



A Review on Occupational Health Hazards and its Consequences among Nurses

Abstract:

Introduction: Health and Wellbeing of employees in the work place are important concerns that should continue to receive attention in any organization. Any kind of work related stress when combined with daily life stress lead to detrimental physical and emotional outcome due to excess physical and mental demand on the human body and mind. The health of nurses is a prime concern for any organization as they are the direct caregivers to the patient and their emotional and physical stability is needed for effective patient care for maintaining their standards in relation to patient safety.

Objectives: The review study was mainly aimed at understanding various kinds of occupational hazards and its consequences on the exposed nurses.

Methodology: The review used descriptive cross-sectional research design using secondary sources related to occupational health hazards among nurses. Very few studies have focused on the psychological hazards of nurses. The review of articles has provided an insight on various kinds of occupational hazards that the nurses are exposed to, based on the area of work, their experiences, age, Body Mass Index, training and their own negligence. The study mainly excluded radiological hazards and return to work program and employers responsibilities in prevention of these risk and exposure.

Results: Each profession has certain amount of occupational risk involved. The health care providers are the third major group who experience high number of work place injuries, as they are direct care providers. Nurses do face considerable amount of risk in varied forms including needle stick injuries, harmful exposures to chemicals and hazardous drug, back injuries, latex allergy, violence and stress. The most common injuries reported are back injury and risk of infection.

Conclusion: Nurses are confronted to various kinds of occupational hazards due to their nature of work. Future interventions or a proper occupational infrastructure should be adapted by all the organizations to promote health and well-being of the staff.

Key Words: Musculoskeletal injuries, depression, occupational hazard, needle stick injuries, workplace violence, exposure to blood borne pathogens, Stress, work related risk factors.

Rennie Joshua¹; Suja Karkada²

1 Doctoral fellow, Women Institute for studies in Development Oriented Management (WISDOM), Banasthali Vidyapith, Rajasthan, India. Working as Nurse Educator, Dubai Hospital, P.O Box 7272, Dubai, and U.A.E.

2 Assistant Professor & HOD. Department of Fundamentals and Administration, College of Nursing, Sultan Qaboos University.P. O. Box 66, Al-Khoudh Muscat, Sultanate of Oman, Postal Code:123

Corresponding Author:
Rennie Joshua
Email: renniepty@gmail.com

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Introduction

Traditionally hospitals are directed towards curative services than

preventive services. It is very important to maintain optimum health of the staff in health care organization as they take care of

Review Methodology

The review used descriptive cross-sectional study design from various secondary sources on occupational hazards including low back pain, musculoskeletal disorders (MSD), and absenteeism due to work related injuries. We also reviewed contents on nursing work environments, relationship between hospital unit culture and nurses' quality of work life, pain related work interference. Electronic searches were conducted in search database engine like American Journal of Industrial Medicine, Journal of Research in Nursing, Sage Publications, Scandinavian Journal of Public Health, Journal of Healthcare Management, Occupational & Environmental Medicine, Journal of Advanced Nursing, AAOHN Journal, International Journal of Environmental Research and Public Health, Springer Publication. Websites like Google Scholar, OSHA sites, Wiley Online Library.

Data The search used key words like sharp injuries, occupational risks, occupational health and safety, musculoskeletal injuries, back pain, needle stick injuries, blood borne diseases, chemical injuries and well-being at work. The articles searched were in English language. The focus of the review was mainly on the various studies done on occupational risk faced by nurses. The study excluded mainly radiological hazards and return to work program and employer's roles and responsibilities in prevention of the risk and exposure faced by nurses. All the articles were sorted out based on inclusion and exclusion criteria. Those articles that fell in the exclusion criteria were considered not eligible and were discarded. The study mainly focused on various occupational risk faced by nurses as the part of their job and its consequences on them.

Findings and Discussion

There are numerous hazards confronted by nurses at their work setting. These risks are inherent⁴ Nurses are exposed to risk in different ways including while taking care of patients, the working

the sick individuals. It is necessary to identify and reduce the hazardous exposures in their working environment as it not only influence their own health but also affect their patient's care. In health care industries, employees experience a high number of workplace injuries. Hospital is one of the most hazardous place to work. Among the health care workers, nurses are more prone to work related injuries as they provide direct patient care and are the largest workforce in any health care organization. Many nurses accept musculoskeletal pain as a part of their job¹. Exposures to work related hazards, which includes needle stick injuries, contact with infectious patients and physical injuries during handling and transfer of patient, increase job demands, violence and stress and are numerous each year in Canada². According to OSHA, 2011 on average there was 6.8 work related injuries and illnesses for every 100 full time staff in United States of America.

Nurses working as full time staff have more frequent illnesses and injuries. The hospital environmental factors definitely have a big role on nurses' health and need to be reviewed due to high level of absenteeism³. Employer is the key person to exercise safety measures and prevent accident at any health care organization. Identifying the risks for safety and prioritizing the solutions tremendously contributes to the integrity of the organization.

Activities of the organization for safety:

1. Involve workers in determining objectives and measures of occupational health and safety, as they are the best to suggest measures.
2. Collect periodic feedback from the nurses on their experience with existing health risks.
3. Identify activities to improve existing working conditions.

The objective of this study is to explore various kinds of occupational hazards faced by nurses and its consequences.

environment, and exposure to certain toxic substances^{5, 6}. Nurses also face abuse from patients, relatives and coworkers⁷ including risk and infection from public health emergencies and their working environment⁸. Factors, which leads to stress, and health problems like under staffing, downsizing, overtime, shift duties^{9,10}.

Many other factors that increases the risk of work related injuries in health care sector are age, gender, employment type, employment status, shift length, Body Mass Index .The health care providers are rated among third major groups besides laborers/freight workers and truck drivers who experience a high number of work place injuries mainly because of direct patient care. (Bureau of Labor Statistics, 2012a)¹¹.

Exposures to work related hazards which includes needle stick injuries, contact with infectious patients, physical injuries during handling and transfer of patient, increase job demands, violence and stress are numerous each year in Canada¹².

Occupational health and safety issues are important indicators of Quality and Risk management. It is important to ensure safety of workers so that it is not affected by work place environment. It is also considered as the social responsibility and should be integrated as an important element of managerial development processes. This is one of the core element for sustainable development and success of health care organization. The goal is to improve patient care from healthy workforce.

The risk encountered in nursing profession is varied, some are present since its inception and some are quite evident in recent years due to the advancement in Health Care System.

In hospital, the hazards faced by health care workers can be broadly categorized as physical, chemical, biological and psychological¹³. The study here mainly presented the risk faced by nurses.

A. PHYSICAL HAZARDS

MSDs includes sprain, strain or any kind of injuries to bones, tendons, muscles, ligaments, soft tissue, nerves. These injuries can be due to single sudden movement or due to mild trauma caused due to multiple attempts over a long period of time¹⁴. In any health care organization, back injury and back pain are the most important concerns for nursing staff; it affects negatively on the quality of life of the worker and affects the productivity of the organization¹⁵. According to U. S Bureau of Labor Statistics, health care workers are more prone to MSD in comparison with other jobs, like construction, mining and manufacturing¹⁶. The main reason of musculoskeletal injuries in health care workers is due to positioning, transportation and assisting patients¹⁷. Approximately 20 percentage of nursing jobs includes patient handling and mobilization; that is the reason adequate training on safe patient handling and mobilization is essential¹⁸.

Among all occupations, nursing was ranked highest for musculoskeletal disorders ranging from 40-80% among all populations¹⁹. Most common part of the body to be affected is the lower back region with the prevalence rate of 29- 64%, neck with the prevalence rate of 34%- 54% and shoulders with the prevalence rate of 35-60%²⁰. Female staff are more at risk when compared to male staff²¹.

The average weight a critical care nurse lifts per day is about 3 tons, around 52% nurses report back pain related to patient lifting and 18% resigns from job each year due to injury^{22, 23}.

Nearly 12% of health employees in United States suffered occupational injuries mainly in the back and shoulders²⁴ due to which annually, 600,000 workers miss work, and expenditure is around 45 to 54 billion dollars and work efficiency decreases^{25, 26}. The American Nurses Association Health and Safety Survey 2011, published 62% of nurses had reported disabling musculoskeletal injury and it was their major concern and 56%

had experienced musculoskeletal pain, which was worsened due to their job nature²⁷.

Significant health risk to the health care workers is ergonomic related. It is still the most prevalent injury mainly due to manual handling requiring force to pull, push or lift patients. Nurses from specialized area are more prone to these hazards due to their nature of work and other reason is shortage of health care workers, which impose large amount of burden on health care providers. Most of the nurses accepts these physical injuries or trauma as a part of their job and fail to report it.

B. CHEMICAL HAZARDS

As per US Department of Labor, OSHA, 2012e, the most common chemical hazard cited in medical surgical hospitals are asbestos, formaldehyde, lead, methylene chloride, and glutaraldehyde.²⁸

Table 1: Health risk and the chemical agent's responsible.

RISK	CHEMICAL AGENT/DRUG
Birth Defects	Glutaraldehyde, Ethylene Oxide, Anesthetic Gases, Chemotherapeutic Agents, Medications
Cancer	Antineoplastic Drugs, Chemotherapeutic Agents, Ethylene Oxide
Asthma	Glutaraldehyde, Ethylene Oxide, Housekeeping Chemicals, Latex, Hand and Skin Disinfection
Miscarriage	Ethylene Oxide, Antineoplastic Drugs
Skin and Eye problems	Glutaraldehyde
Allergies	Hand and Skin Disinfectants, housekeeping chemicals
Anaphylaxis	Latex

CYTOTOXIC DRUGS/ ANTINEOPLASTIC AGENTS

Anti-neoplastic agents are used in clinical settings of health care as many studies have documented its effect on nurses. They have mutagenic, teratogenic and carcinogenic effects. These drugs also cause irritation to skin; eyes and mucus membranes²⁹. Improper handling of these drugs can result in exposure.

FORMALDEHYDE

Formaldehyde is also a substance considered to have adverse effect on human being. It is commonly used as a preservative to store the specimens and for sterilization of surgical instruments. (U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry, 1999; U.S. Department of Labor, OSHA, 2012c). The National Institute for Occupational Safety and Health's (NIOSH) recommended exposure limit (REL) is much lower—0.016 ppm calculated as an 8-hour time-weighted average (U.S. Department of Labor, OSHA, 2012c), the range of measured concentrations observed in the hospitals ranged from 0 to 3.10ppm. The Environmental Protection Agency and the National Institute for Occupational Safety and Health in the United States have classified formaldehyde as a possible human carcinogen³⁰.

LEAD

Not many studies have focused on the hazards and risk related to lead. Lead is found mainly in the lead shielding devices used to protect from hazardous radiation during X-ray³¹ (U.S. Department of Health and Human Services, ATSDR, 2007). It is also found in older hospitals, which still have interior walls with lead-based paint, and is banned by the Environmental Protection Agency in 1978.

GLUTARALDEHYDE

Glutaraldehyde is a cold sterilant used for disinfection of surgical and dialysis instruments. It is also used as a tissue fixative and a hardener in the x-ray development process (U.S. Department of Labor, OSHA, 2006).

It is mainly a skin and mucous membrane irritant and can cause skin sensitization, asthma, headache and flu like symptoms. It can also lead to liver toxicity in case of high-level exposure³².

ANAESTHETIC AGENTS

The carcinogenic and mutagenic effects of exposure to surgical

fumes and the transmission of infections such as HIV and hepatitis are still under discussion³³. In the study conducted in operation theaters of private universities hospitals located in Turkey, nearly half of the operation theater nurses and technicians reported that fumes had affected their health, and they reported specific symptoms. Fewer workers expressed concern about the carcinogenicity of surgical fumes. In many literatures, similar concerns were raised^{33, 34}, exposure to certain chemical fumes could cause acute, inflammatory respiratory tract changes, irritation to eyes, headaches, vertigo, and vomiting sensations³³.

Approximately 14,024 fatal and non-fatal occupational chemical injuries were reported in 2012. (Centers for Disease control and Prevention, 2013). These injuries can be small but can lead to permanent disability.

OTHERS

Rubber gloves can cause urticaria in users who are sensitive to it. Exposures to certain chemicals like glutaraldehyde, formaldehyde, anesthetic gases, chemotherapeutic agents, housekeeping chemicals, agents used for sterilization is quite common. A chemical injury alters the structures or functions of a body due to acute and chronic exposures. The injuries caused by these chemicals mainly causes acute inflammatory respiratory tract changes, skin and eye irritation, headache, vertigo and vomiting sensation.

C. BIOLOGICAL HAZARDS

Worldwide occupational exposure to blood borne pathogens is one of the most common occurrence among health care workers. These hazards include exposures to bacteria, virus, fungi and other living organisms that can cause acute and chronic infection to health care workers. There are mainly three modes of transmission.

- Airborne transmission
- Blood borne transmission
- Contact transmission

Nearly 3 million health care workers i.e. 1 in every 10-health care worker is exposed to sharp object contaminated with hepatitis B, hepatitis C or human immunodeficiency virus (HIV). These exposures mainly take place in clinical settings and inappropriately discarded sharps pose risk to housekeeping staff.

In spite of introduction of safety devices in hospitals, percutaneous injuries from hollow bore needles remains the most commonly reported occupational exposures in the health care facility, around 100,000 sharps injuries are reported from National Health Services hospitals, U.K and about 400,000 sharps-related injuries among health professionals in United States are reported every year. Education and active surveillance is one of the core elements in reduction of occupational exposure to blood borne pathogens.

One of the other risks which health care workers are exposed are blood borne infections. Infections like HIV and hepatitis can be transmitted percutaneously via mucus membranes and non-intact skin. In Thailand in one of the public hospitals, 48.7% of health care workers were tested positive for hepatitis B virus³⁵. The main two reasons of their denial to report on duty was psychological stress (55.0%) and fear (29.2%) had of being infected during H1N1 influenza pandemic in Hong Kong.³⁶

Health care workers are more at risk for infections like MERS-CORONA VIRUS. They are in close contact with patients and handle human biological wastes like sputum, feces, urine, blood which has public health implications as health care workers can be a source of transmission to other patients and other people in the community associated with them³⁶. Certain pathogens like H1N1, EBOLA have emphasized on the importance of respiratory protectors for direct patient caregivers

and many workers who reported illness during that period have claimed poor training and preparedness by the employer³⁸. In a study conducted across 98 acute care hospitals in six U. S states, the researchers observed that the workers did not follow CDC guidelines in taking care of the patients on airborne precautions.³⁹

Health care workers are always at the risk of developing infectious disease due to the contact with blood and contaminated body fluids of patients. One way of preventing this hazard is adherence to universal precautions and use of safety devices. Most of the exposures are due to low compliance with infection control protocols. Availability of PPE with proper training to create awareness is the preferred method to control this hazard.

D. PSYCHOSOCIAL HAZARDS

Factors that lead to stress in workplace are workload, leadership, issues with the management, relationship with colleagues and other staff, shift duties, emotional demands and lack of appreciation or reward⁴⁰. A variety of intrinsic factors in the work setting is well documented that can lead to occupational stress like work overload, promotion, exposure, long working hours, shift duties, new technology. In another study, researchers found there is mild to severe degree of depression in nurses and this mainly affects the work of nurses by feeling unhappy with the work they do⁴¹.

When an individual is involved in work situations that is emotionally demanding, he experiences physical, emotional and mental exhaustion and this state can be defined as burnout state, it can also occur when an individual chases unrealistic goals and ends up losing all his energy. The consequences of professional burn out can be dangerous for themselves, patients as well as the organization⁴².

Stress in an individual is just not because of a single external

event it is a result of complex set of phenomena acting on a person⁴³.

When a person fails to balance his individual needs, and demands of the environment, stress develops⁴⁴. Plenty of resources in the health care facilities is invested in recruitment and training of internationally educated nurses, however; very little attention is being paid on what happens once they start working. As a growing body of research many facts have been produced that nurses are been subjected to work related stress^{45,46}.

One of the type of psychological hazard is horizontal violence; this is stressful and harmful not only to the individual who is facing it but can indirectly affect the patient care by these workers.⁴⁷

Nurses play an important role in delivering comprehensive patient care. Dealing with the emotional aspect of patient and family is another aspect of stress to the nurses as they are the direct caregiver and need to interact on timely basis. Their day-to-day experiences with the patient and relatives and dealing with the process of dying are also factors that lead to depression and stress⁴⁸.

During Severe acute respiratory syndrome outbreak, less than 10% nurses had considered leaving job. The main reasons why nurses considered leaving job were due to shorter job tenure, risk of infection, increased workload and stress and perceived risk of fatality from Severe Acute Respiratory Syndrome, during any pandemic disease additional support from administration is more favourable to build up nursing environment⁴⁹. Many chronic diseases such as obesity, diabetes, cardiovascular disease, gastrointestinal disorders, musculoskeletal disorders and altered immune system are linked with chronic and cumulative psychological stress^{50, 51}. The shortage of health care workers can impose large amount of burden on health care providers, which can lead to stress, depression and anxiety.

CONSEQUENCES OF OCCUPATIONAL HAZARDS

Most of the studies in occupational health have focussed mainly on workers compensation, insurance, absenteeism, and economic consequences towards the organization. Very little focus is made towards the impact on life of the affected workers due to work place injuries and illnesses. The repercussions of these work place injuries reach the victim's workplace, home, hospitals, courts and local community. Besides the injury and the suffering, depression has a larger impact on the ability to work and social functioning of the staff⁵⁴. The type and severity of the illnesses or injuries matters a lot to define its consequences and effects for e.g. an employee with severe disabling back injury will face more consequences than an employee with minor sprain.

An Occupational Safety Health Administration report produced data on workers compensation claim estimated an average loss per claim for hospital workers in 2011 was \$15,860 from Health care Workers Compensation Barometer Report.

Stress, which is useful or harmful, can seriously have conflicting demands on the body thereby disturbing the equilibrium or normal flow of the daily activities. Little stress drives motivation and too much stress leads to dysfunction⁵⁵. The physical response to stress is described as General Adaptation Syndrome, it begins with stage of alarm reaction leading to stage of resistance and finally into stage of exhaustion⁵⁶, described some of the behavioural changes resulting from occupational stress are low productivity, decreased morale and failure to report to work. A nurse Richard Pocock committed suicide as a result of work induced stress, this was the first case in United Kingdom where a widow received compensation as an out of court settlement⁵⁷. A nurse with good mental and physical health are more capable of providing quality patient care.

Most of the injured workers generally report negative experiences with the workers compensation system^{58, 59, 60}.

In a study conducted in Florida, only 10% of claimants reported to have good experience with the workers compensation system⁵⁹.

Many literatures reveal that many workers fail to report work related injuries due to various reasons like fear; pain is an ordinary consequence of the work they do, lack of management support, aging, and the fear of losing jobs⁶¹.

Even though the insurance company of the organization is supposed to pay for the medical care of the person suffering from work related injuries, many individual use their own health insurance or seek private assistance from their own family doctor^{60,62,63}.

Lots of after effect happens to both nurse and to her family, very less studies have focused on these areas, which needs further research and insight.

Conclusion

Significant number of nurses are regularly exposed to various occupational hazards. Workload along with the working environment imposes adverse effect on nurse's health. Each unit or the department should document work related injuries faced by the health care worker so that specific control measures can be incorporated.

Recommendations

Further studies should be undertaken: -

- To analyze the after effect of work related injuries and illnesses on the nurse.
- Effect of work related injuries on the organization.

Each organization should have

- Legislative Occupational health and safety program
- A well-structured return to work program.
- Comprehensive training program for nurses to update their

knowledge on various occupational hazards faced and their role in minimizing these risks for practicing safe nursing.

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