This is the last part in the series on evaluating literature on diagnostic tests. It deals with the issue of whether the results will change the clinical management of our patients and whether they will benefit our patients.

3.3. WILL THE RESULTS HELP US IN CARING FOR OUR PATIENTS? CONTINUED

C. Will the results change the clinical management of the patient?¹

It is useful in making management decisions to link them to the probability of the target disorder.

Thus, for any target disorder there are probabilities below which a clinician would dismiss a diagnosis and order no further tests (a “test” threshold). Similarly, there are probabilities above which a clinician would consider the diagnosis confirmed and stop testing and initiate treatment (a “treatment” threshold). When the probability of the target disorder lies between the test and treatment thresholds, further testing is mandated.

The treatment and test thresholds are a matter of judgment, and vary for different conditions depending on the risks of therapy (if risky, you want to be more certain of your diagnosis) and the danger of the disease if left untreated (if the danger of missing the disease is high – such as in pulmonary embolus – you want your post-test probability very low before abandoning the diagnostic search).

Clinicians often rely on clinical experience and intuition to arrive at the pre-test probability that precedes ordering a diagnostic test. Each item of the history and physical examination is a diagnostic test that either increases or decreases the probability of a target disorder.

Likelihood ratios (LRs) are used to get from pre-test to post-test probability. The easiest way is to use a nomogram proposed by Fagan as it performs the calculations for the user (see Figure 2).^(1,-4)

The first column of this nomogram is the pre-test probability, the LR is shown in the second column, and the post-test probability is the third column. The user places one end of a ruler at the specific pre-test probability, holds it at that position and then rotates the other end until it lines up with the LR for the observed test result. The post-test probability can then be read from the position of the ruler in the third column.

Alternatively, the pre-test probability has to be converted into pre-test odds (odds = probability/1-probability). The post-test odds can then be calculated by multiplying the pre-test odds by the LR. The post-test odds can be converted back into post-test probabilities using the formula for probability = odds/odds+1.

The odds ratio is used to indicate by how much a given diagnostic test result will raise or lower the pre-test probability of the target disorder (determined from the history and physical examination).

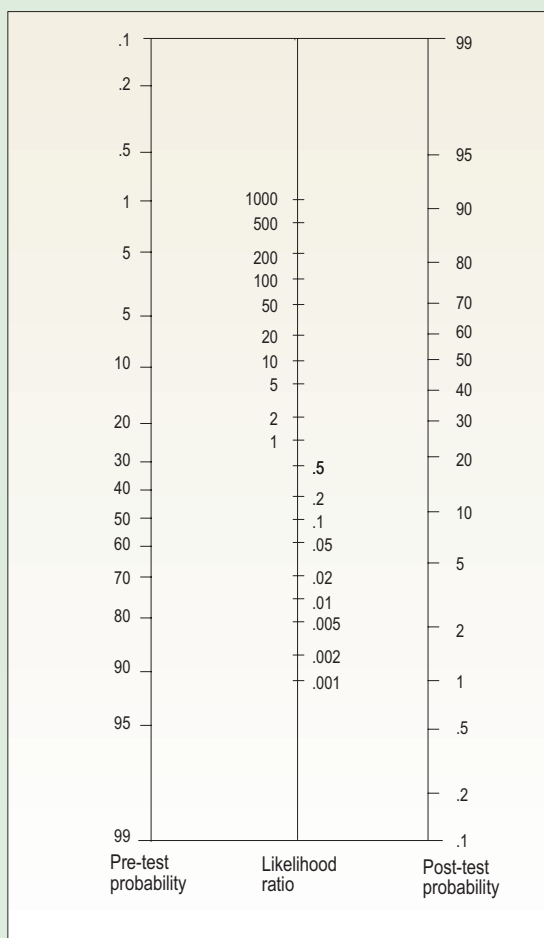


Figure 2. Fagan's nomogram adapted^{1,2}

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Pre-test odds = Prevalence/(1-Prevalence)

Post-test odds = (Pre-test odds)*(LR_(pos)) ≡ Bayes' theorem

∴ True Prevalence = Post-test odds/(1+Post-test odds)

→ Predictive value for a positive test = LR_(pos)

→ Predictive value for a negative test = LR_(neg)

If most patients have test results with LRs near 1, the test will not be very useful. Thus, the usefulness of a diagnostic test is strongly influenced by the proportion of patients suspected of having the target disorder whose test results have very high (LR>10) or very low (LR<0.1) LRs, so that the test results will move their probability of disease across a test or treatment threshold.

D. Will patients be better off as a result of the test? ¹

The ultimate criterion for the usefulness of a diagnostic test is whether it adds information beyond that otherwise available, and whether this information will lead to a change in management that is ultimately beneficial to the patient. The value of an accurate test will be undisputed when the target disorder, if left undiagnosed, is dangerous, the test has acceptable risks, and effective treatment exists.

CONCLUSION

Table 11 summarises the questions that need to be considered when evaluating new diagnostics tests. Methods of finding answers to them have been explained in this four-part series.

4. BENEFITS OF DIAGNOSTIC TEST EVALUATION

The systematic evaluation of diagnostic tests before their widespread usage can be expected to provide the following benefits:

- Elimination of poor or useless tests before they become widely applied.
- Improved quality of diagnostic test information: The appropriate use of diagnostic tests is facilitated if the spectrum of patients evaluated is clearly noted and if indexes of accuracy are reported for pertinent clinical subgroups. Specifications of test accuracy and reproducibility will also contribute to this improvement.
- Reduced health care costs: Health care costs will undoubtedly be reduced if inadequate tests do not receive widespread usage.
- Improved patient care: Patient care can also be expected to improve if ineffective technologies are avoided.

Table 11. Summary of the questions to be considered when evaluating new diagnostics tests¹

Are the results of the study valid?
<i>Primary guides:</i> <ul style="list-style-type: none">• Was there an independent, blind comparison with a reference standard?• Did the patient sample include an appropriate spectrum of patients to whom the diagnostic test will be applied in clinical practice? <i>Secondary guides:</i> <ul style="list-style-type: none">• Did the results of the test being evaluated influence the decision to perform the reference standard?• Were the methods for performing the test described in sufficient detail to permit replication?
What are the results of the study?
<ul style="list-style-type: none">• Are the likelihood ratios for the test results presented or data necessary for their calculation provided?
Will the results help me in caring for our patients?
<ul style="list-style-type: none">• Will the reproducibility of the test result and its interpretation be satisfactory in my setting?• Are the results applicable to my patient?• Will the results change my management?• Will patients be better off as a result of the test?

REFERENCES

- Jaeschke R, Guyatt G, Sackett DL. Users' guides to the medical literature III: How to use an article about a diagnostic test. B. What are the results and will they help me in caring for my patients? JAMA 1994; 271:703-707.
- Duke University Library. Nomogram for Bayes theorem adapted from Fagan TJ. N Engl J Med. 1975;293(5):257. Accessed on 9 November 2008 at <http://www.mcilibrary.duke.edu/subject/ebm/appraising/nomogram.pdf>
- Deeks J and Altman DG. Statistics notes. Diagnostic tests 4: likelihood ratios. BMJ 2004; 329:168-169. Accessed on 8 November at <http://www.bmj.com/cgi/content/full/329/7458/168>
- Halkin A, Reichman J, Schwaber M, Paltiel O and Brezis M. Likelihood ratios: getting diagnostic testing into perspective. QJMed. 1998; 91(4):247-258.

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Achievements in 2008

SASOM MEDAL OF EXCELLENCE

The SASOM Chairman, Prof. Daan Kocks, the Executive Committee and members congratulate Dr Shahieda Adams of the University of Cape Town, who is the first recipient of the SASOM Medal of Excellence.

Dr Adams commenced her specialist training in occupational medicine at UCT in 2004 whilst employed in the Provincial Medical Advisory Panel (a project funded by the Compensation Fund), and completed the MMed at UCT as well as the specialist examinations [FCPHM (Occ Med)] in 2007. She is the first South African to graduate locally in this speciality. In May 2008 she was admitted to the College of Public Health Medicine (Division Occupational Medicine).

Her specialist training involved working full-time as a registrar in occupational medicine for four years and completing all the clinical and academic requirements of the speciality. Her thesis dealt with evaluating the predictors of obstructive lung disease in a working population. In addition the College of Medicine required that she complete a short paper and hers was entitled "Health and Healthcare of the South African Workforce" which was published in the South African Health Review 2007.

Dr Adams is currently a recipient of the Discovery Academic Fellowship and is engaged in research evaluating immunodiagnostic tests for TB in health care workers on a full time basis.

REGISTRATION WITH THE BUREAU OF HERALDRY

The SASOM emblem has been registered at the Bureau of Heraldry and we received a fine hand painted certificate as proof thereof. The emblem is described as 'an inverted demi-cogwheel, there above conjoined to a demi-spoked wheel, all Sable, charged with a rod of Aesculapius, also Sable, entwined of a snake Tenne'. See the emblem on the SASOM logo at the top of the page.

For many years the South African Society of Occupational Health emblem had two serpents, before an article in the SASOM Newsletter No 7 of August 1985, pointed out that the two serpents or Caduceus was not a symbol of medicine. At the Annual General Meeting on 24 August 1985 it was decided to change the name of the Society to the



Dr Shahieda Adams

South African Society of Occupational Medicine keeping with the international trend and proposed new legislation at that time, and to change the emblem to that of Aesculapius with a single snake – the legitimate symbol of medicine.

The logo was altered again in 2005 as the serpent faced right instead of left. It is this emblem that has been registered after a process of refining the edges of the cogwheel, placing notices in the Government Gazette and awaiting public comment as regards the ownership of the emblem.

THE SASOM ANNUAL GENERAL MEETING – 21 NOVEMBER 2008

A report on the proceedings at the Annual General Meeting will appear in the next issue of the Journal.

Invoices for SASOM Membership fees for 2009 will be sent out after the AGM together with 2009 Membership Renewal forms. It is important that these forms are completed and returned to the National Office when payment is made. We have a number of anonymous payments every year. It is for this reason and possibly because our database is not up to date that some members do not receive journals and notices.

GREETINGS

The SASOM Chairman, and Executive Committee wish everyone a peaceful Festive Season and success and good health in 2009.

See you at ICOH2009 in March!

Contact person: Jenny Acutt. Tel: 086 111 4417 or e-mail: sasomdm@iafrica.com



SASOM
South African Society
of Occupational Medicine
FOUNDED IN 1948



SASOHN 2008 Conference report-back

Did SASOHN Port Natal achieve its objective by giving the delegates some tools to 'Apply the Reasonably Practicable Approach to Occupational Health'? We believe we did! The record number of 284 delegates, 340 at the gala dinner, and international OHNs and OMPs from the Illovo group, attest to this.

The Wednesday evening cocktail party commenced with a motivational talk by Mr Mike Smith, Human Resources Director of Tetra Pak South Africa and the Sub-Saharan Cluster. He asked "Are you in control?" and spoke about having a 'fitting attitude'. Dinner followed, and then it was time to relax, meet old and new friends and enjoy the evening. Delegates had a real treat in store for them – the beauty therapists from the Mangwanani Spa at Sibaya provided free hand and foot massages in the room!

Thursday morning started 'on the right footing' with Anette Thompson, a podiatrist and consultant to the footwear manufacturing industry, talking of the incorrect design of PPE footwear, which is currently based on 20-year-old international measurements of feet.

Alma Schultz, a health risk assessor with OCSA, who assists with legal compliance audits, presented her research project for the Master's Degree in Occupational Health on the staff development needs of the OHPs in an OH setting. SASOHN asked the delegates to assist by completing the questionnaire as the information should help in motivating organisations on the need for an increased number of OHNPs in the workplace, in order to provide the best service.

Leagh Clinning, an OHNP and a National Operations Executive with OCSA, spoke about 'Leaving a legacy' and highlighted the growing number of cases lodged with the SA Nursing Council relating to unprofessional behaviour, working out of the scope of practice, etc.

Nell Brown, an OHNP medical and risk consultant with IsoMetrix, who also holds a certificate in Medicine and Law, was the first professional nurse in SA to be admitted to the SA Medico Legal Society. Nell focused on legal compliance.

Before lunch the Hecate Live Theatre production on 'Breaking the Silence' ended with the message: AIDS – an acronym for "Am I doing something?"

Following lunch, Sean Molony, an Attorney of the High Court of South Africa, presented 'Under the influence, under the spotlight', explaining the OHNP's involvement in workplace substance abuse.

Eugene van Zuydam, Urmilla Patel and Rae Bhamu, CCMA representatives, described what happens and is expected by the CCMA and Department of Labour in terms of medical testing to determine medical fitness in the workplace.

A variety of dancers and a musical group called Men in Black thrilled delegates at the gala dinner. Dr Ian McClure of the KZN Chapter of SASOM was our MC, and the following awards were made:

Journal Article of the Year: Anne Queripel.

Ripple Day Award: Deliwe Mulumba.

Ripple Effect Articles of the Year: Therese Hurley, Sharon Alford and Estelle Swanepoel.

A *Certificate of Appreciation* for their on-going support and sponsorship of SASOHN: Anivesh Singh of the Ripple Effect.

The *Corporate OHNP of the Year Award*, sponsored by OCSA, was awarded to Rene Jordaan of Implats. The *Individual OHNP of the Year Award*, sponsored by IsoMetrix, was awarded to Anne Davis of Sandvik. Both scored a very impressive 99% during



Members of the Port Natal Organising Committee

these national audits and are very worthy recipients of two highly prestigious awards – we are proud of your achievements and exceptionally high standard of work. Congratulations!

The OHNP of the Year trophy has been changed, and is now awarded by the SASOHN President to the SASOHN EXCO Rep / Member of the Year who goes the 'extra mile' for SASOHN. The first recipient, who, despite many personal problems during the year, still delivered an exceptionally high standard of work and commitment to SASOHN, was Karen Michell!

With the formalities over, all that was left to do was to party, and oh did we party!

The AGM on Friday morning was very well attended, with the EXCO members' reports generating much interest. During the Educational Report, Karen referred to changes regarding the training and registration of nurses, warning that some OHNPs may need to be assessed in terms of previous qualifications to be registered in the new qualifications framework. Noting that SASOHN had once again shown initiative, she announced that five EXCO members – Barbara Zumani, Catherine van Niekerk, Caroline Naidu, Jenny Meaker and Sharon Severn were the first OHNPs to qualify as assessors. This means that OHNPs instead of professional nurses will be assessing OHNPs.

The AGM closed at 11h30, with delegates receiving a CD called 'Memories of SASOHN 2008' from The Ripple Effect. (Those who didn't will get them shortly.)

The Port Natal Organising Committee meeting concluded that we had flown the SASOHN flag high, in addition to being the first region to fly the new flag with the revised SASOHN logo!

On behalf of the entire committee, we would like to say a very BIG thank you to:

- all the delegates, for attending;
- all our sponsors, who made the event possible;
- SASOHN EXCO – for your belief in our ability to host this event;
- all our helpers who packed 'goodie bags', ran around, and helped on the day;
- Sonja for helping us set up on Wednesday; and
- Linda Stokes – for her endless work in dealing with registrations, bookings, etc.

All that remains is to say "have a wonderful rest over the upcoming festive time of the year, and start next year on the right footing, by taking the Reasonably Practicable Approach to Occupational Health in your Clinic."

Jenny Meaker

SASOHN Vice-President; Port Natal Vice-Chairperson

SAIOH President's report

Colleagues,

It is again that time of the year where we take a reflection and look back at the past achievements as well as past failures. As we look back at the year that was, we take note of what we need to improve in the coming year. We look back at the targets that we had set for ourselves at the beginning of the year.

Despite the financial challenges that all of us have faced in 2008, we hope we have managed to continue advocating for better health and safety working conditions for all employees. We have seen an unprecedented financial pressure on businesses and do hope that these will have minimal negative impact on occupational health and safety. No matter how difficult times may be, we cannot afford to compromise on the health and safety of employees. Times like these, where everybody competes for limited financial resources, call for innovative thinking from all professionals.

Nonetheless, I am in no doubt that 2008 was a great year for us as organised occupational hygiene professionals. It was exactly a year ago when it was reported in this column that we were all looking forward to the special edition of the *Occupational Health Southern Africa* journal of September/October 2008. Yes, we have all seen the excellent account on the 25 years of occupational hygiene profession as contributed by our immediate Past President, Mr Deon van Vuuren. For most of us it was an eye opener in terms of where we have come from, thanks Deon. We have also read the guest editorial of the last issue where we are all challenged to critically evaluate our roles as professionals. I do hope that we are all taking up that challenge and we are prepared to make a difference and make our presence felt.

SAIOH TRAINING & EDUCATION SUBCOMMITTEE

The SAIOH Training & Education Subcommittee met in September to discuss among other things:

1. Listing or registration of all occupational hygiene education and training courses available in the region.
2. SAQA requirements:
 - current and possible future South African Qualification Authority (SAQA) requirements; and
 - how SAIOH should interact with SAQA.
3. Implementation of the International Occupational Hygiene Association – endorsed global industrial hygiene technician modules. Amongst issues discussed were:
 - running of workshops on one of the modules for potential course providers to encourage a consistent approach;
 - approval of course providers;
 - determination of costs and fees; and
 - distribution of course materials.

Rob Ferrie is the Champion of this committee. As he will gladly appreciate your involvement and input, I encourage you to liaise with him (rob.ferrie@nioh.nhls.ac.za) to get involved in this committee.

COUNCIL MATTERS

The last Council meeting for 2008 took place on the 7th of November. I am thrilled by the enthusiasm shown by members of the Council on SAIOH issues. These are men and women who volunteer their time and resources for the benefit of the occupational hygiene community and indeed South Africa as a whole. I am equally inspired by branches which continue to grow from strength to strength through the calibre of dedicated leadership that they have. We have always said that SAIOH can become stronger only if we have stronger branches and we are now witnessing that.

The Council has confirmed that the 25th Anniversary Dinner

will be held at Indaba Hotel on the 11th of March 2009, and is looking forward to this historic event. Everyone will have an opportunity to interact with the founders of SAIOH as we know it today. This is a rare opportunity since the 25th anniversary is a once in a lifetime occasion. There will also be an opportunity to give awards to individual men and women who have excelled in different categories.

It is a long time now since our constitution has been changed. The Council has therefore undertaken a process of reviewing and updating the constitution. Members will have an opportunity to give inputs on the draft constitution. I encourage all of us to participate in this process, study the constitution and give proposals before our last meeting in February 2009.

UPCOMING EVENTS

- ICOH 2009 will take place in Cape Town on 22–27 March.
- 11 March 2009 – SAIOH 25th Anniversary Dinner at Indaba Hotel.
- SAFECONEX 2009 will be held on 12 and 13 March at Indaba Hotel.
- SAIOH AGM will be held on 12 March 2009 at Indaba Hotel.

LEGISLATION AND LIAISON

On the 11th of November 2008 the Department of Labour held a well attended Summit on Occupational Health and Safety in Construction. Although some companies are doing their bit, occupational health and safety in the construction sector is generally neglected. I was made to understand that the Construction Regulations are under review. I do not want to pre-empt the outcome of these regulations but it looks like they will be more effective and stringent. During this summit I had the privilege to interact with Mr Tibor Sizana, the Acting Chief Inspector. It was encouraging to get his personal commitment to the DoL/SAIOH meetings. These meetings are of importance to all occupational hygiene professionals as we get to interact with authorities, plan together on matters of common interest and be able to influence legislative processes and address any issues of misunderstanding. I do hope that we will get this long overdue initiative going again. I want to give thanks to the Editor, Dr Linda Grainger for reminding us in her September/October 2008 editorial, that the occupational exposure control limit for silica has been reduced from 0.4 mg/m³ to 0.1 mg/m³.

CERTIFICATION AND CPD

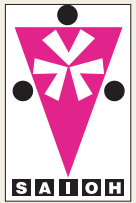
Twenty-five SAIOH members had not renewed their membership by the 7th of November 2008. The Council pleads with members to ensure that they are in good standing as it is sad for any professional body to lose members. The invoices for 2009 subscriptions are already in the post. I am pretty sure that all members have completed their 2009 documents for maintaining continued professional development points. Members are now eager to get the invoices and renew their certificates.

FINAL WORD

May I take this opportunity to wish all of us a merry Christmas and a better year in 2009. May all of us enjoy the festive season and come back refreshed with ideas to take us to a higher level of performance. Those of us who will be travelling, have a safe journey and arrive alive!

Season's greetings

Sibongiseni Myeni, President – SAIOH
082 335 5491, E-mail: info@seninhle.co.za



Local company garners 'Best Distributor Award' of leading UK instrumentation manufacturer

A local company based in Gauteng, AMS Haden Instrument Services, was awarded 'Best Distributor 2008' for Casella CEL, UK. The award was presented at its annual distributor conference held at the Wyboston Lakes Conference Centre in St. Neots, UK. The main focus of the conference was on new product launches for 2009.

Casella CEL will be launching the CEL-600 Series Sound Level Meters in January 2009. Casella's advances in micro electronics has enabled it to create a Type 1 Impulse Integrating, Octave Band Analyzer which fits snugly into the palm of the hand. In addition to its convenient size, this instrument also boasts certain unique features not seen in instruments of this nature before. It has a colour display and will download to a PC without the use of application software. A software package is however, available for the discerning practitioner.

A new addition to the successful Apex Series gravimetric

sampling pumps is due to make its debut early in 2009. The 'TUFF' series was designed to meet the needs of 'Tough' environments. In addition to toughness, it sports a curved bodyfit housing. The housing has an IP68 rating and is further protected by durable rubber laminate. The 'TUFF' will be equipped with all the advanced features found in the Apex. However, it will also be available in a basic unit with a price tag that will knock people's socks off!

AMS Haden Instrument Services is eagerly awaiting these innovations. The service plans for these products are already in place, with new advanced calibration technology on order. Response from customers, who have seen the pre-launch packs, has been one of eagerness to get their hands on the new kit.

For more information, contact John Wernick, AMS Haden Instrument Services, Office: +27(0)11 475 2064, Fax: +27 (0)11 475 2062, Mobile: +27 (0)82 447 1103.

CEL-600 Series



Digital Sound Level Meters

The CEL-600 series sound level meters use the latest digital technology to give standards of performance never seen in such a compact design. Using a high resolution colour TFT display, the CEL-600 series is specifically designed to ensure taking noise measurements is quick and easy. Different models are available depending on your requirements for use in general workplace noise measurements, up to full industrial hygiene requirements where octave band analysis is required for the effective selection of hearing protection.

Key Features

- Compact, rugged design
- Simple operation
- Single large measurement range
- Large memory
- High resolution colour display
- Real-time octave band analysis
- Simultaneous measurement of all workplace noise parameters
- Instrument menu in 7 languages
- Pre-defined and user configurations available
- Automatic calibration function
- Long battery life

Applications

- Workplace noise assessments
- Selection of hearing protection
- Calculation of noise exposure
- Ensuring compliance with workplace noise legislation
- Machinery noise tests

High Resolution Colour Display

- Unique colour coding of measurements
- Bright backlight
- View in all light conditions

The CEL-600 series uses colours of the high-resolution display to aid the user in making measurements. Measurement screens are colour coded depending on the mode of operation. For example, during a measurement run, the header and footer of the display is green (shown right), whereas when a run is stopped they are red, similar to traffic lights for 'stop' and 'go'.

Measured parameters are displayed in different colours, and the bar graphs are illustrated with the same colours to give an easy understanding of the noise climate.



Octave band measurement screen

Broadband measurement



For more information, contact John Wernick, AMS Haden Instrument Services, Office: +27 (0)11 475 2064, Fax: +27 (0)11 475 2062, Mobile: +27 (0)82 447 1103



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Clothing, textiles	4/30
Electrical apparatus	4/31
Electronic apparatus	4/32
Food, drink, tobacco	4/33
Machinery	4/34
Paper, printing	4/35
Rubber, plastics	4/36
Mining/quarrying	4/37
Retail:	
Consumer electronics/appliances	4/38
Other retail	4/39
Service industry:	
Correctional services/prisons	4/42
Printing, publishing	4/45
Healthcare/hospitals	4/46
Hotels/casinos/resorts	4/47
Military	4/50
Police/law enforcement	4/51
Transportation/ports/airports	4/53
Utility:	
Electricity	4/54
Gas	4/55
Water & wastewater	4/56
Warehousing/distribution/shipping	4/57
Other (specify):	4/58

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Upcoming events

INTERNATIONAL CONFERENCES

DATE	PLACE	TOPIC	MORE INFORMATION
18–21 March 2009	Spier Estate, Cape Town	The 8th Global Meeting of WHO Collaborating Centres in Occupational Health	No details available.
22–27 March 2009	Cape Town	ICOH2009 Occupational Health: A Basic Right at Work, An Asset to Society	Website: www.icoh2009.co.za Jenny Acutt' Tel.: 086 111 4417
2–6 August 2009	Venice, Italy	19th Intl. Symposium on Shiftwork and Working Time	http://www.shiftwork2009.it
26–29 August 2009	Helsinki, Finland	4th International Conference on Nanotechnology – Occupational and Environmental Health	http://www.tsr.fi

LOCAL CONFERENCES

DATE	TOPIC	REGION	TARGET	COST	CONTACTNAME
12–13 March 2009	Safeconex 2009: Uniting for Safety	Annual National Conf. of the SHE professional's associations: occ. health, occ. hygiene (SAIOH), occ. safety (IoSM) and SAPEMA. Indaba Hotel & Conference Centre, Fourways, Johannesburg	All SHE professionals	Please contact the organisers	Tel: +27 (0)12 654 8349, E-mail: info@raysaf.co.za , Fax: +27 (0)12 654 8358

2008 SAIOH COUNCIL AND CERTIFICATION BOARD MEETING AND EXAMINATION DATES

5 December	07h00	Cert. Board/Oral exams
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SAIOH'S 25-YEAR CELEBRATION BANQUET

When: 11 March 2009, from 20:00 – till we finish

Where: Indaba Hotel & Conference Centre, Fourways, Johannesburg

Who to contact: Tel: +27 (0)12 654 8349, E-mail: info@raysaf.co.za or jan@raysaf.co.za, Fax: +27 (0)12 654 8358.

HEALTH AWARENESS DAYS, WEEKS AND MONTHS

DECEMBER

Sun Smart Awareness Month – CANSA

DAY	TOPIC
1	World AIDS Day
3	International Day of Disabled Persons
5	International Volunteers Day
9	World Patient Safety Day

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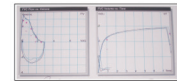
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