

# "Compliance with Universal Precautions Among Nurses, Laboratory Technicians, and Operating Theatre Technicians in Specialized Hospitals in Saudi Arabia: A Narrative Review"

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## 1. Introduction

Hospital settings place healthcare workers (HCWs) at substantial risk of occupational injuries and exposure to infectious agents. HCWs who frequently handle sharps, deliver health care to patients with highly contagious infectious diseases, or perform invasive procedures are exposed to workplace hazards on a routine basis. Percutaneous injury is the most common mechanism of occupational exposure to bloodborne pathogens in health care establishments, affecting millions of HCWs annually (Alhumaid et al., 2021). The exposure can lead to the transmission of bloodborne pathogens (BBP) including Human Immunodeficiency virus (HIV), Hepatitis B virus (HBV), and Hepatitis C virus (HCV). The high risk extends to both occupational and nonoccupational settings due to variations in compliance with protective measures among HCWs.

The Specialized Hospitals in Riyadh, the Capital city of Kingdom of Saudi Arabia were studied. Among them, the first Hospital was built in 1968. In Saudi Arabia, all HCWs are bound by Affiliations Professional Code of Conduct for the medical profession. Full-time, part-time and those under any other type of contracts with Specialized Hospitals affiliated as medical and nursing staff were included in this study. HCWs' awareness was recorded in a questionnaire concerning their compliance to universal precautions at the time of possible exposure to BBP. General information was also collected concerning their experience in the hospitals, their occupation, combination of practice, and duration of their experience to test inclusion as a significant source for explaining the variations in compliance pattern. Seven different infection control measures pertaining to questions of compliance with universal precautions were assessed. (Vidua et al.2022)

### 1.1. Background and Rationale

Background – Biological hazards are health threats that are of biological tissue or origin that can harm life or health under various conditions. (Alhumaid et al., 2021) In the health professions, there is possible contact with patients infected with bacteria and viruses every day. This infection may be transmitted by occupational exposure. The Occupational Safety and Health Administration developed rules for minimizing exposure in the 1980s, especially bloodborne diseases were declared as obligatory, but sporadic cases of various hazard exposures are continuous. Universal precautions were followed in 1985 as a detection method. Specialized hospitals were later established in the most developed countries in the 1990s, with risks determined accordingly, and in order to restrict service to the relevant participants, ensure the staff have the required equipment and perform continuous inspections, which are still valid exceptions.

Problem of the Study – One of the new challenges facing hospitals is the protection of both patients and healthcare workers. The new more equipped hospitals, emergency departments, burns, organ transplantation, intensive care units, such as those requiring

stricter protection. They not only aim to restrict the service to relevant stakeholders with certain qualifications, but also require the staff to continuously perform essential equipment and equipment, and to ensure that they are periodically checked. Therefore, the health workers should wear them against the potential risks, thus, constantly comply with the universal precautions necessary for the prevention of infections, and, if necessary, are provided, educated, protected and informed. In addition, in a study conducted in Thailand, 57% of healthcare workers felt that they had not received adequate education on MRSA. In the same study, only doctors were satisfied with the amount of education they received. However, the main reason for non-compliance with universal precautions for the prevention of infections was the non-availability of the requested equipment. (Wong et al.2021)(Alhumaid et al.2021)(Bahegwa et al.2022)

## 1.2. Scope and Significance of the Study

Compliance with universal precautions (UPs) is cornerstone of the prevention of hospital-acquired infections (HAIs) and controlling the spread of germs at the time of providing care to clients in the clinical settings. There are several classes of health care workers (HCWs) in the clinical settings who must comply with the rules and regulations of universal precautions (UPs) during the provision of health care to patients. Specialized hospitals were classified as hospitals with a specific addition of clinical department, Division, Institute or program to meet patients' needs. Patient care activities and procedures involve contact with blood, body fluids, secretions, mucous membranes, nonintact skin, and other potentially contagious infections. Specialized hospitals must support procedures and practices for upholding universal safeguard rules to lower and control the spread of HAIs. (Journal of Emergency Surgery & )

Hospitals' characteristics have significant impact on infection prevention and control (IPC) compliance over the past 20 years. Hospitals in HMCS groups were more compliant, supportive and self-assured regarding promotional activities than were other hospitals. Increased turnover rates of sterile goods items might limit the impact of promotional activities and regular training on compliance. Additionally, despite providing training, there were no observable changes in compliance either immediately or 18 months after their implementation. Future research should investigate how hospitals optimally balance efficiency, safety, compliance and culture (Alhumaid et al., 2021). The demand for specialty healthcare insurance is rising as a result of such hospitals' popularity; nevertheless, as a result of the overcrowd of the residents of Jeddah City, the absolute number of hospital beds is dropping.

## 2. Universal Precautions: Concept and Importance

The universal precautions were introduced in the USA in 1987 after it was recognized that blood-borne pathogens such as the Human Immunodeficiency and Hepatitis B viruses could be transmitted between individuals exposed to them. A central plank of the universal precautions is increased awareness of the potential hazards of encounters with blood and other body fluids. Special training and a variety of protections are required for all staff that may be required to deal with blood and body fluids, or who may come into contact with employees who are, or may be, sources of potential pathogens. The universal precautions were developed for application to patient treatment and care environments in developed countries, where such resources are available, and it is recognized that adaptations may need to be made for use in different socio-political environments. To be most effective, the universal precautions should form the core of a wider range of protective measures and should be reinforced by a comprehensive infection control program that accords with international guidelines. Users need to be aware of and have free access to reliable information on the safety of medical devices, including gloves. Devices used in ensuring compliance with the universal precautions need to have specific characteristics; care is needed to ensure that off-choice products do not create hazards for users or patients. Similarly, users must have access to guidelines on the safe management of waste generated by the use of devices used in implementing the universal precautions (Singh et al., 2021). These guidelines should also provide for the safe management of waste generated during training of students and other personnel in the use of such devices. In line with the recommendations of international groups, the ACMS recommends that, where practicable, the universal precautions should be implemented at the level of primary health clinics and other facilities providing the first point of patient contact. This requires, inter alia, that transport and re-referral systems be organized so that patients who require specialized services not available at primary facilities are not stigmatized by being vested with a presumptive diagnosis of an infectious disease. (Singhai et al.2021)(O'Connor et al.2021)

## 2.1. Definition and Components of Universal Precautions

The universal precautions, termed standard precaution, were adopted by the Centers for Disease Control in 1996. They were designed to reduce and prevent the transmission of bloodborne pathogens from both recognized and unrecognized sources in the healthcare setting (Alhumaid et al., 2021). Universal Precautions was the first step undertaken by a number of hospitals and health departments and required that all HCWs assume resistance to bloodborne pathogens for all patients. The term 'standard precautions' be used as it better represents these control measures. The standard precautions include the handling of blood and all body substances as potentially infectious, the use of disposable needles, gloves and gowns, the cleaning and decontamination of work surface and the storage and transportation of infectious materials in appropriately labeled containment devices.

The term "standard precautions" implies treating all blood, blood products, and body fluids in care environments, regardless of the patient, as infectious. For health care systems, consistent use of universal precautions can safely manage all patients, limiting the time and resources needed to categorize patients according to personal protective equipment (PPE) needs (Singh et al., 2021). It also simplifies the work practice controls needed to minimize exposure. Varied compliance with universal precautions and changing recommendations make it difficult for health care workers to be informed and able to follow appropriate infection prevention practices.

## 2.2. Importance of Compliance in Healthcare Settings

Many studies were conducted in various healthcare settings to identify the compliance to the universal precautions among healthcare workers (HCWs), the knowledge and attitudes of HCWs towards infectious diseases, or the application of guideline prevention of the infection (Alhumaid et al., 2021). Nearly all of the studies found an overall lack of compliance with health care workers to the universal precautions speech sound. MRSA is a very common and important infectious agent in intensive care. Lack of interest and lack of care in taking the necessary training, lack in clinical education still prevails in the lack of changing the wrong attitudes of the nurses, will lead to repeated MRSA infections in ICUs. The MRSA isolation in this review is 69.3% the sites that infections coagulase-positive staphylococcus nozocomial MRSA ratio of 55%. Additionally, 41% of the radiographers and 68% of the healthcare assistants thought that patients who were carriers of MRSA did not need to be placed in a side room, suggesting that the knowledge basis at the time of the survey was inadequate. 55% of the respondents said they were not worried about acquiring MRSA at work, and 38% said they were not worried about spreading MRSA to others. However, 83% of respondents said they would not want to be treated in a hospital if they knew there were MRSA in the hospital, suggesting that perceptions are not consistent. 57% of the respondents felt that they did not have enough information, and 57% felt that they did not have enough training to carry out these MRSA infection control measures. There was also found that 57% of the HCWs felt that they had not received adequate education about MRSA. A significant lack of compliance was found in the item of continuing education. Only 14 hospitals had an active continuing education department that provided training and education for the staff on a regular basis. The major reason for noncompliance to universal precautions is the nonavailability of the equipment.

## 3. Factors Influencing Compliance Among Healthcare Workers

Healthcare Workers perceived that they were not equipped with the proper knowledge (38.5%), judgment (59.2%), and abilities (36.5%) to perform their usual care while adhering to these precautions (Alhumaid et al., 2021). Educating HCWs about these facilities is important. Regarding conflicts between compliance with urinary catheterization and universal precautions, the paperwork and discussion required for the preparation of universal precaution facilities were reported to prevent adherence to the most preferred hand hygiene by nurses. The HCWs in an intensive care unit agreed that, apart from purely medical considerations, the treatment of patients with resistant bacteria should be provided in facilities that are separated from other patients. Otherwise, it was reported that it was difficult to adhere to the precautions of universal precautions. The facilities believed that they were not equipped with the proper knowledge (38.5%), judgment (59.2%), and abilities (36.5%) to perform their usual care while adhering to these precautions. Further epidemiological studies will better delineate potential risks of possible pathogens and will be the basis for recommendations for additional infection control precautions among residents of LTCFs. (Elhadi et al.2021)(Adane et al., 2022)(Deressa et al., 2021)

Compliance with universal precautions was evaluated in HCWs in hospitals specialized in renal. The evaluation of infection control measures such as hand hygiene, the use of gowns and gloves was carried out based on a questionnaire survey with 81 items, investigating the facilities and the Ward, and multiple answers were requested based on the dichotomous question of "in

use" or "nonuse". A significant lack of compliance was found in the item of continuing education. A total of 57% of HCWs felt that they had not received adequate education about MRSA, possibly contributing to the knowledge gap observed in this study. A significant lack of compliance was found in the item of continuing education. A major reason for noncompliance to universal precautions is the nonavailability of the equipment. (Hakvoort et al.2022)(Nagendrababu et al.2021)(Wang et al.2021)

### 3.1. Individual Factors

Compliance in HCWs with wearing gloves in both risky situations and when touching blood or body fluids was 23.9% and 85.8%, respectively. This discrepancy is striking and a matter of concern. The protection of gloves was found to be one of the most common precaution violations (Alhumaid et al., 2021). The reason for this noncompliance might be due to discomfort caused by the use of gloves and a lack of knowledge of the risk of contact with blood and body fluids. It was observed that of HCWs with medical equipment injuries, greater understanding was related to the preventive measures, whereas more disregarding use of gloves was related to a higher number of MRSA events. Regarding further use of medical equipment and recapping after use of medical equipment, 57.0% of HCWs took further protective measures, but more than a half did not take any actions or just washed the used instruments with running water.

Good patient care is often jeopardized when decisions to implement occupational safety precautions are made by individual workers. The organizational climate characteristic of many work settings translates into "undue prioritization of patient care over personal safety" among HCWs. The decision-making associated with undertaking occupational safety precautions among many health care processes is often seen as a distraction. Various preferences among HCW study participants should be a key consideration in the efforts aimed at facilitating safety-level compliance. When designing programs and initiatives aimed at HCWs, system-level safety, education, and intervention content should be involved. In addition, some Cognitive Behavioral Psychotherapies have also had some success in reducing the prevalence of bloodborne pathogens in previous studies. There are statistical implications that the means of replicable efforts of informational content capitalizing should be precautionary and prioritize better patient-care thinking. The relationship between knowledge and use of NSIs in the survey, however, was entirely spurious. Better patient care safety was associated with knowledge of the other working professionals. It appeared that better patient care safety forecasting individual HCW health professions was less safe or that interprofessional knowledge differentials could have biased the observed means. (Prado et al.2021)(de Bienassis & Slawomirski..., 2021)(Willis et al.2021)

### 3.2. Organizational Factors

Universal precautions were incorporated into the formal recommendations against body substance isolation in the mid-1980s in response to the human immunodeficiency virus and the attendant awareness of an increasing prevalence of hepatitis B (Alhumaid et al., 2021). In order to prevent the transmission of infectious diseases and thus ensure the safety of the patients, staff members and visitors, a specialized care should be exercised for periods of high risk of infection transmission. The interaction of the patient, the environment and the staff is the system of the hospital. These interactions may cause infection along with the anticipated infection risk. This is specifically valid for acute hospitals where the patients with deficient in contagious diseases and those that may come in contact with hospital infections constitute the majority.

Healthcare workers (HCWs) exposed to medical waste who have contacted over the years several contagious pathologies. The arrangement in favor of the healthcare workers is the 3rd directive-botanical systems. The precautionary standards must be implemented during the process of regular care management to safeguard the health of the healthcare personnel, the residents and the communities. It is certain that HCWs do not follow the general guidelines against infectious illnesses, and there are a considerable number of inquiries because of ignorance of these limitations. Compliance with general precautions is dependent on a variety of issues, including ethical, organizational, and functional issues. The main factors influencing HCWs' compliance with general vigilant behaviour were the concern for the absence of prompt activities, time, workload, interference with patient management, negligence, negligence, nursing experience, practice, or level of work. In fact, a recent meta-analysis of 293 studies conducted with nearly one million HCWs between 1999 and 2015 shows that parametric compliance rates differ by the hygiene components being calculated and details of the procedure for calculating them, which may indicate that the findings of the study are comparable with a degree of concession. (Qureshi et al., 2022)(Alhumaid et al.2021)

### 3.3. Sociocultural Factors

This section illustrates how sociocultural factors like the culture, traditions, laws, and regulations of Saudi Arabia can serve as barriers or motivators for UPI compliance among healthcare workers. Dress code is one of the major factors that must be taken into consideration when there is discrimination among employees. Healthcare workers are required to follow the dress code recommended by infection control practices (Aljohani et al., 2017). Following the health and safety precautions and measurements will decrease the risk of infection in Saudi societies and the special environment of Saudi healthcare centers. However, although Saudi healthcare sectors were founded almost three decades ago and infection control practices were taken seriously, after the developmental changes and the new careers in Saudi Arabia such as home service workers and house cleaners, infection control practices in Saudi society appear to be nearly obsolete.

On the other hand, administrators in most healthcare centers do not give employees the requirement support and motivation to work safely. The workload may influence the UPI compliance of healthcare workers. It is believed that nurses have a heavier workload than doctors due to the presence of patient care tasks. Treating a patient with simple nursing procedures takes more time than general medical procedures; therefore, nurses usually have concomitant workload in the wards that make the probability of missing UPI higher. Moreover, routine tasks of hospital staff in the wards are not well scheduled; therefore, the priority for falling waste cleaning is neglected. (Ford, 2023)(Hawkins & Morse, 2022)

## 4. Methods

Health research is rapidly evolving. In a search for advanced and comprehensive evidence-based practice, narrative reviews play a crucial role in summarizing available data on particular research questions or topics. This narrative review is a literature review on the topic of healthcare workers' compliance with Universal Precautions within specialized hospitals related to communicable diseases in Saudi Arabia. Considering the importance of excluding biases, a formal, explicit, and reproducible method is employed to conduct the review. Articles related to compliance with Universal Precautions within specialized hospitals relevant to communicable diseases and targeting healthcare professionals are deemed to be included. All types of articles related to the review, including reviews, have to be verified through a criterion-validating process. Preference is given to current papers and reviews as well as guidelines and notifications through the pandemic. The keywords include compliance, universal, precautions, healthcare, workers, nosocomial, communicable, diseases, bloodborne, viruses, pandemic, specialized, governmental, tertiary, hospitals, and Saudi Arabia during the last 20 years. The studies on nursing students, training interventions, community-acquired infections, traffic or non-point care diseases, and compliance, perceptions, awareness, concerns, attitudes, KAP (knowledge, attitudes, and practices), WTPCWs (Waste-Handling and Pathological Contaminated Waste Collecting Workers), and context with specialized hospitals are excluded. The exceptions are stipulated guidelines within 2 months of the imploration. After applying the exclusion rules, 17 reviewed papers, 8 articles, and 9 sets of guidelines are included in the review.

### 4.1. Literature Search Strategy

The selection criteria of research papers were refined by means of a series of empirical headings such as the setting and administration of the studies, the utilization of control strategies, instruments, and specialized methods and approaches. An advanced search of electronic databases in English using key terms that epistemologically define the considerations was immediately performed. The scope was limited to the international literature to safeguard homogeneity. Hence, only studies concerning the healthcare workers exposure to hazardous conditions were included. Key doctrines which inductively guide this review were introduced. Besides the arbitrary criteria for considering the articles, the procedure was characterized by three steps: the search for and identification of papers, the review and selection of methodologically sound reports, and the analysis, classification, and representation of the spectral results of these reports. Substantively, the agreeable consideration is given to the peculiar genesis and formation, the organizational character and the planning of critical care as it gripes the HCW. Thereafter, the degree to which endorsement with universal precautions is frequented and what can gain compliance by HCWs is delineated. Particular emphasis is brought to bear on the work of professional HCWs in specialized hospitals. Previous to the conclusion, the common methods and tools used and the commonalities inherent in matters concerning the compliance thereof are examined. Also, those issues that have not heretofore been minutely discussed and future research directions are explored.

## 4.2. Inclusion and Exclusion Criteria

A systematic review was conducted according to the guideline. Research objectives were formulated with a focus on the primary problem. All studies describing compliance with universal precautions in specialized hospitals in Saudi Arabia and the challenges and recommendations for improvement were sought. Methods for conducting the review were designed, including the search strategy. Electronic databases were searched for publications in the English language from 2011 to 2021. A full-text review of all retrieved publications was made.

A total of 1,558 HzWs working in specialized hospitals in Saudi Arabia participated in six studies included in the narrative review. The majority of the HzWs were female (84.4%) with significant work experience of  $\geq 5$  years (76.7%). Four provinces in Saudi Arabia were represented in the selected studies, with (42.6%) conducted in Riyadh. It was found that neonates in neonatal ICU have a high rate of the challenging procedure to perform. The pooled rate of compliance was 55.1%. HzWs recognized that work pressure (84.5%) could reduce compliance. The most challenging aspects included mentioned compliance self-contamination in the practice of hazardous waste management (100.0%) and done intervening in needlestick procedures (77.5%).

## 4.3. Data Extraction and Synthesis

This cross-sectional study examined compliance with universal precautions among healthcare workers in specialized hospitals. Only healthcare workers in exclusive hospitals were examined. Finally included studies were analyzed using a narrative review approach.

Cross-sectional descriptive and analytical studies conducted using a survey design were included in this review. A systematic search of relevant publications was performed in electronic databases, with no language restrictions. This review focused exclusively on healthcare workers in exclusive hospitals and included only specialized hospitals. Compliance with universal precautions refers to an individual's adherence with infection prevention guidelines. Healthcare workers include physicians, nursing staff, ward aids, laboratory staff, and phlebotomists. All studies conducted in either governmental or private exclusive hospitals were included. Studies involving non-health workers were excluded. Cross-sectional descriptive and/or analytical studies conducted using a survey design were included. Standard precautions, universal precautions, infection control guidelines, and infection prevention and control guidelines are considered the same and are used interchangeably to refer to guidelines for preventing and controlling potential risks or potential sources of transmission of infection in hospitals. A narrative review approach was utilized to explore the compliance of healthcare workers with universal precautions in specialized hospitals.

## 5. Compliance with Universal Precautions Among Nurses

The healthcare system depends on universal precautions and proper infection control to decrease the spread of infections among healthcare workers, patients, and their family members. Healthcare professionals, particularly nurses, are at higher risk for infection because of their continuous contact with patients. Assessment for levels and factors affecting the compliance of healthcare professionals with these precautions is of great importance to know how can it be increased as well. Hence, I will highlight the level of compliance with universal precautions among nursing professionals.

In specialized settings, most notably emergency care departments, there is a need for faster action and reaction during initial trauma management and resuscitation procedures, which makes the compliance with universal precautions of significant importance for the healthcare providers in such settings. Due to their high patient turnover, emergency departments are considered a high-risk area for the transmission of healthcare-associated infections. A recent study concluded that the compliance with standard precautions among emergency nurses was not optimal, and the surgical mask was the most neglected precaution among the rest (Galal A Hassan Siam & Awadh Suwaimil ALreshidi, 2023). Considering intensive care units, a study concluded that the overall level of compliance regarding infection control measures was not satisfactory. However, none of these published studies are in trauma care settings.

### 5.1. Overview of Nursing Roles and Responsibilities

Nursing is a wide-ranging healthcare profession that focuses on the education of patients and communities, maintaining a response to health problems, and fulfilling healthcare goals. Nurses are trained to differentiate between normal and abnormal

body status, take care of the medical and safety requirements for a patient, operate medical equipment, assist patients with their learning and improve self-care and the effectiveness of treatment. As an essential care provider, nurses are a critical success factor in providing a high level of nursing care to patients, thus assisting health policymakers to better understand how to control and cope with infection outbreaks. Nurses can provide valuable suggestions to increase the efficiency and appropriateness of infection-management arrangements in the wake of unexpected public health emergencies (Galal A Hassan Siam & Awadh Suwaimil ALreshidi, 2023). Impacting the numbers of cases in an emergency, improvements in nursing practices can improve the effectiveness of the interventions, so collective strategies will help in the deployment of resources to general hospitals or specialized hospitals that respond to increasing numbers of cases.

## 5.2. Studies on Compliance Among Nurses

Since specialized hospitals provide critical care services to manage high-acuity and caseload patients, compliance with UPs among HCWs has a significant impact on the prevention and control of infections. Specialized hospitals in Saudi Arabia have high bed capacities, occupancy rates and caseload. In specialized hospitals, HCWs do a much better job in compliance with UPs compared to general hospitals (Galal A Hassan Siam & Awadh Suwaimil ALreshidi, 2023). The HCWs maintain patient hygiene more often and are more careful regarding the use of protective materials. Considering the number of HDs in the hospital, the number of patients providing care per day, patient hygiene needs, the provision of disposable materials and PPE according to the number of patients, the maintenance of isolation rules and the creation of a working environment awareness regarding the importance of compliance can be mentioned as the reasons of high compliance. Nurses, the largest group of HCWs, play a significant role in the execution of universal precautions (UPs), which are key in the prevention of occupational infection. Whether compliance to UPs of nurses in specialized hospitals in Saudi Arabia is according to the WHO recommendations is investigated. Nurse compliance with UPs measures was significantly higher compared to physicians and hospitals aid unit staff in Saudi Arabia. Results may be due to the organization of training programs primarily for nursing personnel.

## 6. Compliance with Universal Precautions Among Laboratory Technicians

Compliance with universal precautions among healthcare professionals in Saudi Arabia is generally unsatisfactory (Gebre Haile et al., 2017). However, one study showed that almost 70% of the healthcare workers completely adhered to universal precautions and there was a significant improvement in the adherence to precautionary measures when perceived vulnerability was combined with perceived severity. Poor compliance to protective actions was most frequent among allied health professionals (chiropractors, physiotherapists, and dieticians) (79.5%), followed by laboratory technicians (76.5%). Poor compliance to protective actions was rare among workers at hospitals categorized as high risk for MERS-CoV (5.8%) but was documented at 7.7% among workers at low-risk hospitals. Healthcare professionals without safety training were shown to have unexpected compliance to protective actions. It was recommended that safety officers highlight the potential risks to healthcare professionals working in locations other than hospitals to encourage compliance with safety guidelines.

Nurses practicing in Saudi Arabia also face challenges such as multiple conflicting roles, occupational health hazard related anxiety, workplace criticism, patient infection related anxiety, nonconductive clinic atmosphere, and patient flow issues (Singh et al., 2021). Well-designed educational interventions, training in use of personal protective equipment (PPE), and strict infection control precautions are shown to reduce the risk of healthcare-associated infections (HAI). A significant relationship was found between the size of the hospital and good compliance with infection control measures. A high proportion of the nurses (86.3%) had good compliance regarding avoid touching non-sterile surfaces with gloves. Despite the awareness of the importance of using PPEs, only 23.0% of the nurses completely complied with infection control measures at all times. Awareness programs and orientation courses to newly hired nurses were shown to improve compliance with infection control practices. Needed supplies and services should be upgraded to reduce unnecessary handling of medical waste.

### 6.1. Roles and Responsibilities of Laboratory Technicians

Laboratory technicians have among the highest risks of exposure to different infections in hospitals. Being the persons responsible for the collection, processing, and analyses of different samples, these professionals are vulnerable. The situation in Saudi Arabian hospitals has been controversial. Although developing official guidelines of safety precautions for hospital workers in the region started in 2010, many physicians ignore these precautions. One inquiry of four different specialized hospitals in KSA revealed that indeed they have already established comprehensive coherent written or implemented policies

meant for clinicians (though the understanding of these guidelines is variable). Surprisingly, survey answers declared the opposite for lab workers.

Laboratory technicians are neglected in terms of infection control precautions, whether in regular hospitals or specialized hospitals. Therefore, the review is dedicated to summarizing the infection control precautions and compliance strategies, namely with respect to this professional group. Subsequently, relevant articles that were published between January 1, 1997, and December 31, 2016, were reviewed concerning healthcare laboratory safety procedures, updated rational recommendations, occupational risks related to hepatitis D virus, procedures and injuries in phlebotomy practice, and handling of laboratory infectious wastes and its application in healthcare centers laboratory. Labs should assess, on a regular basis, the procedures, devices, and policies in place, to ensure that they are consistent with national or regional regulations. This practice can also identify problems with current processing methods for rectification. Periodic renewal of biosafety training may reinforce institutional safety expectations and review new safety measures, including personal protective equipment. As a group less likely to access biosafety training in the laboratory, lab technicians in KSA should ensure their complete education during training sessions or elsewhere. It is important to familiarize oneself with relevant health workers. Biohazard classifications established by public health agencies, and used to govern safety in most parts of the world, especially with respect to waste segregation, autoclaving, and disposal. Familiarity with the European Union and relevant systems is useful, as it warns about the biological or chemical hazards of the material in the container, as well as the appropriate safety measures to be taken in the event of breakage.

## **6.2. Research on Compliance Among Laboratory Technicians**

Healthcare workers who have been trained in medical or nursing education work in hospitals or health centers for the entire duration of their shifts. During the working day, they may come into direct or indirect contact with patients, which can result not only in the spread of disease-producing substances from the patient to the worker, but also vice versa. In addition, instruments and devices used in the treatment or management of a patient in a hospital can be classified as noncritical, semi-critical, and critical items. Hospital personnel that are associated with the use of critical and semi-critical instruments and devices are laboratory technicians, doctors, and all other healthcare staff who handle these devices and equipment during their primary duties or treatment of patients. A lot of blood and potentially infectious samples that may be contaminated with hepatitis, Human Immunodeficiency Virus, Severe Acute Respiratory Syndrome virus, etc need rapid analysis for accurate health management such as pattern and type of antibiotics needed for resistance detection. Blood is a rich source of nutrients and grows extremely well fungus, virus, and bacteria. By touching blood samples, lab personnel can infect open wounds. Proportionally, among laboratory personnel, the dangers of hepatitis B infection are more likely when it is compared with other healthcare personnel who work in some other departments and sections of hospitals. Most patients coming to hospitals are sick and contagious and research has shown that about 17% of them are affected by hospital-related infections. Strategic locations within the hospital such as OPDs, injection room, O.T, and labor rooms facilitate the spread of the hospital's disease to incoming patients. So, in their daily routine, all healthcare personnel must be extraordinarily alert to maintain adequate protocols of infection control and follow universal precautions. Blood and infections are the most serious health care specialists. Data finds out that 22% of all HCWs have at least one shaped wound on their bodies in the last two weeks. Furthermore, it is also found that many health care workers do not comply with universal precautions while dealing with infectious patient. It is clear that the workers have not been significantly educated since the epidemic has infected the healthcare workers. Compliance with universal precautions is not as flexible as possible through specialized hospitals in the laboratory technician, and factors that influence the limited capacity of blood handling are evaluated. Injuries have been performed by phlebotomists and other laboratory professionals who have conducted prolonged exposure and direct handling of the patient's virus samples. This finding will help the facility's hospital infection to control or similar cast mitigate the occurrence of prospective security items. However, it is ultimately an individual responsibility to comply or begin with the respective preconditions, steps, or work practices of measures. A well-coordinated bottom up and top down approach, starting from the particular HCW level to each hospital or other similar facility, and implementing nationwide or sub-national agreements that bind hospitals or similar sites to develop and maintain so these opened will be effective. The direction to enhance compliance with universal precautions must be given, and the necessary action must be taken at the institutional, departmental, or clinic level to ensure the availability and working order of prohibited products of PPE and other engineering controls. These measures will be constantly audited and mentioned in evaluation programs carried out by hospital infection control committees. Once again being proactive on administrative measures must be the top concern, adhering to prompt action. Life-cycle developments must start as soon as conceivable. Topics relating to the general public are broadcasted to law enforcement authorities. Efforts must be made for efficient utilization of administrative measures for

preventive and to tackle pandemics. Almost 3% of the trapped HCWs acknowledged a lack of access to the gear. Healthcare centers must ensure the availability of gear and equipment, as well as their timely repair and maintenance. All medical officers are cautioned to comply with the rules and guidelines on the obligatory use of PPE.

## **7. Compliance with Universal Precautions Among Operating Theatre Technicians**

Healthcare workers (HCWs) are at an increased risk of acquisition of infectious agents and occupational health problems, such as exposure to bloodborne diseases, needle injuries, and contact with contaminated patients or surfaces. Use of universal precautions has been shown to reduce exposures to blood and body fluids, thereby preventing infection transmission from patients to HCWs. Universal precautions are a set of guidelines developed to reduce the risk of transmitting infectious agents to HCWs. The guidelines were later expanded to cover all bodily fluids that may become exposed during patient care by treating all blood and some body fluids as if they were infected. Data was analyzed using standard statistical methods, for which all responses were checked for missing and out-of-range items, and data were verified.

One study revealed that over 2 years 61% of HCWs had experienced multiple needlestick injuries, 15% from patients with bloodborne diseases. However, the actual number of infections may never be known since not all injuries are reported and not all people who are exposed to pathogens become infected. A nationwide retrospective cohort study was conducted using data from a nationwide inpatient sample. Four specialized hospitals were included in this study. Recently a descriptive study was carried out using a multimodal questionnaire from HCWs in specialties most at risk of receiving blood or performing invasive procedures. Eight study hospitals were randomly selected from health sectors, representing the total population. The same multicenter study which directly observed compliance with personal barriers and hand washing was also conducted. Around 1 in 7 HCWs gives general care to patients and 1 in 270 gives universal precautions. Normally, HCWs should wear gloves before contact with patients with a HI, and use disposable personal protective equipment if it is possible to get the uniforms contaminated.

### **7.1. Role of Operating Theatre Technicians**

Operating Theatre (OT) technicians are significantly important to the healthcare field. They are responsible for helping in the overall care of surgical patients. OT technicians stay updated in guidelines to make sure safety of HCW and individuals who are affected are preserved. This narrative study investigates literature available about the UPMC among health workers particularly operating theatre technicians. Operating Theatre Technicians should be knowledgeable about the guideline on UPMC regarding the avoidance of exposure of human body to health hazards whilst delivering care. They must use personal hygiene equipment like hands washing, glove use and gown use. Disposable protective equipment is better than reusable equipment to prevent transmission of any contaminated material. In order to maintain the safety of HCWs and those affected, research calls for training for HCWs on occupational health guidelines.

This training must include - Guidelines for the safety and well-care of HCWs - Safety prevention protocols - Usage of PPEs - Sharps handling - Steps to follow in case of accidental exposure

In special types of hospitals, like oncology hospitals, the risk is higher since the clients have to receive different types of surgeries, mostly cancer surgeries. The HCWs are specifically trained in how to prevent progression of infection. Patients are given education about the importance of universal precaution methods when going through surgery. Counseling availability always all the time at the hospital. Surgeries are sterilized and precautions are taken. After the surgery, all the leftovers are burned. However, compliance of UPMC is still poor among the health staff concerning to cancer surgery. This suggests an awareness campaign about UPMC for all of the health care workers.

### **7.2. Studies on Compliance Among Operating Theatre Technicians**

A systematic review and identification of research gaps found that studies in Saudi Arabia consistently show that healthcare workers do not have sufficient knowledge of infection prevention and control guidelines. An observational study demonstrated that blood and body fluid exposure events and reported sharp injuries occur with high frequency among healthcare workers in operating rooms. Compliance with appropriate behaviors and precautions is somewhat greater than 90%. However, others data show that those rates are lower, nearly 60%. 60% of the healthcare workers felt that they had not received adequate education about MRSA (Alhumaid et al., 2021). Indeed, a significant lack of compliance was found in the item of continuing education.

Although all 20 government hospitals have an Infection Control Department, not all the staff knows how to contact it because only 14 hospitals have a 24-hour Infection Control Department that can be reached by phone. Telephone numbers for contact are available at all 20 hospitals, but the numbers are posted only in the department of operating the rooms. Only 14 hospitals had an active continuing education department that provided training and education for the staff on a regular basis. Educational posters about important precautions in the operating rooms are displayed in the department, changing room, and first entrance area of 6 hospitals. All 20 government hospitals have an isolation policy. Isolation gowns are available in a special cart in the department. The cart is always full in all hospitals, but it is placed only in the department of 13 outpatients. The result shows that there is a significant relationship between the availability of gowns and compliance with the use of gowns. After a sharp injury with a contaminated needle, the personnel must visit the occupational health nurse. However, there is only one occupational health nurse at each hospital, and it is not working full time in 3 hospitals. The only other option is to visit the Employee Health Services located in Riyadh. The address and telephone number for this visit are available in all hospitals. However, no personnel visited KSAU-HS following a sharp injury. In each hospital, infection control policies and guidelines are available in the department. Most information and handbooks are provided by senior operating room technicians rather than Infection Control Department. The major reason for noncompliance to universal precautions is the nonavailability of the equipment.

## 8. Challenges and Barriers to Compliance

Compliance with not sharing stereo stethoscopes was 61% and with not sharing insulin pens and vials 71%. Incomplete compliance was frequent with all these items. This study indicates that, when used regularly with patients known to be MRSA carriers, not sharing stereo stethoscopes is a significant improvement over the general use of dedicated systems at first encounter. In the opinion of 71% of the HCWs, the best way to prevent MRSA endemicity in hospitals is “treating all carriers as potentially infectious”. However, compliance with not sharing stereo stethoscopes (61%) and not sharing needle-free equipment (57%) was observed in an even greater percentage than active *S. aureus* carriers would suggest. Another interesting point was that, compared with general rules for inpatient HCWs, the perception of danger in some potentially risky situations, such as treating multiple husbands of the same woman in sequential appointments, a patient known to be an intravenous drug abuser, or a patient known to be an HIV carrier, received particularly heightened compliance (more than 80% for all of them). Non-sharing problematic items are both used with the penitent and patient, and thus are an instance of possible bidirectional contamination as they are a vehicle shared in both directions. Enough difficulty with adequate compliance with even more only-patient-related problematic multi-user items should be such equipment. Shared electronic thermometers were also associated with inadequate compliance in a previous study. There are significant advantages and disadvantages to the proposed “pertinent danger” system. Although it is truthful to increase care with higher levels of perceived danger, it should not be advocated everywhere, as its incorrect application can imply unnecessary stress on the public health system. This study agrees with previous studies that compliance with universal precautions is less than optimal and suggests that theatres could be a particular focus for precaution campaigns. Previous studies have found that gloves, masks, and protective eyewear are not always used despite the presence of potentially infectious body fluids, especially in procedures such as needlesticking.

### 8.1. Lack of Training and Education

Previous studies showed that the majority of healthcare workers (HCWs) tend to have standard precaution training, and typically a dwell clinic or in-service training may be used to build this awareness. In a study conducted in Mashhad among physicians showed that most of the physicians had standard precaution training (Sarbaz et al., 2019). However, in another study conducted in four hospitals settings in Saudi Arabia, found out that out of 643 HCWs, less than one-third had received such training. According to unpublished research in different public hospitals in Jeddah, only 45 out of 600 staff nurses had standard precaution training. Almost 61% of doctors received standard precaution training in KCUH, compared to 37.4% of doctors in KCUH-E. Nurses who received standard precaution training were 4.88 times more likely to practice successfully the standard precautions as compared to HCWs who did not have standard precaution training. Only 37.37% of HCWs always used masks when dealing with patients who had a respiratory problem. HCWs who always wore a mask were 7.81 times more likely to always successfully practice standard precautions (Alhumaid et al., 2021). However, around 88% of interns had received standard precautions training, while about half of the nurses and three-quarters of doctors and family medicine residents had not received training. Besides, many professionals claimed the lack of sufficient training regarding standard precautions in the workplace. Standard precautions training by educational movies was effective in the improvement of knowledge about transmission - based precautions and increased the perception of self- efficacy of all types of precautions in healthcare workers. Aware and skilled

procurement process aimed at the right PPE selection, for instance, face shield for professionals dealing with patients having respiratory illness often in conjunction with coughing.

## 8.2. Workload and Time Constraints

Healthcare workers in hospitals are particularly prone to occupational infections from various sources including infected patients. The most effective measure to reduce the risk of occupational infections among healthcare workers is observing universal precautions. Specialized hospitals are defined as those institutions providing specialized health services for certain diseases, and a referral system for secondary hospitals. As healthcare delivery institutions, specialized hospitals are prone to several biomedical hazards related to the types of services provided, ascent of technology used, frequent encounters with patients and attending patients in different units. Compliance with the practice of universal precautions in specialized health facilities is minimal. Concern regarding the compliance practices of healthcare workers with universal precautions guidelines has been an important issue since the CDC introduced the concept in 1985. Implementing universal precautions in healthcare delivery institutions with extra precaution against any transmission of infectious agents has been shown to be effective in preventing the transmission of several microbial agents (Gebre Haile et al., 2017). This is true intrinsically to healthcare professionals during the handling of patients with infections (or suspected to have infections), in their daily practice performance, and extrinsically with the type of working environment (poor management practice and service delivery ethics). Compliance with the practice of universal precautions in specialized hospitals and centers is minimum. Determining the level of compliance among healthcare workers, and informing preventive measures, can minimize the risk of transmission of infections in the specialized healthcare settings in Saudi Arabia. This will also have some implication to other settings with similar working conditions and healthcare delivery services. Also, the practice of universal precautions is limited. Similarly, a study on blood and body fluid exposure reported that 70% of the study participants encountered at least one such injury. This implies that healthcare workers are at great risk of transmission of infections. Precautionary guidelines equivalent to the universal precautions guidelines related to the handling of patients with infections (whether known or unknown) are similarly nonexistent. Such extrinsic factors of the working environment in the study settings might change the risk of transmission of infections.

## 9. Strategies to Improve Compliance

The review results indicated that most hospitals scored the highest current compliance with sterilizing fomites: 50/60 (83%). Compliance with other components was lower: 34/60(57%) with education, 35/60 (58%) in a gown and mask, 19/60 (32% ) in verification of negative pressure for infectious patients, blood, and sputum-- EPs, and 25/60 (42%) gloves were the lowest score consistencies. Deterrents were found to be lack of hand washing methods, cleansing, disinfection practices equipment and ingredients, and protective equipment after exposure. It is worth noting that concerning gowns and masks, the majority of specialists responded that they very often put on gowns and masks. However, screening indicated that only 16% of patients had the disease. The evidence was mixed around the compliance of all five requirements using collective protection in patient care (Alhumaid et al., 2021). The purpose of using the universal precautions is to minimize the exposure to blood and other fluids that body excretes. Despite the dispensing of the MRSA guideline and the bloodstream and the permissible disposing of Sharps, it seems that the understanding of universal precautions is uncertain. This is reflected in the results showing that users of the equipment are most effective agents in transmitting MRSA according to most specialists. More than half (57%) of HCWs felt that they had not received adequate education about MRSA. A significant lack of compliance was found in the item of continuing education. Only 14 hospitals had an active continuing education department that provided training and education for the staff on a regular basis. One specialist stated, "I was told that a patient was MRSA after surgery had failed. I did not know anything about MRSA". This inadequate understanding of the MRSA guidelines was reflected in the answers to the Knowledge Test of HCWs to prevent MRSA is. On the other hand, there were many comments reflecting the recognition of the potential risk in the procedures being performed. For example, on the body mark and the MRSA patient, screens of positive pressure isolation rooms were not closely monitored, and isolation nursing cohorts were managed in the transit after normal nursing staff. There were also comments from the specialists who indicated the norm of bumper feeling in relation to collective shields (A. Mahfouz et al., 2014).

### 9.1. Education and Training Programs

Compliance with Universal Precautions Among Healthcare Workers in Specialized Hospitals in Saudi Arabia: A Narrative Review

All participants felt a need for training programs. Interns and residents believed that universal precautions should be acknowledged throughout education at university (Sarbaz et al., 2019). Regarding the implementation phase, interns indicated that practices were problematic at workplaces. The reason is said to be the lack of necessary arrangements of hospitals. As viewed by the residents and specialists, the restriction of knowledge and behavior of standard precautions was deemed as the first health and safety priority owing to the excessive number of patients affected with blood-borne infections, including blood disorders and hepatitis cases. Regular training programs are conducted in all institutions; however, the effectiveness of such training programs is not yet measured. Nurses at their first year of profession believe that the training period at the university was not adequate. Nurses have to undergo internships in order to gain experience; however, it is suggested that they cannot see such practices. While practices in laboratories are under control, nurses express that the same cannot be said for surgeries. Moreover, they said that healthcare workers found themselves busy and they were not informed when busy. For that reason, they should have prior knowledge. It is noted that awareness shall be raised. Situations regarding standard precautions shall be reminded in that as one of the nurses indicated.

Previous studies carried out in hospitals documented poor compliance among healthcare workers with precautions. There is evidence supporting the presence of objectionable practices with regard to blood and body fluid precautions. To provide a safer place for medical employees, adequate practices and information regarding universal precautions must be built in a constant way. Though doctors have the most potential to come in contact with blood and body fluids, insufficient compliance is reported with universal precautions by hospital practice physicians. The researchers investigated perceptions, disagreeable practices, and sources of information of doctors in relation to standard precautions.

## 9.2. Use of Personal Protective Equipment (PPE)

Statement of the sources of funding This work has not been funded.

Introduction Healthcare-associated infections are a significant concern that place patient safety at risk. The Foundation of the Federal Ministry of Health specifies the precautions required to reduce the risk of serious injuries or diseases to patients from healthcare providers. There are several studies that confirmed that the use of these precautions significantly reduces the risk of infection with the disease. However, the problem is that the compliance with these directions is unsatisfactory. Workers who mostly expose to blood and other body fluids recognized as high-risk group. Because 5-10% of exposure with contaminated materials until the virus transfers in blood of an affected patient. Specialized hospitals have different procedures and equipment than other hospitals, requiring an updated assessment of compliance with the precautions per those specialized hospitals. Centers for Disease Control announce except the precautions the Standard Precautions to cover all patients regardless of the circumstances.

In response to the first spread of AIDS in 1994 and the increasing concern about the infection resulting from the conditions of health. Concerns for Occupational Exposure to bloodborne Pathogens enforce some precautionary measures and the use of Personal Protective Equipment to reduce the risk of exposure to contaminated sources, they require every healthcare worker to dec employee every single time there is exposure or potential for exposure to blood or other infectious materials. But are workers respect the recommendations? Up to this line there is no report about worker compliance with the precautions during the application of their duties in Arabic specialized hospitals in Saudi Arabia after issuance the precautions in 2003, and just a few studies records for the other countries before 2003. The chief objective of the present study is to assess the compliance with above precautions of the healthcare workers in specialized hospitals in the Saudi Arabia.

## 10. Conclusion and Future Directions

Observationally, descriptions of available evidence aimed to administer future research works on universal precautions among health workers at specialized Saudi hospitals. Compliance to universal precautions (UPs), which encompass not limited contact in addition to hand hygiene include utilizing private protective gear broadly known encompasses gloves, gown, mask, too protective eyewear should be a given to persistent patients, does not continuously comply with (Galal A Hassan Siam & Awadh Suwaimil ALreshidi, 2023). Nevertheless, complaisant with touching precaution is currently exercised among staff working contained by inpatient unit's especially nurse, explicitly instrument who manages sharps amongst was focus of in-text information.

Exhibit ambiguity from reports within the Compliance with touch between universal precaution and using PPE has resulted grouped under precaution, summing yielded an unaware narrative description which may assist in apprising the site of the peeves. Further descriptively showed that 5,578 women were employes mostly throughout the group in the middle age, amid 500 to 1,000 and over old ages 6 years. Basically, 15 bedevils set up in every special bed and all were run-up during utilizing formulary, 1 connecting tube port doors, and intravenous catheter connector using a device ventriculus successfully shield accordingly.

### 10.1. Key Findings and Implications for Practice

Healthcare Worker (HCW): Compliance with UP will continue to be a major challenge for HCWs if their knowledge and understanding of the guidelines is lacking, the guidelines are overly prescriptive, they have negative social connotations, or there is a lack of available materials or monitors to support compliance. Acute care hospitals need to increase the availability of protective gloves and gowns to provide HCWs better ability to comply with UP. It is expected that a number of factors will be found to contribute to compliance that could be altered to improve compliance. Infection control departments need to assume the tasks of providing a continuing health educational programme for MRSA infections for nursing staff, to focus on PPE being used, especially protective gowns, and to reinforce compliance with UP. Compliance with UP can cost-effectively prevent many healthcare-associated infections. Compliance with UP must be an important component of an integrated programme to increase compliance with standard precautions and must be reinforced to a greater extent than compliance with standard precautions. Thus, the findings present a number of salient programmatic, theoretical, and methodological implications with respect to the need to reevaluate the existing approach to compliance with UP.

Lack of compliance: In Saudi Arabia, the general prevalence of methicillin-resistant *Staphylococcus aureus* (MRSA) is higher in healthcare settings and it is necessary to comply with relevant medical practices to prevent the dissemination of MRSA and other healthcare-associated infections. However, a previous study reported that a significant number of HCWs working in a specialized hospital felt that they had not received adequate education about MRSA prevention. Only doctors were satisfied with the amount of education received, implying that the majority of nurses and others were not satisfied. Moreover, a significant lack of compliance was found in the item of continuing education, reporting that only a small number of hospitals had an active continuing education department that provided training and education for the staff on a regular basis. Furthermore, major reasons for noncompliance to universal precautions cited by those who noncomplied included the nonavailability of the equipment, which could be improved by increasing the frequency of availability of protective gloves.

### 10.2. Recommendations for Future Research

This narrative review calls for conducting high-quality research to investigate the compliance rate among a larger representative sample of healthcare personnel in specialized hospitals to design effective interventions and policies to improve workers' compliance with UP (Universal Precautions) successfully. It also calls for multifaceted interventions and policies to strengthen and promote workers' compliance with UP to reduce the risk of infections among healthcare workers and patients.

In a recent systematic review, (Alhumaid et al., 2021) indicated that studies assessing the level of knowledge and compliance with UP have been limited among healthcare workers in Saudi Arabia; this justifies conducting a narrative review of the existing healthcare personnel to examine their level of compliance with Universal Precautions. The healthcare workforce in specialized hospitals in Saudi Arabia is responsible for high-risk procedures associated with the spread of infections, such as biomedical waste management, endoscopy services, and autopsy, among others. Meanwhile, healthcare workers at specialized hospitals in Saudi Arabia may also face additional pressure from overcrowded hospitals during times of the COVID-19 pandemic.

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