The Relationship between Patient Safety Culture and Adherence to Control Covid-19 Virus Standard Precaution at Mit Ghamr Nephrology and Urology Hospital

1 Neveen Tharwat Ali Mohammed, 2 Abeer Mohammed Zakaria, 3 Hanan El-said El-Sabahy

1 Nursing Specialist, Mit Ghamr Nephrology and Urology Hospital,
2 Professor of Nursing Administration, Faculty of Nursing - Mansoura University,
3 Lecturer of Nursing Administration, Faculty of Nursing - Mansoura University

1.ABSTRACT

Background: With the novel coronavirus pandemic, the impact on the healthcare system and workers cannot be overlooked. health care workers (HCWs) are under chronic emotional stress, affected by burnout, moral distress and interpersonal issues with peers or supervisors during the pandemic. All of these can lead to lower levels of patient safety. **Aim:** the study aimed at evaluating the relationship between patient safety culture and adherence control to Covid-19 Virus standard precaution (SP) at Mit Ghamr Nephrology and Urology Hospital. **Methods:** A descriptive correlational research design was utilized. The study was conducted on 70 nursing staff working at Mit Ghamr Nephrology and Urology Hospital by using two tools as: Hospital Survey on Patient Safety Culture Questionnaire (HSOPSCQ) aimed to examine the nurse's perception of the prevailing safety culture or 'safety climate' in the hospital, and the Control Covid-19 Observation Checklist aimed to assess the nurses and the health-care facility' compliances with SP measures. **Results:** the results indicated that there was a positive response rate for the nurse perception of patient safety culture results in the hospital study. As well, most of the studied nurses adhered to infection prevention and control precautions, and healthcare facility highly complied with the SPs. **Recommendations:** identifying potential new patient safety domains and events that might have occurred during the pandemic. Anticipating new patient safety issues and adverse events during crises might help in preventing them in future crisis situations.

Keywords: *Covid-19, Pandemic, Patient safety culture, Standard Precautions*

2.Introduction

At the end of 2019, the coronavirus disease (COVID-19) arose in China, definitely in Wuhan, and has spread to more than 200 countries and the World Health Organization (WHO) has been declared it a global crisis. Up to the present time, there are over 5.6 million COVID-19 recorded positive cases with at least 350,000 deaths worldwide **(Azlan, Hamzah, Sern, Ayub, & Mohamad, 2020).** Generally, health governments and authorities are warning those who are at higher risks of more serious and possibly fatal disease associated with COVID-19 **(Morrow-Howell, Galucia, & Swinford, 2020).**

The mortality rate of the COVID-19 virus is higher than common contagious diseases. Oxford COVID-19 Evidence Service 25th March 2020 shows a 3.6% risk of mortality, and increases to 8.0% and 14.8% in the age of 70 and over 80 **(Brooke & Jackson, 2020).** The COVID-19 pandemic has focused a spotlight on the harmful effects on the affected patients. Probably, these ongoing effects will suspiciously affect those who've been sicker, and more possible to die from the complications related to that virus. Owing to these unique features, an adequate strategy of

management is recommended to combat that virus and save lives **(Baud et al., 2020).**

Hemodialysis patients are high risk for COVID-19 infection, with extensive comorbid conditions, and frequent interactions with health professionals **(Creput, Fumeron, Toledano, Diaconita, & Izzedine, 2020).** The best method to avoid COVID-19 infection is physical distancing, until now this is challenging for HD patients and long-term care residents, especially for this patient **(Liu, Ghai, Waikar, & Weiner, 2020).**

The rapid and extensive spread of the COVID-19 pandemic is a major concern for healthcare professionals. Standard Precautions (SP) are the key to contain the spread. The elements of SP for COVID19 include hand hygiene, respiratory hygiene, use of Personal Protective Equipment (PPE) according to risk, safe injection practices, sharps management and injury prevention, safe handling and disinfection of patient care equipment, environmental cleaning and safe management of body fluid spillages, safe handling and cleaning of soiled linen and Safe disposal of clinical waste. These precautions should be enforced, and policies should be in place for

postexposure prophylaxis **(Sharma, Bunkar, Damor, Vashistha, & Kaushik, 2020).**

In addition to its effect on patients, Covid-19 has also placed a significant burden on healthcare systems, with drastic ramifications for the way healthcare is delivered. The provision of safe, high-quality care should always be an essential aim of a healthcare system, even during crises such as natural disasters, conflicts, or pandemics **(Denning et al., 2020).** Rapid changes in models of care delivery were seen during the Covid-19 pandemic including increased workload, redeployment of staff to unfamiliar clinical environments, cancellation of routine services, and the requirement to treat patients suffering from a novel disease about which little was known **(Holthof, & Luedi, 2020).**

Working in these challenging conditions may impact the ability of staff to deliver safe and effective care. Previous work has identified organizational breakdown, inadequate staffing, increased production pressures, and provider fatigue as contributors to poor patient safety **(Laschinger, 2014).** Conceivably, all these factors may have been present during the pandemic, and as such patient safety during the Covid-19 pandemic merits further investigation. A way of obtaining insight into the state of patient safety is via assessing safety culture and incident reporting **(Di Gennaro et al., 2020).**

Safety culture refers to managerial and worker attitudes and values related to the management of risk and safety and is positively associated with both patient safety and clinical outcomes **(Denning et al., 2020).** In the last decades, patient safety culture has become a worldwide concern of health service organizations, as it is considered an important quality indicator in health care facilities and has been associated with key patient outcomes in hospitals **(Siman, Cunha, & Brito, 2017).**

The importance of patient safety culture in the different areas of assistance is noteworthy, for example, that of hemodialysis, due to the high number of patients with chronic kidney disease and the probability of incidents related to the assistance provided. Hemodialysis (HD) is a complex procedure, which provides a higher risk to the patient, with an average of 2% to 4% of deaths worldwide. **(Aguiar, Silva, Melo, Pereira, Lima & Caetano, 2020).**

Hemodialysis nurses play an essential role in ensuring adherence to HD standards and to provide effective and safe patient care. Patient comfort and safety are very important as patient safety culture is the cornerstone of high-quality health care **(Minn, 2014).** Nurses provide this important clinical care ensuring that they maintain an appropriate standard. The most crucial obstacle to improve patient care safety is the safety culture of health care organizations **(El-Aziz, Abd El Whab, & Aref, 2018).**

Patient safety culture is a subset of organizational culture and is defined as a set of values, attitudes, perceptions, beliefs, and behaviors that support the safe conduct of individuals' activities in health organizations **(Abbasi, Zakerian, Akbarzade, Dinarvand, Ghaljahi, Poursadeghiyan & Ebrahimi, 2017).** Recently, the Agency for Healthcare Research and Quality (AHRQ) has defined the patient safety culture of an organization as the product of individual and group values, attitudes, perceptions, competencies, and patterns of behavior that determine the commitment to, and the style and proficiency of, an organization's health and safety management **(AHRQ, 2014)**. Organizations with a positive safety culture are characterized by communications founded on mutual trust, shared perceptions of the importance of safety, and confidence in the efficacy of preventive measures **(Wagner et al., 2018)**.

The critical components of the patient safety culture include a common belief that the risk of responsibility for health care is high, organizational commitment to detect and analyze errors and injuries to the patient, and ultimately creating an environment that balances the need for error reporting and the need for disciplinary action **(Khater, AkhuZaheya, AlMahasneh, & Khater, 2015).** Implementing a culture of safety at dialysis centers has been challenging. In 2016, the Centers for Disease Control (CDC) and the American Society of Nephrology (ASN) partnered to create Nephrologists Transforming Dialysis Safety (NTDS) with the goals of improving dialysis safety and eliminating infections (**Wong, 2018).**

2.1 Significance of the study

Hemodialysis patients are highly vulnerable to COVID-19 infection, and this risk could be reduced by better promoting patient and organization safety culture**.** A positive safety culture directs healthcare providers' behaviors, so that patient safety becomes one of their highest priorities; this includes elements such as organizational learning, teamwork, open communications, feedback, and non-punitive and shared cultural perceptions based on the importance

of safety **(Khoshakhlagh, Khatooni, Akbarzadeh, Yazdanirad, & Sheidaei, 2019).**

Also, a positive safety culture can encourage health providers to report and analyze their errors, which is an effective tool for improving safety because the first step toward creating a positive safety culture is to assess the current safety culture. On the other hand, hospitals should create a patient safety culture among their employees before implementing structural interventions **(Basson, Montoya, Neily, Harmon, & Watts, 2018).** So, the present study aims to evaluate the relationship between patient safety culture and adherence control Covid-19 Virus standard precaution at Mit Ghamr Nephrology and Urology Hospital.

2.2 Aim of the study

This study aims to evaluate the relationship between patient safety culture and to adherence control Covid-19 Virus standard precaution at Mit Ghamr Nephrology and Urology Hospital.

2.3 Research Questions:

Q1: What are the nurses' perceptions of patient safety culture at Mit Ghamr Nephrology and Urology Hospital?

Q2: What's the Nursing staff level of compliance with the Standard Precaution measures?

Q3: What's the' level of healthcare facility compliance for standard precautions?

Q4: Is there a relationship between patient safety culture and Adherence to Control Covid-19 Virus standard precaution at Mit Ghamr Nephrology and Urology Hospital?

3. Methods

3.1 Research design:

This study's research methodology was descriptive correlational.

3.2 The study setting :

The study was conducted at Mit Ghamr Nephrology and Urology Hospital, which is affiliated with the Ministry of Health and Population.

3.3 Participants of the study:

Convenience sample of 70 nurses was utilized which included all nursing staff working in the previous mentioned units, were available during the time of data collection and willing to participate in the study at Mit Ghamr Hospital. Also, who fulfilled the criteria of having a minimum of one-year experience, and available at time of data collection included in the study to express their opinion about study variable.

3.4 Tools of data collection: -

Two tools were used for data collection: namely; Hospital Survey on Patient Safety Culture Questionnaire (HSOPSCQ), and Control Covid-19 Observation Checklist.

Tool (I): Hospital Survey on Patient Safety Culture Questionnaire (HSOPSCQ).

This questionnaire was divided into two parts:

The first part

It was used to identify personal characteristic of staff nurses as age, gender, years of experience, and level of education, previous training courses on infection control measures.

The second part

It was developed by **Sorra, and Nieva, (2004),** and made available in the **Agency for Healthcare Research and Quality.** It aimed to examine the nurse's perception of the prevailing safety culture or 'safety climate' in the hospital. The original HSOPSC consists of 44 items on 12 dimensions: two dimensions related to outcome and 10 dimensions related to patient safety which including overall perceptions of patient safety (18 items), supervisor/manager expectations and actions promoting safety (4 items), frequency of events reported (3 items), patient safety grade (1 item), hospital management (11 items), number of events reported (1 item), and background information (6 items). Since the items were written in both directions as positive and negative, the written items were partially reversed. Participants responded to the HSOPSC using a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5).

Scoring System: • If respondents answered "strongly disagree" or "Never" to a negatively worded item, answers were recorded from 1 to 5, if they answered "Disagree" or "Rarely" to a negatively worded item, answers were recorded from 2 to 4. The neutral response categories "Neither agree nor disagree" and "Sometimes" weren't affected by negatively worded items and will always be coded as 3.

Tool (II): Control Covid-19 Observation Checklist:

This tool was adapted from the **Joint Commission, (2020)** and **WHO, (2020).** It included two observation checklists namely; Infection Control Precautions Observation Checklist, & Health-care Facility Compliance for SPs Observation Checklist.

1. Infection Control Precautions Observation Checklist:

It was adopted from **WHO, (2020)** aimed to assess the nurses' compliance with SP measures. The observation checklist included 34 items as hand hygiene (4 items), use of the protective device (12 items), disposal of sharps (3 items), disposal of waste (1 item), decontamination of spills and used articles (3 items), prevention of cross-infection from person to person (7 items), and finally, the respiratory hygiene and cough etiquette (4 items). The observation checklist was scored on the basis of "done" or "not done". The done steps were scored (one), but the not done scored (zero). High scores indicated more compliance with the infection control precautions.

2.Health-care Facility Compliance for SPs Observation Checklist:

It was adapted from the **Joint Commission, (2020)** and **WHO, (2020),** aimed to assess health-care facility compliance for SPs and it included 12 items as respiratory hygiene and cough etiquette (3 items), environmental cleaning (1 item), linens (2 items), waste disposal (4 items), patient care equipment (2 items). This checklist was scored on the basis of "available" or "not available". The done steps were scored (one), but the not done scored (zero). High scores indicated more compliance with the infection control precautions.

3.5 Validity:

It was established for face and content validity by a panel of five expertise from faculty of nursing at Mansoura University who revised the tools for clarity, relevancy, applicability, comprehensiveness, understanding, and ease for implementation and according to their opinion's modifications were applied.

3.6 Reliability:

The reliability of the tool was tested and reported an interrater agreement of 0.947 (95% confidence interval, 0.870 to 0.979), and the calculated alpha value was between 0.71 and 0.79.

3.7 Pilot study:

A pilot study was carried out on 7 nurses (10%) of the total study subjects to test the clarity and feasibility of the statement and to determine the time needed to fill-in the tools. Nursing staff who shared in the pilot study were excluded in the main study sample. Based on the pilot study, necessary modifications included clarifications, and rewording.

3.8 Data Collection:

The questionnaire sheets were distributed to the nursing staff. The aim of the study and how to fill the questionnaire sheets was explained by the researcher. Nursing staff filled-in the tools individually at once and they read the questionnaires and filling it acquired 30-45 minutes to be completed. Firstly, they filled the socio-demographic data and the patient safety culture survey, after that, an observational checklist was done to assess their compliance to the standard precautions. Returning the questionnaire act as indicators of the nurses' acceptance to participate in the study, and they have the right to withdraw at any time during the study. The data collection process started from the beginning of May, 2021 to the end of September, 2021.

3.9 Data Analysis:

Data entry and statistical analysis were performed using computer software; the statistical package of social studies version 21 and appropriate statistical test was used.

3.10 Ethical Consideration

Ethical approval was obtained from the Research Ethical Committee of the Faculty of Nursing, Mansoura University at 7th of February, 2021o. Official permission to conduct the study was obtained from the responsible administrator of the hospital included in the study. Informed consent was obtained from the nurses who accept to participate in the study. All participants were informed that the study is voluntary and they have the right to withdraw from the study at any time. All participants were assured about the confidentiality of the collected data and the privacy of the study sample was assured.

3.11 Statistical analysis:

The analysis was undertaken using SPSS (statistical package for social science) version 22.0. Numbers and percentages were used to represent qualitative data. Quantitative data were described using mean and standard deviation (SD). Qui square test (X2) was used to compare qualitative variables. When p-value ≤ 0.05 a significant level value was measured and a highly significant level value was indicated when p-value ≤ 0.001, but p-value > 0.05 shows the non-significant results.

4. Results: -

Table (1) shows number and distribution of the demographic characteristics of nurses. According to the table mean age of the studied nurses was 32.7 ± 6.4 and more than half of the studied nurses were (54.3%) aged between 30-40 years, whereas 35.7% aged less than 30 years. While about half of studied nurses (48.6%) had a bachelor degree of nursing, and more than half of them was nursing specialist. In addition, more than half of nurses (52.9) had 10 to 20 years of experience, and most

of them attended previous educational training programs in this field. However, less than half of them had less than three years of training.

Table 2 shows means of average response rate for the nurse perception about patient safety culture results in the hospital study. The table revealed that the mean of overall patient safety culture and outcome dimension was 139.8 ±9.9. the highest mean score related to Hospital Management Domain and Team work (30.8 ±3.7 & 16.7 ±1.9 respectively).

Figure 1 shows distribution of average response rate for the nurse perception about patient safety culture results in the hospital study. The figure revealed that more than two thirds of studied nurses (70%) had positive response rate for the nurse perception about patient safety culture results in the hospital study. While, one third of studied nurse had negative response rate for the nurse perception about patient safety culture results in the hospital study.

Figure 2 shows Distribution of Infection Control Precautions Level. The figure revealed that most of the studied nurses adhered to infection control precautions. While, only 12.9% of the studied nurses not adhered to infection control precautions.

Table 3 shows number and distribution of Health-care Facilities used for Compliance Standard Precautions. The table revealed that regarding respiratory hygiene and cough etiquette all studied nurses placed acute febrile respiratory symptomatic patients at least 1 meter (3 feet) away from others in common waiting areas, if possible. Concerning the environmental cleaning all studied nurses used adequate procedures for the routine cleaning and disinfection of environmental and other frequently touched surfaces. Regarding waste disposal all nurses (100%) ensured safe waste management and discarded single-use items properly. As well as, majority of them treated waste contaminated with blood, body fluids, secretions, and excretions as clinical waste. Concerning, patient care equipment all nurses (100%) handled equipment soiled with blood, body fluids, secretions, and excretions in a manner that prevented skin and mucous membrane exposures, contamination of clothing, and transfer of pathogens to other patients or the environment.

Figure 3 shows level of Health-care Facility Compliance for Infection Control Precautions. The figure revealed that the majority of the studied nurses adhered Health-care Facility Compliance for Infection Control Precautions. However, only 7.1% of the studied nurses not adhered Health-care Facility Compliance for Infection Control Precautions.

Figure 4 shows level of Control Covid-19 Precautions level. The figure revealed that the most of studied nurses adhered Control Covid-19 Precautions scores. While, only 11.4% of studied nurses not adhered to Control Covid-19 Precautions scores.

Figure 5 shows relationship between control covid-19 Precautions total score and hospital survey on patient safety culture total score. It revealed that a strong positive correlation between control covid-19 checklist and patient safety culture with r= 0.260, p <0.030.

Table 4 shows association between the Control Covid-19 Precautions and nurse perception for safety culture. The table depicted that most of positive responses of total control Covid-19 Precautions Level were adequate with statistically significant was found between both negative responses and positive responses p=0,033.

5.Discussion

Dramatically, COVID-19 emerged as a global threat, affecting over 433 million confirmed cases worldwide and causing over 5.9 million deaths that have been reported globally (**WHO, 2022**). The COVID-19 pandemic has put inordinate pressure on frontline healthcare workers (HCWs) and hospitals. HCWs are under chronic emotional stress, affected by burnout, moral distress, and interpersonal issues with peers or supervisors during the pandemic. All of these can lead to lower levels of patient safety culture (**Brborović, Brborović, & Hrain, 2022**). This virus potentially influences the care context with negative consequences for provider well-being, safety and quality of care, and outcomes of patients (**Kotlar, et al., 2021**).

Hence, this study was carried out to evaluate the relationship between patient safety culture and adherence control to Covid-19 Virus standard precaution (SP) at Mit Ghamr Nephrology and Urology Hospital via assessing the perception of the studied nurses about patient safety culture, their perception of SPs, the perception of health-care facilities used for compliance SPs, and testing the correlation between hospital survey on patient safety culture and control Covid-19 observation checklist total scores accordingly, the discussion of the study findings will include four main divisions:

- Results regarding the perception of the studied nurses about patient safety culture.

- Results regarding the perception of the studied nurses about SPs.
- Results regarding the perception of the studied nurses about healthcare facilities used for compliance with SPs.
- Results regarding the correlation between the hospital survey on patient safety culture and control Covid-19 Precautions total scores.

1- Results regarding the perception of the studied nurses about patient safety culture:

The present study highlighted that more than two-thirds of studied nurses had a positive response rate for the nurse perception of patient safety culture results in the hospital study, the highest average positive response rate was for the "Hospital Management" and "Teamwork" domains, but the lowest was for perceptions of the "Number of events reported" domain. This result may be due to the hospital's emphasis on providing a high-quality care delivery system that prevents errors and provides a climate of safety that involves health care professionals, organizations, and patients. Also, this means that staff nurses were actively doing things to improve patient care and safety; they had more support and aid in their unit work; preferred teamwork; help out during workload or emergencies.

These results were in the same line with **Muftawu, and Aldogan, (2020)** in Ghana, as they displayed that more than half of respondents perceived that the overall response of the 12 dimensions of patient safety culture was positive, and agreed that teamwork within units was the dimension with the highest positive composite score. They suggested that staff in the hospital support and treat one another with respect and support each other.

This also was consistent with **Stoyanova, Dimova, Tornyova, Mavrov, and Elkova, (2021)** in Bulgaria, who reported that all their respondents demonstrated a positive attitude regarding patient safety culture. Also, **Rajalatchumi et al., (2018)** studied the perception of patient safety culture among healthcare providers in a tertiary care hospital in South India and reported an average positive response rate in more than half of their nursing respondents, and the dimensions of "teamwork within the unit," "organizational learning and continuous improvement," and "supervisor or officer-in-charge expectations" showed highest positive responses. They explained that the nurses had direct access to the inbuilt organizational system, which facilitates day-to-day supervision and conflict management. Furthermore,

the majority of the available reporting systems are controlled by the nursing staff.

Moreover, **Alquwez et al., (2018)** assessed the perceptions of nurses on patient safety culture in three general hospitals in Saudi Arabia and reported that two-thirds of their respondents rated their hospital as excellent/very good in terms of patient safety culture, and concluded that patient safety culture is a paramount issue that every hospital administrator and leader should consider initiating change and to afford a hospital environment where quality and safety are valued.

2- Regarding the perception of the studied nurses about standard precautions.

The present study results pointed out that most of the studied nurses adhered to infection prevention and control precautions. This may be because nurses may have been requested to intensify their efforts to promote compliance with SPs during the pandemic. Also, their fear being infected with a virus that they don't have much information about the mode of transmission and ways of avoiding the spread of the disease, and the risks and the measures to be adopted. This leads to their strict adherence to applying SPs to effectively protect themselves and others.

The **WHO, (2021)** in their interim infection prevention and control guidance recommended strict adherence to infection prevention and control protocols in managing COVID-19 patients. This updated guidance was provided to prevent the virus from entering a facility and from spreading within and beyond the facility, and to support safe conditions for visiting through the rigorous application of infection prevention and control procedures, for the residents' well-being.

Our study findings are congruent with **Refeai, Kamal, Ghazawy, and Fekry, (2020)** in Egypt, they found that the majority of HCWs demonstrated positive perceptions toward infection prevention and control and standard precautions measures. Also, **Saleh, Elsabahy, Mohamed, and Abdelhamid, (2021)** assessed the adherence of HCWs to applying SPs for all suspected or confirmed COVID-19 patients, and a high level of adherence was observed concerning the application of precautions for all suspected or confirmed COVID-19 cases, and they related that to the awareness of HCWs to hand washing to prevent transmission of pathogens associated with hospital care.

This matched with **Ashinyo et al., (2021)** in Ghana, as they found that infection prevention and control compliance during healthcare interactions

and when performing procedures was high. They explained that infection prevention and control compliance play a critical role in reducing healthcare workers' exposure to the COVID-19 virus. Also, **Al-Faouri, Okour, Alakour, and Alrabadi, (2021)** showed an intermediate level of compliance with SPs and that was acceptable to them. They referred their findings to the participants' high level of knowledge.

This result is also in the same line with **Russell et al., (2018)** who studied the "factors for compliance with infection prevention and control practices in-home healthcare" and showed a high rate of self-reported compliance with most infection prevention and control practices among nurses surveyed at 2 large agencies. They summarized these factors as; gaps in knowledge, unfavorable attitudes toward certain infection prevention and control practices, individual socio-demographics, and agency characteristics.

In contrast, in Egypt, **Mohamed, El-Sayed, and Alanwer, (2021)** revealed that the total nurses' compliance with SPs was moderate level. They related that to insufficient supply of resources such as inadequate supplies and equipment, negligence attitude, lack of supervision, inadequate training, and insufficient support from management to facilitate work.

Also, in Tanzania, **Powell-Jackson et al., (2020)** found that health worker infection prevention and control compliance, particularly for hand hygiene and disinfection, was inadequate in outpatient settings. Improvements in the provision of supplies and health worker behaviors are urgently needed in the face of the pandemic. They recommended that a huge injection of infection prevention and control supplies is urgently needed to cover care in both public and private facilities. In addition, support is required for interventions that are targeted to these specific contexts and that consider behavioral determinants and the reality of the facility operating under the crisis.

Specifically, the present study revealed that regarding hand hygiene all studied nurses perform handwashing with soap and water, performed hand rubbing with an alcohol-based preparation, and ensured the availability of clean running water, and hand hygiene products. This result is in the same context with **Saleh, et al., (2021)** studied adherence to infection prevention and control among health care workers during care for suspected or confirmed Covid-19 Patients and revealed that the majority of studied nurses wash their hands with soap and water when they are visibly dirty and disinfected their hands with alcohol. On the other

hand, **Wahab, Bassiouni,** and **Eldin, (2019)** and noted that less than two-thirds of nurses had a poor level of hand-washing activities.

Concerning the use of protective devices for all studied nurses. The current study noted that all studied nurses wearied gloves when they were exposed to body fluids, blood products, and any excretion of patients, wearied a surgical mask alone or in combination with goggles, face shield, and apron, and wearied a gown or apron. This result is in the same context with in the same line with our findings, **Desta et al. (2018)** studied knowledge, practice, and associated factors of infection prevention among healthcare workers and found that most healthcare workers wearied gloves.

This was in disagreement with **Lim, Ahn, and Son, (2019)** who noted that only 17.9% wearied a gown or apron when exposed to blood, or body fluid. In addition, a study in a Palestinian governmental hospital by **Abu-El-Noor, Abu-El-Noor, Abuowda, Alfaqawi,** and **Böttcher, (2019)** studied patient safety culture among nurses working and found that only a third of nurses wearied a surgical mask alone or in combination with goggles, face shield, and apron whenever there is a possibility of a splash or splatter.

Our finding found that more than three-quarters of the studied nurses not wearied clean, non-sterile fluid-resistant gowns, masks, eye protection or face shields, or any patient excretions. This was in agreement with **El-Sokkary et al. (2021)** who studied the compliance of healthcare workers to the proper use of personal protective equipment during the first wave of the COVID-19 pandemic and illustrated that more than half of healthcare workers not wearied gown, mask and face shield.

Moreover, regarding the prevention of cross-infection from person to person, the majority of nurses washed their hands between each patient contact, changed gloves between each patient contact, and decontaminated my hands immediately after removal of gloves. This was in agreement with **Ali et al. (2021)** who revealed that more than two-thirds of nurses washed hands after every procedure that involves direct patient contact, and had gloves removed.

As well, regarding disposal of sharps, the majority of nurses put used sharp articles into sharps boxes. In the same context **El-Greeb, Amel, Hussien,** and **Samia, (2018)** assessed nurses' compliance with infection control SPs and depicted that all nurses had satisfactory handling with sharps instruments. In addition, **Pokorná, Dolanová,**

Pospíšil, Búřilová, and **Mužík, (2020)** studied compliance with SPs in inpatient healthcare settings and noted that the majority of nurses discard used sharp materials into sharps containers.

3- Results regarding the perception of the studied nurses about healthcare facilities used for compliance standard precautions.

The present study revealed that the majority of the healthcare facility complied with the infection control protocols. This is due to the efforts exerted by the Egyptian Ministry of Health during the period of the pandemic, as it provided the necessary patient care equipment, and firm instructions on the importance of complying with SPs including respiratory hygiene and cough etiquette, environmental cleaning, and safe handling of linens, waste disposal. This in turn leads to higher compliance during caring for suspected or confirmed Covid-19 cases.

The interim guidance provided by the **WHO, (2021)** recommended that Health facilities should adhere to key WHO recommended infection prevention and control measures, in particular, adhering to respiratory etiquette and hand hygiene best practices, contact, droplet and airborne precautions, adequate environmental cleaning, and disinfection; ensuring adequate ventilation; isolation facilities of COVID-19 patients.

Similar to our study, **DrsquoSouza, and Ugargol, (2021)** stated that the following are the standard recommended precautions for healthcare facilities to prevent the nosocomial spread of COVID-19: hand hygiene, personal protective equipment (PPE), respiratory hygiene and cough etiquette, prevention of injuries from sharps, safe handling of patient-care material, adhering to the principles of asepsis and ensuring biomedical infection prevention and control (patient placement, environmental cleaning, linen and laundry, and waste disposal).

This matches with **Chakraborty, Ray, and Roy, (2021)** who concluded that proper handling of biomedical waste and segregation of wastes as per classification can help in preventing disease in the community and among health care providers. Proper disposal of PPE after doffing is vital and needs proper training for performing correctly.

This is incongruent with **Altigani, (2016)**, as they found that the compliance rate of respiratory hygiene and cough etiquette practice was only one-third. They explained that this may be determined by fewer training programs in the hospital, and a shortage of PPE mostly in surgical masks and washing soaps. Also, there were no written guidelines, policies, and no posters about risk communication of respiratory hygiene and cough etiquette in that hospital.

Although **Wahab, et al., (2019)** reported that single-use equipment is not available all the time with needed quantities, their nurses safely handled contaminated equipment at a good level, but they did not comply with respiratory hygiene/cough etiquette by covering mouth and nose when coughing or sneezing, and This clarified that this may be due to negligence behavior among the majority of HCPs, and they are afraid to touch their nose with hands or gloves even though a tissue is found.

Concerning, respiratory hygiene and cough etiquette the majority of nurses educated health workers, patients, and visitors, covering the mouth and nose when coughing or sneezing, and performing hand hygiene after contact with respiratory secretions. This result is in the same context with **Alqahtani, Alrasheed,** and **Alqunaibet, (2021)** noted that covering the mouth and nose while coughing or sneezing, was performed by more than half of healthcare workers. As well, the majority of nurses performed hand hygiene after contact with respiratory secretions.

This result is in the same line with **Saleh et al. (2021)** noted that the majority of health care workers washed their hands after coming into contact with respiratory secretions. On the contrary, **Wahab et al. (2019)** found that most of the nurses adhered to respiratory hygiene /cough etiquette. This contradiction may be due to the negligence behavior among the majority of healthcare providers.

4- Results regarding the correlation between the hospital survey on patient safety culture and control Covid-19 observation checklist total scores.

The present study showed a strong positive correlation between the covid-19 checklist and patient safety culture with adequate positive responses. This may be explained as the safety culture refers to the managerial and worker attitudes and values related to the management of risk and safety, and our participants were positively complying with SPs to prevent the risk of Covid-19 and promote safety for patients and themselves.

This result is in agreement with **Lim, et al., (2019)** who noted that there was a significant positive correlation between nurses' SPs adherence and their perceptions of patient safety management, and declared that the nurses' perceptions of patient safety management may affect nursing activities.

They recommend future studies to investigate the causal relationships between nurses' work environments including patient safety culture and compliance with infection prevention and control practices in clinical settings. Also, **Braun, Chitavi, Suzuki, Soyemi, and Puig-Asensio, (2020)** reported that the associations between improvement and safety culture may be bi-directional such that positive safety culture contributes to successful interventions, and implementing effective interventions drives improvements in culture.

As well, **Burlison et al., (2020)** found that the patient safety culture dimensions at the hospital level had a strong correlation with the management support for safety and teamwork across units. This goes online with **Kim, and Moon, (2021)** who detected a significant correlation between awareness of patient safety culture and compliance with infection prevention and control. They concluded that it is necessary to prioritize patient safety and to develop and verify the effects of various programs that emphasize factors of patient safety culture, such as leadership, teamwork, knowledge, and attitude.

Also, as reported by **Hessels, and Wurmser, (2020)** all patient safety culture dimensions, with exception of management support for safety and a nonpunitive work environment, were positively and significantly associated with greater SP adherence. A positive perception of patient safety culture is important to SP adherence, although additional factors and mechanisms must be explored.

On the other hand, **Meddings et al., (2017)** found no association between results of the HSOPS and infection rates when measured at baseline and post-intervention in two successful large national collaboratives. Their results suggested that it may be possible to improve infection rates without making significant changes in safety culture, particularly as measured by instruments like HSOPS.

6.Conclusion:

Based on the findings of the current study, it could be concluded that during the COVID-19 pandemic, some patient safety issues have been identified, the highest average positive response rate was for the "Hospital Management" and "Teamwork" domains, but the lowest was for perceptions of the "Number of events reported" domain. Also, the staff nurses were actively doing things to improve patient care and safety during the crisis; they had more support and aid in their unit

work; preferred teamwork; help out during workload or emergencies. The participants were positively complying with SPs to prevent the risk of Covid-19 and promote safety for patients and themselves. This is because they may have been requested to intensify their efforts to control the spread of the virus, to protect themselves and their patients.

7.Recommendations: -

Based on the findings recommended to:

- Collaboration between the hospital management and its HCWs to enhance the achievement of all patient safety cultures.
- Assess organizational barriers to identify any practices that contribute to unsuccessful implementation of the patient safety cultures.
- Regulate orientation programs depending on key elements of HSPSC.
- On the educational levels, shifting from traditional training of medical and other clinical skills to train on skills supporting patient safety culture.

Implications for further research:

- Developing questions for new HSOPSC dimensions that will assess the infrastructure.
- The development of patient safety strategies and guidelines for crises in general, especially for the Covid-19.
- Identifying potential new patient safety domains and events that might have occurred during the pandemic, and anticipating new patient safety issues and adverse events during the crises might help in preventing them in future situations.

Implications for implementation:

- Implementing and strengthening the integrated health information infrastructure such as electronic medical records to facilitate linking the patient information and capturing the full picture of patient harm is also recommended.
- The nurses should address any safety concerns by encouraging them to report errors, near misses, and other safety and quality issues, and to comply with the SPs to limit the virus.
- The hospitals should provide a supportive, blame-free environment emphasizing staff's ability to report issues without the fear of punishment, encourage a teamwork environment, and provide enough staff to handle the workload
- Finally, the hospitals should promote a safe and supportive environment of trust and

empowerment for HCWs, along with support from supervisors/managers and the same supervisors/managers being available and visible on the front line.

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Table (1): Number and distribution of the demographic characteristics of nurses (n=70)

Items	N	%
Age (Years)		
< 30	25	35.7
30 – 40	38	**54.3**
> 40	7	10.0
Mean ±SD	**32.7 ±6.4**	
Educational level		
Bachelor of Nursing	34	**48.6**
Nursing technical institute	27	38.6
Nursing Diploma	7	10.0
Postgraduate of Nursing	2	2.9
Job title		
Nursing Specialist	36	**51.4**
Nursing technician	34	48.6
Experience (Years)		
< 10	27	38.6
10 – 20	37	**52.9**
> 20	6	8.6
Attended previous educational training programs		
No	14	20.0
Yes	56	**80.0**
If yes, how many training years you had (n=56)		
< 3	33	**47.1**
≥3	23	32.9

Highly statistically significant (p <0.05) / ** highly statistically significant (p <0.01)

Table 2. Means scores of all patient safety culture dimensions as reported perceived by amongst the studied nurses in the hospital study (n=70)

| Items	Number of items	Mean ±SD
Overall Patient safety culture		
Organizational learning and continuous improvement	3	11.8 ±1.3
Team work	4	16.7 ±1.9
Staffing	4	13.1 ±1.9
Non punitive error	3	8.0 ±1.8
Communication	3	9.6 ±1.8
Hospital handover transition	1	4.2 ±0.9
Immediate supervisor/manager Domain	4	16.0 ±2.3
Frequency of Events Reported Domain	3	11.6 ±2.8
Hospital Management Domain	11	30.8 ±3.7
Background information	6	15.0 ±3.5
Outcome dimension		
Number of events reported	1	1.4 ±0.7
Patient safety grade domain	1	1.7 ±0.5
Total Score	12	139.8 ±9.9
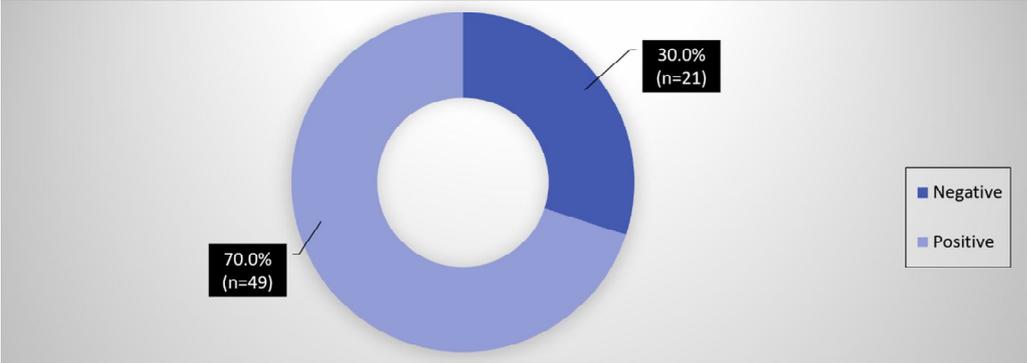
Figure 1. *Distribution of average response rate for nurse perception about patient safety culture results in hospital study*
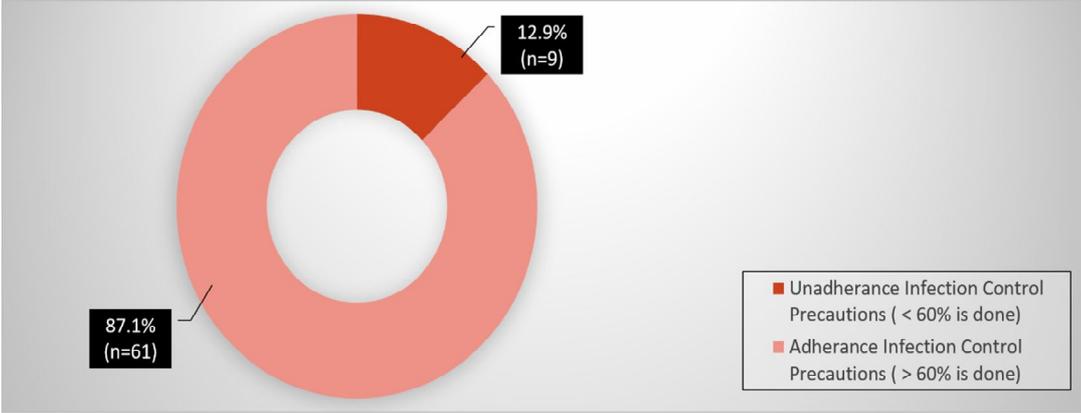

Figure 2. *Distribution of Infection Control Precautions Observation Checklist Level*

Table 3. Number and distribution of Health-care Facilities used for Compliance SPs (n=70)

| Items	Done		Not Done	
	N	%	N	%
Respiratory Hygiene and Cough Etiquette				
1. Place acute febrile respiratory symptomatic patients at least 1 meter (3 feet) away from others in common waiting areas, if possible.	70	**100**	0	0.0
2. Post visual alerts at the entrance to health-care facilities instructing persons with respiratory symptoms to practice respiratory hygiene/ cough etiquette.	65	92.9	5	7.1
3. Consider making hand hygiene resources, tissues, and masks available in common areas and areas used for the evaluation of patients with respiratory illnesses.	68	97.1	2	2.9
Environmental Cleaning				
4. Use adequate procedures for the routine cleaning and disinfection of environmental and other frequently touched surfaces.	70	**100**	0	0.0
Linens				
5. Prevents skin and mucous membrane exposures and contamination of clothing.	70	**100**	0	0.0
6. Avoids transfer of pathogens to other patients and or the environment.	68	97.1	2	2.9
Waste Disposal				
7. Ensure safe waste management.	70	**100**	0	0.0
8. Treat waste contaminated with blood, body fluids, secretions, and excretions as clinical waste, following local regulations.	65	92.9	5	7.1
9. Human tissues and laboratory waste that is directly associated with specimen processing should also be treated as clinical waste.	30	42.9	40	57.1
10. Discard single-use items properly	70	**100**	0	0.0
Patient Care Equipment				
11. Handle equipment soiled with blood, body fluids, secretions, and excretions in a manner that prevents skin and mucous membrane exposures, contamination of clothing, and transfer of pathogens to other patients or the environment.	70	**100**	0	0.0
12. Clean, disinfect, and reprocess reusable equipment appropriately before use with another patient.	69	98.6	1	1.4
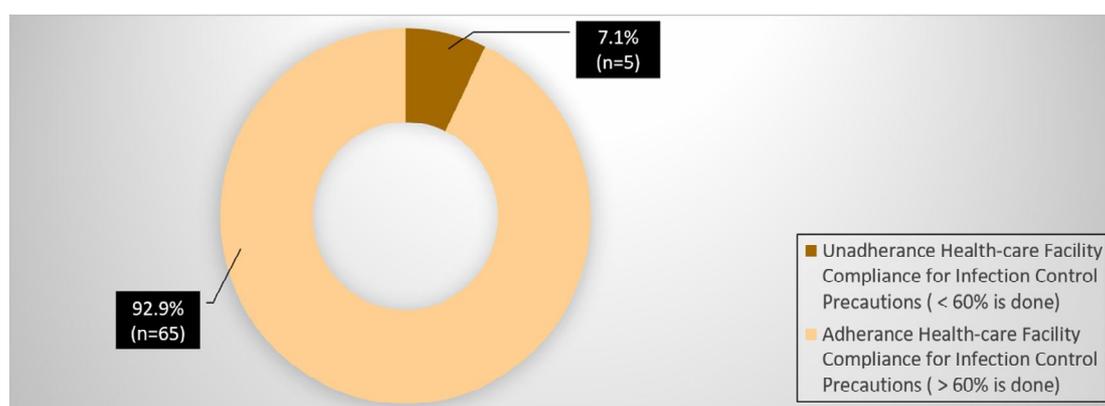
Figure 3. Level of Health-care Facility Compliance for Infection Control Precautions Observation Checklist
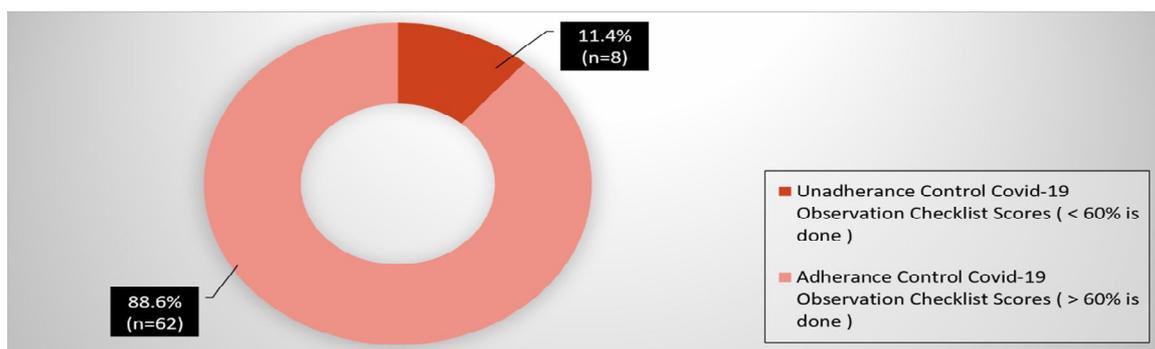
Figure 4. *level of Control Covid-19 Observation Checklist*

Figure 5. *Correlation between Hospital Survey on Patient Safety Culture and Control Covid-19 Observation Checklist Total Scores*

Table 4. Association between the Control Covid-19 Observation Checklist and nurse perception for safety culture (n= 70)

Total Control Covid-19 Observation Checklist Level	Negative Responses (n=21)		Positive Responses (n=49)		Chi-Square	
	N	%	n	%	X^2	P
Un-adherence	5	23.8	3	6.1		
Adequate	16	76.2	46	**93.9**	4.543	**0.033***