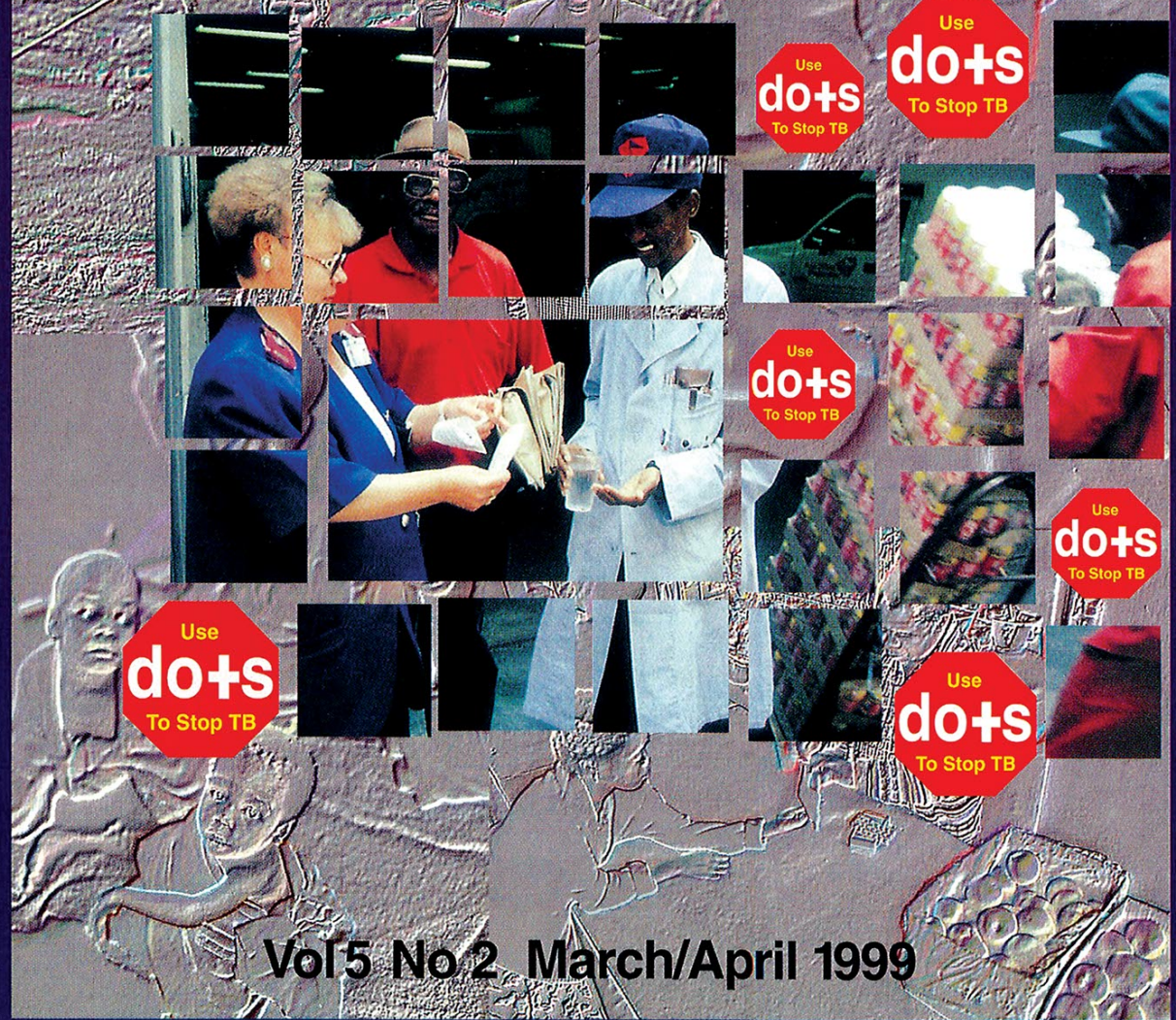
Occupational HEALTH

SOUTHERN AFRICA

Official Journal of the SA Society of Occupational Health Nurses (SASOHN), the SA Society of Occupational Medicine (SASOM) and the Occupational Hygiene Association of Southern Africa (OHASA)



Vol 5 No 2 March/April 1999

A CANNON MEDICAL MEDIA PUBLICATION

CALL FOR DELEGATES

THEME: THE INTEGRATION OF SAFETY, HEALTH AND ENVIRONMENT IN COMPETITIVE GLOBAL BUSINESS STRATEGIES.

NOSHCON '99, one of the largest Occupational Safety, Health and Environment conferences in the world, will be held at one of the world's most exotic pleasure resorts - Sun City.

Delegates who wish to network with colleagues and international associates in a setting that's quite literally "Out of Africa" and out of this world, should do everything in their power to be there.

Subject Areas include Risk Management, Integrated Management Systems, Occupational Health, Occupational Hygiene, Environment, SHE Management, Training and Accreditation.

For further information, please contact Marina Nel or Jacqui Price at Tel 321-7736, Fax 323-2436. (Dialling codes - Local (012) International 27.12.) e-mail: worksafe@nosa.co.za or visit the NOSA website at http://www.nosa.co.za

NOSHCON '99

SUN CITY SOUTH AFRICA

9-11 June 1999

NOSA

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This journal focuses on Occupational Health, Medicine, Hygiene and Safety, Primary Health Care at the workplace, Environmental Health and other employee health benefits

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Occupational HEALTH SOUTHERN AFRICA

Official journal of

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Continuing Professional Development

CPD or continuing professional development has now become a reality in South Africa for medical practitioners. The objective of CPD is to achieve improved patient care. The system which is administered by the Interim National Medical and Dental Council (INMDC) has been developed in such a way as to be user-friendly and the 250 points required over a 5 year cycle will be easily obtainable (a minimum of 25 points in any one year, with a maximum of 75 points may be accumulated in any year). The initial cycle will extend over six years in order to afford council, accreditors and providers an opportunity to eliminate any problems that may arise with the system during the first year.

There is no doubt that SASOM needs to apply and register as an accredited provider for the benefit of SASOM members so that conferences and seminars that it arranges or education such as the COIDA project can be approved for CPD points. The journal may also need to be involved in this process through using questionnaires similar to the South African Medical Journal and CME - however, the marking of these returns and passing them onto the INMDC is at present a logistical problem; but it is one area where the South African Medical Association may be able to assist. The executive committee of SASOM is fully aware of these responsibilities and initial discussions have already been held.

Guest editorial

On occasion we invite experts in particular fields to contribute to this section. In this edition, Geddes discusses the food industry, an industry he has been involved with for many years and one from which he recently retired. He reviews the subject and discusses some of the recent contentious issues.

Tuberculosis

This continues to be a major scourge in South Africa and the fact that we have one of the highest burdens in the world is little of which to be proud. The fact that we have had sufficient funding for medication and other aspects in the past is indicative of our poor efforts to date.

The Department of Health (DOH) via the Tuberculosis Control Programme has put together a well thought out strategy outlined by Matji. The DOTS strategy with its five major components has been adopted. Ultimately, time will tell how successful it will be, but we need to understand clearly that the DOH cannot control this scourage on its own. It requires the dedication of many individuals and organisations. Industry is one of these and all occupational health workers should include it as a priority. In the industrial and mining setting, it should be simple to diagnose it early, to treat it properly under supervision and to achieve a cure rate in excess of 80% of infected individuals.

The treatment of asthma

Lalloo has written a simple and clear article on the treatment of chronic asthma in adults. This is such a debilitating disease if not well controlled and yet the means to control it are available. The role of a peak flow meter in monitoring the condition should be part of the equipment at every factory clinic.

Quality Control in Occupational Hygiene

This is a discipline in which measurement of parameters plays a crucial role. It is vital that not only are the methods to measure them correct, but also that the results of these investigations are accurate and repeatable because employee health and potential significant costs depend on them. Proper quality control is thus essential to achieve these objectives and Marais outlines this very clearly. At some stage in the future, simple regulated Quality Assurance programmes need to be put into place.

ASOSH - ORG

ASSOSH and the web master Stanton are to be congratulated on the development of the web site on occupational health and safety for South and Southern Africa. This new initiative will expand and is certain to be of great benefit for occupational health and safety in this country in future.

Radiation hazards in perspective

To the uninvolved, the mention of radiation conjures up the atom bomb and the Chernobyl disaster and yet, as pointed out by Basson and Swiegers, if used correctly it can hold great benefit for mankind. The subject is reviewed and it seems to be under control in South Africa by the regulatory authorities. This article will not only educate readers but put their minds to some degree at rest.

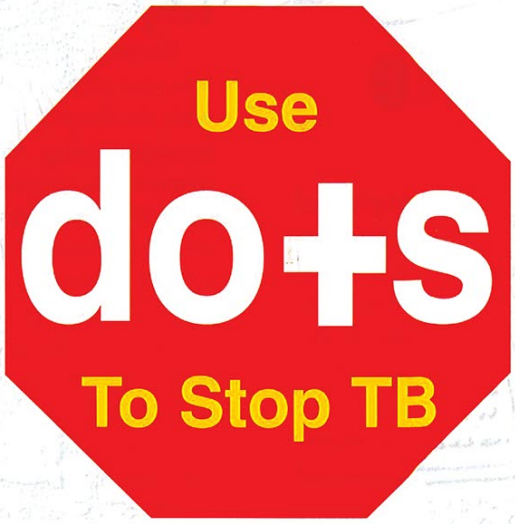
In a lighter vein

A short article is included by Harrower which is light - hearted in nature. We live in a stressful environment with increasing demands made on all of us and often laughter is the best medicine. We would invite readers to submit articles to the journal in this category. So often humorous articles, cartoons or satire belie an important message. Let's see what our readers can come up with.

Mike Baker
HONORARY EDITOR

stop TB with DOTS

The Department of Health is implementing the Directly Observed Treatment, Short - course (DOTS) strategy to help cure TB at the first attempt.



Five Core Elements of DOTS

- Government commitment to sustained TB control
- Sputum microscopy to diagnose infectious patients
- A standardised, TB drug combination
- Direct observation of treatment for at least the initial two months of treatment
- A standardized recording and reporting system which allows assessment of treatment results and overall programme performance

It takes at least six months of TB treatment before one can be cured. However, after a few weeks of treatment, most patients start to feel better and stop taking their tablets. They later become sick with TB and may develop resistance to some of the key TB drugs. It is for this reason that patients should have treatment supporters to encourage them to continue with TB medication. Treatment supporters observe TB patients take their tablets everyday and help educate patients to understand that they are not cured until TB treatment is completed. Supporters can be health workers, managers, co-workers, peer educators, community members, teachers, shop keepers, or any responsible person. A supporter should be chosen by the TB patient in consultation with a health worker. With the support of health care workers and community members TB can be cured.

For more information on TB and the DOTS strategy, please contact Ntombekhaya Matsha, Advocacy Officer, National TB Control Programme: Tel: 012 - 312 0113 Fax: 012- 326 4365

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Overview and Recent Debate

Food production involves a whole complex of industrial activities aimed at the treatment, preparation, conversion, preservation and packaging of food stuffs. An important sector of industry, it probably directly involves 10 - 15% of the working population, a percentage that increases if we extend the agrifood chain back to primary sources and include farming and fishing. With the development of our modern, industrial society - with its sheer volume of pre- prepared foods - we have witnessed a transformation, not only of our eating habits but also in our farming methods. Both these factors have increased the potential risks enormously.

On the production side, we have probably grown weary of the food scares over the last decade - listeria, salmonella in eggs, and mad-cow disease. To date, in South Africa, we have been fortunate as these have had little impact here. Indeed, with the intermittent nature of Scrapie in this country (the disease in sheep thought to be responsible for the initial 'infection' of beef cattle) and the fact that offal is such an important source of protein for a large segment of the population living on or below the bread-line, it is unlikely that much will find its way into local animal feed.

More recently overseas, the scare has been of genetically modified foods (GM foods or 'Frankenstein' as the press has dubbed them). Over the last 15 years, as all major crops such as maize, oil-seed rape, tomatoes and potatoes have had DNA manipulation in the west, the debate still rages as to how safe such foods really are. Concern is expressed not only for the safety of humans but that such modified crops could transfer their genes (DNA in the form of pollen) and produce superweeds that are virtually resistant to known herbicides. As the public overseas has become so thoroughly alarmed by the scare stories, rational debate is increasingly difficult. Many of these changes could dramatically enhance our ability to feed ourselves. However, as with the widespread rejection of radurized (irradiated) foods, the baby tends to get thrown out with the bathwater. These foods could have proved beneficial in third world countries, such as our own, where electricity and proper refrigeration are so often lacking outside the urban areas

Food Hygiene - Training the Key

Because of the sheer scale of modern food production and preparation any breakdown in good hygiene with foodhandling can lead to major epidemics of food-poisoning. Certainly outbreaks do occur with monotonous regularity but of greater import may be the ubiquitous upset tummies and gastro-enteritis which are probably never linked to food contamination and seldom reported.

The former reliance that was placed on laboratory tests to prove that a foodhandler was not a risk was misplaced. Blood tests such as a Vi antigen for typhoid have no routine place in examinations and there can never be justification for a WR or an HIV test - although they are still sometimes requested.

Most developed countries no longer insist on medical examinations of foodhandlers, although SASOM feels that in a third world situation, where even basic medical care is problematic, such examinations still provide a useful baseline.

The key to food safety lies not with pathology reports but with good food-handling techniques and good manufacturing processes and this requires exemplary supervision. Management commitment is vital, but all too often a functionally illiterate workforce is given some basic instruction by a hardly better informed supervisor. Senior and middle management in food operations should all be fully conversant as to the potential hazards with perishable foods and their performance appraisals should reflect the importance of such issues. Supervisors should be trained to a far higher standard than is currently the norm and must understand the underlying biological processes. There is much merit in the appointment and training - eventually to the same sort of level as the supervisor - of a food hygiene representative. His or her duties and responsibilities will be comparable to that of the health and safety representative in that section.

Health and Safety in the Industry

If one excludes fishing and farming then the hazards for workers in the food industry are probably on a par with industry in general. Certainly the full spectrum of physical, chemical, biological, organizational and psycho-social aspects will be present but will vary between operations. Biological hazards are well represented given the nature of food and its production, and ergonomic hazards are particularly prevalent in fish poultry and meat processing. Noise tends to be a widespread feature in the food industry

and cold environment work - long considered to be virtually free of chronic effects - may need to be re-examined in the light of a recent report from the Federal Institute for Industrial Protection in Germany (Research Series, Report no. Fb 716, 1995) which casts considerable doubt on this perception.

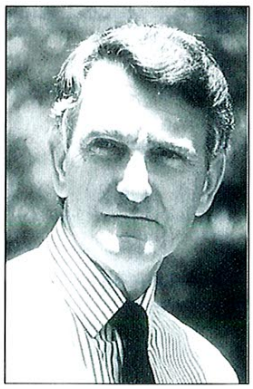
Current (though dated) information from the Workmen's Compensation Commissioner for disabling injuries in the food, drinks and tobacco industry, gives rates of 2,0 compared with an average of +/- 1,5 for industry in general in South Africa (based on 200 000 hours worked and not one million hours). Fatalities however were reversed - industry in general having an average figure of 0,2 per thousand workers per year compared to an average figure of +/- 0,15 per thousand workers in the food, drinks and tobacco industry.

In one large South African food manufacturing group where detailed rates have been followed for more than a decade , the fatality rate has been constant over that time and has averaged 0,13 per thousand workers per year; 75% of these fatalities involved motor vehicle accidents.

To give some idea of how far we have to go in this country the comparable fatality rates for industry in general in the UK (and therefore likely to be a higher figure than for food alone) approximates 0.013 per thousand workers - 10 food workers are killed in accidents at work in South Africa for every one in Britain.

Occupational health in the food industry is a fascinating discipline. Almost uniquely, together with the pharmaceutical industry, any possible impact on the product , as well as the health and safety of the worker, must be considered.

Exciting ? Certainly, but there is a staggering amount still to be done.



Dr. Terry Geddes
GUEST EDITOR

Inauguration of SASOHN President

Extract from Louwna Pretorius' inauguration speech to all SASOHN members.

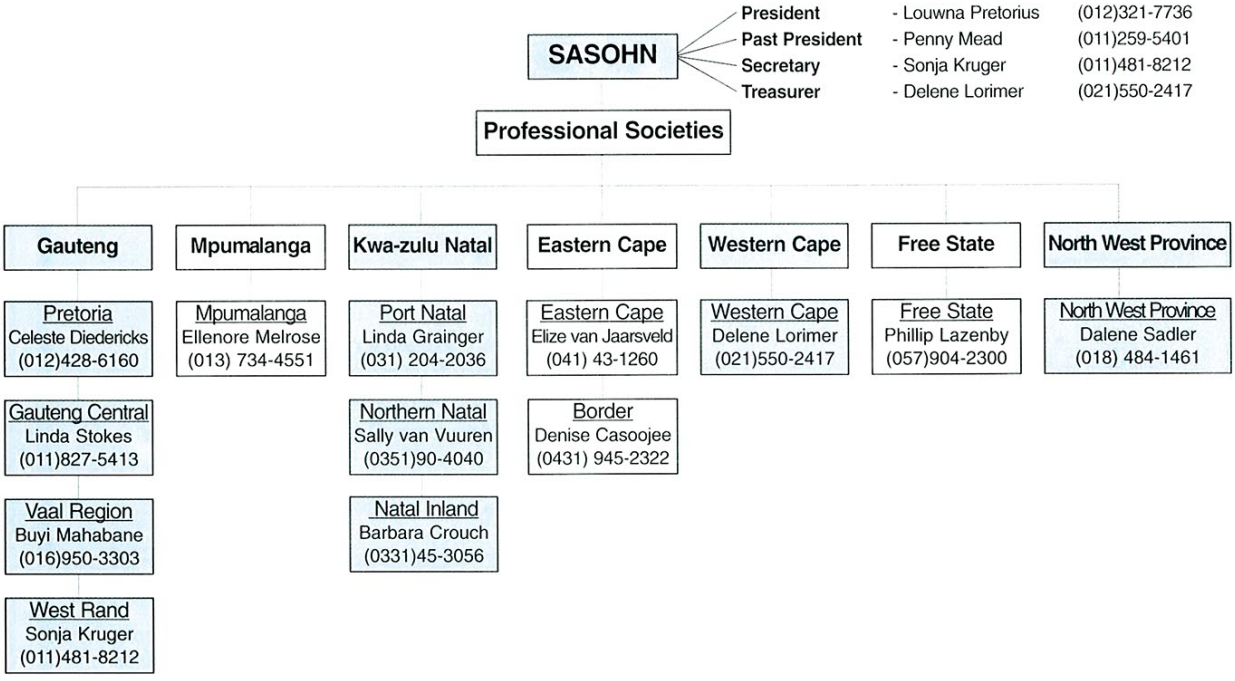
I have always been committed to the greater cause of Occupational Health and its development in South Africa and will try to make the most of any given situation, striving to acquit myself in the best possible fashion to serve SASOHN and, of course, yourselves.

I would like to share with all of you here today, my version of the attainable goals for all the societies that form part of this wonderful professional organisation, namely:

- To commit ourselves to continuous improvement in the Occupational Health field and to remain sensitive to the needs for constant monitoring (quality assurance) in order to ensure progress in all fields. This means that we have to improve on our skills base and keep abreast of new developments in the field.
- For SASOHN to be perceived and experienced as sincere, ethical, accountable, open and transparent in pursuing our goals, adhering to the best operating practices and standards set by our profession.
- SASOHN must play a pivotal role in providing advice, networking and participating as a change agent with other organisations in order to ensure quality in career education and research.
- SASOHN must create an environment which empowers our stakeholders to realise their full potential and goals through serving the community
- The forging of partnerships and relationships based on sound ethical/moral beliefs and business principles.

I would also like to take this opportunity to thank our outgoing President, Penny, for her support and wonderful friendship over the past years as well as all the other SASOHN representatives with whom I have served. It has been a wonderful experience to be part of the vibrant, enthusiastic and innovative group that has made SASOHN into an organisation of which members can be truly proud. I know I can count on the support of all of you in our new venture.

Louwna Pretorius, SASOHN's new president



Organogram of the South African Society of Occupational Health Nurses (telephone numbers are all work numbers)

SASOHN Task Groups

GROUP	CONTACT PERSON	TELEPHONE
Permit	Penny Mead Louwna Pretorius Celeste Diedericks	(011) 259 5401 (012) 321 7736 (012) 428 6160
Occupational Health SA	Bev Hoggins Dee Boorman	(011) 871 8600 083 600 3182
ASOSH	Sonja Kruger Dolores Smit	(011) 481 8212 083 701 8863
SASOM	Louwna Pretorius Penny Mead	(012) 321 7736 (011) 259 5401
Mine Qualifications Authority	Penny Mead Linda Grainger Marinda Lazenby Louwna Pretorius	(011) 259 5401 (031) 204 2036 083 443 7443 (021) 321 7736
OHN Accreditation (Audiometry)	Ellenore Melrose	(031) 734 4551
Professional Society Forum	Celeste Diedericks	(012) 428 6160
Resuscitation Council	Denise Mulloch Brown	083 227 6840
PRO/Marketing/Website	Delene Lorimer Penny Mead Dee Boorman	(021) 550 2417 (011) 259 5401 083 600 3182
Database	Jenny Pottow Delene Lorimer	(041) 432 525 (021) 550 2417
Sordsa	Sonja Kruger	(011) 48182
Department of Transport	Penny Mead Dee Boorman Phillip Lazenby	(011) 259 5401 083 600 318 (057) 904 2300

New appointment

Dr Nono Simelela was appointed as the Director of the HIV/AIDS and STDs Department on 1 December 1998, replacing Rose Smart.

She was introduced to key role players and at the meeting she outlined both her personal vision and the formalised plans for the Directorate for the next two years.

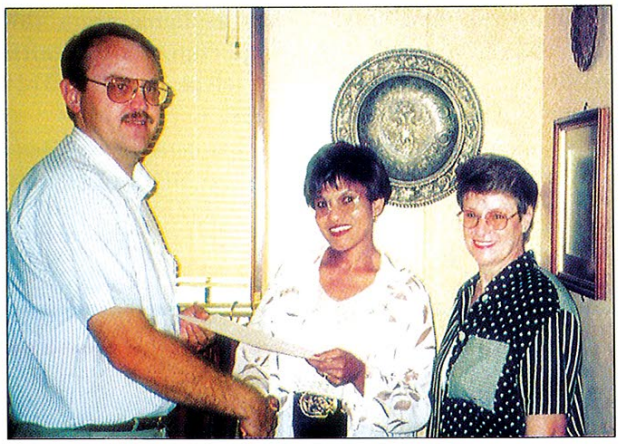
Her personal vision is as follows:

- All other government departments need to become more involved. She plans to discuss impact studies with them, to work with the Department of Welfare to plan for AIDS orphans, to discuss with the Department of Labour regarding the impact on labour, to establish land for graves and so on.
- The development of medium and long term plans to cope with the impact of the epidemic.
- To focus on care and support of those infected and dying from the HIV virus.
- To integrate AIDS orphans into the community.

Winner of the third annual MOM competition

The draw for the 1998 MOM competition was held recently at the Institute in Centurion. **Michelle Sampson** of Iscor Refractories was the winner and received the prize of a week's holiday.

The actual draw was performed by Mr. Arthur Pritchard representing MoM's auditors. Present also was Ria Scheepers of the S.A. Mint who was last year's winner.



Right: Dr Adriaan Combrinck presenting the prize to Michelle Sampson. Looking on is Ria Scheepers, a previous winner.

Right: Mr Arthur Prichard drawing out the winning entry with Lizelle Coombs from Mobile Occupational Medicine (MoM)

New EDL launched

The revised edition of the Essential Drug List (EDL) for primary health care and the treatment guidelines for provincial hospitals were launched in Pretoria in December 1998. All provincial hospitals and clinics are now obliged to keep in stock the full list of 693 drugs selected as essential. Health minister, Dr Nkosazana Zuma, emphasised that unlisted drugs would not be banned from the country and tertiary hospitals would still stock drugs for rare diseases. She said the re-aligning of tenders to the EDL process would ensure that scarce financial resources were utilized to purchase the most essential drugs and the phasing out of products that were deemed of no therapeutic valve. According to the Department's EDL Committee the drugs currently listed were based on WHO guidelines and were found to be the cheapest, the best researched and produced by the most reliable local manufacturer. Professor Partrick Mokhobo, Chairman of the EDL Committee, said the list would be updated regularly. It was also suggested that the EDL be included in training at medical schools and be part of the compulsory continuing professional development programme. Dr Zuma recommended that health care providers in the private sector adopt the EDL as this would be 'more cost-effective'.

The revised EDL and the treatment guidelines are available from the Department of Health on telephone (021) 312-0328.

Extracted from Medigram of SAMA 18 January 1999, 7 (1).

Act gazetted to regulate medicines

The South African Medicines and Medical Devices Regulatory Authority Act (No 132 of 1988) was gazetted on 18 December for general information (Gazette No. 19615). This new Act replaces the Medicines and Related Substances Control Act of 1965, but as yet the regulations have not been promulagated. This new piece of legislation is of particular interest to occupational health clinics who operate under the permit system of the old Act.

Provision has been made under Section 33 (Licensing) to a nurse (amongst other health care practitioners) to apply for a license to dispense medicines under certain prescribed conditions (which will be included, it is assumed, in regulation in the future).

A new important addition is that under subsection (2) of 33, a license may not be issued unless the applicant has successfully completed a supplementary course as prescribed under the Pharmacy Act of 1974 by the South African Pharmacy Council.

Thus it seems that, at some date in the future, the permit will be replaced by a license and that the occupational health nurse will need to complete an approved course in pharmacology, a course which is likely to be based on the Essential Drug List booklet.

Finally, some direction has been achieved. This is exactly what both SASOM and SASOHN have been advocating. However, the time frame for implementation is not yet known.

For further information, contact Dr Jim Murphy on (011) 801-2434.

International symposium on biological monitoring

22H00 25 September 1998
Hong Kong Airport

I am on my way back from attending the 4th International Symposium on Biological Monitoring in Occupational and Environmental Health in Seoul, Korea. The symposium took place from 23-25 September 1998 at the Catholic Research Institute of Korea.

(I am, of course, referring here to South Korea. North and South Korea seem to be in a state of ideological war, with South Korea being assisted by a strong and very obvious American Task Force of about 30 000 strong. South Korea is a very interesting country with big contrasts between the ancient and modern with touches of Americanism, religious differences and, above all, a very strong sense of patriotism. For instance, almost no other make of car is seen on the roads other than Hyundai, Daewoo and Kia. For South Africans, Interesting aspects of Korean society include the mass housing projects and numerous small business beehives.)

The symposium was organised with typical Asian care and precision for the approximately 200 attendees. I saw quite a few familiar faces from the previous symposium in Helsinki two years ago and also made several new acquaintances.

The presentations were of a high standard and the level of research in geno- and fenotypes once again amazed me.

Biological effect monitoring, determination of various adducts, mixed chemical exposures and carcinogens, biological markers and biological monitoring in risk assessments were all addressed. These research projects are rapidly nearing a stage where they are becoming a reality in the sense of application in industry. There is also excellent grassroots research being conducted with some surprising results that are challenging old, established perceptions.

A sad note, however, was that only three Africans attended and unfortunately no presentations from Africa were forthcoming. Nevertheless, some of the delegates expressed interest in initiating collaborative research with Southern African countries.

The next symposium takes place in Banff, Alberta in Canada in 2001. It promises to be an interesting symposium - even if this is only judged by the picturesque surroundings seen on the promotional video. Unfortunately, there is no snow on the Canadian Rockies in September - but there will certainly be some good salmon fishing for the fly fishermen!

Deon van Zyl,
Occupational Medical Practitioner, Johannesburg

TB, AIDS and Dust: the diagnostic dilemma in compensation & equity

Date: Thursday 22 April 1999

Venue: Cedar Park Convention Centre, Woodmead, Gauteng

This conference will be of particular interest to occupational health practitioners in mining and general industry, engineers, occupational hygienists, pulmonologists, researchers, the assurance industry, HR practitioners, academics, Department of Health and Labour representatives and community health workers. It will focus on:

- TB, AIDS and Dust in view of impending changes in Legislation e.g. *Employment Equity Act* and *Occupational Disease in Mines and Works Act.*
- The rights of the worker with regard to compensation.
- The environmental costs of Dust and Communicable Disease in the Workforce.
- Whether job applicants are compromised in terms of Dust exposure and the Employment Equity Act before they begin work.

The conference is being organised under the auspices of Rand Mutual Assurance company Limited. There will be an international speaker as well as many experts in thiese fields.

The cost of the conference is R 450.00 per delegate.

For more information and to register contact the conference co-ordinator, Brenda Webster on telephone or fax (012) 46-7424 or email brendaw@icon.co.za

SASOM COID Seminar

Date: 30 July 1999
Venue: CSIR Conference Centre, Pretoria

This seminar is for medical practitioners who were not able to attend previous SASOM COID Act workshops as well as for nurses and other occupational health practitioners in the industry.

For further information contact the SASOM National Office on telephone: (012) 6675161 or tel/fax: (012) 6675160 or email: sasomdm@iafrica.com

Safety, Health and Environment '99

Date: 14-16 September 1999
Venue: Gallagher Estate, Midrand

Any suppliers of safety and health solutions should not miss the opportunity to exhibit at this year's Safety, Health and Environment '99. Over the last three years, the Safety, Health and Environment exhibition has developed into a world-class exhibition and has gained recognition as the industry's premier event.

This is proven not only by the prestigious exhibitor profile but also by the high calibre of visitors.

Research over the past two years has shown that companies are making a point of sending representatives on management and other decision making levels to attend the show.

"Safety, Health and Environment attracts quality trade visitors which, for the exhibitors, means a higher return on investment," says Joan de Beurges, exhibition organiser at RAI.

The show - which will once again be held at the prestigious Gallager Estate in Midrand, Johannesburg - has been moved forward to September this year in line with numerous requests from the industry.

RAI is working closely with the industry to ensure a worthwhile, dynamic event which will prove indispensable for exhibitors as well as visitors.

The show has the full endorsement and support of all the relevant industry authorities, unions and government departments in the mining, safety, occupational health, labour, environmental and allied sectors. These include

SAPEMA, ASOSH and the Departments of Labour and Compensation, Environmental Affairs and Tourism, Health, Minerals and Energy and the National Union of Mineworkers.

An impactful marketing campaign has been put together to create awareness of Safety, Health and Environment to attract visitors. Great emphasis will be placed on trade promotions including: personalised invitations to key decision makers, magazine advertising, previews and supplements, electronic media, posters, personalised fax mailing and editorials.

Conference

The ASOSH annual conference will run alongside the show and will be addressed by high profile industry speakers. The conference will provide the ideal platform for delegates to learn about international and local safety trends with specific focus to be placed on providing solutions for occupational and health problems. "We invite all companies involved in the full spectrum of health, safety and environmental products and services to include Safety, Health and Environment '99 in their marketing budgets," says de Beurges.

To book your stand, or for further information, call Joan de Beurges at RAI on (011) 794-5511.

National Tuberculosis Control Programme

Dr Neil Cameron	Director Communicable Diseases Control Directorate	Tel: (012) 312 0090	Fax: (012) 323 8626
Dr Refiloe Matji	Manager	Tel: (012) 312 0106	Fax: (012) 326 4365
Dr Harry Hausler	HIV and TB Consultant National HIV/AIDS and STDs	Tel: (012) 312 0124	Fax: (012) 326 2891
Mr Joel Mokonoto	Laboratory Services	Tel: (012) 312 0112	Fax: (012) 326 4365
Ms Joyce Lotter	Training	Tel: (012) 312 0101	Fax: (012) 326 4365
Ms Ntombekhaya Matsha	Advocacy	Tel: (012) 312 0113	Fax: (012) 326 4365
Ms Suzette Pretorius	Patient Centred Care	Tel: (012) 312 0109	Fax: (012) 326 4365
Mr Sidwell Khosa	Senior Administration Officer	Tel: (012) 312 0109	Fax: (012) 326 4365
Mr Hannes Cilliers	Chief Administration Clerk	Tel: (012) 312 0108	Fax: (012) 326 4365
Ms Eunice Mokwena	Administration Clerk	Tel : (012) 312 0107	Fax: (012) 326 4365

Successes and constraints of the Tuberculosis Control Programme and DOTS in the workplace

Dr Refiloe Matji
National TB Control Programme, Department of Health
Occupational Health SA 1999; Vol 5, No. 2: 11-15

Globally, TB is one of the most neglected health crises. South Africa falls under the first 22 countries with the highest burden of TB in the world. The National Tuberculosis Control Programme adopted the Directly Observed Treatment Short-Course (DOTS) strategy in 1996.
The main elements of the DOTS strategy are introduced, successes and constraints reviewed and guidelines offered for industry and employers.

Introduction

Recognising that TB is one of the most neglected health crises and that the TB epidemic is out of control in many parts of the world, TB was declared a global emergency by the World Health Organisation in 1993. "Worldwide TB is the leading cause of death due to a single infectious agent" (WHO 1996).

The main reasons for the resurgence of TB are:

- the neglect of the disease by governments
- poorly managed and incorrectly conceptualized TB control programmes contributed to an increase in the burden of the disease as well as to the emergence of Multi-Drug Resistant (MDR) TB
- population growth
- link between TB and HIV

Situation

South Africa falls under the first 22 countries with the highest burden of TB in the world. In 1997, about 108 000 people were reported to have had TB. Out of these, 42 000 were new infectious cases.

The National Tuberculosis Control Programme adopted the Directly Observed Treatment Short-Course (DOTS) strategy in June 1996. DOTS is an internationally recommended strategy that provides a way of helping patients take their treatment properly and provides the means for health workers to know whether the patient is becoming non-infectious and in the end is cured. DOTS has five main elements:

- Direct Observation of patients by treatment supporters as patients swallow their TB drugs everyday for at least 3-5 days a week. Any responsible member of the community, employer, colleague or family member can act as a treatment supporter. Patients should be observed for at least the intensive phase, which is the first 2-3 months of treatment. Health workers should use the first two months to build a relationship of trust with the patient, make sure that patients take their treatment and understand the dangers of not completing TB treatment. It takes at least 6 months to cure TB. This is a long time and it is necessary to support patients until they are cured.
- Microscopy services to diagnose infectious TB patients, to test TB patients after 2-3 months to check their progress and to test patients at the end of treatment to confirm cure. Within 2-3 months of taking proper TB treatment, 85% of infectious TB patients should convert from a positive sputum result to a negative one.
- Standardised Short-Course chemotherapy in the correct combination and dosage of anti-TB medicines taken for the right length of time.
- Recording and Reporting systems using standardised material provides through sputum examination, clear information on type of disease and case category and through cohort analysis, information on treatment results. This system is a tool to evaluate the essential aspects of the control programme and should be used in preparing an annual evaluation report on the programme.
- Government commitment to ensure funding for the programme.

Successes

Establishment of Demonstration and Training districts

In order to ensure effective implementation of the DOTS strategy, the National TB Control Programme (NTCP) started the process of establishing Demonstration and Training Districts (DTDs) since January 1997. Demonstration and Training Districts are developed to turn the idea of the DOTS strategy into practical reality - firstly on a limited scale, then to scale up to cover the entire province. These districts can test the feasibility of implementing all aspects of the strategy within the existing health system. Introducing the strategy in a few selected districts allows one to identify and solve problems. Once a district has been able to achieve high cure rates, it can be used as a training site for staff from other districts. The goal is to cover all districts in the country by the year 2000.

To date, 54 DTDs have been established in the country and out of these, 23 have achieved good results of smear conversion rates of >80%.

Expansion of laboratory services

To date, 14 new microscopy centres have been established and communication between clinics and laboratories is being improved. The target is to ensure a turn around time of less than 48 hours in all DTDs.

Drug supply

The programme is introducing and expanding the use of fixed dose combination drugs especially at primary health care level. TB treatment is free of charge.

Training

Training manuals for health workers have been developed. Health education materials for the public have been developed in 6 languages. Posters on DOTS, symptoms and signs of TB have also been developed. To date, more than 5000 health workers have been trained on the DOTS strategy.

Staffing

Staff has been appointed at National Level and a full time person responsible for TB has been appointed in all provinces. District communicable disease coordinators (CDC) have been appointed in 7 provinces.

Collaboration between TB and HIV/AIDS/STD programmes

Tuberculosis is the most common opportunistic infection of people living with HIV in South Africa. Approximately one million of the 3 million South Africans who are living with HIV/AIDS will get sick with TB before they die. HIV, by attacking the immune system, increases the lifetime risk of getting sick with TB after infection from 10% to 50%. The rapid increase of HIV/AIDS in the country is accelerating the TB epidemic. People with TB or HIV face similar problems of stigma, fear and discrimination, and have shared needs for counselling, care and support.

Recognizing the strong interaction of these diseases, one of the major recommendations of the National HIV/AIDS/STD Review in 1997 was to improve collaboration between HIV/AIDS/STD and the TB Programmes at all levels. Since then, a technical advisor was hired at national level to facilitate collaboration between the programmes and there have been many collaborative activities in the areas of policy formulation, advocacy, training and provincial support visits. At district level, TB/HIV pilot districts will be established to provide a comprehensive package of HIV/AIDS/STD/TB prevention, care and support.

Constraints

Directly observed treatment

Defaulter rates (proportion of patients who were started on treatment and did not finish it) are still very high at 21% in 1997. This group of patients is at a high risk of becoming chronic patients or developing a severe form of TB - Multi-Drug Resistant TB. Directly Observed Treatment is poorly implemented. It is the role of health workers to ensure that all TB patients are directly supervised. In order to decrease the spread of TB and stop the development of MDR TB, the programme should not have defaulter rates of more than 5%.

Bacteriological coverage

Even though the bacteriological coverage (proportion of patients diagnosed properly by the use of microscopy) has improved from 78% to 85% in 1997, there is still over reliance on the use of X-rays alone to diagnose TB. This is a dangerous practice as it is very difficult to distinguish in a Chest X-ray whether a patient has active TB or not or whether the changes are of other lung diseases. The aim is to achieve a bacteriological coverage of 100%.

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It is only disposed when damaged,
if breathing becomes difficult or it becomes contaminated with
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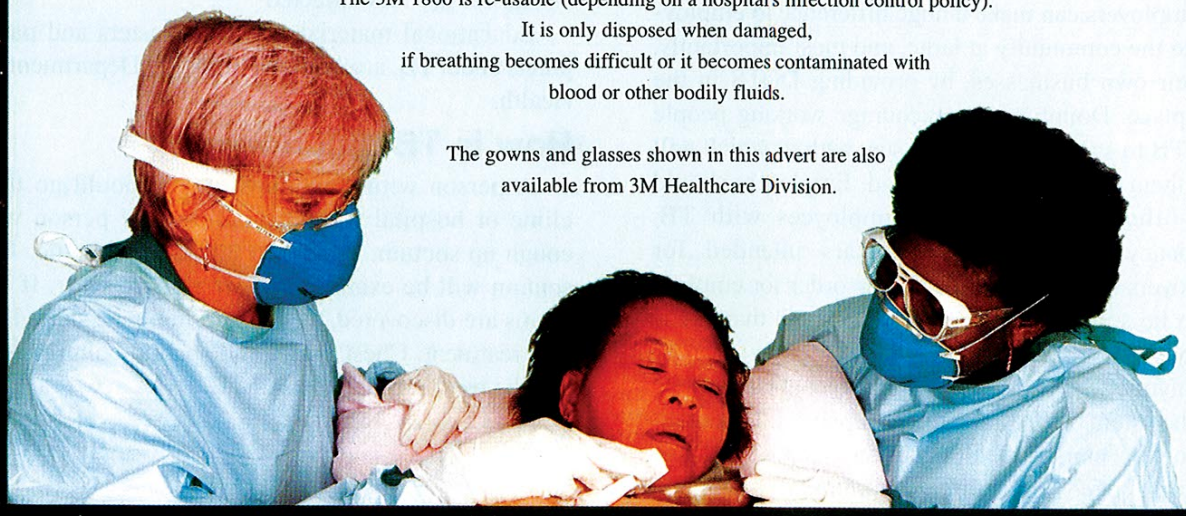

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Training

Even though more than 5000 health workers have been trained on the DOTS strategy, there is still a need for refresher courses. Those who have been trained need to be supervised to ensure that there is proper implementation. There is also a high turn over of staff at facility level.

Advocacy

Advocacy needs to be strengthened at all levels. Health workers need to be trained on the DOTS strategy, the public also needs to be trained on symptoms and signs of TB in order to ensure that suspects report on time. Inter-sectoral collaboration is necessary.

Tuberculosis and HIV/AIDS

HIV/AIDS is increasing rapidly in the country and these two form a lethal combination, each speeding the other's progress. It is estimated that 40% of South Africa's TB cases are attributable to HIV. TB can be cured with DOTS using the same available drugs even with the presence of HIV.

Potential role of industry and employers

DOTS boils down to a simple act: a treatment supporter gives the TB patient his or her medication every day, and keeps track of the treatment progress on a treatment card. Because curing TB takes a minimum of six months, TB patients benefit enormously from the arrangement, which gives them the impetus to continue treatment even once they feel better.

Employers can make a huge difference to employees, to the community at large, and most importantly, to their own businesses, by providing DOTS in the workplace. Doing so will encourage working people with TB to start treatment and stay with it, which will cure them and prevent TB spread. Employers should also offer job security for employees with TB. Advocacy workshops or seminars intended for employers need to be conducted, in order for employers to be supportive and fully understand that TB is curable.

Anyone who is dependable and accountable to the health system can be a treatment supporter. Treatment supporters can be health workers, managers, co-workers, peer educators, community members, teachers, shop keepers and family members. A treatment supporter should be chosen by the TB patient in consultation with a health worker.

For people with TB who work, it is often most convenient to receive their TB treatment at the workplace. The increased convenience of receiving TB treatment at work makes it more likely for the person to complete their TB treatment and be cured. Because people who are on correct TB treatment don't infect other employees, providing DOTS in the workplace prevents the spread of TB.

How will I know if an employee has TB?

Employers and employees should be taught the symptoms of TB. Employees should be encouraged to go to a clinic to have their sputum examined if they develop TB symptoms.

The symptoms of TB are:

- cough for more than 3 weeks
- chest pain
- loss of appetite and weight
- night sweats
- tiredness and weakness
- coughing up blood

Education about TB should also include the following:

- TB patients on appropriate treatment are not infectious
- TB patients can continue working and can receive TB treatment from a treatment supporter in the workplace

HIV may be a factor, however:

- TB can be cured as easily in HIV-infected people as in people who are not HIV-infected
- HIV increases the risk of developing TB, but not all HIV-infected people have TB and not all people with TB are HIV-infected

Educational materials, such as posters and pamphlets about TB, are available from the Department of Health.

How is TB diagnosed?

A person with symptoms of TB should go to a clinic or hospital for examination. The person will cough up sputum, and spit it into a small bottle. The sputum will be examined under a microscope. If TB germs are discovered, the person should be started on TB treatment. Chest x-rays and sputum cultures may also be used for diagnosis of TB.

What should I do if my employee is diagnosed with TB?

People diagnosed with TB should be given at least two weeks of sick leave to allow them to begin their treatment and make an initial recovery. After two weeks of treatment, the person should be reassessed

by a health worker to determine if she/he can return to work. At this time, most TB patients can return to work without putting their co-workers at risk, as long as they take their treatment regularly. TB patients on correct TB treatment will not infect other people.

How do I provide DOTS in my workplace?

If a TB patient chooses a treatment supporter in the workplace, the supporter should work closely with the health worker at the local clinic.

The **health worker** will do the following:

- explain to the treatment supporter how to give the correct doses of TB drugs, to refer the patient to the clinic if they develop side effects, and to fill in the Patient Treatment Card
- provide monthly supplies of drugs and review the Patient Treatment Card to make sure that treatment is going smoothly
- provide ongoing support to the patient and treatment supporter and follow up all problems and concerns
- trace the patient and ensure appropriate treatment supervision if the patient resigns, goes on leave, or is absent from work for any reason

The **treatment supporter** will do the following:

- observe the TB patient as she/he swallows the daily dose of medication
- liaise with health worker to ensure an uninterrupted supply of TB drugs
- advise the patient to attend the clinic if side-effects develop, and remind the patient of clinic appointments
- check off the appropriate box on the Patient Treatment Card each time a dose of TB drugs is taken
- support and motivate the patient to complete treatment
- visit the patient or inform the health worker on the second day if the patient did not show up to receive treatment
- inform the health worker if the patient resigns, goes on leave, is absent from work or is unable to receive TB treatment for any reason

The **TB patient** will do the following:

- swallow each dose of TB medication, report side effects and any other problems promptly to the supporter or health worker, attend the clinic for appointments
- inform the health worker or supporter if resigning, going on leave, absent from work or unable to receive TB treatment for any reason

The **employer** has the following responsibilities:

- support and encourage DOTS in the workplace
- allow time off for employees to meet with health workers about how to provide DOTS in the workplace
- allow time off for employees to go to clinic, attempt to provide a private space where a TB patient can receive TB treatment

How to set up DOTS in the workplace

DOTS in the workplace should be set up by an occupational health nurse, employer, manager, or supervisor in consultation with a health worker at the nearest clinic which treats TB. If you are interested in providing DOTS in the workplace, contact the clinic, your local health authority, your Provincial TB Coordinator or the NTCP.

What's in it for me?

You, as an employer, will not lose your valuable, trained employees due to TB, nor will your employees infect others around them. DOTS is therefore a cost-effective, win-win proposition for employers and employees alike. Additionally, your business will get much better performance from healthy workers, and your relationship with your employees will improve. If your workers see that their company cares about them, they in turn will care more about their company, and ultimately be much more productive. Working together, we can stop the spread of TB in South Africa, and reduce the economic toll this disease is taking on the country.

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Stop TB with DOTS

Kaya Matsha
Advocacy Officer, National TB Control Programme, Department of Health

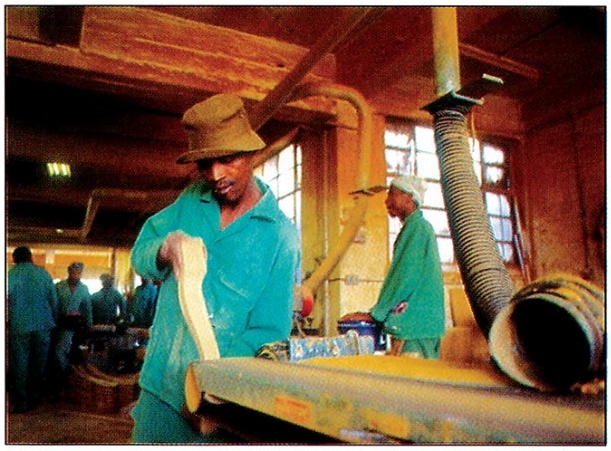
Occupational Health SA 1999; Vol 5, No. 2: 8

DOTS in the workplace

Directly observing patients everyday as they take their treatment encourages patients to continue treatment. For people with TB who work, it is often most convenient to receive their TB treatment at the workplace rather than at the clinic. This makes it much easier for the person to complete their TB treatment and be cured. When workplaces help and encourage TB patients to take their treatment at work it also encourages others who are suspected to have TB to come for help early on. DOTS in the workplace also prevents the spread of TB in the workplace because it ensures early diagnosis, support and cure.

Patients who are on TB medication are not a risk to fellow workers as long they take their treatment regularly. It is those who have symptoms and are not taking treatment, but are afraid that if they are found to have TB will lose their jobs and keep their illness hidden that are a risk to fellow workers.

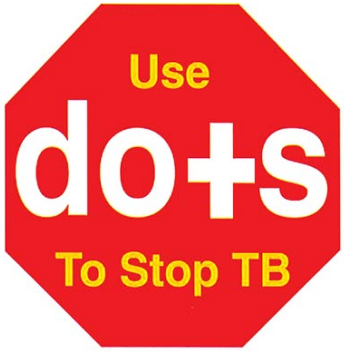
Here are two good examples of providing DOTS in the workplace.



This TB patient works for an upholstering and wood work company in Gauteng Province. He was diagnosed with TB two months ago. He felt very sick in the beginning and within two weeks of taking his medication, he felt strong enough to go back to work. He now receives his treatment from his supervisor at work. His supervisor keeps contact with the clinic nurse and the patient goes to the clinic monthly for review and to collect medication.

Teaspoon, a young man working in the fishing industry was diagnosed with TB four months ago. After diagnosis, the thought of taking TB tablets every day was bad enough. In addition, his job as a fisherman requires him to spend up to 40 days at sea. In the past, this would have been cause for panic. He might have even lost his job as the company would not give him six months leave. Cynthia Joshua from SANTA, the company's occupational nurse has worked with staff from the local clinic to deal with this problem. Each boat that goes out to spend 40 days at sea has a first aid officer who is second in command. All these officers were trained on direct observation of TB treatment. Enough medication is provided and the first aid officer documents treatment taken on the green treatment card.

The officers have also been taught on possible side effects. Cynthia Joshua laughs and adds, " I tell the officers to use tough love. The patients may be annoyed with you but soon they see that you are trying to help them. We have had many TB patients who are fishermen. This way they can continue to earn a living, get cured and do not pose any danger to their colleagues".



Guidelines for the management of chronic persistent asthma in the workplace

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Occupational Health SA 1999; Vol 5, No. 2: 18-21

A simplified approach to the management of asthma in the workplace is outlined. It is compatible with the guidelines outlined by most respiratory societies internationally. It represents an optimal approach to asthma management. Departure from these guidelines should always be based on evidence-based medical practice. The workplace presents an opportunity for asthma education and good asthma management.

Introduction

Asthma is a common and chronic disorder, affecting between 3-6% of adults according to community based studies in Western societies. The prevalence, severity and consequent mortality appears to be rising despite advances in the understanding of the pathogenesis and refinements in therapy. Thus it presents a challenge to health care workers. Based on the assumption that the majority of adults are employed, it makes good sense to target the workplace as a base from which asthma education and care can be delivered. In addition, occupational asthma accounts for about 1-2% of cases of asthma i.e. exposure to a sensitising agent at work causes asthma. Exposure to sensitising agents in the workplace can cause asthma in susceptible individuals. This further emphasises the potential role of the health care worker in the workplace in managing and preventing asthma. This review presents an approach to the management of chronic persistent asthma in adults with an emphasis on the role of the health care worker in the work environment. The management of acute asthma is beyond the scope of this review.

Definition

Pathologically, asthma is a chronic inflammatory disorder of the airways. The inflammation is characterised by an eosinophilic infiltration in the airway walls once asthma is established. It manifests clinically as hyper-responsive airways. This means that the airways respond to a variety of environmental (exogenous) and endogenous factors by narrowing of the airway lumen much more than in non-asthmatic subjects. The narrowing of the airways is widespread and variable. The latter represents a functional description of asthma. The initiating factors for this process are poorly understood. There is no doubt that a polygenetic influence combined with environmental factors play a pivotal role. Currently large studies are underway to define the genetic basis of asthma.

Clinical features

Symptoms

The cardinal symptoms of asthma are:

- *cough*
- *wheeze, chest tightness*
- *dyspnoea, shortness of breath*

These symptoms are variable in keeping with the functional definition of asthma. The symptoms are often worse at night. Dyspnoea and wheeze depends on the patient's perception and may not correlate with severity.

Signs

The cardinal sign of asthma is a wheeze on auscultation of the chest. The intensity of this sign varies with the severity of the airflow obstruction. An important lesson is that it does not always correlate. Some patients with very severe asthma may have a poorly audible wheeze on auscultation of the chest whilst there may be marked airway obstruction. Associated signs are those of respiratory distress which depends on the severity of the airway obstruction.

Lung function

It is important to have an objective measure of the severity of the airway obstruction (lung function) in order to assess the severity of asthma and to monitor

response to therapy. As indicated above the symptoms and signs may be misleading. This is achieved cost-effectively by use of the simple peak flow meter. The measure of the peak flow, if conducted correctly, is a good reflection of the severity of the airway obstruction in asthma. Any health-care facility managing patients with asthma must have a peak flow metre. The meter is small, cheap, portable and robust. Even where a spirometer is available the peak flow meter is still more cost-effective and the peak flow is relatively easier to measure. In the context of asthma, the measure of the peak flow is as important as the measure of the blood pressure in a patient with hypertension.

Asthma in the workplace

There are 3 scenarios for asthma in the workplace:

- A patient with asthma is employed in the workplace and the work environment has no impact on the asthma
- A patient with asthma is employed in the workplace and the occupational exposure may aggravate the asthma
- A worker may develop asthma as a consequence of exposure to a sensitising agent in the workplace

Occupational exposures more frequently aggravate asthma. This is due to the effect of dust in the workpace. A subject with asthma has hyper-responsive airways, ie the airways are more irritable. Thus dust particles and fumes may exacerbate asthma without actually aggravating the inflammation. This is referred to as 'nuisance dust' or 'fumes' and can impact significantly on the subjects ability to work in the particular environment. The latter includes cigarette smoke and cold air. Fortunately, new legislation in South Africa will ban smoking in the workplace.

In general, patients with suspected occupational asthma should not be advised to stop work until the diagnosis is proven. This frequently requires a co-ordinated exercise by the occupational health nurse and doctor, respiratory physician and employers in order to achieve an acceptable outcome.

Table 1 summarises the causative agents for asthma that have been recognised by the workman's compensation commissioner for the purposes of compensation in South Africa.

The health care worker in the workplace, in most instances the occupational health nurse, has an important role in recognising the sensitising agents in the workplace and the aggravating factors for asthma. This will lead to a healthier work environment and contribute to the stated objective of allowing an asthmatic to achieve a normal lifestyle which includes the ability to work.

Table 1:List of agents recognised under the Workman's Compensation Act as Causing occupational asthma

- isocyanates
- platinum, nickel, cobalt, vanadium, chromium salts
- hardening agents, including epoxy resins
- acrylic acids or derived acrylates
- soldering or welding fumes
- substances from animals or insects
- fungi or spores
- proteolytic agents
- organic dusts
- vapours or fumes of formaldehyde, anhydrides, amines or diamines

Management of asthma

The goals of asthma management

- abolish symptoms
- restore normal lung function (or best possible lung function)
- allow patient to lead a normal lifestyle

The goals of asthma management may be achieved by recognising asthma early, avoidance of precipitating or aggravating factors and the early introduction of anti-inflammatory therapy. Monitoring lung function is key to achieving these goals.

The occupational health nurse should measure baseline lung function of all workers entering the work environment for the first time using the peak flow meter. Many industries have a spirometer and where possible the baseline lung function should be recorded. This has the advantage of recognising asthma early and will be of enormous medico-legal value when the diagnosis of occupational asthma is in question.

The role of the occupational health worker can be summarised as follows:

- monitor lung function
- avoid exposure to sensitising agents where possible
- avoid aggravating factors
- monitor treatment and treat acute attacks
- assist in the diagnosis of occupational asthma by
  - regular peak flow measurements on and off work
  - measuring cross-shift change in lung function
  - identifying potential sensitising agents
- early referral of patients with severe asthma
- patient education

Pharmacotherapy of asthma

The overriding principle in the management of asthma is the acknowledgement that asthma is a chronic inflammatory condition of the airways and that anti-inflammatory treatment is the cornerstone in its pharmacotherapy.

There are several classes of drugs available to treat asthma. These are relievers (acute bronchodilators), controllers and preventers (anti-inflammatory agents). These are shown in *Table 2*.

Table 2: Classes of drugs available to treat asthma

RELIEVERS	CONTROLLERS	PREVENTORS
Cause acute bronchodilation. No or minimal anti-inflammatory action	*Results in sustained bronchodilation. No or minimal anti-inflammatory action*	*Anti-inflammatory*
ß2 agonists aminophylline	long acting ß2 agonists slow release theophylline preparations leukotriene antagonists	inhaled corticosteroids oral corticosteroids leukotriene antagonists sodium chromoglycate nedocromil sodium

Leukotriene antagonists have been developed as a result of scientific research into the mechanisms of asthma. As yet, there is no consensus whether it should be classed as a reliever or a preventor. They are due to be launched in South Africa soon and their efficacy and position in the management plan of asthma will become apparent after experience with their use and more clinical data. Current data suggests that they are particularly effective in aspirin sensitive asthma from a mechanistic perspective and in mild asthma.

In order to apply drug treatment to asthma in a cost-effective manner it is necessary to classify asthma into various grades of severity. The grading into intermittent and; mild, moderate and severe persistent asthma has world wide acceptance and is convenient to apply. The allocation of a patient to a particular grade is dependent upon symptomatology, frequency of attacks and lung function. The criteria for each category is summarised in *Table 3*.

Once the patient has been placed in a particular category of severity appropriate treatment may be instituted. It may often be difficult to determine the category because patient information may be inadequate or vague. The simple approach is to err on the side of placing the patient in the more severe category. This is relevant especially when initiating therapy for the first time. This is based on the principle of attacking asthma inflammation aggressively at the earliest opportunity. Once the objectives have been achieved treatment should be stepped down. One of the criticisms of asthma management is that we often fail to step down treatment although there is eagerness to add treatment. Thus it needs to be emphasised that managing asthma is a long-term commitment between health care worker and patient. Once again, the occupational health nurse is in an ideal position to implement this.

A practical approach to drug therapy is presented in *Figure 1*. Clearly the approach is based on severity of asthma and the emphasis except in the intermittent asthma category (*refer Table 3*) is on anti-inflammatory therapy. For all intents and purposes in the vast majority this represents inhaled corticosteroid treatment on a regular basis. Enough evidence has accumulated to confidently recommend that short acting inhaled ß2 agonists be used on an as needed basis.

Controversy still surrounds the precise positioning of slow release theopylline preparations in asthma. It must be seen as adjunctive treatment to inhaled corticosteroids. It is a viable option when adequate control is not achieved with low dose inhaled steroids. The options available would include slow release theopylline preparations, long acting ß2 agonists, high dose inhaled steroids and oral corticosteroids. The factors to be considered are cost, steroid side-effects, inhaler technique and efficacy.

Low dose inhaled steroids is defined arbitrarily as ≤ the equivalent of 800mcg of inhaled beclomethasone dipropionate per day in an adult. Factors that will influence this definition are:

Table 3: Criteria for severity classification of asthma

CLASS	*intermittent*	*persistent*		
		mild	*moderate*	*severe*
DAYTIME SYMPTOMS *	< twice a week	2-4 times a week	> 5 times a week	continuous
NOCTURNAL SYMPTOMS*	< twice a month	2-4 times a month	> 5 times a month	frequent
LUNG FUNCTION**	>80% predicted	> 80% predicted	60-80% predicted	<60% predicted

* cough, tight chest and/or wheeze

** predicted normal lung function or patient's best achieved lung function (peak flow rate or FEV1)

- potency of steroid molecule
- method of delivery of the drug - use of and type of spacer device
- formulation - dry powder vs aerosol

Once a patient is stabilised at a particular treatment level, consideration must be given to stepping down treatment. Guidelines for stepping down treatment are:

- objectives of asthma treatment must be achieved
- step down should not occur more frequently than 3 monthly
- adequate monitoring and patient education must be available -implies the use of asthma diary cards and peak flow monitoring

Patient participation in the decision process will ensure the success of this strategy as it will give patient responsibility for his/her asthma.

Nebuliser treatment is not indicated in the vast majority of patients for the management of chronic persistent asthma. The availability of well designed spacer devices allows optimal drug delivery via the inhaled route. Nebulisers vary considerably in their performance.

All patients on high dose inhaled steroids should use a spacer device to reduce oro-pharyngeal deposition which causes oral thrush and dysphonia. Spacers devices must be cleaned at least once a week and air dried as wiping increases electrostatic forces in the device and reduce drug delivery.

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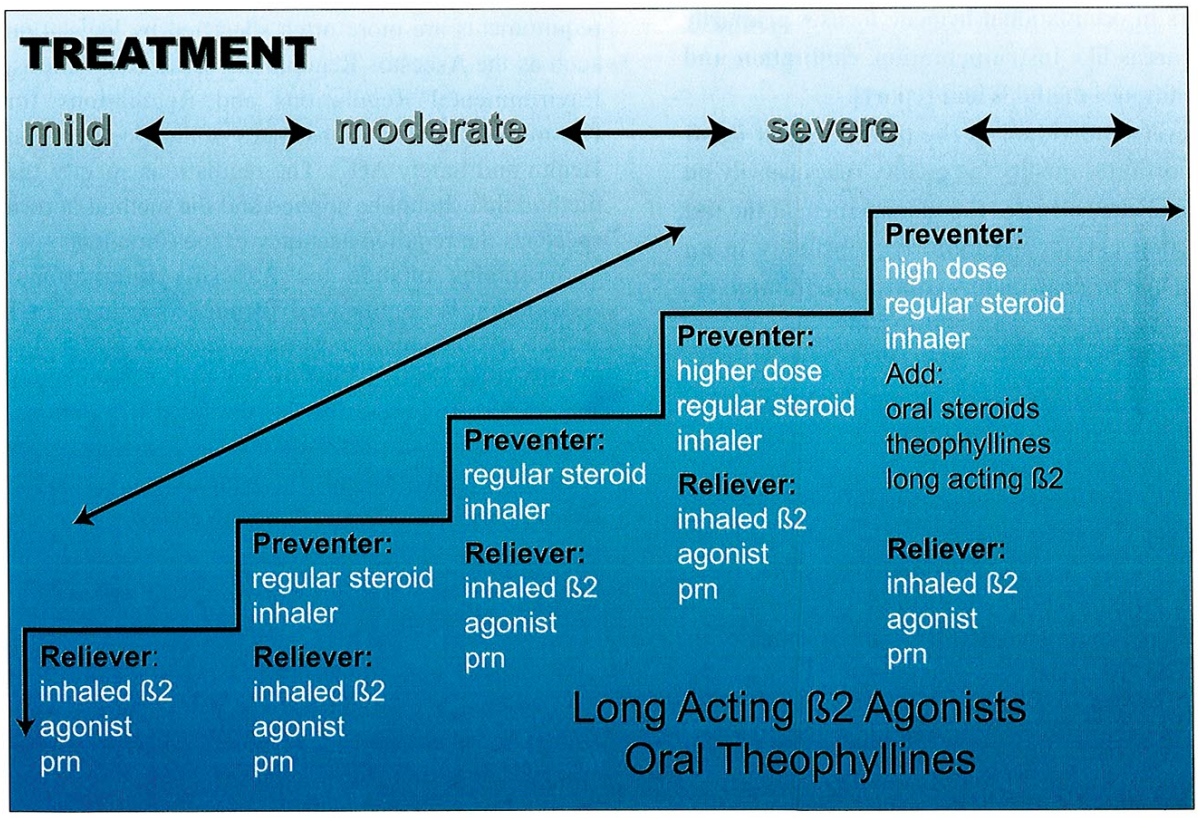

Figure 1

Quality control in Occupational Hygiene

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Occupational Health SA 1999; Vol 5, No. 2: 22-23

Quality control is no longer the unique domain of the manufacturing industry. It is being implemented successfully in several service industries. Occupational hygiene is an example of a service where quality control is particularly important. Apart from being expensive financially, errors can endanger the health and safety of the labour force.

Quality is conformance to requirements and in the case of occupational hygiene, the requirements are usually specified in legislation. Legislation prescribes the test method and, in turn, the method specifies the required accuracy of measurement. The elimination of errors in occupational hygiene focuses primarily on key areas like instrumentation, calibration and traceability, test methods and reports.

While every individual in the practice must know what constitutes quality (as quality relies heavily on the human element), it is the management of the test facility that carries the main responsibility in an occupational hygiene quality control programme.

Introduction

Quality control originated in the factory environment with a view to controlling the dimensions of manufactured products. Today this concept, developed in the manufacturing industry, is being successfully applied in the service industry.[1] Examples of these service industries include financial institutions, security, hospitals and laboratories.

A quality control programme that is suitable for one service industry will not necessarily apply to another. Therefore it is important to identify the unique characteristics of occupational hygiene services that require quality control.

While a number of quality aspects apply to occupational hygiene, one area in particular - the accuracy of results - is of vital importance to the client. Erroneous results not only compromise the health and safety of the labour force, they may also result in the implementation of unnecessary control measures at the expense of the employer.

Unfortunately, attempts by the Department of Labour in 1987 to introduce a uniform quality system for occupational hygiene test facilities failed. The system was based on SABS 0215 [2] and most practices could not afford the cost of implementing and maintaining the listing scheme.

The scheme was abandoned but occupational hygiene test facilities wishing for recognition by the Department of Labour as Approved Inspection Authorities are still required to maintain a formal quality control programme.

What is quality control?

Quality is conformance to requirements. In occupational hygiene, the main requirement centres around the accuracy of results. This means that quality control is aimed at the prevention (not only the detection) of errors by eliminating possible causes through corrective actions.

In many service industries, the client sets the requirements. However, in occupational hygiene the requirements are more often specified by legislation such as the Asbestos Regulations, Lead Regulations, Environmental Regulations and Regulations for Hazardous Chemical Substances of the Occupational Health and Safety Act [3]. The regulations specify the method that should be applied and the method in turn specifies the required accuracy of measurement.

Examples include the Asbestos International Association Recommended Technical Method No 1 as prescribed by the Asbestos Regulations, SABS 083 of 1993 that is prescribed by the Noise Regulations and SABS 1164 prescribed by the Lead Regulations. The Regulations for Hazardous Chemical Substances does not refer to any specific methods and leaves the choice open for the occupational hygienist.

Applications in occupational hygiene

The most important areas of quality control in occupational hygiene include instrumentation, calibration and traceability, test methods and reports. The aspects regarding these matters that should be addressed in a quality control programme are detailed in SABS 0215-1987 2 and other similar documentation [4] and are briefly discussed below.

Instrumentation

An occupational hygiene test facility must be equipped with the correct equipment required for the intended tests and measurements. The borrowing or hiring of equipment is not acceptable and may only be tolerated if the user can guarantee traceability at a later stage. A test facility that uses an instrument which is not under its direct control may have difficulty to prove that it was correctly calibrated before and after use, or that it was well maintained and correctly used.

Test facilities must also be equipped with a sufficient number of instruments. An important example in this regard is the constant flow sampling pumps used for the measurement of exposures to dusts, vapours and other air pollutants. A sampling strategy that requires the collection of fifteen samples will take fifteen shifts to complete if the test facility has only one pump. Alternatively, there may be a temptation to shorten sampling times in order to save costs, thereby deviating from the specified method and compromising accuracy.

Calibration

Instruments used for occupational hygiene measurements must be calibrated and the calibration certificate must be traceable to a documented national or international standard.

Some test facilities religiously calibrate their constant flow sampling pumps before each use and again check them after use. However, the soap bubble flow meter used for calibration is never calibrated and therefore its accuracy is not traceable to a national standard. Since the concentration of dust measured with the pump is directly related to flow volume, the result is also not traceable to a national standard and may be regarded as worthless.

Not every aspect regarding occupational hygiene tests is calibrateable and, for that matter, traceable to a recognised standard. For example, how do you 'calibrate' a person's ability to accurately size and count asbestos fibres under an optical microscope? In this instance, the test facility should include reference testing in its quality control programme.

Reference testing, or inter-laboratory test comparisons for asbestos, has been established by the Department of Minerals and Energy and is based on the Asbestos Fibre Regular Informal Counting Arrangement (AFRICA). Although started in the early nineties, only 3 of the 15 occupational hygiene test facilities approved for asbestos participate in the scheme (personal communication with the Departments of Labour and Mineral and Energy).

Some instruments, for example calorimetric indicator tubes, cannot be calibrated and should not be used for tests where conformance with statutory requirements is evaluated.

Test methods

The methods of test and sampling procedures are usually prescribed by the relevant legislation and these documents must be available to the occupational hygiene test facility. Where a method is not clearly described in national or international documents, the practice must develop an internal procedure that will serve as the quality requirement for such tests.

Test reports

Test reports have a prescribed format and a quality report conforms to these requirements. Although the contents of each report may differ, headings and layout is standardised.

Results of test work should be reported in an accurate, clear, objective and unambiguous form.

Attaining quality

The goal of quality control in occupational hygiene is error-free performance.[1] Errors cost money and may endanger the lives and safety of people. What is necessary to obtain quality?

Quality must be made specific and operational and must be defined for every task. Every individual must know what constitutes 'quality' in the job task he or she performs. Management is responsible for quality policies, quality planning, providing leadership, staffing and other facilities and resources needed to put the quality programme into effect at all levels. More than 80 % of quality problems lie with management.

The test facility must give careful attention to important details, make a habit of verifying and checking, assume nothing, take nothing for granted, make sure, develop a sense of urgency and try to prevent poor performance.

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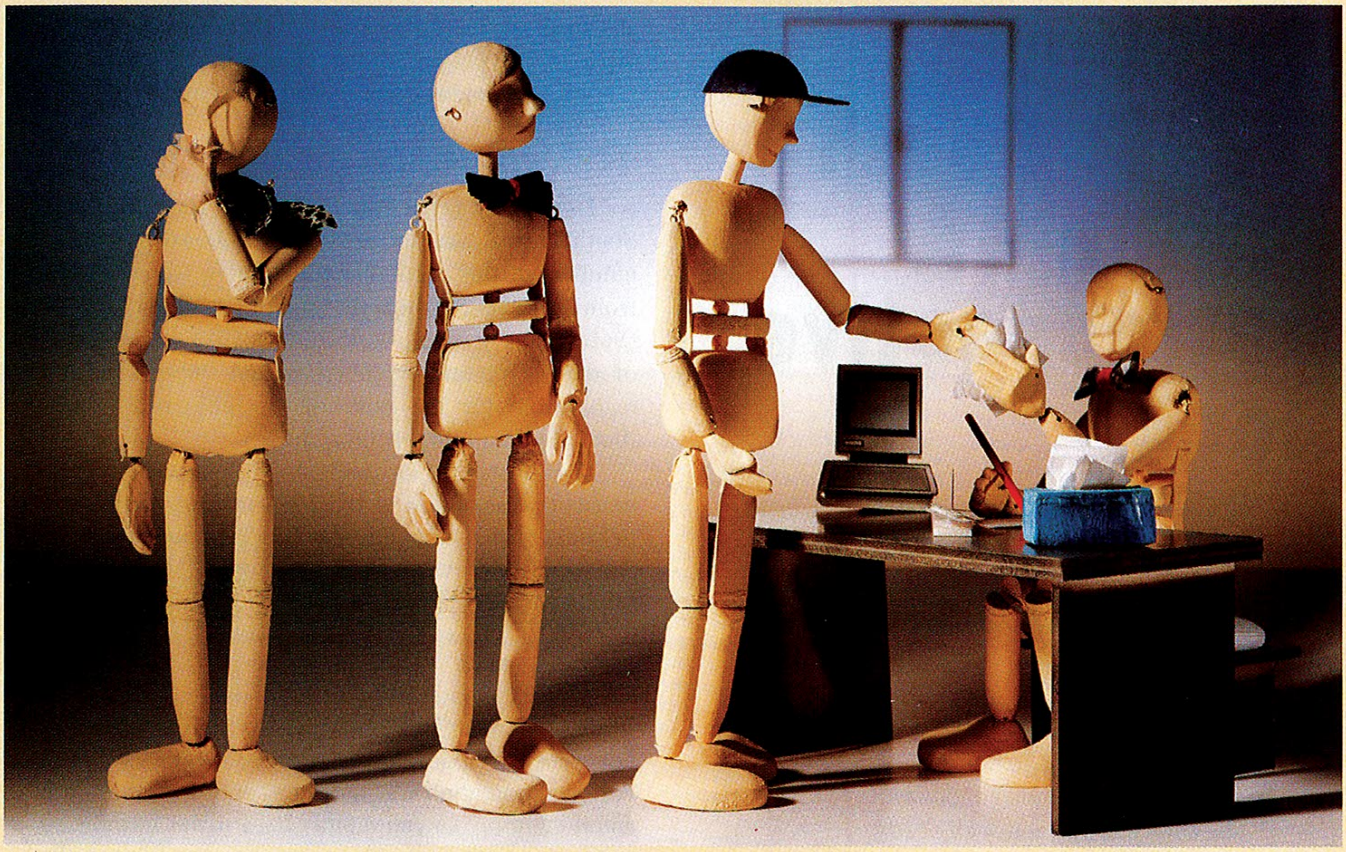

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An overview of health assessments using the NOSA 5 star programme

Louwna Pretorius
Occupational health consultant, NOSA Health Services
Occupational Health SA 1999; Vol 5, No. 2: 25-27

The NOSA 5 star SHE Programme provides a tool for a more accurate means of assessing occupational health risks, as well as a methodical process to assist with measuring quality assurance in occupational health.
Of a total of 200 companies visited, 60% employed occupational health practitioners and about 30% of these occupational health practitioners were implementing the whole scope of the occupational health programme, including health risk assessments and medical surveillance programmes. In companies without any occupational service, the awareness level concerning occupational health requirements varied from 0 - 10%. The chemical and allied manufacturing industries, in the main, have satisfactorily addressed health risk assessment with specific reference to the Hazardous Chemical Substances Regulations.
These results indicate that many companies have not yet addressed occupational health issues and the realisation that there is still room for improvement in the provision of occupational health services and the effective implementation of preventative measures pertaining to work exposure. There is a need to ensure management awareness with regard to occupational health so that the majority of employees in industry may be protected in the work place from the hazards of their occupation.

Introduction

The Nosa 5 star system provides for a quality management system for integrating safety, occupational health as well as environmental management into a system that addresses all key factors which may impact on the working environment and long term economic viability of South African Industry.

In line with its philosophy of continuous improvement, NOSA revised the scope of the NOSA 5 star system on safety management by expanding the system to cover occupational health and fundamental environmental issues.

The concept is in line with NOSA's approach of providing quality control external audits, constancy and advice, as well as training to their clients. Companies, in their turn, are required to identify their risks and devise appropriate policies, procedures and systems to manage these risks at an acceptable level. Grading assessments will now encompass occupational health on a more evenly spread basis, with environmental standards being available (although they will only be included this year.)

Including occupational health as part of a current programme provides managers, employee organisations and safety and health professionals with a standard to evaluate the health status of their organisation and the quality of the Occupational Health Service (OHS) being provided by health care professionals.

Background

The original NOSA 5 star draft Occupational Health document (now integrated into the SHE system) was intended as a self audit document to provide occupational health practitioners with a tool to evaluate the extent and quality of the service being rendered. In addition, the document was to serve as an indicator of legislative compliance in the execution of occupational health and hygiene programmes and to assist in identifying critical areas where employees might be at risk in terms of developing occupational diseases due to undetected exposure. Methods outlining how existing financial and personnel resources could be utilised to address and counter-act such issues were also covered.

The NOSA 5 star draft document highlighted the awareness amongst occupational health practitioners role in enhancing both individual and employer responsibility in promoting occupational health and safety awareness and sustaining well-being in the workplace.

Review of work

The service provided by the NOSA occupational health consultants over the past two years was mostly advisory in nature and took the form of consultative assessments of the occupational health service delivery

within companies and a review of the extent of overlap with other aspects of the safety programme.

Scope

What emerged was that, in general, companies have not yet effectively addressed the benefits of the full scope of occupational health and hygiene including medical surveillance and biological monitoring as part of their occupational health programmes. Formal health risk assessments are outstanding in most cases. Liaison with other related disciplines, i.e. occupational hygiene and safety, as well as integrating the role players involved with operating standards in the various production processes seems to be lacking or absent. Where occupational health services are available, they have concentrated on primary health care issues with a limited emphasis on the full spectrum of the occupational health function.

Awareness

Greater management awareness and involvement in utilising the broadened scope of the OHS in full for the provision of health education, health risk identification, site inspections, hazardous information induction to employees will improve the communication between the role players and prevent misunderstanding. The OHS requires full details on the process as well as all the raw materials and substances (chemical and other) used in the production process in order for the OHN practitioner to function optimally in providing an effective service within the NOSA System.

Roles

The perceived role of the occupational health practitioner and the safety professional and their function in the execution of the Occupational Health and Hygiene programme needs to be re-examined as this is clearly a cause of concern between safety, health and occupational hygiene professionals.

Information

Understanding the critical and overlapping areas between Health and Safety and the importance of cross pollination of information for effective preventative action, implementation and efficacy in the Occupational Health and Hygiene Programme is essential.

The importance of continuing education, the development of new trends and technology in the occupational health field as well as the effect of existing and new legislation on occupational health needs to be pursued by tertiary institutions and professionals societies alike, as this forms the basis from which every occupational health practitioner should operate. The lack of information and resource materials pertaining to the adverse health effects of processes or substances used, the non-availability of occupational hygiene survey results, risk assessment and relevant copies of legislation underlines the reason for substandard performance in specific cases.

In most clinics, the focus is on managing established (non-occupational) diseases rather than on a pro-active approach towards exposure prevention in the work place or the identification of clinical signs and symptoms which could lead to the early diagnosis of possible occupational diseases.

Collaboration

In most instances, collaboration between Health and Safety is limited to the information required on occupational injuries/disease and Compensation Commissioner correspondence. The role of the occupational health practitioner in incident investigation pertaining to injury/occupational disease is often downplayed by the safety department as occupational health practitioners are not perceived to have any role to play in incident investigations (which are mainly conducted by the safety department with little participation from the OHS.) The identification of environmental stresses or the initiation of Occupational Hygiene surveys (in liaison with the safety officer), or the interpretation of results and the effect of these in terms of their Medical Surveillance Programme seems not to receive the required involvement of the OHS practitioner.

Material Safety Data Sheets (MSDS's) were not always adequate. Where a system existed for upgrading of substance information, communication with the OHS did not take place. The OHS practitioner often is left out of the communication correspondence on matters such as the updating of substance information or changes pertaining to raw materials, chemicals and processes, which result in an incomplete inventory of MSDS's and the related risk assessment.

In certain instances, it seems that OHS practitioners are reluctant to involve themselves in Occupational Hygiene issues. This may be due to a variety of factors:

- A generally poor record of ongoing education in South Africa
- Additional work responsibility
- The perception that Occupational Hygiene forms part of the safety portfolio

Discussion

Uncertainty exists amongst a number of occupational health practitioners concerning their role and function, legally as well as in terms of the NOSA programme, as past programmes focused on safety-related issues and not on an integrated SHE approach. In most

instances, this results in the ineffective execution of the programme as well as the possible risk of legal non-compliance. Insufficient understanding and support for the OHS functions and misinterpretation of the Occupational Health practitioner's position and role, coupled with the dilemma of confidentiality as part of medical ethics, have lead to union / management disagreement. Lack of communication between the occupational health practitioner and the CEO or senior management on their responsibility towards an integrated SHE approach was also found to be a contributing factor in SHE programmes that do not meet the required standards.

Site inspections for the purpose of identifying occupational hazards are seldom undertaken by the OHS practitioner and rarely involve the medical practitioner, mainly due to the limited time medical practitioners spend at the work site. Management's perception of the role and function of the medical practitioner and the possible financial implications to the company (for instance, additional constancy fees) often detract from the role which the medical practitioner could play in supporting these functions. The inclusion of occupational health practitioners / medical practitioners as part of an internal management audit team is found to be more the exception than a rule.

It was also found that a large number of occupational health practitioners were appointed as departmental health / safety representatives but they were not co-opted to the safety steering committee, thereby losing out on the opportunity to raise awareness on occupational health issues and risks, as well as initiating hazards containment and effective reporting on the progress of the occupational health and hygiene programme (medical surveillance). The Hazardous Chemical Substances Regulation requirements has in this regard, come as a surprise to both management and occupational health practitioners alike.

The lack of policy and procedure manuals, job descriptions for OHS practitioners and guidelines for the early identification of occupational diseases as well as the development of clinical and diagnostic skills have clearly been identified as urgent needs in the occupational health field. Overcoming these aspects will enhance the professional stance of occupational health and make South Africa internationally more competitive.

The NOSA 5 star System provides a tool for a more accurate means of assessing occupational risks. It helps to create awareness of the need for more effective protection of people in the workplace and compliance with statutory requirements as stipulated by the legislation applying to Occupational Health. Addressing the dire need for continuous updating and refresher training in the occupational health field underpins the programme to ensure ultimate success.

New dilemmas in barrier protection

Jo Goddard
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Occupational Health SA 1999; Vol 5, No. 2: 28-33

Introduction

Surgical gloves, in one form or another, have been around for over 200 years, and are largely taken for granted. Nowadays, however, circumstances dictate that surgical gloves must provide more than a simple barrier between the health care worker (HCW) and the patient, and vice versa. This is due to the emergence of two serious and potentially life-threatening medical phenomena: the advent of virulent, blood-borne viruses, such as Hepatitis B and HIV/AIDS and the emergence of latex allergy in both HCW's and patients. Another area of concern is the complications arising from glove powder contamination. These topics were addressed in a recent countrywide lecture tour, sponsored by Regent Medical, from both a surgeon's and a researcher's point of view.

Complications of surgical glove usage - the surgeons viewpoint

The surgeon's viewpoint was presented by Christopher Wastell, Emeritus Professor, Imperial College of Science, Technology and Medicine at the Chelsea Westminster Hospital, London, United Kingdom..

Professor Wastell told delegates to the meeting that, in surgical patients, glove powder has been associated with several serious conditions, for example:

- Starch granulomatous peritonitis[1]
- Peritoneal adhesions[2]
- Interference with diagnostic procedures, e.g. HIV polymerase chain reaction (PCR) [3]
- Bacterial infection[4]
- Impaired wound healing[5]
- Contamination of surgical devices, e.g. extradural catheters[6]

In HCWs, a Type I allergy to latex has been confirmed in 7% of surgeons[7], and HCW's are also frequently exposed to the possiblity of infection with blood-borne viruses as a result of contact with blood or body fluids. Professor Wastell said that for maximum performance and protection of both HCWs and patients, a surgical glove should:

- Present a thin layer, impervious to particles as small as viruses, but with high sensitivity
- Have a low water extractable protein content
- Be powder free

Latex allergy and surgical gloves - a researcher's viewpoint

Dr. Jenny Stark, Assistant Director of the National Centre for Occupational Health and Associate Research Fellow of the University of the Witwatersrand, is currently researching the problem of latex allergy among staff at the Johannesburg General Hospital, in association with Professor Mary Ross of the Department of Community Health, University of the Witwatersrand. Dr. Stark explained the epidemiology of latex allergy and presented some results from her research and from research undertaken by Professor Paul Potter at Groote Schuur Hospital, Cape Town. Dr. Stark acknowledged the contribution by Professor Potter of some of the material used in her presentation.

Latex gloves and latex allergy

Latex is derived from the milky sap of *Hevia braziliensis*, the rubber tree. Analysis of proteins extracted from latex have shown a number of polypeptides, some of which have been shown to bind to IgE antibodies from patients with latex allergy. In addition to latex allergy, localised irritation or allergic skin reactions can occur as a result of other chemicals, which are added to the latex during the manufacturing process. These products include sulphur, accelerators, anti-oxidants and stabilisers, which give latex the useful qualities of strength, elasticity, flexibility, tear resistance and barrier integrity.

During manufacture, glove moulds are dipped in latex and then are washed repeatedly before being dried, powdered and packed. In 1987, the Centre for Disease Control in Atlanta, Georgia, USA, recommended the use of gloves for barrier protection against blood and body fluids. Since then, there has been an exponential rise in demand for gloves, due mainly to the attempts by HCWs to protect themselves against HIV/AIDS and Hepatitis B. Unfortunately, in order to produce sufficient gloves to meet the increased demand, short cuts in the manufacturing process are sometimes taken. This may include a reduction in the number of washes the

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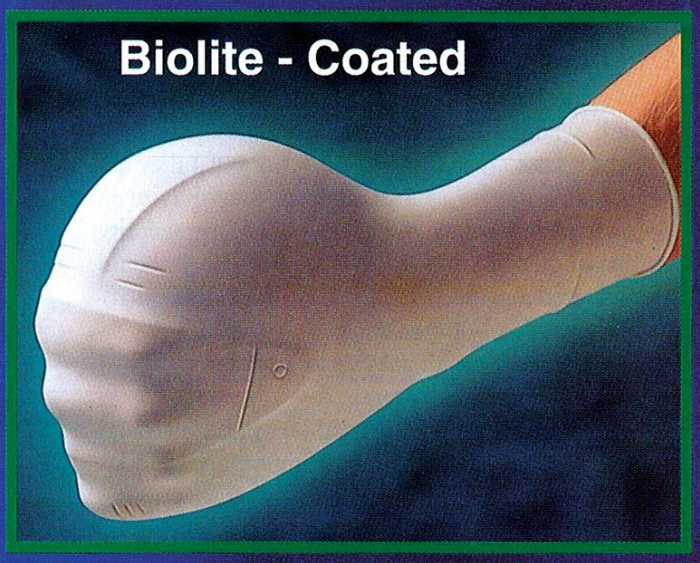

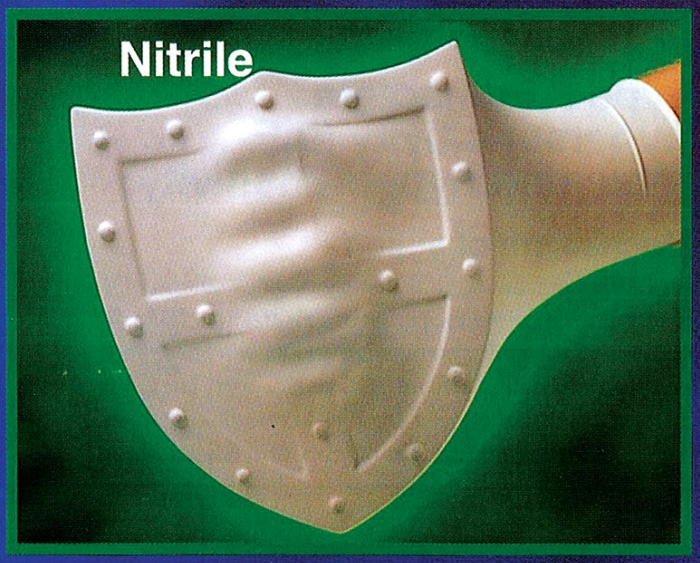

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glove moulds receive, which means that more protein responsible for inducing allergy remains in the gloves.

The role of glove powder in latex allergy

It is now known that glove powder is not the innocuous substance it was once thought to be. Gloves are powdered to make it easier to put them on. However, the proteins responsible for latex allergy have been found to adsorb onto the cornstarch powder. Because the powder particles combine with latex protein, there is a concentration of latex protein in contact with the skin when powdered gloves are worn. Furthermore, when powdered gloves are donned, powder particles coated with latex are released into the air. They are then inhaled, gaining access either to the mucus membranes of the airways, or the mucus membranes of the eyes, or both. The powder is also taken into the air conditioning system, where it is recirculated and may be concentrated over time.One study has shown that powdered gloves contain one thousand times more airborne allergen than non-powdered gloves[8]. This is very important, since sensitization probably takes place via the mucus membranes and not through the skin. "Unfortunately", said Dr. Stark, "surgical gloves are not the only culprits in latex allergy. There are about 400 hospital products, over 40 000 industrial products and a host of domestic products that also contain latex - a substance that permeates every facet of modern life".

Epidemiological trends in latex allergy

There has been an exponential rise in latex allergy from 1980-1995 and indications are that this trend has continued. Some people are more prone to develop latex allergy than others. Certain fruits (e.g. bananas, avocados, tomatoes, raw potatoes, chestnuts and melons) contain similar polypeptides to those found in latex, and IgE antibodies generated against these foods may cross-react with latex proteins. Hence, people who are allergic to these foods are at increased risk of developing latex allergy. Latex allergy does not occur at first contact with latex; it occurs as a result of repeated exposure over time. This explains why the group most at risk are children with spina bifida - a condition which necessitates frequent catheterisation and surgery. The next most vulnerable group are HCWs, with dentists most at risk within this group. There are three types of latex allergy:

- **Irritant reactions**

This is the most common non-immune reaction, caused by additives (e.g. thiurams and carbamurates), rather than latex-associated proteins.

- **Allergic contact dermatitis**

This is the most common immuno-reaction, characterised by a time delay between exposure to the allergen and the development of symptoms (delayed hypersensitivity reaction).

- **Immediate hypersensitivity**

This is an antibody response characterised by the rapid development of symptoms after exposure to latex, ranging in severity from mild contact urticaria to anaphylaxis.

"These three types of manifestation are not mutually exclusive," said Dr. Stark. "They may coexist in the same patient.

Latex gloves as personal preventive equipment (PPE)

"The use of latex gloves as protective equipment by all and sundry has its own set of problems", explained Dr. Stark, who gave the following examples:

- Gloves do not always reduce the hazard that they are intended to protect against. Indeed, they may even increase the hazard by giving a sense of false security to the wearer, leading to carelessness. They should therefore be regarded as secondary prevention only.
- Total protection is not guaranteed.
- They may cause health hazards to the wearer, as discussed above.
- The misuse of latex gloves, said Dr. Stark, needs to be urgently addressed, since it undoubtedly contributes to the growing increase of sensitisation. Furthermore, the use of gloves by personnel who do not need them is a waste of money. That money could be better employed for the purchase of better quality gloves for HCWs, who do need to wear them.

Type I Immediate hypersensitivity (IgE-mediated hypersensitivity)

Mechanism of action

Explaining the natural history of latex allergy, Dr. Stark said that during the period of sensitization, IgE antibodies against latex proteins are produced. These then bind to mast cells. On further contact with latex, the allergen binds to the IgE antibodies, cross-linking them. This induces the release of a number of mediators from the mast cells which cause the various allergic symptoms.

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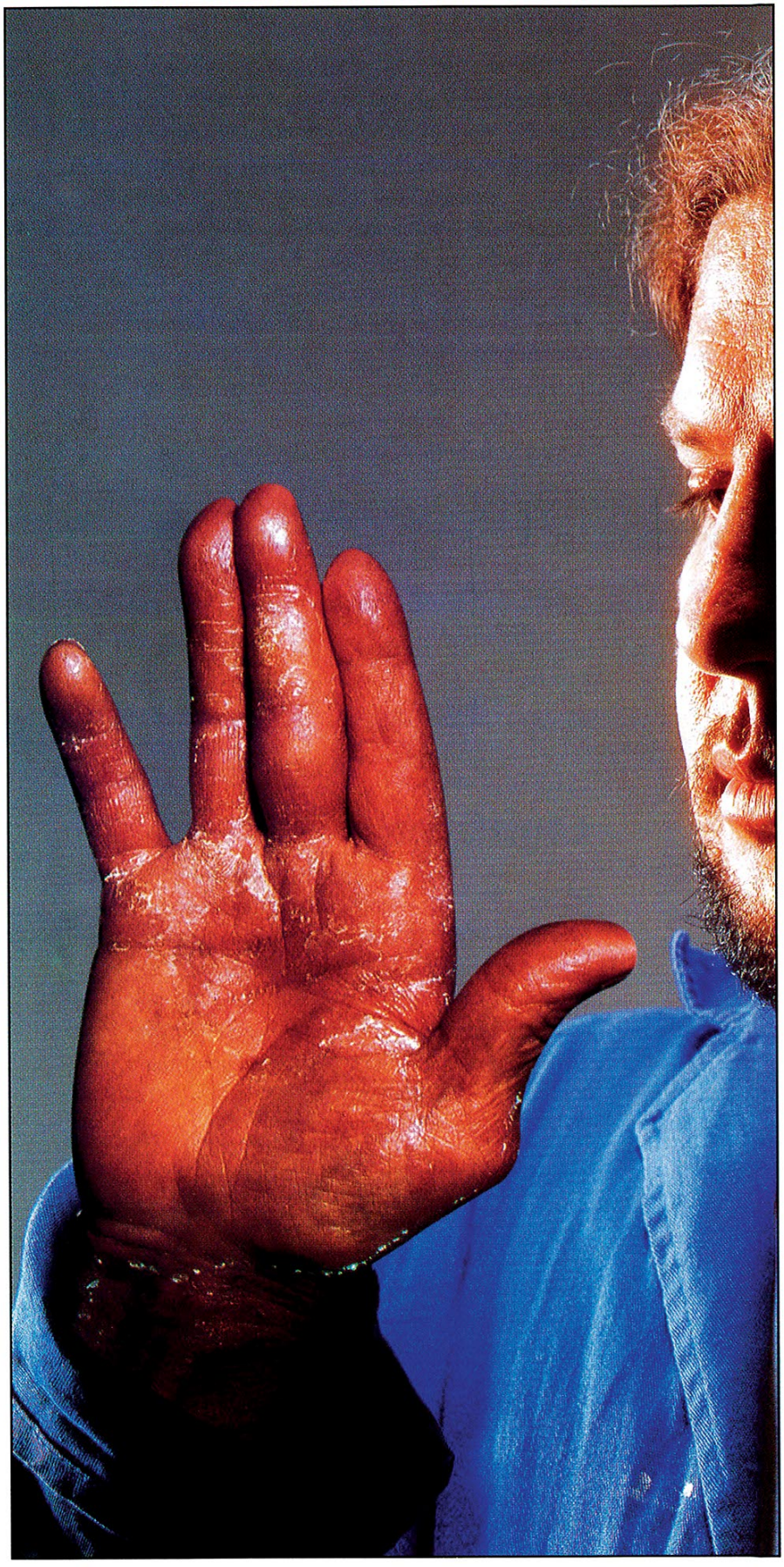

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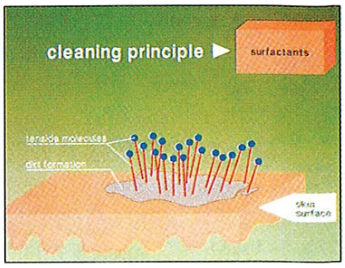

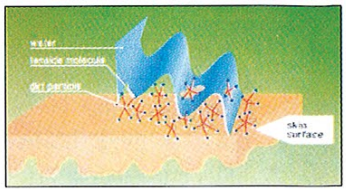

In industry and in many workplaces the human skin particularly the hands are subject to contact with various kinds of harmful substances and hazards.

This has led to a continual increase in occupational skin disease – in fact industrial dermatitis constitutes over 50% of all reported occupational accidents in South Africa.

At a time when there is a shortage of skilled people, every employer should be automatically involved in safeguarding workers from skin disease.

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In order of commonality, these are:
- Urticaria
- Rhinoconjunctivitis
- Bronchospasm
- Anaphylaxis

International studies show that 5-10% of HCWs have been involved in this type of latex-allergic reaction[9]. By 1992, over 1 000 cases of latex allergy had been reported to the American Food and Drugs Administration (FDA), with the greatest numbers of latex-associated anaphylaxis resulting from the use of examination gloves and barium enemas[10]. Eight fatalities were reported following barium enemas. (Mucus membranes, for example of the rectum, are moist and form a less effective barrier to latex proteins, which solubilize and pass through). Dr. Stark emphasized that the avoidance of latex allergens is the only method shown to prevent latex-induced anaphylaxis in sensitized individuals.

Latex allergy in South Africa

A quotation from a publication circulated widely to HCWs in South Africa in 1998 reads: "In some countries where latex is widely used, latex allergies have reached epidemic proportions. In South Africa, we still have a window where preventative strategies can be implemented[11]." "Unfortunately", said Dr. Stark, "the facts show otherwise". Dr. Stark then presented the results from studies on latex allergy in HCWs at Groote Schuur Hospital[12] and the Johannesburg General Hospital[13] (*Table 1.*)

In the Cape Town study, on the basis of questionnaire response, nearly half of the respondents were suspected of having symptoms related to latex exposure. Confirmation of immediate hypersensitivity using stringent tests (RAST and skin prick testing (SPT)) gave a value of 8.7% of staff with confirmed latex allergy.

The Johannesburg Hospital study was only begun during the second half of 1998, but again, nearly half of the questionnaire respondents were suspected of having latex - related symptoms and 13.2% confirmed positive with RAST. "If one compares the Cape Town and Johannesburg results with the 5-10% of health workers identified in international studies as having type I hypersensitivity, it is clear that even if South Africa did have a "window of opportunity", it has now slammed shut", said Dr. Stark. "South Africa is now right up there with the rest of the world, and there is no room for complacency".

Symptom prevalence

The manifestations of latex allergy symptoms in the Johannesburg study has confirmed the Cape Town findings and those in the international literature, said Dr. Stark. Skin rash is the most common symptom of latex allergy, followed by rhinoconjunctivitis and bronchospasm. Symptoms may progress as follows:
- Asymptomatic → urticaria
- Asymptomatic → bronchospasm
- Asymptomatic → urticaria → bronchospasm → anaphylaxis.

Because of this progression of symptoms, early diagnosis of latex allergy is essential in order to remove the worker from further exposure to latex, she said.

Table 1: The incidence of latex allergy in HCWs at the Groote Schuur and Johannesburg Hospitals

	GROOTE SCHUUR		JOHANNESBURG	
	Number	%	Number	%
Suspected	857	45.8	63	48.8
Confirmed	163	8.7	17	13.2*
TOTAL (n)	2 195		129	

* Confirmed on RAST only

Legislation

According to the Occupational Health and Safety Act No. 85, 1993, "The employer must provide, as far as is reasonably practical, a working environment that is safe and without risk to the health of his employees". "Current wisdom has it that failure of a hospital, (or any other facility), as an employer to fulfil these requirements on the grounds that it is too costly would not be an acceptable defence in a South African court of law",[14] Dr. Stark told her audience.

Prevention of latex allergy

Quoting Professor P. Potter, Dr. Stark emphasized that the prevention of latex allergy requires that the following procedures be implemented without delay:
- Adoption of a powder-free policy (already implemented at Groote Schuur Hospital)
- Set manufacturing standards for low protein levels in latex products
- Control of the inappropriate use of gloves
- Avoidance of exposure to latex
- The establishment of a central monitoring facility to 'police' the above measures.

Professor Paul Potter has already published recommendations for a national policy on latex allergy, aimed at preventing new cases and managing those that have already occurred," [15] said Dr. Stark.

The future

In view of the serious ramifications of latex allergy, both in terms of the physical effect of the disease on the individual and its effect on employment potential, Dr. Stark said that serious attention must be given to the following:

- Desnsitization of people who have already developed latex allergy
- Improved diagnostic tests, so that earlier diagnosis can prevent the progression of symptoms
- More stringent quality control of latex products
- More acceptable thresholds of protein content in latex products
- The production of lower allergen latex
- More sensitive assays to monitor protein content of latex items
- The search for new, affordable, non-allergenic materials.

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David W. Stanton
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Occupational Health SA 1999; Vol 5, No. 2: 34-35

Introduction

The official web site (http://www.asosh.org) for the Association of Societies for Occupational Safety and Health (ASOSH) was published on 18 January 1999 after five meetings of a small group of ASOSH Council members. The first meetings were held at the National Centre for Occupational Health (NCOH), Johannesburg in July 1998, to review society and related web sites around the world and to discuss the contents required for this site.

The main purposes of the web site are:

- To promote ASOSH, its members and OHS
- To provide a comprehensive OHS web site for Southern Africa
- To provide easy and rapid access to the huge wealth of OHS and environmental (OHS&E) information around the world on the Internet.

Much of the information on the site was gathered by the author in 1996/97 when he established and managed the WHO/South Africa Technical Co-operation Programme: Occupational Health.

Phased development

During the first half of 1999 ASOSH.ORG can be regarded as a draft site for comments and improvements. The site will be under heavy construction in 1999 and 2000 to fill in the information for the Southern African Development Community (SADC) region, to develop the Careers, Products, Services and Jobs pages and to maintain the very extensive World Links page.

OHS&E practitioners now have access to a world library and extensive online training courses. The Internet is an essential tool for the OHS&E practitioner.

Design

The site was built with Microsoft FrontPage 98 and utilises the theme 'Subterranean'. The theme was chosen because of its visual appeal to the Webmaster and the ASOSH Council and the fact that Southern Africa is noted for its extensive mining activities. The opening of the shell at the top of each page represents to ASOSH the pearl of knowledge and the interior of the shell represents the bleakness and poor working conditions in many of the workplaces in the region.

The site has been designed to consist of two separate but interlinked parts: the Southern African component and through the World Links page - the World component. The World Links page is the last page in the Southern African component *(refer Figure 1)*. The navigation bar under the World Links header lists the Southern African pages. The bulleted items in the Table provide the links to thousands of OHS&E sites around the world. The Best Sites page lists the top sites with extensive OHS&E content.

The Online Training page provides links to a large number of online training courses on OHS, the Internet and Internet tools. If you are new to the Internet, ASOSH.ORG provides all the links to online training courses you need to start to mine the Internet effectively. The site will be useful not only for OHS&E practitioners but also for schools and students with its Careers, Education (OHS&E courses at Technikons and Universities), Courses (overseas) and SADC (extensive links to information on countries in the region) pages. ASOSH.ORG, through the Search Sites and General Resources pages, can be used to quickly gather information on any subject.

ASOSH.ORG has been listed in the top fifty OHS sites in the world (the only one in Africa) by two international experts on the Internet, Ralph B. Stuart III, at the University of Vermont, USA and Christopher Moore, at CCOHS, Canada. The 3rd edition of their book *Safety & Health on the Internet* will be published shortly with summaries of their top fifty OHS sites plus extensive additional links.

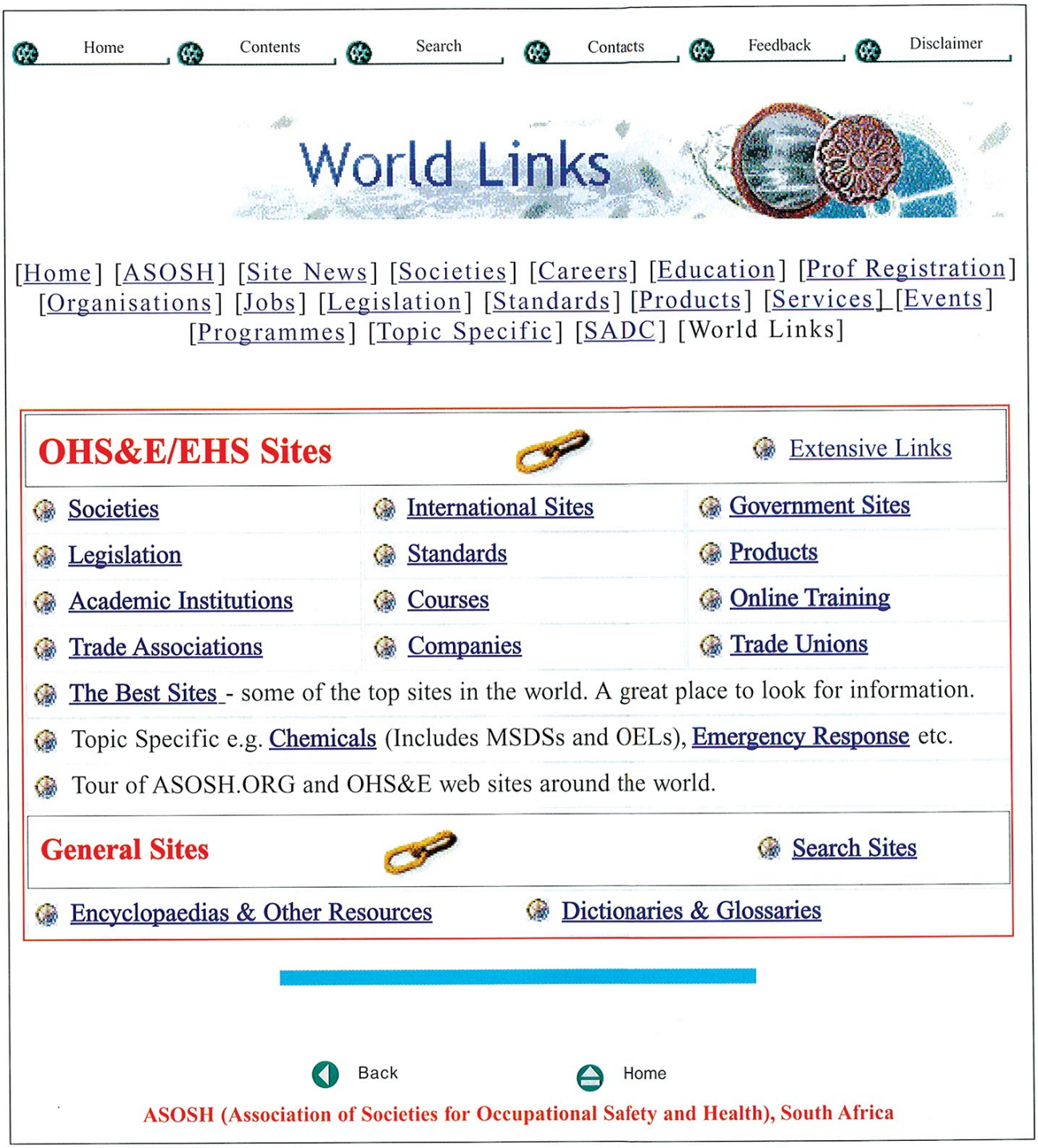
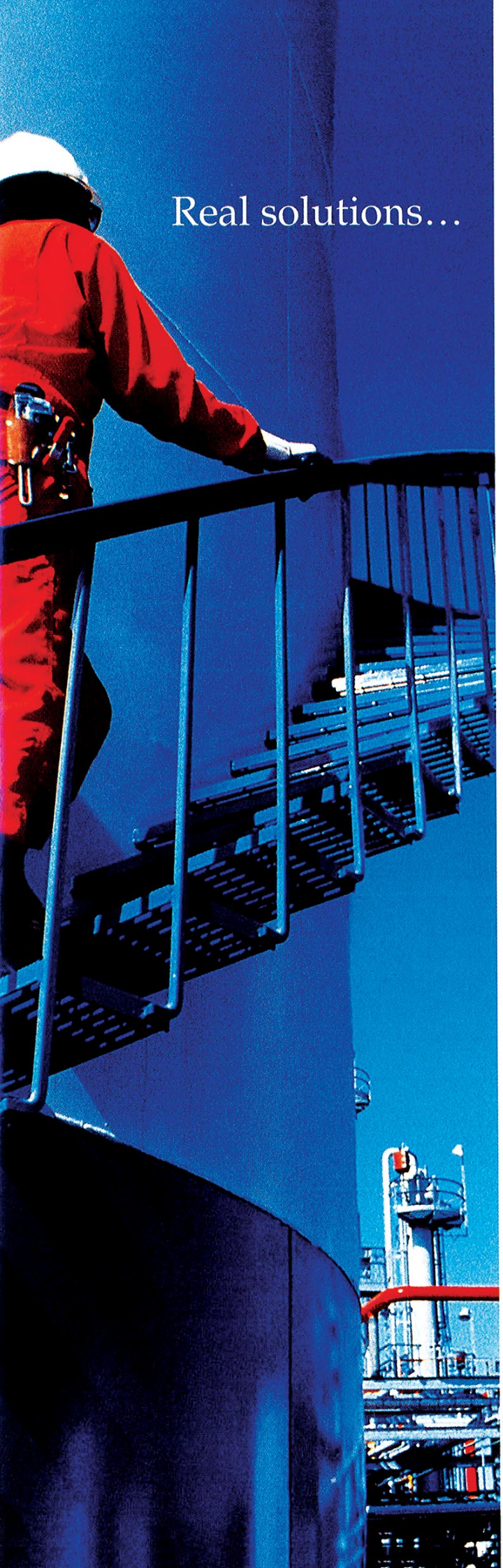


Figure 1: ASOSH.ORG World Links Page

If you market or manufacture OHS&E products or supply OHS&E services in Southern Africa you will want to be listed on the top OHS site in Africa. Product Central and Service Central pages will be created on ASOSH.ORG similar to the Safety Central site in the USA.

ASOSH looks forward to assistance from OHS&E practitioners in and outside the SADC region to help maintain the high standard of this site. Please let us know about the broken links, as well as new and revised links. ASOSH will be grateful for volunteers to assist with maintenance of specific web pages on ASOSH.ORG.

ASOSH would like to thank all the sponsors who have helped with the first year of payments to host ASOSH.ORG on an M-Web server.



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Four case studies of hydrofluoric burns: prevention is better than cure

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Occupational Health SA 1999; Vol 5, No. 2: 37-39

Hydrofluoric acid is the inorganic acid of elemental fluorine and one of the strongest inorganic acids known. It is widely used in industry and in research and major exposure results from spills and splashes[1,2,3]. Human exposure, particularly digital burns, usually involves small surface areas only and are due to the utilization of either the wrong type of protective equipment or failing to use any protective equipment[4]. Four case studies are presented as well as recommendations for preventing burns.

Introduction

Hydrofluoric acid produces its characteristic injury by two distinct mechanisms namely superficial burns and the destruction of deeper tissue[4,5]. Burns should be recognized promptly and treated properly otherwise it may produce serious injury, prolonged disability and even death[6-9].

Four cases of hydrofluoric acid burns recently occurred simultaneously at an industrial laundry. In these four cases, the main problem was that the patients were not treated promptly and correctly due to the lack of an early diagnosis at the local Occupational Health Clinic and at the Casualty Department of an Academic Hospital. Contributing factors included that the workers were unaware of the dangers of hydrofluoric acid and that the information on the label of the container was inadequate. No hazard data sheet was provided.

Physiochemistry

Hydrofluoric acid is an aqueous solution of hydrogen fluoride which is a colorless liquid or gas[3]. Concentrated solutions are strong protonic acids and the more common diluted solutions are weak acids because of the strong hydrogen bonding of all forms of hydrogen fluoride[10].

Diluted forms of hydrofluoric acid generally do not cause any immediate pain on skin contact but it releases fluoride ions when it moves into the deeper tissue layers. In the presence of tissue cations such as calcium and magnesium, insoluble salts are formed[11].

Pathophysiology

The fluoride ion is the primary agent responsible for the prolonged destruction seen in hydrofluoric acid burns. Insoluble fluoride salts precipitate in the deeper tissues resulting in cell death and necrosis and the ionic shifts are thought to be responsible for the excruciating pain associated with hydrofluoric acid burns[1,4,12].

Some of the symptoms and signs of hydrofluoric acid burns (depending on the concentration of acid used) are[2,9]:

- Delayed onset of severe pain
- White burn lesions and/or erythema
- Swelling and blistering
- Necrosis
- Systemic abnormalities such as hypocalcaemia
- Death, with as little as 2,5% total body surface area exposure

Case studies 1 and 2

Two male workers removed stains from washing machines on 28 September, wearing only rubber gloves. They worked with the acid for 4 hours before realizing the intense pain in their fingers. Washing their hands with water relieved the pain. They had repeated exposure on 11 October for 4 hours with the same symptoms. No abnormalities were observed.

Case study 3

A male, with first contact on 12 October for 4 hours (also wearing rubber gloves) experienced intense pain after 4 hours' work with the result of red and swollen fingers. He visited the Occupational

Health Nursing Professional on 13 October and a dressing was prescribed. He was seen again on 14 October and continued with the dressings. A further examination on 18 October showed necrotic lesions of the right middle and index fingers.

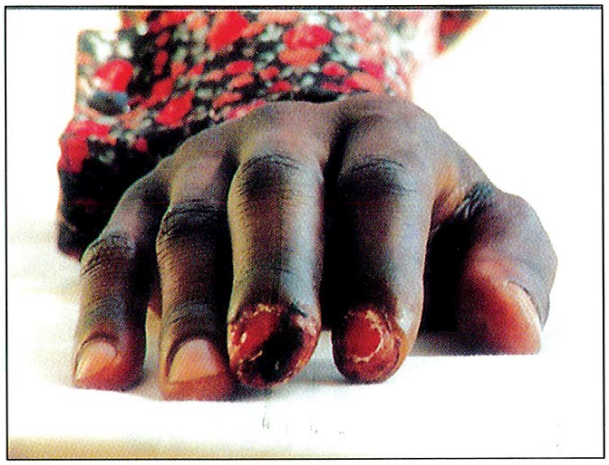
Case study 4

A male with first contact on 13 October for 5 hours (also wearing rubber gloves) experienced intense pain afterwards. His right middle finger became blue/green in the evening, also swollen. Two additional burns were evident on his wrist and hand. An examination on 18 October revealed gangrene of the last phalanx of middle finger and burns on the wrist and palm.

Discussion

These cases of hydrofluoric acid burns occurred because of the following circumstances:

- Insufficient information is revealed by the supplier and for this reason inadequate information is passed on to the workers.
- Insufficient information is displayed on the hydrofluoric acid container:
  - -'Hydrofluoric acid' is not adequately visible
  - -The concentration of the acid is not given
  - -The correct personal protective equipment is not indicated clearly
  - -Special medical treatment for body contact is necessary
- The diagnosis of hydrofluoric acid burns was not made promptly enough.
  - -Lack of knowledge of hydrofluoric acid in health workers
  - -Employer/employees do not adhere to warnings on container labels
  - -Occupational health service is not readily available at the laundry
  - -The association between the hydrofluoric acid and the typically delayed onset of symptoms complicates the establishment of the correct diagnosis[2]
- The inability to apply the correct treatment timeously.
  - -Lack of knowledge of hydrofluoric acid burns at the occupational clinic
  - -No collateral information available when patients arrived at the Emergency Department of the Academic Hospital
  - -No topical treatment for hydrofluoric acid burns was available



Photographs of three of the cases: note the extensive necrosis visible where diluted HF acid came in contact with the skin. These injuries were sustained despite the workers wearing intact industrial type rubber gloves.

Recommendation

The primary level of prevention will be the most important level, namely to prevent/minimize any such occupational disease/injury from hazardous chemical exposure.

Chemicals

- All relevant information must be revealed on the label of the hazardous chemical
- The hazards of the chemicals must be stressed by the supplier when such chemicals are sold to consumers
- All employers and employees must be fully informed regarding the hazards of the chemical[13]
- There must be a policy regarding the utilization of any new chemicals
- All new chemicals must be used with the utmost care
- Guidelines regarding the utilization of hazardous chemicals must exist, as well as managing spills and body exposure
- Use the least hazardous chemicals for the task.
- Stock control mechanisms must be in place:
  -Placing an order
  -Purchase
  -Storage
  -Responsible person

Employees

Employees must be fully informed regarding[14]:
-The hazards
-Appropriate protection
-Action to be taken after exposure (refer Table 1)

- Employees must be issued with the appropriate personal protective equipment as a last, but not the least, alternative. This will include a mask, goggles and special (Teflon) apron and gloves and should be stipulated as such by the manufacturer.
- Employees must be constantly motivated to wear the personal protective equipment.
- Housekeeping must be of a high standard.

Occupational Health Services

- Occupational health services must be readily available
- Continued in-service training to ensure the rendering of a quality service
- Health workers must be alert for any atypical signs or symptoms occurring
- Support systems for the occupational health service must be in place, for example, the referral system to specialized care

Table 1: Actions to be taken[9]

- **Speed** is vital in initiating both first aid and definitive treatment.
- Immediate and copious **irrigation** of the affected area with ice-cold water (or sodium bicarbonate if available) as soon as possible after exposure to decontaminate the skin.
- Prevent the destructive effects of the fluoride ion on the tissue by **detoxifying** the fluoride ion by applying modalities to the skin. Available modalities are magnesium oxide paste, high molecular weight quaternary ammonium compounds or calcium gluconate gel.
- A 10% solution of **calcium gluconate** can be injected through a 30-gauge needle in milliliter quantities directly into the affected dermis and subcutaneous tissue (0.5ml/cm^2).
- **Systemic evaluation** is imperative, particularly electrolyte and electrocardiogram monitoring for hypocalcaemia and hypomagnesaemia.

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Radiation hazards in perspective

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Occupational Health SA 1999; Vol 5, No. 2: 40-46

Man's exposure to ionising radiation by the medical use of x-rays and radioisotopes for diagnosis and therapy, as well as by nuclear technology, is reviewed in the light of natural radiation levels, especially from radon. The resulting biological effects can range from cellular changes, both deterministic and stochastic, to acute mortality and morbidity due to carcinogenesis and genetic deformation. The consequent radiation protection principles are explained with reference to the ICRP and SA Forum for Radiation Protection as well as South African regulatory control.

Introduction

Radiation has always been a part of man's natural environment and as such most of our radiation exposure is unavoidable. However, the public perception of the potential hazards associated with radiation is greatly influenced by the events following the bombings of Hiroshima and Nagasaki in August 1945. The public concern is also due to the fact that these radiations are invisible, not detectable by the human senses and can cause extensive harm when uncontrolled. This concern was kept alive by the media and accentuated by events such as the Three Mile Island incident and the Chernobyl accident.

Chernobyl accident

What is often forgotten is that the same knowledge which produced the bomb also led to the development of nuclear fission reactors and radioactive isotopes widely used in medicine, research, agriculture and industry.[1,2,3] We are, however, living in a world where nuclear reactors provide energy to millions, diagnostic radiology is widespread and doctors are treating dreaded diseases with radiotherapy. Radiation is a reality.

The therapeutic applications by the medical profession to cause biological effects in patients under well-controlled physical and clinical conditions resulted in more being known about the effects of ionising radiation on the human body than any other toxic agent. These effects are identical - regardless of whether the vector is an artificial radioisotope or natural radiation.

Ionising radiation

The word 'radiation' includes the emission of energy by means of electromagnetic waves as well as particulate radiation. Electromagnetic wave radiation is classified according to frequency and wavelength as radio and microwaves, infrared, visible light, ultraviolet and gamma or x-rays. Particulate radiation refers to the emission of particles (electrons, neutrons etc.) separated from atoms.

The basic difference between ionising radiation and the more commonly encountered radiations such as heat and light is that the former has sufficient energy to cause ionisation when passing through matter. Such absorption takes place mainly by the interaction with the electrons which are knocked out of their atomic orbits. When an electron is displaced into another orbit it can return to its original orbit with loss of excitation energy as light or x-radiation. If the electron is removed completely from the atom, the remaining atom has a shortage of negative charge and is called a positive ion. (The chance of nuclear reaction occurring is much smaller and is consequently unimportant as far as the absorption of ionising radiation is concerned.)

Ionising radiation can be produced by machines (x-rays, electron accelerators etc.) or result from radioactive decay (alpha, beta, gamma rays). The former can be switched off but radioactivity results in continuous emission from the unstable atomic nuclei (radioisotope).

Radioactivity is the property of unstable atomic nuclei to disintegrate with the emission of characteristic nuclear radiations. Such decay takes place with a half-life which is characteristic of the radioactive nuclide involved and cannot be influenced by heat, chemical reactions, etc. It is important to realise that isotopes are forms of the same elements and therefore have identical chemical properties.

However, ionising radiations from both sources have similar interaction with matter, biological effects and consequently, radiation safety procedures.

Because alpha and beta rays are actually particles, they can be comparatively easily absorbed. A few centimetres of air in the case of alphas and a centime-

tre of water in the case of betas. Gamma radiation is even more penetrating than x-rays and several centimetres of lead may be necessary.

The unit of absorbed radiation dose is the 'gray' (1Gy = one joule per kilogram = 100 rad, old unit) which is numerically equal, in the case of beta, gamma and x-rays, to the biological dose equivalent 'sievert' (1Sv = 100 rem, old unit).

Our exposure to ionising radiation is received from natural background sources and sources such as medical x-rays. The average dose received varies from country to country but is about 2 millisieverts (mSv). Of this total dose about 0,3mSv come from cosmic rays (originating in outer space), about 0,3mSv from buildings and rocks (radioactive elements present during the formation of the earth), about 0,4 mSv from foods and drinks, about 0,25mSv from medical x-rays and about 0,8 mSv from natural radioactivity in the air. Those who are employed by the nuclear industry might receive an added dose. As of March 1998, there were 437 power reactors in 28 countries of which 12 are generating one third or more of their total electricity using nuclear power.[6]

In addition to the natural background radiation, there are several other sources of human exposure which are peculiar to the last few decades, viz. diagnostic radiology, radiotherapy, use of radioisotopes, radioactive waste, fall-out from nuclear weapons tests and occupational exposures from nuclear reactors and accelerators. However, in developed countries by far the largest contribution, corresponding to an appreciable fraction of the natural background, is due to diagnostic radiology.

Radiation activities in South Afrcia

The use of ionising radiation in South Africa since the turn of the century was initially limited to x-rays and radium, with predominant application for medicines for diagnosis and therapy. Since 1948, artificial radioisotopes have been increasingly available and although this new modality is employed mainly by physicians as tracers, such applications have been widely extended to industry, agriculture and science.

The present extent of the radiation industry is evident from (end of 1991 figures)[3]:

- The use of electronic products producing ionising radiation (mainly x-ray machines) comprises 7 969 licences (of which 6 694 are medical-diagnostic and 915 industrial) to over 3 000 licencees.
- The application of radioactive nuclides includes 105 medical and 1 485 non-medical users.
- More than 90% of radioisotopes are locally supplied, mainly by the Atomic Energy Corporation (AEC) Isotope Production Centre (11 378 consignments of which 74% are medical with 95% of the total activity of 3 137 TBq or 84 kCi for industry) and complemented by the National Accelerator Centre 200 Mev separated sector cyclotron 1 003 consignments, mainly to medical institutions where some 10 000 patients benefited from diagnostic procedures.
- The 2 x 922 MW Koeberg Nuclear Power Station has been operated by ESKOM since 1984/85, with a full reload off AEC-manufactured fuel elements at the beginning of 1990. The National Facility for the Disposal of Radioactive Waste, Vaalputs, accepted 134 loads of radioactive waste in 532 concrete and 1 774 metal containers.
- Efficient regulatory control is exercised by the Council for Nuclear Safety over nuclear installations and by the Department of National Health over electronic products and radioactive nuclides as well as non-ionising radiations.
- The number of radiation workers monitored by the SABS Radiation Protection Service was 18 138. The SA Medical and Dental Council has registered 33 radiologists (outdated), 77 therapeutic radiologists, 502 diagnostic radiologists and 17 nuclear medicine specialsists as well as 76 medical physicists and numerous radiographers.

Biological effects

Ionising radiations are usually penetrating and can therefore cause biological damage by external irradiation or internally, if the radio-nuclide is taken up by the organism in question. Such metabolism is dependent only on the normal biochemical, rather than the radioactive, properties of the element of which the nuclide is a radioisotope.

Because of their radiation properties it is clear that alpha and even beta radiation have only a local surface effect unless the radioactive material is present internally. Penetrating gamma rays, however, can irradiate the whole human body.

Exposure to ionising radiation can cause both immediate as well as delayed harm to health. Information about effects of radiation are based on experiments on animals and observations in human beings exposed to various levels of radiation i.e. survivors of atomic explosions, populations subject to medical diagnosis and therapy and populations incur-

ring occupational exposure. The main target of ionising radiation is living tissue which contains a high proportion of water (up to 82%). The basic unit of tissue is the cell, which has a control centre, the nucleus. The complex compound deoxyribonucleic acid is found mainly in the nucleus. The DNA controls the structure and the function of the cell and passes on copies of it. Although the ways in which radiation causes damage to other cells are not fully understood, many involve changes to the DNA. The DNA can be damaged either by being ionised (direct chemical change) or indirectly through the formation of highly reactive free radicals (atoms or molecules which are electrically neutral but with an unpaired electron in the outer electron cell). Both these mechanisms may result in the prevention of cell division or may modify the cells, which can be passed on to daughter cells or cause the early death of the cell.

The non-lethal changes referred to above may, in living cells, be reversible. Furthermore, no harmful biological effects have been demonstrated as a result of low doses of ionising radiation (<10mSv) either to individual human beings or to human population groups.

It is customary to distinguish between two broad classes of effects, mainly deterministic and stochastic effects. Deterministic effects are those that result from the killing of cells which, if the dose is large enough, causes sufficient cell loss to impair the function of the organ or tissue. The probability of causing such harm is effectively zero at small doses but at some levels of dose (above the threshold), the severity of the effect is the function of the magnitude of the dose. Typical examples are the development of cataracts, skin erythema and interference with blood formation.

Stochastic effects are those that result from the modification, rather than the killing, of an irradiated cell. Such modified cells may, after a prolonged delay, develop into a cancer. Whilst these are repair and defence mechanisms, the probability of cancer induction increases with increments of dose, probably without a threshold. Stochastic effects in cells that have the function of transmission of genetic information are termed 'hereditary'effects.

Acute effects

The acute effects of high doses of radiation are well documented. When enough cells are destroyed, vital organs will cease to function leading to the death of the organ and the individual, i.e. the gastrointestinal tract or the blood-forming cells in the bone marrow.

A high radiation dose (approximately 4,5 Sv) administered to the whole body can result in death. As in the case of sunburn, a considerably larger dose can be tolerated if applied gradually and the body thus has the opportunity to recover between doses. It is also possible to apply large doses to parts of the body (cf. localised burns) without damaging the whole body. A dose smaller than about one-twentieth (0,25 Sv) of the fatal dose cannot, however, be detected medically and physical methods of dose measurement are necessary i.e. by health physics.

These are three recognised syndromes, namely.:

- *The central nervous system*

  This is seen in cases in which single doses in the range of tens of sieverts are delivered to the head or the whole body - there is almost immediate loss of co-ordination, convulsions and delirium and death occurs in a matter of hours.

- *The gastrointestinal syndrome*

  This is seen in cases where whole body doses of several sievert are received - there is nausea, vomiting, diarrhoea, electrolyte imbalance from loss of fluids into the lumen of gastrointestinal tract and death occurs in three to four days. With higher doses there is shock and death may occur from heart failure. With lower cases which do not result in early death, there is a loss of the lining of the tract, with ulceration, bleeding and secondary infection which may in turn prove lethal.

- *The haemopoietic syndrome*

  This is seen in cases where less than 8 Sv are received. Here there is a pancytopaenia (depression in the numbers of all the blood cells), the lymphocytes being the first and most severely affected. Later, haemorrhage, secondary infection and anaemia result and any or all of these may prove fatal.

The effects on haemopoiesis and its sequlae are best considered together. The effects on the red blood cells are a function of dose and time; with high doses the haemotocrit (that is the volume percentage of red blod cells) rises rapidly and early due to fluid loss, but this is followed by a precipitous fall. With a lower dose, the rise in the haemotocrit is slower and less marked and the drop is more gradual. The lymphocytes are the most sensitive cells of all and a maximal effect can be expected from a whole-body dose in the range of 2-2.5 Sv. The granulocytes and platelets both show an early rise, followed by depression maximal at about four to six days and then slow recovery over the next 25 to 30 days. The anaemia can be controlled by administration of whole blood, a bleeding tendency by

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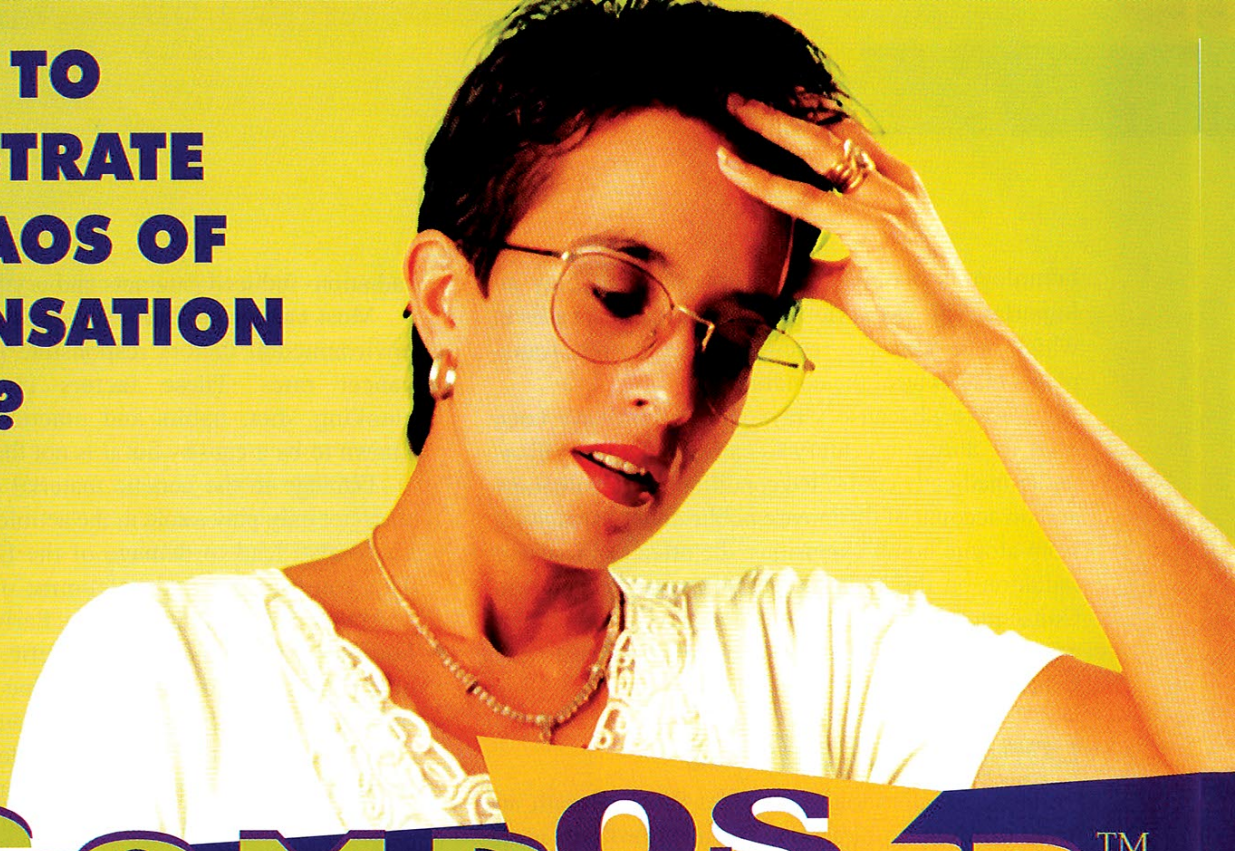

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homologous platelet transfusion (platelets play an important part in the clotting of blood) and in cases in which over 8 Sv are received, bone-marrow transplants may control the condition.

However, because x-rays and radium have been used for almost a century to cause biological effects under medically controlled conditions in radiotherapy and on account of the intense public concern resulting from atomic bomb explosions, the effects of ionising radiation on the human being are very well known. Consequently, only the long term results of small exposure should be of practical importance to the radiation worker.

Long-term effects

There are also long-term risks involved with an acute exposure to radiation. The main problem is an increase in the incidence of cancer which can be estimated in terms of an additive or a multiplicative risk model.

The additive risk is the number of excess cancer cases found for a given unit of time or dose for the population at risk, whilst multiplicative risk is the ratio of risk in an irradiated population to that in a control group and does not state the number of individuals involved.

There is also an increased risk of leukaemia. Survivors of Hiroshima and Nagasaki who received a dose of more than 2 gray, showed an excess of 13 cases of leukaemia per 10 000 survivors after 5 to 10 years. No increase in genetic defects could be observed.

Studies of children exposed in utero at Hiroshima and Nagasaki have shown a dose-related increase in the incidence or severe mental retardation. The number of cases are small but the data indicated that the most sensitive period is 8-15 weeks after conception. The downward shift in the IQ of 30 points per sievert was noticed but no effect could be measured below 0,1 sievert. The effect is believed to be deterministic.

The health effects on long term exposure to low level radiation are not fully understood and remain controversial because of the difficulty in establishing dose-related effects. Risk estimates for low dose response is linear without a threshold. This hypothesis is convenient for radiological protection but its predictions do not always correlate well with epidemiological data. The argument for a threshold is based on a cell's ability to repair itself and there are definite examples such as the deterministic effects of radiation- induced cataracts and erythema.

Most cancer epidemiologists appear to consider environmental factors responsible for variations in cancer rates. These factors include radiation, smoking, diet, habits and practices. Radiation is known to be a cause - but it is not the only cause.

Damage to the genetic material of somatic cells does not only play a role in the aetiology of cancer but could also lead to damage of the DNA genus line. This can lead to the development of malformation and other genetic abnormalities. Early development is however very sensitive to genetic (chromosomal) abnormalities and it is known that almost 30% of human conceptions abort spontaneously.

The US National Cancer Institute study found no increase in cancer deaths around nuclear facilities. The research, however, carried out by the Massachusetts Department of Public Health traced all types of adult leukaemia (except chronic lymphocyte leukaemia which is believed not to be associated with radiation) found in those who worked or lived close to the Pilgrim Nuclear Power Plant in Massachusetts during 1978-1983. The study was well designed and one of the first to correct for confounding factors and suggests that there may be increased risks levels from radiation at low levels of exposure.

There have been reports on leukaemia clusters near nuclear installations (Italy, England, America and Argentine). In 1990, MJ Gardner et al[9] reported on a correlation between the cases of leukaemia and the father's irradiation history. Other studies (at Dounray) do not support Gardner's study and different explanations have not been fully excluded.

Radon

Radon exposure, a natural hazard, is receiving increasing attention. Radon is a radioactive noble gas that originates from the natural decay of uranium and thorium. In restricted areas it can contribute to the public's radiation dosage. A study was consequently carried out of houses in the vicinity of uranium mine waste in the Transvaal and of granite formations of the Western Cape.[3,4]

The radiation dose associated with exposure to radon in dwellings varies considerably. On average, the annual dose is 1,2 mSv but it can be as high as 12 mSv (0,3 mSv - 100 mSv). There is as yet no consistent evidence on any health effect associated with higher exposures of radon in dwellings. It is, however, advisable to improve ventilation to reduce radon exposure.[4]

Excessive exposure to radon and its daughter products increases the risk of lung cancer in smoking and non-smoking uranium mine workers. Epidemiological studies in various groups of mine workers showed a significant excess of lung cancer rate. This dose-effect relationship and the attributable cancer risk are significantly influenced by the age at first exposure, total accumulated exposure and cigarette smoking.

Radiation protection

The basic objective of radiological protection is to provide an appropriate standard of protection against ionising radiation without unduly limiting the activities that hold great benefit for mankind. This constitutes the balancing of risks and benefits.

The norms for radiation protection are based on recommendations by the International Commission of Radiological Protection (ICRP) since 1928 and are accepted throughout the world. In practice this requires:

- Justification of a practice and/or project
- Optimisation of the required protection measures
- Dose limitation, which also implies that radiation exposure should be kept as low as reasonably achievable (ALARA)

The most recent ICRP recommendations were published early in 1991 as ICRP Publication 60. (In its Publication 6, the SA Forum for Radiation Protection provides an authoritative review.[3] The basic objectives for the system of radiological protection recommended by the Commission are:

- To prevent deterministic effects by keeping doses to levels which are below the relevant threshold
- To require that all reasonable steps are taken to reduce stochastic effects to acceptable levels.

The effective dose limit for radiation workers is 20 mSv per year, averaged over defined periods of 5 years. However, the effective dose should not exceed 50 mSv in any single year. Similarly, a limit for a member of the public is 1 mSv per year averaged over 5 years, with a maximum of 5 mSv in any one year.

Occupation exposure limits of non-pregnant women is the same as that for men. Once pregnant, the foetus should be protected by applying a supplementary equivalent dose limit to the surface of the women's abdomen (lower trunk) of 2 mSv for the remainder of the pregnancy and by limiting the intake of radio-nuclides.

Practical radiation protection is based on the properties of the specific radiation source i.e. the energy and intensity of an x-ray machine or the characteristics of the radioisotope - half-life as well as the nature (alpha, beta or gamma) and energy of the radiation. These determine the penetrating power and biological effects.

The permitted exposure time can then be determined taking into account the distance from the source (inverse square law) and also the required shielding. Irradiation from external sources can normally be easily controlled because the person and source can easily be separated. However, great care must be taken to ensure that no radioactive material comes into contact with the body either external or internally. It is important to note that the mass of radio-toxic material is very much lower than that of corresponding chemical poisons. As a result, the hazards associated with internal contamination must be eliminated by good housekeeping and diligent preplanning including, in the case of industrial radiography, regular leak testing of each sealed radioactive source.

Because ionising radiation cannot be detected by the ordinary senses, it is necessary to have suitable monitoring instruments. In addition, it is essential to record the observed dose very carefully. For individual personal dose measurement, use is made of the darkening of a piece of radiographic film or the absorption of energy by a thermoluminescent dosimeter. The basis of all radiation control is the monitoring of doserate by means of the Geiger counter and ionisation chambers. These instruments ensure that personal exposures are kept to a minimum. It is also essential to ensure that no radioactive contamination of clean areas or persons take place.

Regulatory control

Since June 1986, the regulatory control over all radiation sources in South Africa is the responsibility of the Directorate : Radiation Control of the Department of National Health. Man-made radionuclides (outside nuclear installations such as Koeberg) are regulated according to the Regulations Relating to Group IV Hazardous Substances (No. R247 of 28 February 1993). Regulations controlling the sale of electronic products which produce non-ionising radiation (for example, microwaves, optical radiation and ultrasound, No. R690 14 April 1989) stipulate that before a listed electronic product is sold on the South African market it has to be approved and licensed.

It is important to note that the appointment of a

person as a radiation worker has definite implications regarding medical control and personal dosimetry (health registry), as well as the responsibility that he must accept, e.g. an 'industrial radiographer' is defined as a person who supplies satisfactory documentation that he or she has received adequate training to use radiation sources for industrial radiography.

An efficient country-wide personal dosimetry service is provided by the SABS Radiation Protection Service which monitored 20 050 radiation workers in 1996, of which 95% received less than 1 mSv.

Radiation risks - perception vs reality

It is difficult to think clearly about risks. Frequently intelligent and well-informed individuals have different perceptions, values and biases. Mathematically, risk is identical to the average consequence but numerous factors unrelated to likelihood such as vivid imaginable events (for example, the China Syndrome) can seriously distort a potential hazard's perceived risk.

The dose equivalent provides a useful index of risk. For instance, the risk factor for leukaemia is about 1 in 500 per sievert. This means that if a person received a dose equivalent to 1 Sv to the red bone marrow, the most important blood-forming tissue, there is a 1 in 500 chance that he will eventually die of leukaemia as a result of that dose. On average, death would occur about a decade after the dose was received.

Diagnostic radiology is the greatest source of public exposure to radiation. Although these investigations are medically justifiable, it is important to limit the dose per examination. The SA Forum for Radiation Protection has initiated such a project to determine the generally significant dose for the South African population.[3]

The consensus of opinion of the risks associated with nuclear energy are summarised in a World Health Organisation publication[4]. Since then, the results of a number of epidemiological studies have been made available and the present consensus can be summarised as follows:

- More is known about the toxicity and effects of ionising radiation than the consequences for health and the environment of other sources.
- In the nuclear cycle an increased incidence of lung cancer has been observed in uranium ore miners - particularly in those who smoke cigarettes.
- The consensus view is that there is about 1 in 100 risk of fatal cancer developing for each sievert of radiation dose received over and above the dose received from natural background radiation.
- A dose of 1 sievert is also associated with risk of a serious genetic defect appearing.
- There is no reliable evidence of any effects associated with the dose received from average background radiation (lifetime dose about 130 mSv).

The available scientific data thus does not bear out public concern about the effects of exposure to low levels of radiation.

Conclusion

The 1992 Earth Summit in Rio de Janeiro provided world leaders with a unique opportunity to overview the planet's energy needs and associated problems. The supply of an average of 2,6 kilowatt per person to 5,3 billion people in 1993 is already severely straining the planet's technological, managerial and environmental resources and the situation is not getting better - it is getting worse.

The impact of various energy technologies on public health is difficult to determine with certainty and for instance, it is nearly impossible to quantify the deaths caused by sulphur dioxide emissions or its ecological impact. It is, however, generally accepted that the emissions of carbon dioxide and particulates associated with the burning of fossil fuel must be controlled.

The health hazards associated with the normal operation of nuclear power plants have been shown to be considerably less than those from coal-fired stations. Wide-spread experience in the application of ionising radiation and nuclear technology has been gained over many decades by South African medicine, science and industry.

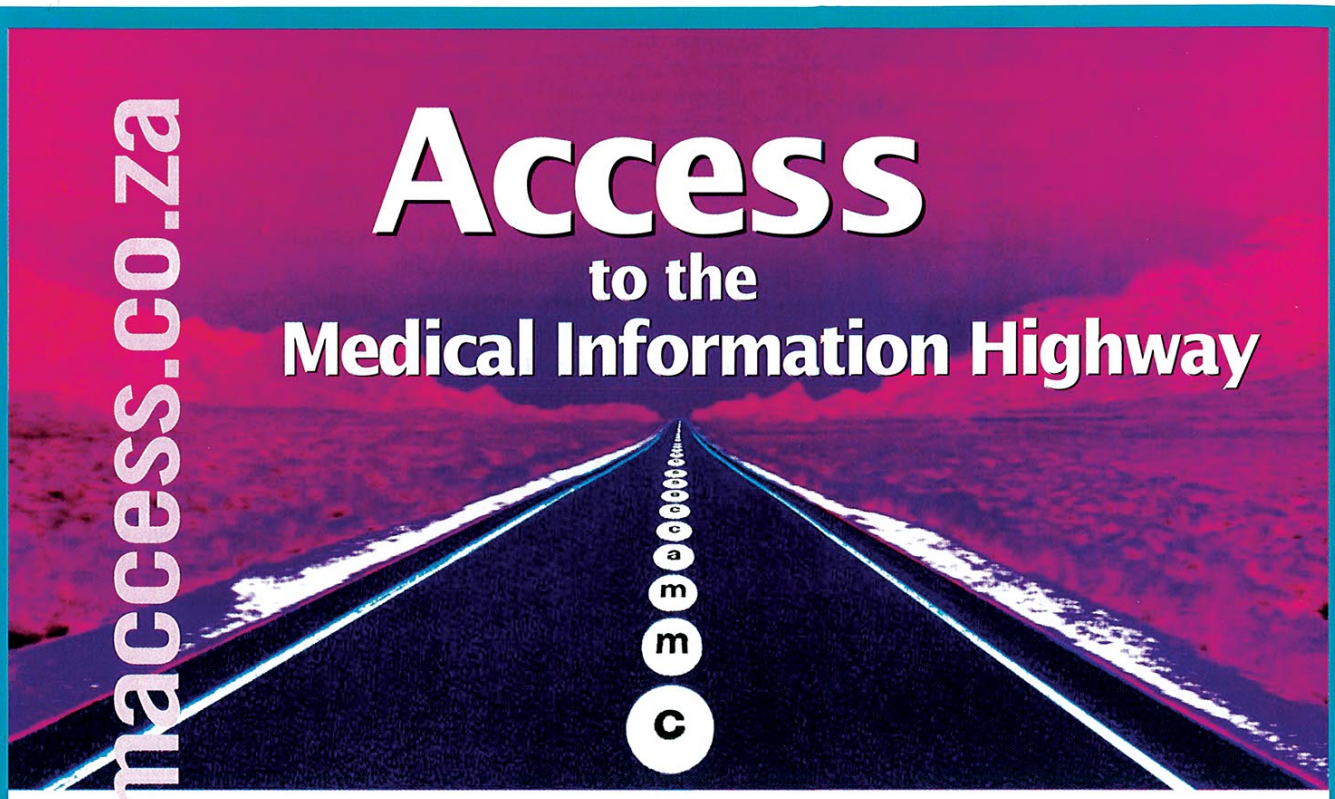
The very high sensitivity with which ionising radiation can be detected, coupled with the fact that more is known about the effects of ionising radiation on the human body than that of any other toxic agent, have led to international agreement on radiological safety measures. It is also important to note that in the case of radiation hazards, precautions must be taken against long term effects (cancer, genetic) which cannot be predicted clinically, rather than acute injuries - hence, health physics. This approach is receiving increasing attention in preventive medicine, also with regard to non-radiation hazards.

The South African Forum for Radiation Protection can be contacted at: P.O. Box 19063, Tygerberg 7505

For Acknowlegdments, References and Bibliography, please turn to page 49

Access to the Medical Information Highway

www.cmmaccess.co.za



South Africa's most Informative Medical Web Site

Structured along the lines of the Medical Industry Directory, the **CMMACCESS** web site gives you access to the widest range of information about medical products.
With the marketing muscle of Cannon Medical Media, it is to become SA's most well known medical web site too.

Supplier Index

Do you need to find a company? Supplier Index is an A-Z list of suppliers to the medical industry plus all their contact details.

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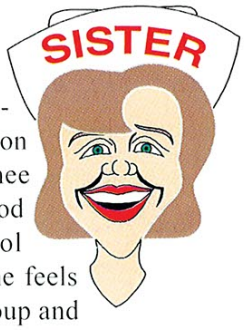
A day in the life of the Medical Centre at Unilever, Boksburg ...

Gill Harrower
Unilever, Boksburg
Occupational Health SA 1999; Vol 5, No. 2: 48-49



7:00am - Arrive at work to be met by a gathering of patients anxious to share their problems and pains. One hobbles on crutches following major knee surgery; one waits for his blood to be taken for a cholesterol check - hungry and thirsty, he feels irritated as he surveys the group and anticipates a delay. A swollen jaw and vague appearance tell a tale of a bad seizure over the weekend. A few heavy head colds and coughs, earache, Monday morning gastritis and a limping case of gout make up the rest of my little crew of patients. A quick run around to switch on the lights, steriliser, computer, air-conditioner (and kettle) ... unlock the medicine cabinets, grab a stethoscope - and the usual busy day has begun...

8:00am - Next I see a septic neglected wound of the finger. My patient sheepishly confesses that this human bite was his punishment for unfaithfulness ... This is dressing time for wounds, cuts, ulcers and boils.

9:00am - Time to taxi 3 patients to the X-ray department for routine chest X-rays. Back in time to cope with a severe nose bleed - ice blocks to the rescue and firmly pinched nostrils do the trick.

9:30 - A 'phone call from the Department - an uncontrolled epileptic is having a seizure. Medical Centre - come quickly to the rescue and assist.

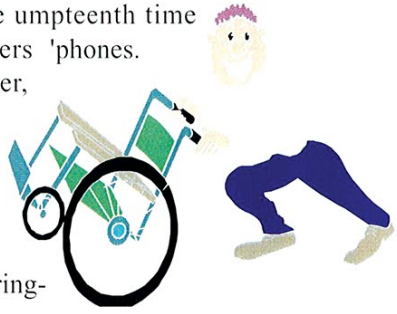
9:45 - Oh, for a cup of tea! ... but in walks Jomo, the asthmatic, wheezing and tight chested. Time to nebulise and calm him.

10.00 - Jimmy, one of the diabetics was bitten by mosquitoes over the weekend. He used his razor to open the swollen lesions and his leg is hot and swollen - blood glucose far too high. He needs a firm lecture, and then referral to hospital.

10:15 - "Sister, sister come quickly!"
Joe Smith has a bad chest pain. Grey, and sweating, we settle him on the examination couch, soothing and calming. Oxygen, and careful monitoring of vital signs, before calling the Paramedics to transport him to hospital. A pill under the tongue and he begins to feel better. Colleagues look strained and anxious, and need reassurance.

10:30 -In staggers Danny, clutching his face, hot glue has splashed into his eye. He panics and struggles to use the eyewash bottle. Doctor arrives - how may routine medicals today? Blood pressures, urine tests, lung functions, weight and eye tests, all carried out in a trice. The atmosphere is one of warmth and participation, as patients compete to see who has the best lung function. Each one moves forward to take his turn behind the cubicle curtain, and the odd joke and comment is shared, worries allayed in many cases, and secret fears expressed and laid to rest. This is only possible where there is complete professional confidentiality, and a deep seated trust between medical staff and their patients.

12 midday - Julius arrives with a large block-soaked bandage around his hand. Whilst herding oxen, his hand was caught between the rope and the trunk of a tree, neatly severing his index finger at the base. He ruefully holds it out for comment. This will be a company insurance claim to follow up.
Still no time for tea ... The 'phones do not stop ...
The Glynwood Hospital number?
My wife has an ulcer, what must she take?
John Smith is absent today, where is he?
Did you make a physio appointment for me?
The mobile eye clinic has arrived to test all the forklift drivers. Quickly phone the departments to remind them the umpteenth time ... no-one answers 'phones.



12:30 pm - "Sister, please take my blood pressure, I have such a splitting headache ... ."
My ears need syring-

ing ... These stitches must come out today ... I need the hot lamp ... I have a terrible back ache ... My finger was jammed in the taxi door and needs the blood released under the nail.

Did you order my tablets from the chemist?

Did you organise my script from the doctors?

You promised to phone about my child in hospital ...

1:00 pm - Time to sort out sick notes and input them but oh, so many queries ...

An altered sick note ...

A herbalist's sick note ...

No diagnosis or date on this one, what a hassle ...

Enter all those drugs dispensed in the register. Write up doctors' orders and pack away files.

2:00pm - A nasty dog bite on the calf. Anti-tetanus, sterile dressing and time to calm the patient. He is shocked and upset - the dog owner was apparently very abusive.

"Sister, sister come quickly! Someone has fainted in the canteen."

3:00pm - A steady stream of sore throats, upset tummies, fungal feet and blood pressure checks.

4:00 pm - " I need to speak to you, Sister ... ."

Did you make my specialist appointment?

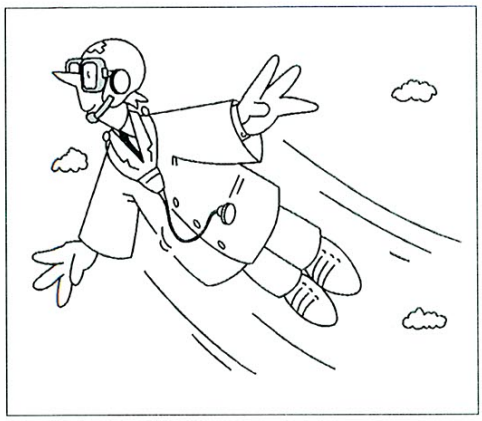
Where are the accident stats ?

How is the unconscious patient in hospital?

Across the desk sits my patient - wasted, ill and oh so sad. Will I be able to help him? Yes - with steadfast support and genuine care I will.

It is a privilege to be part of the lives and problems of so many people. Approximately 1800 people pass through our doors each month. Hopefully they leave with renewed hope and faith, no matter how heavy the burden may be.

This article was first published in ***Safety On Site*** *(December 1998/January 1999).*



Radiation Hazards in Perspective from page 46

Acknowledgement

In South Africa, an independent national advisory body was founded in 1987 under the auspices of the Medical Research Council - The South African Forum for Radiation Protection. It liaises with similar organisations internationally, publishes comments, annual reports as well as scientific articles on the subject of radiation. Both authors are members of the Forum.

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Workers compensation training: A panacea for all ills?

Virtually everyone has trouble claiming from the Compensation Commissioner (WCA) for workplace injuries. For the past year, WorCS (Pty) Ltd (Workers Compensation Solutions) has been training frustrated employers to deal effectively with the Compensation Office. A little knowledge goes a long way and Louis van Assen, previously the Compensation Commissioner himself, is astounded at how the outlook of so many candidates has changed as a consequence of the one-day course. "Most of the people have a working knowledge of the Act but everyone has some or other hassle when reporting or administrating Injuries on Duty. WorCS's training helps them to understand how the Office operates and what information they need. They leave the course much better equipped to do their work efficiently and as the Act requires."

WorCS runs courses throughout the country and they also offer in-house training to large employers. Feedback from attendees has been overwhelming. The schedule for the first six months of this year include:
Johannesburg (23 February)
Cape Town (7 April)
and Durban (7 May).

Other centres to be covered between April and July are Springs, Pretoria, Nelspruit, Pietermaritzburg and Rustenburg. Costs are R695,00 per delegate all inclusive.

Call Elmarie Bekker on (012) 342-0238 for more information and a programme.

Changes at MoM

Well known mobile screening services, Mobile Occupational Medicine, has become a wholly owned subsidiary of the Occupational Medicine and Health Risk Management Institute (Pty) Ltd, known as the Institute. The Institute is the largest independent provider of employee health care services in the country and functions on the principles of master mind alliances (a concept very similar to multi-disciplinary consultancies) to find solutions to complex problems.

Services

The Institute offers the following services: Doctor and nursing services, psycho-social, occupational hygiene, health care benefit and mobile services, human resources and legal services, education and training services, information and customised research services.

The Institute has been described as "a legendary multi-disciplinary health care organisation which closes the knowledge gap in occupational and environmental health."

For more information, contact the Institute on telephone (012) 667-2847, fax (012) 667-2846 or e-mail:
institute@iafrica.com
or mom@iafrica.com

Safety, Health and Environment '99

Date: 14 - 16 September 1999
Venue: Gallagher Estate, Midrand

The Health and Safety At Work and Ergonomics Exhibition and Conference focuses on a subject that figures prominently in the internal operations of commercial and industrial enterprises - the health and safety of the workforce, a critical consideration for the economic development of South Africa.

The Bill of Rights in the new constitution states that everyone has the right to an environment that does not adversely affect their health and well being - and this applies to the workplace also.

Safety, Health and Environment '99 will feature measures to improve working conditions, enhance safety, protect health and promote welfare. Representatives of businesses and institutions will be actively searching for products, services and information to help them solve their problems.

For further information, contact Joan de Beurges on telephone: (011) 444 3937 or fax: (011) 444 7987.

New safety resource

A new safety information resource and discussion group (list serve) has been provided free of charge on the Internet by Safety Information Systems. In association with an American Internet Service Provider, an Internet discussion group facility has been set up for those working in the Occupational Safety and Health fields in Southern Africa. The list is moderated - in other words, queries and contributions are read first to establish that they are suitable for the list. This ensures that no blatant advertising or 'spam' gets through. Advertising of a new product or use of a product is allowed only if it is of interest to and of use to list members.

Advertisements must be headed as 'Commercial ...' in the subject line or they will not be placed.

Those wanting to use the list should confine themselves to matters relating to all aspects of safety and health, indoor air quality, risk management, loss control and occupational hygiene in the Southern African context. These topics may relate to technical, training, management and philosophical items. Members are welcome to submit problems for discussion and to elicit opinions from others via the list. HIV and AIDS should not be discussed here unless it applies directly to the workplace, as there is already a facility for this elsewhere.

Under no circumstances will names and email address lists be passed to a third party. People will need to subscribe to the list before contributions will be accepted.

Further particulars may be obtained from oshinfo@pixie.co.za

Introducing OHM for Windows

Occupational Health is an important issue in many companies, whether small and large. OHM for Windows has been developed to assist Occupational Health practitioners to keep track of their daily events.

The occupational Health clinic provides more than just primary health care. It facilitates the monitoring of employees' health according to environmental and physical risks. This is where OHM is of immense help to the OHN. With OHM it is possible to define the hazards for the various risk areas and job titles and to record the medical screening results for each employee. Lists of employees can be printed and department managers informed about employees still required to have medicals. The information collated after medicals can be printed/ graphed according to a number of different criteria. Problem areas can then be pinpointed and the problems addressed.

OHM provides for full investigation of injuries on duty. If an employee contracts an occupational disease or is injured, a full history of where he/she has worked and what the exposures have been can be called up immediately, obviating the need to scratch through files. Also, the management of periodic screening is easy to maintain through the use of an integrated recall diary.

For more information contact the office closest to you - Cape Town (021) 783 1234, Gauteng 082 6517 109 or KwaZulu Natal: (031) 465 8268.

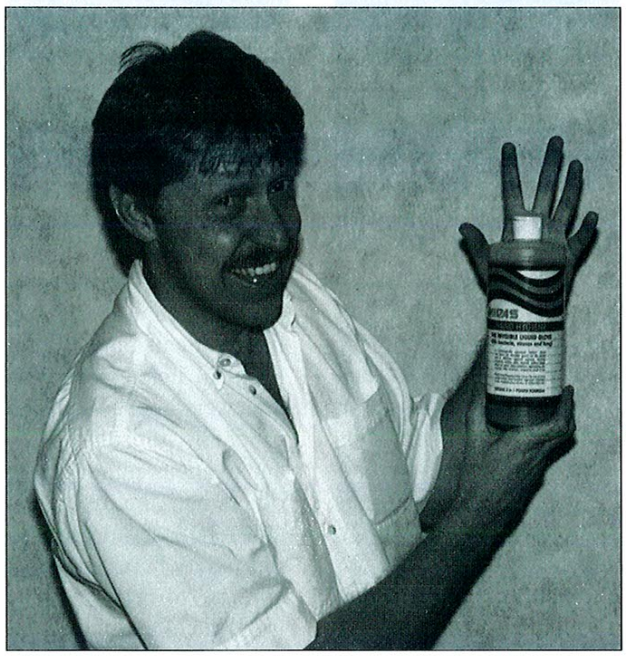
Invisible gloves

Hand Hygiene, a solution that forms an invisible glove to protect hands from grease, grime and microbes is now available exclusively through King Midas stores. *Hand Hygiene* is a technologically advanced hand cleaner that is used before coming into contact with grease or other contaminants. A teaspoon of the lotion rubbed into the hands forms a protective, invisible, non-sticky, glove as it dries. The soiling agents bond to the *Hand Hygiene* barrier and not to the skin. When the task is finished, the water used to wash the hands activates the detergent, already present in the invisible barrier, making the additional use of another cleaning agent unnecessary. The dirt is simply washed away under the tap.

Developed locally, *Hand Hygiene*'s mild detergent formulation combines with a highly effective anti-viral, anti-microbial agent which offers unsurpassed protection against a wide range of bacteria, viruses and fungi. Machine operators, spray painters and printers can now expect to have their hands permanently clean.

Midas buying executive Andy du Plessis says, "*Hand Hygiene* is also safe. It's 'before action' lotion contains no silicon and it is not slippery after application - an important safety feature for mechanics and those working with tools. *Hand Hygiene* offers protection against a wide range of chemicals, a definite plus for those prone to skin irritation and for those operating machinery or repairing motors regularly."

For information regarding your nearest King Midas store phone (011) 454-0100.



Midas buying execuive, Andy du Plessis with Hand Hygiene, the solution which creates an invisible glove and protects the hands.

Launch of new range of examination gloves

REGENT MEDICAL, manufacturer of latex and synthetic surgical gloves, has launched a new range of examination gloves.

Using the expertise and knowledge gained as the manufacturers of the Biogel® surgical glove, the company has developed the Skinsense TM range to provide the wearer with effective barrier protection.

The three gloves in the Skinsense range reflect the varying needs of today's clinical environment.

"Following the success of the Biogel® surgical gloves, our priority was to produce a range of examination gloves which benefits from this heritage, providing the combination of features that health care workers require," explains Steve King, director and general manager, Regent Medical.

"Natural rubber latex (NRL) is a proven barrier against HIV, Hepatitis B and C and other blood-borne viruses, but at the same time it is essential to ensure that the glove is of high quality natural rubber latex, low in extractable protein and accelerator levels, and powder free.

"In line with all Regent Medical gloves, the entire Skinsense range is subjected to rigorous monitoring and testing procedures, allowing us to provide high quality gloves and limiting the cost of wastage and failure rates.

"We also recognise that patients and staff already sensitised to latex proteins require an alternative product. Therefore, in addition to the two natural rubber latex examination gloves, the Skinsense BioliteTM-Coated glove and the Skinsense Biogel®-Coated glove, the Skinsense range includes the Skinsense NitrileTM synthetic examination glove."

The Biolite-coated examination gloves are made from high quality latex and coated with a state-of-the-art polymer system, providing protection for day-to-day nursing procedures.

For use in high risk nursing situations when superior protection is required, use of the Biogel®-coated examination glove is recommended, being thicker and longer than normal.

For staff and patients sensitised to natural rubber latex proteins, the Skinsense Nitrile examination glove provides the protection of a high quality synthetic alternative.

Information from Regent Medical, Telephone: (011) 314-3102.

From right : Pat Botes ***(Hospital Supplies)*** *and Pru Baker* ***(Occupational Health SA)*** *with Dr Jenny Stark* ***(NCOH, Johannesburg)*** *at a discussion on HIV infection and latex allergy organised by Regent Medical in January. Dr Stark spoke on the topic "Latex sensitivity amongst health-care workers: a serious occupational health issue".*

Calender of Congresses and Conferences

1999			
April			
22	TB, AIDS and Dust: The diagnostic dilemma in compensation and equity.	Cedar Park Convention Centre Woodmead, Gauteng	Brenda Webster Tel/fax: (012) 46-7424 or email: brendaw@icon.co.za
26-29	2nd International Symposium on Occupational Environmental Allergy & Immune Diseases í99 (ISOEAIDí99)	University "G. D'Annnunzio" Chieti-Pescara, Italy.	P. Boscolo and M. Di Gioacchino: University "G. D'Annunzio", Medicina del Lavoro, Via dei Vestini, 66100 Chieti, (Italy). Fax:+39-871-355-6704, E-mail: isoeaid99@unichi.i June
June			
6 - 9	14th Annual International Ergonomics and Safety Conference	Orlando, USA	Professor Gene Lee, Department of Industrial Enginnering, University of Central Florida, Orlando FL 32816 or email: GLEE@mail.ucf.edu
9 - 11	NOSHCON "99 The 38th Annual Conference to address integration of safety health and environmental standards and legislation in global business strategies	Sun City	Marina Nel, NOSA at tel: (012) 321-776, Fax: (012) 323-2436 or website http://www.nosa.co.za
20-24	7th International Symposium on Neuro-behavioural Methods and Effects in Occupational and Environmental Health .	Stockholm, Sweden	Health, Attn: Anders Iregren, National Institute for Working Life, S-171 84 Solna, Sweden. Tel: +46-8 730 91 00 Fax: +46-8 730 90 51, E-mail: anders,iregren@niwl.se, Internet: http://www.niwl.se/konf/neurotoxJuly
July			
6	The Ability to Work. (Joint conference between the Royal College of Physicians and the Faculty of Occupational Medicine)	United Kingdom	Tel: Faculty of Occupational Medicine (0171)317-5890
13 - 16	Annual Scientific Meeting 1999 Society of Occupational Medicine	United Kingdom	Tel: Dr. Sayeed Khan, (0117) 979-5906 or email: Sayeed.S.Khan@rolls-royce.btx400.co.uk
29 - 31	Vision Africa	Sun City	Felicia van Wyk Tel: (011) 794-5511 or email: feliciav@iafrica.com
29-Aug 4	IEA 2000: XIVth Triennial Congress of the International Ergonomics Association	San Diego, California, USA	IEA Fax:+ 1-310-394 2410, E-mail: HFES@compuserve.com
30	SASOM COID Seminar	CSIR Conference Centre, Pretoria	SASOM National Office Tel: (012) 667-5161 or email: sasomdm@iafrica.com
Sept			
13-17	XIV International Symposium on Night and Shiftwork: Shiftwork in the 21st Century	Wiesensteig, Germany	Symposium Secretariat, Heidi Dolde, Hertzstr.16, D-76187 Karlsruhe, Germany Tel: +49-721-608-4461, Fax: +49-721-75 8909, E-mail: peter.knauth@wiwi.uni-karlsruhe.de
14 - 16	Safety, Health and Environment '99 Exhibition	Gallager Estate Midrand	Joan de Beurges, PO Box 652495 Benmore, 2010 Tel: (011) 444-3937 or Fax: (011) 444-7987 or email: raisa@iafrica.com
29 - 2 Oct	5th PACOH '99 - Pan African Conference on Occupational Health	Tunis	Secretariat, PACOH '99, 138 Boulevard du 9 Avril - 1006 Tunis - Tunisie Tel: (216-1) 596244 Fax: (216-1) 564280 or e-mail:rafik.gharbi@ing.tn
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27 - 1 Sept	ICOH 2000 - 26th International Congress on Occupational Health	Singapore	ICOH 2000 Congress Secretariat, Dept Community, Occupational and Family Medicine Faculty of Medicine MD3, National University of Singapore, Lower Kent Road, Singapore 119260 Tel: (65) 874-4989or Fax: (65) 779-1489 or e-mail: icoh2000@post1.ocm

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Articles may be submitted in the following categories:

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

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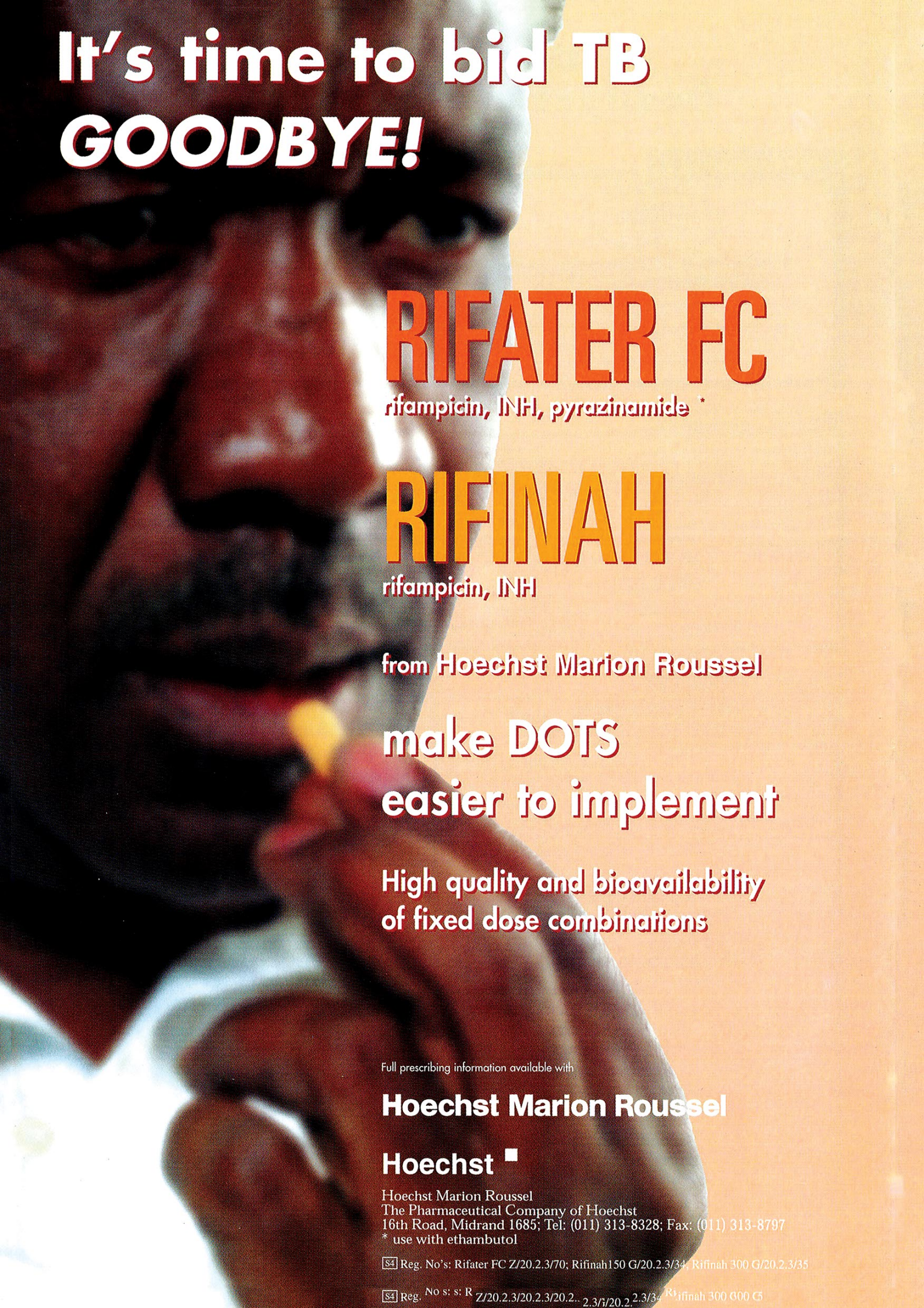
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