Environmental and Occupational Health Issues in Hospitals

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Environmental Health is the measurement, evaluation and control of factors within our environment that have an effect on the health and well being of the public. Occupational Health is that aspect of Environmental Health, which concerns itself with the interaction between the workplace and the health of the worker.

The Common Law’s obligation of Duty of Care is applicable to everyone to ensure that the outcome of one’s actions or interactions does not affect others negatively. People have the right to expect and ensure that there is an adequate level of control over those environmental factors that affect their state of health. Members of a community should have the right to drink safe water, to breathe safe air, to eat safe food, to live in safe shelter, to have a safe workplace in which to earn an income, and a safe community in which to live. Statutory Authorities have a legal and binding duty to control those factors posing an unacceptable risk to the community.

With regard to workplace safety, there is legislation at National and State level to safeguard the health and safety of the worker. In Queensland the Workplace Health and Safety Act of 1989 is administered by the Workplace Health and Safety Council and provides for Occupational Health and Safety Representatives and Officers within the workplace.

Hospitals are large, organizationally complex, system driven institutions employing large numbers of workers from different professional streams. They are also potentially hazardous workplaces and expose their workers to a wide range of physical, chemical, biological, ergonomical and psychological hazards. Thus Occupational Health and Safety issues relating to the personal safety and protection of its workers is a very important Environmental Health concern for hospitals. Hospitals also play an integral role in community protection through wider Public Health issues including injury and illness prevention, health surveillance and disease notification, and disaster management. Additionally, over and above their core business of acute health care for inpatients, hospitals are also concerned for the safety and protection of those inpatients with respect to nosocomial infection control, evacuation plans for internal emergencies, and food preparation and handling by the hospital kitchen. Finally, hospitals are also concerned with environment protection through their waste management strategy, and in particular, the collection and disposal of contaminated waste.

Hence, discussion of Environmental Health issues relating to hospitals can be conveniently divided into 4 parts - Personal (staff) protection, Patient protection, Population (Community) Protection, and Environment protection. The main body of this report will look at the major components of each of these 4 parts in more detail.

Personal (Staff) Protection – Physical Hazards

Radiation Exposure

There is a wide range of radiation hazards related to medical imaging (x rays, nuclear scans utilizing radioactive isotopes) and radiation oncology which utilizes ionizing radiation from a variety of sources to treat a range of malignant tumors. These sources include (i) sealed sources containing radioactive material such as isotopes of radium, cobalt and strontium, and (ii) linear accelerators emitting short wave length gamma waves.

Licensing users of this technology is strictly controlled through the office of the Chief Health Officer in Queensland Health and is contingent on (i) appropriate training, certification and credentialing of users (ii) demonstrated implementation of safety precautions related to storage, use and shielding of non target personnel (iii) regular inspection, maintenance and certification of equipment by the Department of Physics within Queensland Health, and (iv) ongoing monitoring of radiation exposure of staff using the equipment.
Hospital compliance with all relevant codes of practice, standards, statutes and guidelines, is required by Queensland Health.

**Back Injury**

Hospital staff and particularly nurses are prone to back injury from the need to lift and roll immobilized or disabled patients for toilet, washing, dressing and pressure care. Hospitals are now required to give training on back care to all new staff. This training, combined with the use of wards persons to assist nurses and the use of hydraulic lifting devices, has decreased the risk of back injury considerably.

**Burns due to Steam Sterilizing**

Larger hospitals now have Central Sterilizing Departments utilizing appropriately trained, dedicated staff, that are familiar with and follow set policy and procedure. This type of specialized set up minimizes risk of physical injury from hot equipment. However, smaller peripheral steam sterilizers are still required in some departments such as the Operating Theatres.

Where possible many smaller satellite hospitals now use the Central Sterilizing Department of their larger referral Base Hospital for their sterilization needs.

**Laser Burns**

Lasers are now frequently used in Operating Theatres and appropriate protective equipment must be used, especially eye protection to prevent retinal burns. The use of this equipment is covered by set protocols.

**Electrical Defibrillators**

Use of this equipment is restricted to those staff who have undergone competency based training and certification.

**Personal Violence**

Risk of injury from personal violence is an important hazard in Emergency Departments who at times deal with mad, bad or intoxicated patients. Similarly, Psychiatric Units who have to look after the psychotically disturbed are also at risk. Again, staff education and set policy and procedure needs to be in place for dealing with aggressive patients. Personal security alarms, a system for rapidly mobilizing ancillary staff, and a set approach to safely restraining, immobilizing and sedating violent patients are all important components.

**Personal (Staff) Protection – Chemical Hazards**

Toxic chemicals in use in hospitals include:-

- Industrial cleaners used by contracted cleaning staff.
- Chemical sterilizers, in particular gluteraldehyde used for the sterilization of endoscopes and other equipment that cannot be steam sterilized.
- Tissue preservatives such as formaldehyde used to store and preserve body tissue prior to histopathology.
- Chemical reagents used in the hospital Pathology Laboratory.
- Cytotoxic drugs requiring preparation prior to parenteral administration to cancer patients.
- Processing chemicals for X-ray film development.
- Anesthetic gases in the Operating Theatre.

The hierarchy of principles for controlling chemical hazards are well documented and utilized within hospitals:-

- Elimination (use an alternative process or strategy eg. disposables).
- Substitution (use the least toxic chemical that will do the job).
- Isolation (keep the relevant chemical in one isolated area if possible).
- Enclosure (e.g. gluteraldehyde fume cupboard, preparation enclosure for cytotoxics, closed circuit anesthetic machines with scavenging of exhaust gases).
- Ventilation (X-ray processors).
- Personal protection (gloves, goggles, plastic gowns etc. where appropriate).
- Personal hygiene (hand washing after use).
- General cleanliness (clean up spills, appropriate storage, etc.).

Again, relevant staff must have appropriate training and education in the use of any of these chemicals, and must be informed of any dangers including those of low risk.

Personal (Staff) Protection – Biological Hazards

Management of biological hazards should be comprehensively covered in the hospital’s Infection Control Manual, with the policies and procedures developed and monitored by an Infection Control Committee chaired by an Infection Control Nurse. This manual should be based on expert publications such as the National Health and Medical Research Council’s “Infection Control in the Health Care Setting” 1996.

There are 3 important modes of disease transmission from patients to staff:

1. Airborne and droplet aerosol exposure - includes viral upper respiratory tract infections, measles and TB. Preventative measures include (i) keeping distance (>1m) from frontal coughing as much as possible (ii) wash hands after every patient contact and especially avoid rubbing eyes before washing (iii) high filtration face masks (where applicable - generally not practical in the outpatient setting) (iv) isolate inpatients in a negative air pressure room.

2. Skin contact exposure - includes *Staphylococcus aureus* and *Varicella*. Prevention requires protective gown and gloves.

3. Exposure to infectious fluids via broken skin, eyes, mucous membranes, and parenteral exposure - includes hepatitis B, hepatitis C, and HIV from all body fluids except sweat, as well as gastroenteritis and hepatitis A from fecal fluid. Preventative measures include universal precautions (gloves, gown, goggles and mask), and appropriate management of sharps, spills, and contaminated waste.

If acute exposure to a biological hazard does occur, staff members need to be aware of relevant policies and procedures for appropriate management of the exposure. This will include:

- Appropriate washing for mouth, eyes or skin exposure
- First aid for penetrating sharps injury
- Prophylaxis for high risk exposure
- Testing of the source if possible
- Testing and follow up of exposed staff
- Incident reporting.

Personal (Staff) Protection – Psychological Hazards

Hospitals are stressful places for sick and injured patients and their families. However they can also be stressful for staff due to such factors as:

- Shift work, on call duty, fatigue and “burn out”.
- High workload and demand.
- High or unrealistic patient expectations.
- Verbal abuse or threats from disgruntled or intoxicated patients.
- High or unrealistic expectations from supervisors and management.
- Problematic interpersonal work relationships.
- Frustrations due to limited resources, especially staffing levels.
- Poor organizational climate with low staff morale.

Hospitals are part of a high demand, high expectation service industry and are heavily reliant on staff for the friendly, safe, effective and efficient delivery of services. To optimize
productivity and attitude of staff, senior management must be committed to ensuring a conducive organizational climate with high staff morale. Clear priorities and direction, realistic performance goals and workloads, commitment to continuing education and quality assurance, reception to staff feedback, and support with counseling services for stressed staff are all important components.

**Personal (Staff) Protection – Prevention and Legislative Requirements**

The Queensland Workplace Health and Safety (WHS) Act 1989 provides for WHS representatives within work units in the hospital, as well as a full time WHS Officer for larger hospitals. This person is responsible for administering the hospitals WHS Plan, provides training for the WHS representatives, and chairs the WHS Committee which reports to the Hospital Executive.

Additionally, there is a Queensland Health Workplace Health and Safety Management Plan that addresses specific WHS issues within hospitals.

Work unit WHS representatives are nominated by workers and act as their representatives on the WHS Committee. These representatives are instrumental in ongoing awareness and educational campaigns and informational dissemination for workers, as well as hazard identification in the workplace.

Individual workers must be encouraged to report any relevant incidents to their supervisors on the appropriate incident report form which are then forwarded to the hospital’s WHS Officer for collating and analysis, and, if appropriate, investigation and action.

**Patient Protection**

**Nosocomial Infection Control**

Minimizing adverse outcomes of health care for inpatients is of prime importance to hospitals and a major focus of Quality Assurance activities. A very significant indicator of quality care is the nosocomial infection rate.

The hospital's Infection Control Nurse and Infection Control Committee are concerned with the prevention, surveillance and control of nosocomial infections. The Infection Control Program should be documented in the hospital's Infection Control Manual, which outlines the principles, strategies, policy and procedures for infection control in the hospital. All staff need to be familiar with its contents. Regular feedback on surveillance of nosocomial infection rates will help motivate staff to remain vigilant.

**Patient Safety**

Injury prevention for patients may require some of the following interventions when appropriate:-

- Diligence in keeping bed rails up particularly for those patients with an altered conscious state from medication or illness.
- Bathroom / toilet aids particularly for the elderly or disabled.
- Nurse and physiotherapy assisted mobilization during recovery.
- Walking aids for the disabled, and during recovery.
- Occupational therapy home assessment for home aids.
- Community nurse visits for bathing etc. following discharge.

**Evacuation Plans for Internal Emergencies**

Various internal emergencies including fire, explosion and bomb threat may require evacuation of all or parts of the hospital. Well-documented and rehearsed evacuation plans are required to ensure the safe evacuation of disabled, immobilized or otherwise helpless patients. In critical care areas this will include manual back up for life support systems.

**Food Safety**
Hospital kitchens prepare meals for inpatients and in many cases prepare meals for the staff canteen. It is obviously imperative that food storage, handling and preparation is done to the highest standards and poses no risk to already sick or compromised patients.

The Australian and New Zealand Food Association is currently in the process of developing a national food safety regulatory system for Australia, incorporating the 4 national food safety standards, State and Territory Food Acts, Industry guidelines, food safety auditing, and food safety training. The eventual national legislation will be binding on the Crown and will be administered by a State Food Authority.

Current Queensland state legislation including the Food Act, Food Hygiene Regulations, and Food Standards Regulations are not binding on the Crown. Nonetheless Queensland Health encourages all Queensland Public Hospitals to meet Australian Council of Healthcare Standards for hospital accreditation and these standards comply with the 4 national food safety standards.

Furthermore, through the Enterprise Bargaining process, Queensland Health has tied staff pay increases to the achievement of various benchmarks including those for hotel services.

The Kitchen / Catering Supervisor is responsible for documenting and administering the hospital's food plan, and reports through the Manager Hotel Services to the Director of Corporate Services.

**Population (Community) Protection**

**Injury and Illness Prevention**

In Australia, injury is the leading cause of death for those less than 45 years of age. The economic cost of treating survivors as well as the cost of lost productivity is enormous. Injury prevention is therefore a very worthwhile strategy.

Many of the larger Queensland public hospitals now have Emergency Department Information Systems that allow collection of injury data that complies with the minimum data set of the National Injury Surveillance Unit. This data gives a good cross section of the epidemiology of injury within the community. Analysis allows direct comparison with other communities of injury incidence, as well as indicating injury trends and “hot spots” within the community.

This data allows an opportunity for hospitals, various community organizations and Local Government Authorities to collaborate in a Safe Community Project. Specific injuries can be targeted with interventional strategies to decrease the incidence. Outcomes can be monitored and strategies modified to optimize impact.

Hospitals also play a role in illness prevention through the early detection of risk factors and identification of risk behaviors related to various lifestyle factors. Referral can then be made to the appropriate community agencies for advice on interventional strategies.

Hospitals also play a role in disease prophylaxis through such things as (i) detection of incomplete vaccination schedules in presenting children (ii) tetanus prophylaxis for trauma (iii) lyssa virus prophylaxis in bat exposures (iv) antibiotic prophylaxis in meningococcal contacts.

**Health Surveillance**

The hospital's role in health surveillance is mainly limited to notifiable disease. Laboratory confirmed diagnosis is automatically notified to the Public Health Unit within Queensland Health. Early notification of a provisional clinical diagnosis of certain notifiable diseases is encouraged, particularly those of major public health significance such as Dengue Fever and meningococcal disease. This allows the early mobilization of resources for contact tracing and other public health measures to contain outbreaks.

**Disaster Management**
Hospitals obviously have a major role in disaster management where those disasters result in multiple casualties. The procedures for mobilization of resources to (i) receive and triage (ii) assess, resuscitate and stabilize (iii) provide definitive care for and facilitate inter-hospital transfer of patients should be clearly documented in the hospital's external disaster plan.

The Hospital Disaster Committee is responsible for the preparedness and planning of the hospital for the management of multiple casualties, and should regularly review and rehearse the plan with mock exercises. The committee must also ensure the adequacy of back up power and water supplies to the hospital following the impact of natural disasters.

The hospital's external disaster plan forms part of the functional Regional Health disaster plan, which in turn forms the medical sub plan of the comprehensive District Counter Disaster Plan.

Environmental Protection

Waste Management Issues

In an increasingly cost conscious world concerned with the long term environmental effects of pollution there is an increasing expectation that producers of hazardous products should be responsible for them “from cradle to grave”, that is from their production to their safe disposal.

Also, in a world of limited and diminishing resources there is increasing pressure for waste minimization and recycling despite the costs involved. This has led to the introduction of waste management principles - reduce, reuse, recycle, treat and dispose.

Waste disposal is governed by the Queensland Environmental Protection Act 1994, the Environmental Protection (Interim Waste) Regulation 1996, and various Local Government Authority by-laws. The Environmental Protection Act is administered by the Environmental Protection Agency and is binding on all persons including the Crown.

Clinical (biomedical) waste disposal gives rise to some special issues in relation to infectious material, hazardous chemicals and drugs, and body parts. A standardized systems approach is adopted by most Queensland Public Hospitals and is generally documented in the hospital's Infection Control Manual. It is based on a number of key policies and guidelines including (i) Queensland Health guidelines for the management of clinical and related waste (ii) National Health and Medical Research Council guidelines (iii) National Clinical Waste Management Industry Group code of practice (iv) Australian Standards.

The major components of such a waste management system include:-

- Waste segregation at the source - sharp containers, biohazard bins, general waste bins, and cytotoxic bins - all standardized and color-coded.
- Waste streams - general, contaminated, cytotoxic / pharmaceutical, body parts.
- Storage and transport - cold storage for contaminated waste and body parts; transport in safe, leak proof containers.
- Waste treatment - sterilization of contaminated waste (steam autoclave); incineration of cytotoxics, pharmaceuticals and body parts in an incinerator meeting all relevant standards and statutes.
- Waste disposal - Local Council approved, engineered, sanitary landfill.

Summary and Conclusion

This report presents a brief overview of how hospitals are concerned with the protection of their workers, patients, community and environment. These various functions are under the control, surveillance and review of widely differing work units and multidisciplinary committees within the organization. It is interesting to take a step back from this organizational complexity and look at the big picture of Environmental Health issues as a whole, and appreciate their general relevance and importance to hospitals.

Hospitals are often one of the biggest employers of staff in their district and therefore have a wonderful opportunity to take a proactive role in the community by:-
Promoting worker health through safe workplaces, and facilitating fitness programs, weight reduction, smoking cessation, and stress relief for their workers.

Promoting public health in the community by being a lead agency for injury prevention through a collaborative Safe Community Project.

Increasing commitment to quality assurance activities to maximize patient protection against adverse outcomes.

Promoting environmental health by support for waste reduction, reuse and recycling; use of energy efficient, environmentally friendly buildings; and greener, organic gardens.

Aiming for best practice in all these areas will result in happier, healthier and safer staff and patients; safer and healthier communities; and a safer and greener environment.

References

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