

**ASSESSMENT OF KNOWLEDGE, ATTITUDE AND
PRACTICES AMONG OPERATING ROOM STAFF
NURSES TOWARDS THE STANDARD AND
TRANSMISSION-BASED PRECAUTION
IN UNIVERSITY HOSPITAL**

BY

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LIST OF ABBREVIATIONS

AIDS	Acquired Immunodeficiency syndrome
BBP	blood-borne pathogen
CDC	Centre for Disease Control & Prevention
HACCP	Hazard Analysis Critical Control Point
HAI	Healthcare-associated infection
HBV	Hepatitis B virus
HCWs	Healthcare workers
HCV	Hepatitis C virus
HIV	Human immunodeficiency virus
HUSM	Hospital Universiti Sains Malaysia
ICNA	Infection Control Nurses Association
MRSA	Methicillin – resistance <i>S. aureus</i>
NHS	National Healthcare Services
SP	Standard Precaution
SEHD	Scottish Executive Health Department
UP	Universal Precaution
VRE	Vancomycin – resistance enterococci
WHO	World Health Organization

ABSTRAK

Penilaian tentang pengetahuan, amalan dan reaksi terhadap *standard* dan *transmission-based precautions* di kalangan jururawat yang bertugas di bilik pembedahan di hospital universiti.

LATARBELAKANG DAN OBJEKTIF : Mematuhi amalan yang betul berkenaan dengan *precautions* amatlah dititikberatkan kerana ia mampu mengelakkan daripada berlakunya jangkitan kuman dan mampu memastikan keselamatan sewaktu bertugas. Kaji selidik yang dijalankan ini adalah untuk melihat sejauhmanakah pengetahuan, amalan dan reaksi para jururawat yang bertugas di OR, dalam mengamalkan *precautions* tersebut. Objektifnya, adalah untuk mengenalpasti hubungkait antara amalan, pengetahuan dan reaksi dan juga untuk melihat lebih dekat antara karekter mereka dalam situasi menjaga diri sendiri dan pesakit daripada terdedah pada bahaya jangkitan.

TATACARA : Kajian ini merupakan kajian soalselidik yang mana responden diminta mengambil bahagian dengan menjawab soalan yang diedarkan dan perlu disiapkan dalam tempoh waktu mereka datang bertugas. Soalan kaji selidik terdiri daripada tiga komponen utama iaitu berkenaan dengan pengetahuan, amalan dan juga reaksi yang berkaitan dengan *precautions*.

KEPUTUSAN : Terdapat satu petunjuk yang positif dalam kajian ini yang mana responden wanita lebih cenderung dalam mengamalkan carakerja yang selamat berpandukan pada apa yang disyorkan oleh *precautions*. Walaupun terdapat satu lagi kecenderungan yang mana bagi responden yang masih lagi baru keluar daripada kolej menunjukkan pencapaian positif dari segi pengetahuan tetapi tidak cukup menyakinkan. Secara keseluruhannya, tiada perbezaan dalam profil responden yang dapat dikaitkan dengan keberkesanan dalam mematuhi amalan *standard and transmission-based precautions*.

RUMUSAN : Kajian ini dapat memberikan sedikit gambaran tentang profil para jururawat yang bertugas di bilik pembedahan yang mana boleh dijadikan sebagai garisukur tentang tahap pengetahuan mereka. Data ini juga perlu dikembangkan agar ianya lebih terperinci dan munasabah, maka dapatlah dipertingkatkan amalan mereka. Dengan itu nilai-nilai ini perlu diterapkan lebih awal agar ia berakar umbi pada semua para pekerja yang bertugas di hospital.

ABSTRACT

TITLE : Assessment of knowledge, attitude and practices among operating room (OR) staff nurses towards the standard precaution and transmission-based precautions in university hospital.

BACKGROUND AND OBJECTIVES : These precautions are strongly recommended as the guidelines for preventing infections and ensuring occupational safety. This survey discussed on the level of knowledge, attitude and practices among OR staff nurses mainly related to standard precaution and transmission-based precautions. The specific objective of this survey are to identify relationship between variable demographic profiles of participants towards these precautions and to characterize the relation between knowledge, attitude and practices towards standard precaution and transmission-based precautions.

METHODS : This was a self-reported survey conducted during April 2009. Seventy-five out of 100 operating room staff nurses had returned back the completed questionnaires on the same day the questions had been distributed. The questionnaires comprised of three major components; the knowledge, the attitudes and the practices, towards the standard and transmission- based precautions.

RESULTS : There was significant differences towards the standard and transmission precautions were found among OR female staff nurses in term of practices as compared to OR male staff nurses. There were weak correlation on level of knowledge among younger age of female staff . However, the overall result did not showed any clear correlation and there was no significant differences in demographic profiles.

CONCLUSION : This study broadly profiles knowledge, attitudes and practice patterns of operating room staff, which may benefit healthcare educators in planning and developing appropriate educational programmes, may help organizations to provide a safe workplace climate and may aid healthcare workers to learn the important of personal responsibility in preventing infectious disease transmission to patients, co-workers and even themselves.

1. INTRODUCTION

Infection control precautions have been strongly recommended by the Center for Disease Control and Prevention (CDC) for many decades as a means of avoiding the spread of cross-infection, disease outbreaks and to ensure healthcare workers' occupational safety. In recent years, such precautions have involved a two-tiered approach based on modes of disease transmission and they include both standard and additional precautions (Garner, 1996).

Therefore, in 1996, The National Health and Medical Research and National Council on Acquired Immune Deficiency Syndrome (AIDS) recommended a standard precautions and transmission-based precautions (Osborne, 2001). This approach aims to protect patients and healthcare workers (HCWs) from any disease transmission or occupational exposure. Because the risk of blood exposure is substantial, the operating room (OR) is a primary area of concern for OR personnel (Akduman *et al.*, 1988, Panilio *et al.*, 2004).

Exposure-prone activities include starting intravenous lines, assisting in intubation, handling bloody sponges and specimens, picking up bloody instruments that have been dropped from operating field and transferring patient and bloody instrument (Ronk & Girrard, 1994; Kermode *et al.*, 2005). Compliance with standard precautions and transmission-based precaution guidelines is required to decrease the risk of exposure and disease transmission to OR staff (Jeffe *et al.*, 1998; Kim *et al.*, 2001).

Occupational exposure to human immunodeficiency virus (HIV), hepatitis B virus (HBV), Hepatitis C virus (HCV) and other blood-borne pathogens (BBP) poses substantial risks to HCWs, particularly in the regions with high prevalence of such pathogens (Wang *et al.*, 2002). Expert estimated that the number of people infected with HIV will be over 20 million by the year 2010 (Plafker, 2001). The prevalence of HBV infection is even higher, with 60% of the population having evidence of HBV exposure and 10% being chronically infected (Zhao *et al.*, 2000). In addition, the prevalence of HCV is rising. Unlike HIV and HBV, there are no immunization or chemoprophylactic interventions currently available to reduce the risk of infection after exposure to HCV (CDC, 2001).

Among the types of occupational exposure, percutaneous injury carries a higher risk for transmission of BBP than either cutaneous or mucous membrane contamination. The risk of transmission is estimated at 0.3 - 0.4% for HIV, 10 - 30% for HBV and 1.2 - 10% for HCV after injury with a contaminated needle (Gershon *et al.*, 1995, Bernadette *et al.*, 2001).

Nursing personnel experience a higher rate of workplace exposure than other HCWs (Beekman *et al.*, 1994). High-risk percutaneous exposures are most frequently reported by nurses (Gershon *et al.*, 1995), most likely because nurses perform more bedside procedures than other workers. In developing countries, excessive handling of contaminated needles, high patient demand for injections, and lack of safe needle and sharp containers enhance the risk of occupational transmission to blood-borne pathogens (BBP) (Sagoe-Moses *et al.*, 2001). Nurses working in central supply rooms, who are responsible for collecting, cleaning and sterilizing reusable equipment, have a high risk of exposure to infectious diseases (Chen, 2000).

In a range of studies, HCWs' knowledge of and compliance with procedures related to infection control have been examined. The groups concerned have included physicians, nurses, medical and nursing students and other groups of health-care providers.

The results of these studies revealed a significant deficit in knowledge of and compliance with infection control precautions (Evanoff *et al.*, 1999; Kim *et al.*, 2001; Atulomah & Oladepo, 2002; Shiao *et al.*, 2002; Askarian *et al.*, 2004). Indications are that HCWs often have had no specific training in matters of infection control, are frequently inexperienced in applying the necessary precautions and have poor knowledge of and performance capacity in handling such precautions.

Some studies have also established that the extent of adherence to and compliance with infection control precautions among HCWs is often unacceptably low (Evanoff *et al.*, 1999; Shiao *et al.*, 2002; Bennet & Mansell, 2004). A national survey conducted to probe the prevalence and characteristic of needlestick injuries among student nurses in Taiwan revealed that 67.3% of participants recapped used needles (Shiao *et al.*, 2002). This finding indicated that a lack of universal compliance with precautions for handling sharps exists within this group.

HCWs training in proper self-protective techniques should begin in professional and vocational school and continue as an ongoing process, and training programmes emphasizing blood and body fluid precautions should be part of all medical and nursing school curricula (Jaffe *et al.*, 1999).

1.1. Objective of The Study

1.1.1. General Objective

To assess the knowledge, attitude and practices levels of operating room (OR) staff towards the standard precaution and transmission-based precautions.

1.1.2. Specific Objective

- i) To identify profiles of OR staff based on their demographic variables and their current level of knowledge, attitude and practices towards the standard precaution and transmission-based precautions.
- ii) To characterize the relationship between their knowledge, attitude and practices towards the standard precaution and the transmission-based precautions.
- iii) To explore any differences in the demographic factors which related to their knowledge, attitude and practices towards the standard precautions and transmission-based precautions.

1.2 HYPOTHESIS

The compliances towards the standard and transmission-based precautions mainly influence by the level of knowledge, behaviour and belief of that individual and depends on local practices.

2. LITERATURE REVIEW

2.1 Background

Internationally, standard precautions (SP) [previously known as Universal Precaution (UP)] have been regarded as fundamental in the control and prevention of infection and are considered an effective means of protecting healthcare practitioners, patients and the public (Department of Health, 1998; Ward, 2004; Golan *et al.*, 2006). In addition, they are regarded as effective in reducing the healthcare – associated infections (HAI) [Jadoul *et al.*, 1998; Department of Health, 2003].

Infection control precautions had been changed from UPs to SP since 1996 in US (CDC, 1996), 1999 in Canada (Health Canada, 1999), and in other countries e.g. the UK (Department of Health, 2003), they are also recommended. However, it is evident from the research that adherence to, and practice of SP are a concern and internationally suboptimal amongst many professionals (Osborne, 2003; Askarian *et al.*, 2005; Gammon & Gould, 2005).

Over the past 20 years, healthcare workers (HCWs) have become increasingly aware of potential occupational health risks related to blood-borne pathogens (BBP). In the latter part of the 1970s, the focus of concern was hepatitis B virus (HBV) infection. In the early 1980s, human immunodeficiency virus / acquired immune deficiency syndrome (AIDS) was the disease of concern. In the early 1990s, hepatitis C virus (HBV) infection was a recognized concern for HCWs. Now, attention turning to drug – resistant organisms such as methicillin – resistant *Staphylococcus aerus* (MRSA) and vancomycin – resistance enterococci (VRE) as possibly posing a risk. Transmission of these and other disease is related to direct contact with infected patient, their equipment or both (West *et al.*, 2007).

The occupational risks of blood-borne diseases result from employees' exposure to BBP. Such exposure is influenced by different environmental factors such as increased contact with contaminated needles or sharps, the seroprevalence of HIV or HBV in the population. Condition and practices in an environment such as the OR may increase the duration and frequency of HCW exposure to blood (William *et al.*, 1994) which increased the risk of occupationally acquired diseases transmission (Gershon *et al.*, 1995, Gemert-Pijnen *et al.*, 2006).

The World Health Organization (WHO) reported that of the 8,422 infected individual worldwide, 1,725 (20%) were HCWs (Ho *et al.*, 2003). More than half of the person-to-person transmission within healthcare facilities was to HCWs, especially in Hong Kong, which reported that 62% of the person-to-person transmission cases were HCWs (Thorne *et al.*, 2004). This highlighted the need to re-visit the principles infection control practice and to remind HCWs of the risk of occupational exposure disease transmission (Ho *et al.*, 2003).

Universal precautions (UP) referred to the routine use barrier precautions used by healthcare practitioners, to prevent contamination by blood and specific body fluids, from all patients, that were visibly contaminated with blood (CDC, 1987). CDC (1987) defined UP as a set of precautions designed to prevent transmission HIV, HBV and other BBP when providing any form of health care.

It was suggested that the blood and certain body fluids of all patients be considered potentially infectious for HIV, HBV and other BBP. UP involved the use of protective barrier such as gloves, aprons, masks or protective eye wear, which can reduce the risk of exposure of the healthcare practitioners' skin or mucous membrane to potentially infective materials.

In addition UP recommended all that practitioners take precautions to prevent injuries caused by needles, scalpels and other sharps instruments or devices.

The term UP has now been superseded by the term standard precautions (SP) [Pratt *et al.*, 2001], with research findings alleviating initial concerns over the concept and cost of such a routine approach to practice (Leclair *et al.*, 1987; Klein *et al.*, 1989). The value of such an approach to preventing and controlling infection is now generally accepted (Wilson, 2001), and reflects the wider agenda of risk management, which aim to improve health and healthcare outcome (SEHD, 2001).

Risk means the chance of something happening that affects outcome, and is measured in terms of severity and probability. In the National Healthcare Service (NHS), different types of risk exist, such as financial, organisational and clinical, and these risks can result in adverse events. Infections contribute to a large proportion of adverse event (Leape *et al.*, 1991), and managing such risk requires individuals and organisations to recognise the cause of such problems, analyse, communicate and act to prevent recurrence (Damani, 2003).

Applying and practicing all these precautions is strongly recommended in everyday clinical activities to prevent infections and thus ensure the safe delivery of healthcare. Many international studies have shown that the risk of morbidity and mortality in patients and HCWs and the rate of cross-infection among them can be reduced successfully by appropriately applying and strictly adhering to the demands of infection control precautions (Affonso *et al.*, 2004; Cromer *et al.*, 2002; Quah & Lee, 2004).

Chalmers *et al.*, (2006) mentioned that the ability of HCWs to recognise and address risk, such as risk of needlestick injury when managing sharps, can improve the quality of care patients receive. To maximise such benefits and enhance good practice, healthcare organisations need to create a culture that actively encourages staff to develop their knowledge and understanding of risk and risk management. One key measure to manage the risk of infection is to adopt standard infectious control precaution. Therefore CDC (1996) publish, as part of their Two Tier Isolation System, Standard Precaution (SP) and Transmission-based Precautions.

2.2 Standard Precautions

Standard infection control precautions incorporate both universal precautions – designed to prevent transmission of blood-borne infections, and body substance isolation – designed to reduce the risk of transmission from other body substances (Pratt *et al.*, 2001). Therefore both HCWs and patients are protected from the risk of cross-infection and they must be applied by all HCWs in all healthcare settings, to the care of all patients, all of the time, whether an infection is known to be present or not (Lawrence & May, 2003). This approach to infection control is a two-tiered system.

The first tier, standard precaution, is the primary strategy for successful nosocomial infection control and exposure reduction for HCWs (Bauer, 1991). The standard precaution are used when contact is required with blood, bodily fluids, secretions, excretions, non-intact skin and mucous membranes or any item soiled or contaminated with any of these substance. They are applied to all patients regardless of diagnosis or infection status (Borton, 1997). They consist of nine elements (Table 2.1) based on the use of practices and procedures to prevent or reduce the likelihood of infection being transmitted (Pratt *et al.*, 2001).

Table 2.1 : Infection Control Nurses Association (ICNA) 2003

Standard Infection Control Precautions
Hand hygiene
Personal Protective Equipment
Safe use and disposal of sharps
Safe handling and disposal of waste
Safe management of laundry
Food hygiene
Maintenance of a clean environment
Decontamination of equipment
Staff hygiene

The second tier defend in infection control practice is transmission-based precautions. They are used when the standard precautions are insufficient to prevent transmission of a known or suspected infection, or when there is colonization with an epidemiologically important or highly transmissible pathogen, which usually occurs through air-borne transmission, droplet transmission or transmission via direct or indirect contact with intact skin or contaminated surfaces (Osborne, 2001).

Katherine *et al.*, (1997) mentioned regarding organisms that listed in the airborne grouping are those that are transmitted by droplet nuclei (small particle residue or evaporated droplets that might be suspended in the air for long period of time) or dust particles containing an infectious agents. These organisms can be carried by air currents or inhaled by a susceptible host. The primary diseases that come to mind are tuberculosis, varicella, and measles.

A separate grouping is needed for mumps, rubella, influenza, and pertussis. Patients with clinical disease or who are carriers can generate large particles droplets. Droplet transmission takes place when the infected patient cough, sneezes or talks, and during procedures such as suctioning or bronchoscopy. Droplet transmission precautions focus on contact of the conjunctivae or mucous membranes of the nose or mouth of a susceptible person with these large particles droplets. Large particle droplets do not remain suspended in the air and only travel short distances (3 or fewer feet).

Katherine and colleagues (1997) further described on the contact transmission which involves skin-to-skin contact and the transfer of micro-organisms from an infected contact or colonized patient to a susceptible host.

Contact transmission precaution would be taken when bathing a patient or turning a patient. Methicillin – resistance *S. aureus* (MRSA) has been shown to be spread in this manner. MRSA and Vancomycin – resistance enterococci (VRE) have been shown to survive on the hands of healthcare personnel for several hours (Boyce *et al.*, 1996). Indirect contact also is a concern; it involves the contact of surface. VRE has been shown to be spread by this route. Studies have shown VRE to survive on surface for up to 5-7 days (Boyce *et al.*, 1996).

2.2.1 Hand Hygiene

Hands play a significant role in the transmission of infection between patients (Reybrouck, 1983), with the potential of adversely affecting patient outcomes. Handwashing, therefore, is the single most important measure for preventing the transmission of infection. Despite this, many studies have shown that HCWs fail to wash their hands appropriately (Gould, 1993; Glynn *et al.*, 1997; Pittet *et al.*, 1999).

Factors that influence hand hygiene compliance include workload and staff shortage, poor facilities and lack of understanding (Wilson, 2001). Hand hygiene should become part of routine care provision and, therefore, improving understanding and changing behaviour are essential.

Roberts and colleagues (1998) conducted a study of physicians, nurses, and assistive health workers in a facility for older adults. The data were gathered by two surveys and direct observations of clinical staff. Result showed that 45% health worker did not wash their hands and 24% did not change their gloves between patient consultations. The authors also cited the estimated annual costs of nosocomial infections in United States as being between \$5 - \$10 billion.

The principles of hand hygiene are rooted in understanding the skin, and its microbiological state. Skin provides a micro-environmental that supports the growth of microbes and two populations can be found on the hands – transient and resident micro-organisms (ICNA, 2002). Resident micro-organisms have adapted to the acidic conditions of the skin, and are not readily transferred to others. As such they play a significant role in protecting the skin from harmful invasion.

Transient micro-organisms are acquired on the hands through contact, and are easily and readily transferred to others. Removal of transient micro-organisms is essential to prevent and control the spread of infection during routine clinical care (ICNA, 2003).

However many studies have shown that compliance of HCWs with hand hygiene recommendations is low (Pettit, 2001). Full compliance with hand hygiene guidelines seems unrealistic, especially in intensive care unit (ICUs) where compliance is low (Voss *et al.*, 1997; Pettit *et al.*, 1999).

2.2.2 Personal Protective Equipment (PPE)

Protective clothing is a requirement of health and safety legislation, and should be available in all clinical areas, where its use is based on risk assessment of the planned activity or care (NES, 2005).