

Occupational Medicine Clinical Update

Dedicated to the prevention of occupational illness and injuries, and promoting the well-being of all workers

Occupational Health Clinics for Ontario Workers Inc, Samia-Lambton

Shedding Light on Hazardous Agents in Health Care

Table 1: Risks for Health Care Workers
Chemicals
Drugs
Infectious agents
Latex
Musculoskeletal
Radiation
Shift work
Stress
Violence

SARS is changing the way we look at issues regarding control of infectious diseases in public health and, more specifically, in health care workers (HCW's). It also has highlighted the breadth of risks HCW's encounter in the workplace (see Table 1).

Perhaps we should not be surprised that workers in health services have some of the highest rates of occupational injuries and illnesses of all sectors (see Table 2), with nursing home and hospital workers ranking number 1 and 2 respectively.

Injuries and infections are relatively obvious causes of these statistics. However, HCW's have many exposures to hazardous agents with risks that are: less well known, can take many years to develop into disease, and are less likely to be recognized as resulting from the causative agent.

In fact, while HCW's have relatively high exposure to workplace hazards, they have been shown to have low awareness of these hazards [Charney, 1999].

For example, how many of us knew that the antiviral agent Ribavirin (usually reserved for use

in RSV) which has been used for SARS, is a potent teratogen requiring special handling instructions?

To help physicians with some of the less-commonly recognized hazardous agents encountered in the HCW's environment, the following very brief overview is provided.

Anaesthetics

Although there is considerable research on anaesthetic gases in animals and surgical patients, there has been a relative dearth of study on those with occupational exposure. Studies of operating personnel have identified a number of apparent health effects which include: DNA alterations, neurobehavioral changes, neurodegenerative diseases, elevated spontaneous abortions and reduced fertility, decreased birth weight and increased congenital malformations [Vecchio et al, 2003].

As an aside, there is a fascinating debate in the occu-med literature about the life-expectancy of anaesthe-siologists [Hagmar, 2003]. Many studies have suggested shortened life spans for this group, but the methods and conclusions of these studies have been the subject of controversy. It is also not clear, if there is an actual difference in longevity, or whether it has to do with personality traits, lifestyle habits or workplace expo-sures/stresses.

(Continued on page 2)

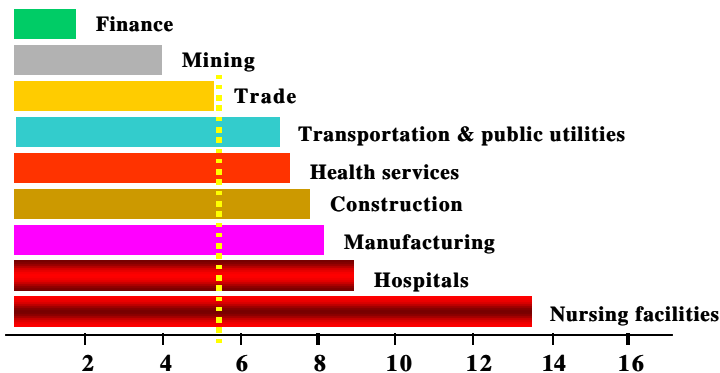
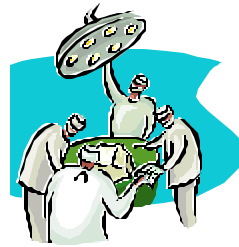


Table 2: Incidence Rates of Nonfatal Occupational Injuries and Illnesses, 2001 (per 100 full-time workers), U.S. Bureau of Labour Statistics. Graph courtesy Sarah Jewell, MD, MPH, Associate Clinical Professor UCSF/SFGH Division of Occupational and Environmental Medicine.

The Physician as a "Hazardous Agent"

British surgeon Robert Liston was revered and feared for his legendary speed with the scalpel. His most famous case involved the amputation of a patient's leg (who died afterward of hospital-acquired gangrene, circa 1840's):

"He amputated in addition, the fingers of his young assistant (who also died afterward from hospital-acquired gangrene). He also slashed through the coattails of a distinguished surgical spectator, who was so terrified that the knife had pierced his vitals he dropped dead from fright."

"That was the only operation in history with a 300% mortality." [Gordon, 1995].

One wonders who holds the current record for needlesticks.

Who is at risk?

Administrative workers	Physical and occupational therapists
Custodial staff	Psychologists/counselors
Food service workers	Radiology technicians
Laboratory and pathology technicians	Records and unit clerks
Laundry workers	Respiratory therapists
Nurses	Security guards
Pharmacists	Social workers
Physicians	Volunteers

Antineoplastics

Although anticancer agents have been shown to be themselves mutagenic, teratogenic and carcinogenic, there has been remarkably little study on this question for those handling the agents occupationally. There have been studies suggesting such relationships but not enough to formulate any strong conclusions.



More research has looked at reproductive outcomes in those working with these agents. These studies showed changes in menstrual function, increased risks of spontaneous abortion, decreased fertility and increased congenital malformations [Vecchio et al, 2003].

Ethylene Oxide (ETO)

This widely used disinfectant is considered by the International Agency for Research on Cancer (IARC) to be a Group 1 carcinogen (known human carcinogen). It has been linked with a number of different cancers, most convincingly with those of the lymphohematopoietic systems [Vecchio et al, 2003].

It has also been associated with increased risk of spontaneous abortion, pre- and post-term births. Workers in central supply are at highest risk, with staff using sterilized equipment or protective clothing also at risk (OR, ER, ICU, etc.).

Due to a wide variety of acute and chronic health concerns with ETO, other sterilization techniques are seeing increased use (e.g. hydrogen peroxide gas plasma).



Formaldehyde

Formaldehyde (the major component of formalin) was last reviewed by IARC in 1994 and its status was upgraded at that time to Group 2A (probably carcinogenic in humans). The most compelling evidence is for cancers of the upper respiratory tract (nasal and pharyngeal cancers). Studies are also suggesting increased risks for brain, colon and kidney cancers [Vecchio et al, 2003].

At-risk groups include those in the OR (physicians, nurses), pathology (physicians, technicians) and outpatient clinic settings where formalin (formaldehyde-based fixative) is used for biopsies (ER, SDC, etc.). It is also used in the laboratory, dialysis (disinfection of machines) and research settings.

Glutaraldehyde

This disinfectant has been gaining popularity for use as a substitute for formaldehyde. Consequently it sees use in many of the same areas. Glutaraldehyde has a number of acute health effects affecting the skin and respiratory systems primarily. It has been shown to be a mutagen and fetotoxic in animal studies. Long-term consequences of exposure in humans are not known [Vecchio et al, 2003].

Solvents

Solvent exposures primarily affect laboratory technicians and custodial staff. These substances have neurologic and respiratory effects in the acute setting. Long-term exposures can result in malignancies (e.g. benzene), cardiac toxicity (methylene chloride), reproductive and developmental effects [McDiarmid, 1997].

Surgical Smoke

The evidence for health concerns from surgical smoke (from both electrocautery and laser) have been accumulating only since the late 1980's. These types of smoke contain carbonized tissue, blood and virus, as well as known carcinogens in the form of benzene, toluene, formaldehyde and PAH's (polycyclic aromatic hydrocarbons) [Charney, 1999].

More surprisingly has been the finding that surgical smoke can contain living virus (e.g. HPV) and their DNA, including that of HIV.

These findings have led a variety of regulatory agencies to develop policies to protect both workers and patients from surgical smoke.



Conclusion

Health care workers have received much overdue attention as a result of the SARS crisis. It has brought to light a great many concerns for those working in this stressful and injury/illness-prone environment. Due to the wide range of concerns in this group, we plan to explore some of these other topics in future issues of the *Update*.

We hope this very brief overview will bring awareness of some of the less obvious health hazards to health care workers (including physicians). Although we should always consider the question, "Where did you/do you work" when taking a patients' history, this may be particularly important when a health care worker comes to you with an illness.

References

- Charney W. 1999. *Modern hospital safety*. Boca Raton: Lewis Publishers.
Gordon R. 1995. *Great medical disasters*. New York: Barnes and Noble Inc.
Hagmar L. 2003. *Is the life expectancy of anesthesiologists decreased?* *Scand J Work Environ Health*. 2003. 29 (2):83-84.
McDiarmid MA, Kessler E. 1997. *The health care worker*. *Occupational Medicine: State of the Art Reviews*. 12(4) Oct-Dec 1997.
Vecchio D, Sasco AJ, Cann CI. *Occupational risk in health care and research*. *Am J Ind Med*. 2003 Apr;43(4):369-97.

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