FACTORS ASSOCIATED WITH INFLUENZA VACCINE ADHERENCE AMONG HEALTHCARE WORKERS IN ABU DHABI

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DECLARATION

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FACTORS ASSOCIATED WITH INFLUENZA VACCINE ADHERENCE AMONG HEALTHCARE WORKERS IN ABU DHABI

I declare that the above dissertation is my own work and that all the sources I have used or quoted have been indicated and acknowledged by means of complete references.

I further declare that I submitted the dissertation to originality checking software and that it falls within the accepted requirements for originality.

I further declare that I have not previously submitted this work, or part of it, for examination at Unisa for another qualification or at any other higher education institution.

30 January 2023

SIGNATURE DATE

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FACTORS ASSOCIATED WITH INFLUENZA VACCINE ADHERENCE AMONG HEALTHCARE WORKERS IN ABU DHABI

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ABSTRACT

Vaccination is regarded as the cornerstone of public health policies aimed at reducing the spread of various infectious illnesses. Influenza outbreaks and pandemics reoccur on a regular basis, presenting a threat to public health. Healthcare workers (HCWs), particularly those directly engaged in patient care and the handling of human tissues, are urged to be vaccinated against influenza to boost their resistance to the virus and improve patient safety. Aside from the danger of infecting other people in the hospital, vaccination among HCWs is advised because it decreases staff absence, allowing them to maintain high production levels throughout the influenza season.

This study aimed to identify and describe the factors associated with HCWs' adherence to the annual influenza vaccines in a hospital in the United Arabs Emirates (UAE) to provide recommendations that can contribute to the enhancement of adherence rates.

A generic quantitative study was conducted using a questionnaire based on literature and the health belief model to gather data from HCWs in a hospital in the UAE.

A total population sampling was done. All 2 080 staff members of the hospital under study received an information letter with details about the research, inviting voluntary participation. Ultimately, 1 018 respondents returned completed questionnaires, and this data were analysed.

The findings revealed that social influence from colleagues was an essential factor influencing influenza vaccine uptake. The lack of a convenient time to be vaccinated, knowledge about the hospital's policy regarding influenza uptake, a lack of follow-up by the hospital administration, no previous cases of influenza, and fear of the injection were also identified. Motivational factors included the need to protect their friends and family from flu; recommendations by employers; policies that forced compliance; as well as their own motivation to protect their patients.

The findings and a thorough literature review contributed to the proposed recommendations. The recommendations include the provision of health education material, social media use, mandatory vaccination, on-duty vaccination, free vaccination services, flexible post-vaccination recovery time, special sick leave, and greater awareness about the benefits of the vaccine. In conclusion, the study's objectives were met based on the above findings.

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LIST OF ABBREVIATIONS

AIDS:	Acquired Immuno-Deficiency Syndrome
CDC:	Centre for Disease Control
FDA:	Food and Drug Administration
HBM:	Health Belief Model
HCWs:	Healthcare Workers
HIV:	Human Immuno-deficiency Virus
LASAG:	L-lysine-acetylsalicylate glucine
NAIs:	Neuraminidase inhibitors
NICE:	National Institute for Health and Care Excellence
PMT:	Protection Motivation Theory
SARS:	Severe Acute Respiratory Syndrome
SPSS:	Statistical Package for Social Sciences
UAE:	United Arab Emirates
UK:	United Kingdom
USA:	United States of America
WHO:	Word Health Organisation

CHAPTER 1
OVERVIEW OF THE STUDY

1.1 RESEARCH BACKGROUND

Vaccination is widely considered the cornerstone of public health strategies meant to mitigate various infectious diseases. At present, there have been efforts to develop and introduce a large number of vaccines as a mitigation strategy against contagious diseases, especially among high-risk groups (Van Panhuis, Grefenstette, Jung, Chok, Cross, Eng, Lee, Zadorozhny, Brown, Cummings & Burke, 2013:2152). The influenza virus infection, which is the focus of this study, constitutes one of the common diseases that, when left unmanaged through vaccination programmes, can lead to pandemics. As an example, the Spanish influenza in the early 20th century resulted in the deaths of over 20 million people and was considered a global disaster (Rewegan, Bogaert, Yan, Gagnon & Herring, 2015:354). While this epidemic has not been experienced to this degree in recent years, the effects of the influenza infection remain a serious concern in public health care.

Influenza epidemics and pandemics are periodically re-emerging, thus posing a great danger to public health. This is evident from the 2009 Hemagglutinin 1 Neuraminidase 1 (H1N1) influenza pandemic, first detected in North America in 2009, rapidly spreading to 73 other countries around the world. By the time the pandemic was contained, the World Health Organisation (WHO) reported that over 18 000 laboratory-confirmed deaths had occurred (Vousden & Knight, 2020:42). The influenza virus, which infects the respiratory tract mucosa, can therefore lead to severe illness and in some instances high levels of mortality due to accompanying complications such as pneumonia (Suda, Nagatomo, Yokoyama, Ohzono, Aoyama, Zhang, Nakajima, Murakami, Shinoda, Hirota,Yanagihara & Nishi, 2015:64).

In December 2019, health officials in Wuhan (China) announced that a severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) had emerged after doctors indicated this new virus was producing a condition later called COVID-19 (coronavirus illness 2019) (Huang, Wang, Li, Ren, Zhao, Hu, Zhang, Fan, Xu, Gu, Cheng, Yu, Xia,

Wei, Wu, W. Xie, Yin, Li, Liu, Xiao, Gao, Guo, Xie, Wang, Jiang, Gao, Jin, Wang & Cao, 2020:498). Even though SARS-CoV-2 was first discovered on 17 November 2019, retrospective investigations indicate that it had been circulating for many weeks, perhaps since October 2019 (Frutos, Serra-Cobo, Chen & Devaux, 2020:84). The disease contributed to 6 804 491 global deaths as of 27 January 2023 (WHO, 2023).

Since it was a new virus, approved vaccinations were not available at that time (Soleimanpour & Yaghoubi, 2021:24). However, the extent of the globalised spread of the disease led to a widespread research movement that resulted in the development of more than 60 potential vaccine candidates (Soleimanpour & Yaghoubi, 2020:24). Several of those vaccines completed clinical trials and were distributed to the general population for immunisation across the world (OECD, 2021), assumingly similar to after the start of the influenza outbreak.

While influenza and other infectious diseases such as polio and measles can be prevented, it has been argued that the overall low incidence often leads to perceptions among the population that the risk of acquiring the diseases is low (Haque, Sartelli, McKimm & Bakar, 2018:2321). Moreover, the influenza virus infection is mostly associated with morbidity and mortality among specific populations, such as the young, the elderly, and the chronically ill (Macias, McElhaney. Chaves, Nealson, Nunes, Samson, Seet, Weinke & Yu, 2021: 7; Ohmit, Thompson, Petrie, Thaker, Jackson, Belongia, Zimmerman, Gaglani, Lamerato, Spencer, Jackson, Meece, Nowalk, Song, Zervos, Cheng, Rinaldo, Clipper, Shay, Piedra, & Monto, 2014: 325). However, advances in medicine have made it possible to provide these populations with effective vaccines targeting seasonal outbreaks of the main types of influenza, including influenza A (H1N1; H3N2) and influenza B.

Within this context, the role that healthcare workers (HCWs), including nurses, play in the transmission of the virus has often been overlooked. Due to their close proximity to patients, HCWs risk acquiring the infection and transmitting it to other staff members and uninfected but vulnerable patients (Jaiyeoba, Villers, Soper, Korte & Salgado, 2014:69-70). Whenever such transmissions occur, the healthcare principle on patient safety and the Hippocratic Oath to ‘first, do no harm’ are compromised. Moreover, it has been documented that adherence to annual vaccine immunisation among HCWs

is effective in preventing nosocomial infections that are mainly associated with morbidity among patients (Haque et al., 2018:2321). Adherence to influenza vaccination is therefore recommended on the basis that it reduces the risk of infection.

HCWs, especially those directly involved in providing patient care and handling human tissues, are encouraged to get vaccinated against influenza in order to increase their resistance to the infection and enhance patient safety during the influenza season (Alsuhaibani, 2020:313). Besides the risk of infection of other individuals in the hospital setting, vaccination among HCWs is recommended on the basis that it reduces absenteeism among staff, thus maintaining high levels of productivity during high-risk seasons (Antinolfi, Battistella, Brunelli, Malacarne, Bucci, Ceroto, Cocconi & Brusaferro, 2020:763).

1.2 STATEMENT OF THE RESEARCH PROBLEM

Research shows that there are low immunisation adherence rates among HCWs in most healthcare institutions across the world (Della Polla, Licata, Angelillo, Pelullo, Bianco & Angelillo, 2021:695; Cortes-Penfield, 2014:2062; Seale, Kaur & MacIntyre, 2012:325). In the United States, where relatively accurate data records are maintained, the vaccination coverage rate among HCWs is 77.3% (CDC, 2016). The majority of other countries, particularly in regions where influenza epidemics have not been experienced in recent years, have recorded coverage rates below 50% (Verger, Fressard, Cortaredona, Lévy-Bruhl, Loulergue, Galtier & Bocquier, 2018:48; Bish, Yardley, Nicoll & Michie, 2011:6474).

A reluctance to be immunised poses a major health risk to both patients and the HCWs due to their close proximity and contact. Nurses, in particular, work in close contact with patients and must protect themselves and their patients to reduce the disease burden, increase health worker productivity, and reduce associated healthcare costs.

1.3 ADHERENCE RATES IN THE MIDDLE EAST

In the United Arabs Emirates (UAE) and other Middle East countries, HCWs' vaccinations against influenza typically follow guides set by the WHO, among other

international health agencies. HCWs in this region are required to adhere to vaccination recommendations for both the seasonal and pandemic influenza virus. In the specific case of the UAE, the government distributes pandemic influenza vaccines to all healthcare facilities across the country. These vaccines are available free of charge to HCWs (Awaidy, Al Mayahi, Kaddoura, Mahomed, Lahoud, Abubakar & Zaraket, 2020:661).

Previous studies, though few, suggest that adherence rates to influenza vaccines in the UAE have remained very low. Abu Hammour and Al-Saleh (2019:16) conducted a survey at a children's hospital in the UAE and found that 63% of HCWs did not uptake the influenza vaccine. Tamimi, Nusair, Al-Yateem, Ayesh, Noronha and Dinesh (2022:10) also reported that only 36.7% of nurses were willing to adhere to COVID-19 vaccinations at a hospital in the UAE. In light of such concerning statistics pertaining to vaccine adherence in the UAE, there is a need to provide, identify and describe the factors associated with non-adherence and formulate recommendations for possible interventions.

In the UAE and other countries around the world, HCWs' vaccination against the influenza virus is a policy decision for each hospital or jurisdiction (Abu Hammour & Al-Saleh, 2019:18). As such, there is a need to investigate adherence rates on a case-by-case basis in order to identify and recommend plausible solutions or interventions that can increase uptake among HCWs.

1.4 RESEARCH AIM

The aim of this study was to identify and describe the factors associated with HCWs' adherence to the annual influenza vaccines in a hospital in the UAE in order to provide recommendations that can contribute to the enhancement of adherence rates.

1.5 RESEARCH OBJECTIVES

The following objectives were applied to meet the aim of the study:

- Identify challenges with influenza vaccine adherence among HCWs in the hospital.

- Identify opportunities for influenza vaccine adherence among HCWs in the hospital.
- Describe interventions meant to promote influenza vaccine adherence among HCWs in the hospital.
- Identify and describe ways to promote influenza vaccine adherence among HCWs.

1.6 RESEARCH QUESTIONS

The study sought to provide comprehensive answers to the following research questions:

- Which are the main factors that pose challenges to vaccine adherence among HCWs in the hospital?
- Which are the main factors that motivate vaccine adherence among HCWs in the hospital?
- How efficacious are current intervention measures to promote influenza vaccine adherence rates among HCWs in the hospital?
- What can be done to improve the hospital's influenza vaccine adherence rates?

1.7 SIGNIFICANCE OF THE STUDY

The study provided both practical and theoretical significance by investigating the factors associated with low adherence to vaccines among HCWs in a hospital. In terms of practice, the study identified the causes of low adherence and consequently suggested recommendations that can help improve HCWs' vaccine uptake, subsequently reducing morbidity and mortality among HCWs and other vulnerable groups. The study's findings may assist the management of the hospital to enhance patient safety and increase staff productivity by reducing absenteeism from influenza-like illnesses. From a theoretical perspective, the findings were significant in filling the current research void on influenza vaccine adherence rates, specifically in the UAE. Studies focusing on influenza vaccination in the UAE are scarce (Abu-Gharbieh, Fahmy, Rasool & Khan, 2010:19; Olaimat, Aolymat, Al-Holy, Ayyash, Abu Ghoush, Nabulsi, Osaili, Apostolopoulus, Liu & Shah, 2020).

1.8 DEFINITION OF KEY CONCEPTS

1.8.1 Influenza

Influenza is an acute respiratory infection caused by viruses from the orthomyxovirus family. The disease is highly contagious and causes severe aches and catarrh that occur in epidemics (CDC, 2020).

1.8.2 Adherence

Adherence refers to compliance with guidelines for vaccinations or treatments, such as annual revaccination required for HCWs (Auladell, Jia, Henson, Chua, Fox, Nguyen, Doherty & Kedzierska, 2019:10).

1.8.3 Vaccination

Vaccination refers to an immunotherapy procedure that involves administering an individual with substances that can stimulate the body's production of antibodies that can help provide immunity against one or more known diseases (Voller & Abraham, 2012:152).

1.8.4 Healthcare workers

Healthcare workers encompass all workers in healthcare offices and facilities involved in providing health care to patients (Joseph & Joseph, 2016:71).

1.8.5 Risk factors

Risk factors are, from a health or medical perspective, the variables associated with an increased risk of an infection, such as influenza (Coffin, Zaoutis, Rosenquist, Heydon, Herrera, Bridges, Watson, Localio, Hodinka & Keren, 2007).

1.9 OPERATIONAL DEFINITIONS

1.9.1 Vaccination

Vaccination in this study refers to an immunotherapy procedure that can stimulate the body to produce antibodies that can help provide immunity against the influenza virus.

1.9.2 Healthcare workers

Healthcare workers in this study refer to all hospital workers likely to come into contact with influenza-infected patients or transmit the virus to co-workers and patients. They include nurses, physicians, dieticians, physiotherapists, respiratory therapists, midwives, pharmacists and medical laboratory specialists.

1.9.3 Risk factors

Risk factors in this study refer to factors that can increase the risk that HCWs are likely to be infected with the influenza virus, including the risk of close contact with influenza-infected patients.

1.10 THEORETICAL GROUNDING

Factors influencing adherence to the influenza vaccine can be evaluated using a range of conceptual frameworks. For instance, Bastani, Glenn, Taylor, Chen, Nguyen, Stewart and Maxwels' (2010) health-seeking behaviour model, which is similar to Butts and Richs' (2015) health belief model, are both applicable theoretical frameworks that could be used in the current study. This study applied the health belief model to guide the collection of data on possible factors that influence HCWs' decision to adhere to or flout guidelines on the annual influenza vaccine (see Figure 1.1).

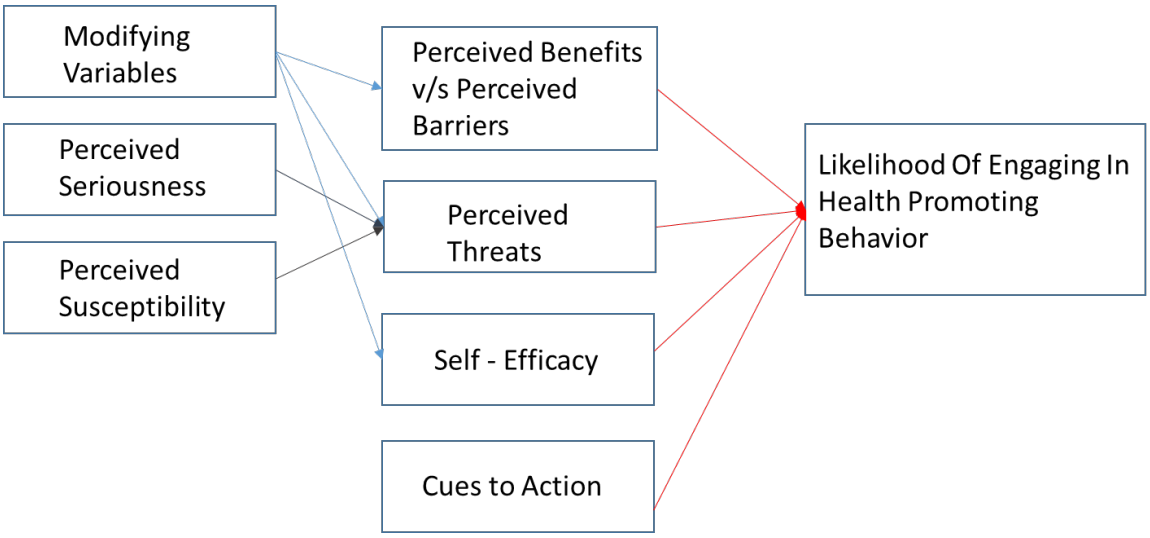

Figure 1.1: Health belief model conceptual framework (Adapted from: Butts & Rich, 2015)

The health belief model and its application are further discussed in Chapter 2, section 2.9.

1.11 OVERVIEW OF RESEARCH METHODOLOGY

1.11.1 Research design

A cross-sectional descriptive quantitative design was used to describe the research participants' characteristics and the collection of data in an accurate way. When using this type of design, data are collected from the respondents only once at a given time, as described by Saunders, Lewis and Thornhill (2007:153).

1.11.2 Study setting and population of the study

The study was conducted in one of the public hospitals in the UAE, which offers tertiary healthcare. The hospital has over 2 040 HCWs who comprise nurses, midwives, physicians, pharmacists and clinical staff (dieticians, respiratory therapists, physiotherapists, radiographers and radiotherapy technicians). Additional details about this study's setting and population are provided in Chapter 3, sections 3.2.7 and 3.2.8.

1.11.3 Sampling and sampling methods

The total population size was 2 080 HCWs. Total population sampling was done, thus the entire population was invited to participate in this study. Of these HCWs, 1 018 completed the questionnaire, bringing the response rate to 48.94%. More details are provided in Chapter 3, section 3.2.9.

1.11.4 Data collection methods and procedures

A questionnaire was developed after a thorough literature review was conducted and used as the data-gathering instrument. Closed-ended and open-ended questions were included in the questionnaire (see Annexure E) for qualitative enhancement. After permission to conduct the study was received from the Health Research Ethics Committee from the Department of Health Studies at UNISA (see Annexure A), as well as the Operations Department of the hospital (see Annexures B and C), informed consent (see Annexure D) was obtained from the volunteer respondents before data were gathered. The respondents were required to complete the questionnaire through self-administration (see Chapter 3, section 3.3.1.3).

1.11.5 Data management and analysis

Data obtained from the survey were stored safely in a locked cabinet and a password-protected computer, with only the researcher, supervisor and statistician having access. Quantitative data results were analysed with the assistance of statistical tools, namely Statistical Package for Social Studies (SPSS) version 22 and Excel spreadsheets. Qualitative data from the open-ended questions were open-coded separately to enrich the data received (see Chapter 3, section 3.3).

1.11.6 Validity and reliability

Validity refers to the extent to which the research instruments truly measured the research aspects the researcher intended to measure (Easterby-Smith, Thorpe & Jackson 2012:102,109). Content validity was achieved by formulating the questions in such a way that a strong link existed between the questions posed, the objectives of

the study, and the available literature on the topic. A pilot study (see section 3.3.3) was also used to improve the questionnaire's internal validity.

Reliability refers to the extent to which the results of the study constitute an accurate representation of the target population and are consistent over time (Saunders et al., 2019:156). Reliability was achieved through test/retest principles (see section 3.3.4).

1.11.7 Ethical principles

The following ethical principles, as described by Gerrish and Lathlean (2015:38), were taken into consideration in this research: minimising the risk of harm; informed consent; anonymity and confidentiality; avoiding deceptive practices; providing the right to withdraw; beneficence; and the right to receive the results. These principles and their applicability to HCWs' involvement in the research conducted on influenza adherence rates are discussed in detail in section 3.3.5.

1.12 STRUCTURE OF THE STUDY

This study comprises five chapters, as indicated in Table 1.1.

Table 1.1: Chapter layout

CHAPTER	DESCRIPTION
Chapter 1	Offers background information on the research topic. It also highlights the aim and objectives that were pursued in the research and offers an overview of the methodology.
Chapter 2	Presents a discussion of the literature reviewed on influenza and the factors associated with influenza vaccine adherence among the general HCW population around the globe, as well as the health belief model applicable to the study.
Chapter 3	Describes the research methodology selected. This includes the research design, the development of the research instrument, population, sampling, data collection, data analysis, validity, reliability, as well as the ethical considerations adhered to during the collection, analysis and presentation of the data.

CHAPTER	DESCRIPTION
Chapter 4	The data obtained, the analysis thereof, as well as the interpretation of the findings, are presented and discussed.
Chapter 5	The conclusions of the study and recommendations to promote and enhance influenza vaccine adherence rates in the study hospital and other hospitals across the UAE are discussed.

1.13 CONCLUSION

Chapter 1 provided an overview of the study. The chapter outlined the main aim of the research, the significance of the study, and outlined the gap in research that the study aimed to cover. The research methods employed in the study were also presented. The next chapter covers the literature review on the topic under study, as well as the applied theoretical framework.

CHAPTER 2
LITERATURE REVIEW

2.1 INTRODUCTION

Chapter 2 provides a detailed theoretical basis for the study's research topic. The literature review focused on published literature regarding factors associated with influenza vaccine adherence among HCWs. The following databases were used to select appropriate literature: PubMed, Ebsco-Host, Science Direct, Emerald Insight, and NHIS, among others. The following keywords were used to search the literature: influenza, influence prevalence, influenza vaccine complications, influenza treatment, influenza risk factors, absenteeism and pandemic. The health belief model is also discussed as it applied to the study.

2.2 INFLUENZA

Influenza is an acute respiratory virus responsible for epidemic and pandemic disease outbreaks. It has been recognised as a key cause of serious health consequences, such as morbidity and mortality around the globe. Despite its early existence, the influenza virus was first isolated in 1993 as a single-stranded RNA virus (Su, Wilson, Samuel & Ma, 2021:126). Three basic antigen types (A, B, and C) were later determined. The type A strain is the most common and causes moderate to severe illness. It is also capable of affecting all age groups and is mainly perpetuated by wild birds (Vousden & Knight, 2020:4). Influenza B is milder and primarily affects children. Unlike influenza A, which can also be found in animals, influenza B affects only humans. Influenza C infections generally cause mild illness and are not thought to cause human epidemics (CDC, 2021).

Statistically, influenza results in an estimated five million cases of severe illness and over 500 000 deaths annually (WHO, 2022). It has been estimated that 20-30% of children and 5-10% of adults are infected with the influenza vaccine annually (Hurt, 2014:24). Influenza has also resulted in several pandemics worldwide. For instance, the most popular pandemics of the 20th century occurred in 1918, 1957 and 1968. It

is reported that the “Spanish” influenza that occurred in 1918-1919 resulted in 21 million deaths worldwide (Karlsson, Nilsson & Pichler, 2014:3-4). In the 21st century, one of the recent pandemics is the 2009 influenza A (H1N1), which began in North America (Mexico and the United States) and later spread to 74 other countries. In the US, the Centres for Disease Control and Prevention (CDC) reported over 29 million cases of influenza illnesses and 28 000 deaths associated with H1N1 (CDC, 2020).

2.3 CLINICAL SIGNS AND SYMPTOMS

The influenza virus causes inflammation of the upper respiratory tract and the trachea. The incubation period for the virus is between one to four days, meaning symptoms can begin within one to four days after exposure (WHO, 2018). The body’s immune system reacts to the virus, and the interferon is responsible for symptoms of fever and body pain. Thus, symptoms will appear within two days after exposure to the virus and are present for anywhere from seven to ten days. The symptoms begin with an abrupt onset of a sore throat, fever, cough, muscle or body aches, fatigue and headache.

Other common symptoms include a runny nose and ocular symptoms such as pain in the eyes (Grech & Borg, 2020:105116). The infection may progress to serious complications such as chronic bronchitis, Reye syndrome, and even result in death among individuals with weak immune systems (Tao, Yang, Shi, Xue, Yang, Song & Cai’, 2013:255; Burrell, Howard & Murphy, 2017:37-556). Additional complications that can develop include pneumonia, sinusitis and bronchitis (Tao et al., 2013:255). In the absence of effective treatments, the administration of inactivated and attenuated influenza vaccines is considered the most efficacious protective method (Mohn, Smith, Sjursen & Cox, 2018:572).

2.4 COMPLICATIONS

Influenza infection causes not only pulmonary complications leading to pneumonia, but also cardiac and neuromuscular complications (Kalil & Thomas, 2019:6). Some of the most common extra-pulmonary complications include viral myocarditis and viral encephalitis (Sellers, Hagan, Hayden & Fischer, 2017:373).

Influenza can also interact with existing chronic conditions such as asthma, chronic obstructive pulmonary disease, heart disease, sickle cell disease, diabetes, kidney disorders, liver disorders, neurological and neurodevelopmental conditions, cancer, and Human Immunodeficiency Virus/ Acquired Immune Deficiency Syndrome (HIV/AIDS). It exacerbates these conditions and increases the individual's risk for persistent catastrophic disability (Andrew, MacDonald, Godin, McElhaney, LeBlanc, Hatchette, Bowie, Katz, McGeer, Semret & McNeil, 2021:698). Therefore, the unchecked spread of influenza can lead to widespread severe illness.

2.5 TREATMENT

Literature and research pertaining to influenza outbreaks, prevention, and treatment emphasise its ease of transmission (Moghadami, 2017:3). A range of treatments have therefore been recommended. In mild cases, physicians recommend that patients abide by bed rest and drink at least 64 ounces (1.8 litres) of room temperature to warm fluids as part of the treatment process (Cheung, Tsang, Fang, Xu, Chan, Ip, Peiris, Leung & Cowling, 2015:58).

However, moderate to severe cases of influenza infection requires the prescription of antiviral medication (Koonin & Patel, 2018:216). The United States CDC and the UK National Institute for Health and Care Excellence (NICE) recommend neuraminidase inhibitors for the early treatment of influenza (Parra-Rojas, Nguyen, Hernandez-Mejia & Hernandez-Vargas, 2018:2; Rauš, Pleschka, Klein, Schoop & Fisher, 2015:67). The specific neuraminidase inhibitors include Oseltamivir and Zanamivir and have been demonstrated to be effective in reducing the duration and intensity of the virus (Parra-Rojas, Nguyen, Hernandez-Mejia & Hernandez-Vargas, 2018:2). Ultimately, the effectiveness of these treatments depends on early intervention (Muthuri, Venkatesan, Myles, Leonardi-Bee, Al Khuwaitir, Al Mamun & Beovic, 2014:397) and the causative viruses' sensitivity to the drugs available Principi, Silvestri & Esposito, 2019:1).

In the most recent influenza pandemics documented (2008-2009 winter seasons), it was found that H1N1 influenza subtypes had a low sensitivity to Oseltamivir and Zanamivir (Jefferson, Jones, Doshi, Del Mar, Hama, Thompson & Howick, 2014:257).

The authors concluded that administering either Oseltamivir or Zanamivir as a preventive measure reduces the risk of developing symptomatic influenza.

A recent study by Scheuch, Canisius, Nocker, Hofmann, Naumann, Pleschka, Ludwig, Welte and Planz (2018:9) also supports the use of D L-lysine-acetylsalicylate glucine (LASAG) in treating the virus in mice and cell cultures. The research found that LASAG helps in improving the timeframe for alleviating patients' symptoms of influenza. Despite screening for new antiviral drugs against these viruses, limited numbers of Food and Drug Administration (FDA) licensed or conditionally/regionally licensed anti-influenza drugs are available as a preventive strategy (FDA, 2020).

2.6 MODES OF TRANSMISSION

The influenza virus can be transmitted directly or indirectly. **Indirect transmission** occurs when the virus is transferred by intermediate items such as food, dust particles, water, surface contact, and air, among others. Indirect transmission includes airborne transmission when droplets carry the pathogen to the host (Gustin, Katz, Tumpey & Maines, 2013:7) through sneezing, coughing, etc. Airborne spread is considered the predominant mode of indirect transmission and can occur through coughing and sneezing (Tellier, Cowling & Tang, 2019:8).

Direct transmission refers to the direct and immediate transfer of the influenza virus from one host to another susceptible host. It occurs mainly through direct physical contact with fluids, oral secretions, or body lesions contaminated with the virus (Abu Hammour & Al-Saleh, 2019:16-20).

2.7 PREVENTATIVE MEASURES

In healthcare settings, the CDC (2019) has outlined several strategies that can be adopted to prevent influenza infection. Strategies include getting vaccinated, practising respiratory hygiene and cough etiquette, systematic management of ill HCWs, maintaining strict compliance with the precautions stipulated for all patient-care procedures, and procedures that generate aerosols. It further recommends

administering strict engineering and environmental infection control and implementing generalised yet comprehensive infection prevention measures.

2.7.1 Vaccination

Antiviral medicines, particularly neuraminidase inhibitors (NAIs), are available for both therapeutic and preventive actions against influenza, yet vaccinations remain the most efficacious means of preventing influenza (Barberis, Myles, Ault, Bragazzi & Martini, 2016:115; Dini, Toletone, Sticchi, Orsi, Bragazzi, & Durando, 2018:772). Inactivated and live, attenuated influenza vaccines are the two main types of seasonal vaccines (called LAIVs). Subunit vaccinations consisting of refined hemagglutinin and NA proteins, as well as split-virion vaccines, are examples of inactivated influenza vaccines. It is known that conventional non-adjuvant trivalent influenza vaccinations have several drawbacks, such as poor immunogenicity in the elderly, in people with severe chronic conditions, and immunocompromised patients. Traditional vaccinations may also provide less protection due to periodic antigenic drift, resulting in a mismatch between virus strains in circulation and vaccine strains.

It has taken time to improve the efficiency of influenza vaccines in terms of tolerability, convenience, effortlessness and, notably, clinical protection (Dini et al., 2018:775). Efforts have been expended to provide distinct vaccine options to enhance their performance (Bragazzi, Orsi, Ansaldi, Gasparini & Icardi, 2016:2616). For patients and other people at risk, including HCWs, several innovative methods have been created to improve uptake. Furthermore, vaccinations against influenza have been proven to prevent infections among HCWs with an efficacy of about 70.5% to 90.5% (Restivo, Costantino, Bono, Maniglia, Marchese, Ventura, Casuccio, Tramuto & Vitale, 2017:725).

2.7.2 HCWs' compliance with influenza vaccination campaigns

There is evidence that the efficacy of the influenza vaccine decreases throughout the influenza season, and the more time that passes after immunisation, the greater the risk of influenza infection (Ray, Lewis, Klein, Daley, Wang, Kulldorff & Fireman, 2019:1625). Postponing vaccination programmes may therefore result in lost

immunisation chances. Regardless of when immunisation begins, it should be continued throughout the influenza season to ensure it is still effective (Grohskopf, Alyanak, Broder, Walter, Fry & Jernigan 2019:20). Increased influenza vaccination rates among HCWs are linked with a substantial reduction in nosocomial influenza infections and hospitalisation for HCWs (Hayward, Fragaszy, Kovar, Nguyen, Beale, Byrne, Arvee, Hardelid, Wiljaars, Fong, Geismar, Patel, Shroti, Navaratnam, Nastouli, Spyer, Killingley, Lampos & McKendry, 2021:1250; Frenzel, Chemaly, Ariza-Heredia, Jiang, Shah, Thomas, Graviss & Raad, 2016:1016; Amodio, Restivo, Firenze, Mammina, Tramuto & Vitale, 2014:185). Therefore, adherence is of utmost importance.

2.7.3 Respiratory hygiene

Hand cleaning is a critical component of good hygiene. As elementary as it may seem, hand washing is vital for avoiding the transmission of any illness. Hands should be thoroughly washed with soap and water, including between the fingers, for at least 30 seconds. After washing, contaminated surfaces should not be touched (Toney-Butler & Carver, 2019), and if touched, the process of hand washing needs to be repeated (Mathur, 2011:5).

Before engaging with a patient, healthcare personnel must perform a multi-step hand-washing procedure. The initial step is to use (ideally) warm water. Then, lather up and clean both hands and fingers in a circular motion. The water should then be turned off using the wrist or elbow. The hands should be dried with a blow dryer or paper towel. The paper towel needs to be discarded immediately after use. In order to prevent dry, cracked skin, HCWs can pat the skin dry instead of rubbing it. A topical antiseptic must be applied liberally and rubbed into the skin for the duration indicated in the applicable instruction of the antiseptic used (Mathur, 2011:11).

Patient rooms and operating rooms must be kept clean, and cleaning staff are advised to use a wipe cloth with disinfectants and different detergents to ensure there are no residues or contaminants in the hospital environment (Mathenge & Prasad, 2021:4). Overall, proper cleanliness, as prescribed within hospital policies, should be practised. Garbage bins and appropriate bin bags for dirty goods should be easily accessible,

and frequently used objects such as pens and toilets must be kept clean (Chavis & Ganesh, 2019:100).

Signage placed around the doctor's office, surgical rooms, hospital bathrooms, and common lounge areas is beneficial in informing and reminding patients to be aware and respectful of common ways to prevent the spread of germs and viruses. Strategies include covering the mouth and nose with an elbow when coughing or sneezing, washing hands, and disposing of any trash in the appropriate container (Chavis & Ganesh, 2019:100).

2.7.4 Management of infectious HCW

Since healthcare facilities are often the epicentres of newly propagating illnesses, HCWs are at an increased risk of contracting infectious diseases (Liang, Tan, Mark & Chen, 2018:406). HCWs' connections and contact with infectious individuals may vary significantly from those of community members due to their work-related conditions (Jiang et al., 2018:407). They consequently face an increased risk of being infected themselves (Jiang et al., 2018:407).

Surveillance of emerging infections may be possible by monitoring infectious symptoms among HCWs (Liang, Gao, Cheng, Zhou, Uy, Heiner & Sun, 2020: 765). Symptom monitoring may aid in the early identification of a healthcare-associated epidemic, such as influenza. However, it must be accompanied by a complete outbreak control plan, such as HCW exclusion, to ensure containment and prevent spread. The most effective way of preventing respiratory infections from spreading is to avoid contact with others while a person is experiencing symptoms (CDC, 2019). It is also critical to educate all HCWs, employees, and patients alike that if they have respiratory infection symptoms, they should avoid contact with others until they are asymptomatic and no longer infectious. There should be strict rules or policies in place requiring HCWs to remain home if they experience respiratory symptoms.

2.7.5 Prophylactic drugs

Zanamivir or Oseltamivir can be used as prophylaxis to reduce the risk of developing symptomatic influenza (Jefferson et al., 2014:257). These drugs are proven to be successful in 70–80% of influenza cases (Bridges, Harper, Fukuda, Uyeki, Cox & Singleton, 2003:6; Stiver, Evans, Aoki, Allen & Laverdière, 2015:6). However, if more than 48 hours have passed since the onset of influenza-like symptoms, moderately ill patients without risk factors for severe or complex influenza should refrain from using antiviral drugs, since research reported antiviral drugs work best when the onset of the influenza virus has been longer than 3-4 days (CDC, 2021).

Oseltamivir, when administered up to 96 hours after the onset of symptoms, has been proven to decrease mortality and severe illnesses that need hospitalisation (CDC, 2021; Louie & Lampiris, 2015:1198). It should be taken as soon as possible after a thorough clinical evaluation and the collection of suitable specimens for viral testing (CDC, 2021).

2.7.6 Protective gear

Protective gear refers to clothing or articles that are worn to protect oneself from outer elements, such as face masks, glasses, gloves, face shields, and coveralls, among others (Mahase, 2020:5). To guard against body fluids or respiratory secretions splashed during regular patient care, or while conducting high-risk operations, healthcare professionals must wear protective gear, including surgical face masks, face shields, and even eye protection (Perencevich, Diekema & Edmond, 2020:4).

The COVID-19 pandemic emphasised the importance of not only surgical face masks, but (reusable) fabric masks as an alternative to surgical masks (WHO, 2022). These face covers may further decrease contact transmission by reducing the frequency of hands coming in contact with respiratory mucosa (Kwok, Gralton & McLaws, 2015:113), in addition to minimising droplet and aerosol transmission.

If a healthy person wears a face covering, it reduces their exposure to a virus. If an infected person wears a face covering, it reduces exposure to a virus and deflects it.

The use of face coverings alone or in combination with other non-pharmaceutical interventions can reduce the risk of respiratory illnesses or virus transmission in healthcare settings (Offeddu, Yung, Low & Tam, 2017:1933; Jefferson, Del Mar, Dooley, Ferroni, Al-Ansary, Bawazeer, van Driel, Jones, Thorning, Beller, Clark, Hoffmann, Glasziou & Conly, 2020; Leung, Chu, Shiu, Chan, McDevitt, Hau, Yen, Li, Ip, Peiris, Seto, Leung, Milton & Cowling, 2020:677). However, although essential, protective gear does not replace vaccinations as one of the most important preventive methods of reducing infection rates among HCWs (Yassi, Grant, Lockhart, Barker, Sprague, Okpani, Wong, Daly, Denderson, Lubin & Sing, 2021:254920).

2.7.7 Risk factors

Influenza epidemics can seriously affect people of all age groups (Monto & Fukuda, 2019:7). However, certain people are at a greater risk of infection than others. For instance, people over 65 years are recognised as a high-risk group, especially if they live in nursing homes and care centres for the elderly. They often have a weakened immune system due to age and pre-existing heart or other chronic conditions (Song, Shi, Shan, Zhang, Shen, Lu, Ling, Jiang & Shi, 2020:2655).

Young children below the age of five also have a weak immune system and are therefore at risk of contracting influenza (Ailes, Newsome, Williams, McIntyre, Jamieson, Finelli & Honein, 2014:1579; Tanner, Dorey, Brendish & Clark, 2021:159). Ultimately, patients with underlying risk factors or diseases that suppress immunity are at an increased risk (Tanner et al., 2021:158). These are patients with chronic cardiac diseases, asthma, and chronic renal dysfunction, as well as patients receiving immunosuppressive treatment for Chron’s disease, rheumatoid arthritis, multiple sclerosis, and psoriasis, among others (Tanner et al., 2021:158). People with HIV/AIDS are also at a higher risk of influenza and influenza-related complications due to having a compromised immune system (CDC, 2019). Individuals with compromised immune systems do not have the capacity to fight against infections and have a greater need for ongoing healthcare, exposing them to HCWs on a regular basis (da Silveira, Fagundes, Bizuti, Starck, Rossi & Silva, 2021:16).

Pregnant women are also recognised to be at a high risk of influenza illness, mainly due to changes in the immune system during pregnancy (Ailes et al., 2014:1579). They also face regular exposure to HCWs during antenatal care, intrapartum care, and postnatal visits (Auchynnikava & Habibov, 2020:160).

Consequently, HCWs are also recognised as a high-risk group due to their continued exposure to patients with influenza (Pavlič, Maksuti, Podnar & Kokot, 2020:21).

2.8 INFLUENZA IN THE HEALTHCARE FACILITY AND ENVIRONMENT

2.8.1 Risk of influenza infections among HCWs

HCWs face a higher risk of exposure to influenza infection while at work, compared to the general population, as reported in a Spanish study (Castilla, Godoy, Domínguez, Martín, Delgado-Rodríguez, Martínez-Baz, Baricot, Soldevila, Mayoral, Astray, Quintana, Canton, Castro, Gonzales-Candelas, Alonso, Saez, Tamames & Pumarola, 2013:179). The findings are attributed to HCWs' direct contact with infectious persons.

While HCWs play a crucial role in reducing the transmission of influenza pandemics in society (Basso, Nordbo, Sundqvist, Martinsen, Witso & Wiks, 2020:640), they are exposed to this and other contagious diseases at work themselves. They can consequently contract and spread the virus to other patients and their family members (Alloubani, Khater, Akhu-Zaheya, Almomani & Alashram, 2021:8; Alhammadi et al., 2015:3822; Kaur, Weiss, Perez, Fink, Chen, Luo, Liang, Mirza & Li, 2020:7). Research findings reported patients acquiring influenza from contagious HCWs was as high as 5.48% (Kaur et al., 2020:7). The risk of acquiring influenza increased significantly to 34.75% when a patient was exposed to both another contagious patient as well as a contagious HCW (Vanhems, Voirin, Roche, Escuret, Regis, Gorain & Barret, 2011:153). Annual influenza vaccinations are thus recommended for HCWs (Kuster et al., 2011:8; Restivo et al., 2017:729).

Alagappan, Silverman, Hancock, Ward, Akerman, Dawood and McCullough (2013:140-143) studied HCWs' risk of exposure during the first wave of the Hemagglutinin1 Neuraminidases1 (H1N1) pandemic in the United States. They found that from the 193 HCWs who were involved in the direct care of infected patients, 22%

had serological evidence of infection with the virus. Frontline HCWs working in specially designated influenza areas are therefore at great risk, especially when protective measures such as vaccinations, hand washing and face masks are not utilised. If protective measures are undertaken by frontline HCWs, they are no more likely to be infected with the virus than nonclinical staff (Lim, Lim & Lee, 2022:213). Therefore, vaccination plays a significant role in reducing HCWs' exposure to the risk of infection.

2.8.2 Absenteeism among influenza-infected HCWs and patient care

The need to vaccinate HCWs with the influenza vaccine has been justified on the basis that it prevents unnecessary absenteeism during periods characterised by a high demand for health service delivery (Castilla et al., 2013:180). This is similar to absenteeism due to other infections that could have been prevented (Di Martino, Di Giovanni, Di Girolama, Scampoli, Cedrone, D'Addezio, Meo, Romano, Sciascio & Staniscia, 2020:248).

Influenza infections' impact on HCWs' ability to provide healthcare services was particularly evident during the 2009 H1N1 and the COVID-19 pandemic (Di Martino et al., 2020:248). Due to the high rate of infections, patients in need of healthcare increased, and HCWs were thus critically important in managing pandemics (Al Thobaity & Alshammari, 2020:3; Galli, Pozzi, Ruggiero, Mameli, Cavicchioli, Barbieri, Canevini, Priori, Pravettoni, Sani & Ferrucci, 2020:1). While more patients become ill during pandemics, infections among HCWs also increases, and the demand for sick leave escalate as a result (Pappa, Sakkas & Sakka, 2022:2390). The overall impact is a reduced ability of a country's health sector to offer the necessary care to communities (Dias, Komagata & Levin, 2011; Mahmood, Hasan, Colder Carras & Labrique, 2020:18980).

HCWs who are infected during influenza pandemics must be isolated as a precaution to prevent further transmission (Thomas, Jefferson & Lasserson, 2013:7). This means they need to be absent from the healthcare setting and are unable to care for patients. The WHO and the CDC (2021) recommend that infected HCWs with a fever and respiratory symptoms be excluded from work for at least 24 hours. The CDC (2021),

in particular, recommends exclusion for a minimum of 24 hours after the reduction of fever is noted.

The guidelines for HCWs working in areas with severely immune-compromised patients are even stricter (CDC, 2021) due to the increased chance of transmission to this population. It is recommended that affected HCWs be excluded from work in the hospital for at least seven days after the onset until the resolution of symptoms (CDC, 2021). Depending on a hospital's infection control policies, some healthcare institutions have also been indicated to offer two sick days for HCWs suspected of having influenza infection (Sommerstein, Fux, Vuichard-Gysin, Abbas, Marschall, Balmelli, Troillet, Harbarth, Schlegel & Widmer, 2020:6). This results in staff shortages and inadequate provision of care to patients, which can increase the rate of complications (such as pneumonia) among patients (Dias et al., 2011; Malelelo-Ndou, Ramathuba & Netshisaulu, 2019:7).

However, some studies offer contradictory views about the impact of influenza infection on HCWs' absenteeism. A UK-based study by Nguyen-Van-Tam, Granfield, Pearson, Fleming and Keating (1999:691-694) assessed two influenza seasons (1993-94 and 1996-97). The authors found that while cases of influenza infections increased markedly during the two seasons, there was no corresponding significant increase in the number of sick days requested by hospital staff, possibly due to the mildness of the outbreak.

Still, documented findings provide reliable evidence indicating that a lack of protective measures (such as vaccination) leads to significant cases of HCW absenteeism during influenza outbreaks (Alhammadi et al., 2015:3824). During the global COVID-19 pandemic, at least 20% of the USA's hospitals experienced staff shortages due to absenteeism (Aguilar, Roberts, Uluturk, Kaminski, Barlow, Zori, Hebert-Dufresne & Zusman, 2021:2). Hospitals in the UAE similarly faced HCW shortages, to the extent that staff from other countries were recruited. HCW shortages can lead to poor patient health outcomes and reduce the quality of care provided (Marufu, Collins, Vargas, Gillespie & Almghairbi 2021:302). The COVID-19 pandemic and the subsequent lack of resources to prevent transmission to HCW (Coppeta, Somma, Ippoiti, Ferrari, D'Alessandro, Pietroiusti & Aurilio, 2020:9082) is proof of the importance of preventive

measures, such as vaccinations, to ensure optimal availability of HCW, promoting quality patient care.

2.9 THE HEALTH BELIEF MODEL AND VACCINATION

The HBM was developed by Rosenstock (1974:358) and has been widely used in public health services to explain preventive health behaviour. Notably, the model focuses on the relationship between an individual's health-seeking behaviour and the utilisation of necessary health services (see Figure 2.1). Six categories of the HBM model are relevant to the context of this study. These include (1) HCWs' susceptibility to influenza; (2) severity of influenza infections; (3) benefits of immunisation; (4) barriers to acceptance of the vaccine; (5) the cues to action; and (6) self-efficacy (Champion & Skinner, 2008:46-50; Butts & Rich, 2015:238). The health belief model (HBM) provides an effective framework to comprehensively understand the factors likely to cause low influenza vaccine adherence among HCWs. The model predicts health-seeking behaviour based on underlying assumptions and beliefs of the individual, as will be discussed. The six categories are presented in Figure 2.1.

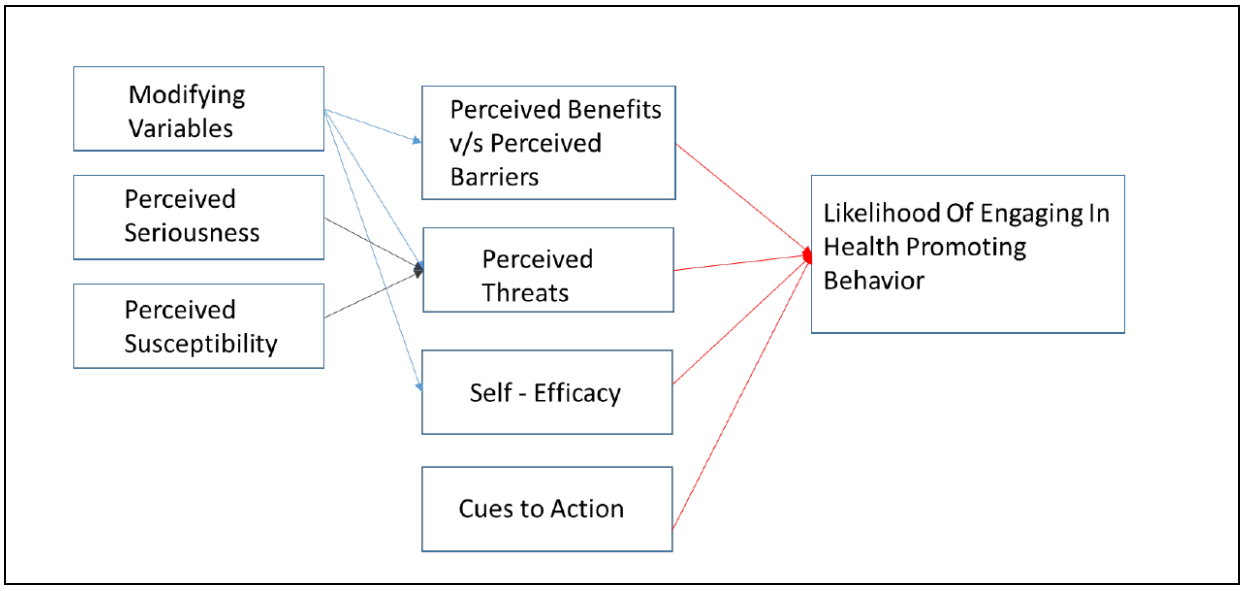

Figure 2.1: The health belief model (Adapted from Butts & Rich, 2015)

2.9.1 Perceived susceptibility to influenza

According to the first category of the HBM, the level of personal risk or susceptibility to a given health risk is one of the factors that may prompt an individual to embrace risk prevention measures (Polit & Beck, 2008:128). In general, it is assumed that higher perceptions of risk are likely to increase the likelihood of an individual engaging in health behaviours that seek to reduce exposure to the risk. Put differently, individuals will only take action when they perceive their personal susceptibility to a health risk is high enough to cause serious health consequences (Champion & Skinner, 2008:46-50).

In the specific case of influenza, HCWs who declined to take the influenza vaccine were found to indicate a 'low risk of infection' as the basis of their decision (Gallant, Vollman & Sethi, 2008:19-20). However, such decisions are often based on incorrect or incomplete information about the risk of influenza or other infections (Gallant et al., 2008:20; Li, Watson, Zheng, Ren, Tang & Chen, 2021:2). Gallant et al. (2008:20) determined that perceptions of influenza as a mild disease were associated with low vaccine adherence rates among nurses. In health institutions where adherence rates were high, the majority of HCWs perceived the disease as likely to lead to serious, negative health outcomes (Gallant et al., 2008:20), similar to other infections that are deemed serious, such as the ongoing Covid-19 (Li et al., 2021:3).

Studies revealed that one of the causes of low adherence rates among HCWs is the belief that their immune systems are 'strong' (Li et al., 2021:5). Most HCWs thus do not identify themselves as an at-risk group that needs to take precautionary measures (Albahri, Alnaqbi, Alnaqbi, Alshaali & Shahdoor, 2021:11). As such, evaluating the extent to which HCWs in the UAE perceive themselves as a high or low-risk group could help illustrate the causes of low adherence rates.

2.9.2 Perceived severity of influenza infections

Perceived severity is one of the key aspects of the HBM and revolves around one's perceptions about the gravity of the disease (Polit & Beck, 2018:128). Perception of the seriousness or severity of the disease can be attributed to medical knowledge as

well as beliefs about the difficulties that the disease could potentially create (Barakat & Kasemy, 2020:5). The majority of HCWs are aware that influenza can lead to serious health consequences, such as morbidity and mortality among patients (Diomidous & Isaakidou, 2020:307; Youssef, Berry, Youssef & Abou-Abbas, 2022:10), but they tend to be reluctant to adopt the patient role themselves (Li et al., 2021:5). Infected nurses and physicians are therefore likely to downplay the seriousness of a given illness such as influenza, and are also less likely to request sick leave for an illness that they perceived to be 'minor' (Khorasanee, Grundy, Isted & Breeze, 2021:3). Such a situation has been described as 'sickness presentism' and has been on the rise in most healthcare institutions (Webster, Liu, Karimullina, Hall, Amlot & Rubin, 2019; Hansen & Andersen, 2008:958).

Several factors have been identified that can influence individuals' perceptions of the seriousness of influenza. These factors include perception of increased susceptibility and previous vaccination (Li et al., 2021:5; Nichol & Hauge, 1997:193-194). Vaccinated HCWs have been found to perceive influenza as a more serious health issue compared to their counterparts who have never received the vaccine (Nichol & Hauge, 1997:193-194). Moreover, those HCWs who have previously taken care of influenza-infected patients have also generally depicted higher influenza vaccine adherence rates (Schumacher, Salmanton-Garcia, Cornely & Mellinghoff, 2021:389). According to Dini et al. (2018:785), the higher adherence rates among such HCWs are attributable to their perception of increased susceptibility to illness, higher levels of cues to action, and fewer barriers in their quest to get vaccinated.

2.9.3 Benefits of immunisation

Perceived benefits relate to HCWs' views of the value of adopting risk-reduction measures such as immunisation against the influenza virus. Within this context, it is suggested that individuals adopt healthy behaviours to the extent that they believe their actions will reduce the risk of infection (Champion & Skinner, 2008:46-50). One of the powerful influencers of acceptance of an influenza vaccine among HCWs is the need to protect themselves from the pandemic. Personal protection from diseases particularly gained prominence after the 2009 global influenza outbreak (Alhammadi et al., 2015:3824). HCWs who had previously taken the vaccine as protection against

seasonal influenza were shown to accept subsequent vaccinations (Davis, Golding & McKay, 2021:315). Previous vaccine uptake is therefore deemed a strong predictor of future adherence rates.

The Hippocratic Oath to 'first do no harm' has also been considered one of the factors influencing vaccine uptake among HCWs (Najera & Reiss, 2015:370) to reduce the spread of influenza. Adhering to influenza vaccination guidelines should, in this context, be perceived as beneficial among HCWs in the sense that it ensures they minimise other individuals' exposure, such as patients and their families (Najera & Reiss, 2015:363). Despite this duty to protect, there have been conflicting results regarding the extent to which nurses consider the community's protection as one of the most important factors directing their decision (Shen & Dubey, 2019:176). In addition, many HCWs lacked awareness and understanding of the vaccine, especially in relation to its benefits and side effects.

2.9.4 Barriers to adherence

Perceived barriers in the HBM refer to an individual's own evaluation of the obstacles preventing them from adopting a desired new behaviour (Rani, Mohamed, Solehan, Ithnin, Ariffien & Isahak, 2022:4). This specific aspect of the model has been considered important in terms of determining behavioural change (Rani et al., 2022:4). In order for the new behaviour to be adopted, the benefits of the new behaviour should outweigh the costs of the old behaviour (Butts & Rich, 2015:238).

The HCW will, therefore, have to recognise the benefits of the new behaviour (getting vaccinated with the influenza vaccine) outweigh the costs of the old behaviour (refusing the influenza vaccine) (Savulescu, 2020). In the case of influenza adherence, three of the main factors that could be sources of barriers include psychological factors, demographic barriers and concerns about the efficacy and safety of the vaccine.

2.9.5 Psychological factors

In the HBM, the investigation of psychological predictors has been largely undertaken within the Protection Motivation Theory (PMT) framework (Han, Michie, Potts & Rubin, 2016:60-61). The PMT attempts to explain HCWs' attitudes towards the influenza vaccine and predict factors that motivate individuals to change their health behaviour. The model describes the cognitive processes that contribute to an individual's decision to perform or not perform a health behaviour, such as taking influenza vaccines. "Fear appeals", which are persuasive messages meant to arouse an individual's fear, are identified in the theory as one of the factors that lead to compliance (Han et al., 2016:60-61).

In the context of this study, exposing HCWs to messages about influenza that describe unfavourable consequences of the illness should increase the likelihood of positive behaviour being adopted (getting vaccinated). Three main stimuli of fear are identified, namely the magnitude of an aversive event; the probability that the event will occur if the necessary protective behaviours are not adopted; and the recommended coping response's ability to reduce or eliminate the aversive event (Williams, Rasmussen, Kleczkowski, Maharaj & Cairns, 2015:834). In this context, the aversive event is contracting influenza.

In relation to influenza vaccine adherence, the PMT specifies that health protective behaviour among individuals is determined by 'threat appraisals' and 'coping appraisals' (Han et al., 2016:60). Appraisal of the threat posed by influenza infections largely relates to how the potentially exposed person perceives the risk associated with the flu. Based on the PMT, the risk of becoming infected is likely perceived more seriously when the individual is exposed and experiences severe implications. Conversely, coping appraisals pertain to an individual's perceptions of behaviours that are likely to offer protection against the threat. A given protective behaviour will be adapted to the extent that it is seen to be effective (Han et al., 2016:60). Notably, the effectiveness of the protective behaviour is not only assessed in terms of elimination of the threat to health but also the response costs, such as money involved and the side effects (Susskind & Vines, 2020:3).

It is important to evaluate the extent to which there are sufficiently strong fear appeals to necessitate higher adherence to influenza vaccines among HCWs, who are part of the population of interest.

2.9.6 Concerns about vaccine efficacy and safety

Based on HCWs' knowledge of medications, it is expected that they are aware of the importance and effectiveness of various vaccines. However, studies on influenza vaccine adherence indicate HCWs share many of the same questions about the efficacy and safety of the influenza vaccines as the general public (Grochowska, Ratajczak, Zdunek, Adamiec, Waszkiewicz & Feleszko, 2021:475). Some individuals, including HCWs, are sceptical regarding the efficacy of the vaccine for several reasons. First, it is generally known among HCWs that the influenza vaccine does not confer 100% protection. Second, findings indicate that the vaccine performs relatively poorly among people with weakened immune systems and older adults, fuelling the debate among naysayers about its effectiveness (Trombetta, Gianchecchi & Montomoli, 2018:667; Sullivan, Price & Regan, 2019:5). However, such views are based on misinformation as the influenza vaccine has over 90% efficacy among healthy individuals such as HCWs (Little, Goodridge, Lewis, Lingard, Din, Tidley, Roberts, Williams & Hayes, 2015:760).

Besides the efficacy of the vaccine, there have also been ongoing debates regarding its safety (Trombetta, Gianchecchi & Montomoli, 2018:657). In a US study, concerns that one would become ill after taking the vaccine were identified as the second-most common reason (23%) HCWs were hesitant to adhere to the annual vaccination recommendations (Chow, Hein & Kyaw, 2020). In other more recent studies, the view that the vaccine causes illness is even more common, with almost a third (31%) of physicians believing the vaccination could actually cause influenza. This misconception is based on the observation that some individuals have complained of flu-like symptoms after receiving the vaccine (Geoghegan, O'Callaghan & Offit, 2020:372; Ryan, Fillip, Gurka, Zirulnik & Thompson, 2019:2604).

Still, contrary to the assumptions of the vaccine's potential to cause illness, some studies proved its safety. Randomised clinical trials found that, apart from mild pain and swelling at the injection site, no other adverse reactions to the flu vaccine were experienced (Cuschieri, Borg, Agius, Souness, Brincat & Grech, 2021). Moreover, side effects of vaccination are generally rare and do not necessitate any absence from work (Smith, Amlôt, Weinman, Yiend & Rubin, 2017:1937). COVID-19 vaccines have similarly been proven to be very safe in clinical trials, and vaccines themselves prevent absenteeism.

2.9.7 Cues to action

In the HBM, cues to action are people, events or things that might influence individuals to change their behaviour (Butts & Rich, 2015:235). Specific examples of cues to action include advice from healthcare providers, health education such as knowledge regarding side effects in the media, and the illness of a close individual such as a colleague or family member (Zickfeld, Schubert, Herting, Grahe & Faasse, 2020:10). Examples of popular cues to action include information from important sources, like a physician's recommendations for taking the vaccine or the media highlighting the impact of influenza on HCWs (Polit & Beck, 2018:128). Cues to action related to this study's context refer to the presence or absence of internal or external stimuli that act as a basis for motivating HCWs to take the influenza vaccine. Those previously vaccinated indicated greater cues to action and were therefore likely to take the annual vaccine (Schmid, Rauber, Betsch, Lidolt & Denker, 2017). Among inexperienced HCWs, like new nurses, it was found that the absence of cues to actions was one of the main barriers to increasing adherence rates (Vaismoradi, Tella, Logan, Khakurel & Vizcaya-Moreno, 2020:2049).

Lack of knowledge regarding the vaccine and influenza, perceived seriousness of the illness, perceived susceptibility, and lack of health motivation are some reasons for poor adherence (Schmid et al., 2017; Shahrabani, Benzion & Din, 2009:227-231), as was the case with the widespread hesitancy in adhering to COVID-19 vaccinations (Lin, Tu & Beitsch, 2021:16). In the UK, nurses were more willing to increase their adherence rates if the vaccine was recommended by the hospital's occupational health unit (Costantino, Ledda, Squeri, Restivo, Casuccio, Rapisarda, Graziano, Alba,

Cimino, Conforto, Costa, D'amato, Mazzitelli, Vitale & Genovese, 2020:686). HCWs thus need to be educated on the myths and misconceptions surrounding vaccination (Ferragut, Barry & Cummins, 2020:116). This can then indicate greater cues to action and promote annual influenza vaccinations.

2.9.8 Demographic factors

Following the growing interest among researchers and practitioners to ensure high influenza vaccine adherence rates, demographical aspects such as gender and age are considered possible explanatory factors for vaccine adherence (Schmid et al., 2017). Disparities exist between the uptake of influenza vaccines between men and women in various countries (Costantino et al., 2020:2). Men in Europe were more likely to be vaccinated than women because of vocational differences and medical recommendations, which may be connected to availability and work-based vaccination duties (Costantino et al., 2020:2).

Low levels of adherence to influenza vaccines could also be explained by predictors such as age, marital status, educational level, frequency of visits to the physician, and the presence of associated chronic conditions (Dubov, Distelberg, Abdul-Mutakabbir, Beeson, Loo, Montgomery, Oyoyo, Patel, Peteet, Shoptaw, Tavakoli & Chrissian, 2021:1442). In a country such as Spain, with an ageing population, lower access to and knowledge of the benefits of vaccinations result in uptake among older people being negatively impacted. Conversely, HCWs in Qatar over the age of 40 were more likely to receive flu vaccinations than their younger colleagues (Alhammadi et al., 2015:3821). In the UK, younger females and those belonging to a minority group were negatively associated with vaccine adherence rates (Adams, Tenforde, Chodisetty, Lee, Chow, Self & Patel, 2021:1). Thus, biographical information and its impact on vaccinations are not the same in all countries and cultures.

2.10 RECOMMENDATIONS TO IMPROVE VACCINE ADHERENCE RATES AMONG HCWS

The literature has outlined several approaches that can be implemented in order to promote and enhance vaccine adherence rates among HCWs. Some measures and recommendations have been criticised, while others have been constrained by applicability issues.

2.10.1 Mandatory influenza vaccinations and underlying ethical issues

Influenza poses serious health risks to both HCWs and patients. It might therefore be a viable solution to implement mandatory influenza vaccinations (Maltezou, Ioannidou, De Schrijver, François & De Schryver, 2021:11123). However, adherence to voluntary vaccination is low, at a 69.6% adherence rate, despite the CDC (2020) advocating for at least a 90% adherence rate to be maintained in healthcare settings.

The implementation of a mandatory vaccination policy can take various forms. In some hospitals, HCWs who decline to receive the vaccination must take compulsory unpaid leave during seasons marked by influenza illnesses (Pless, Shaw, McLennan & Elger, 2017:248). Another drastic measure pertains to requiring HCWs to wear special masks throughout their work shifts in order to prevent exposure to the virus (Bauchner, Fontanarosa & Livingston, 2020).

The feasibility of mandatory vaccinations was evident when more stringent policies were put in place (Savulescu, 2020:78). The policies include making yearly vaccination a prerequisite for HCWs' employment (Gualano, Corradi, Voglino, Catozzi, Olivero, Corezzi, Bert & Saliquini, 2021:910), and suspending or terminating the contracts of unvaccinated HCWs (Kitt, Burt, Price, Satchell, Offit, Sammons & Coffin, 2020:294). Such policies were implemented in the case of Yellow Fever and hepatitis.

Mandatory vaccination has, however, been shrouded with a host of ethical issues. On the one hand, it is generally agreed that high adherence rates among HCWs can lead to positive outcomes such as decreased illness and absenteeism, and reduced

transmission within the healthcare settings (Alhammadi et al., 2015:3824). Evidence of this can be seen in reduced rates of hepatitis B infection due to high adherence rates to vaccination uptake (Johnson, Lu & Zhang, 2019:1; Trantham, Kurosky, Zhang & Johnson, 2018:5333). Proponents of this measure argue that under the duty to do no harm or non-maleficence, HCWs have an obligation to ensure they take all possible and reasonable actions to prevent the transmission of infectious diseases to patients. On the other hand, labour unions and other opponents of mandatory vaccination have claimed immunisation should be an individualised decision. It has further been pointed out that professional codes of ethics do not have explicit requirements for HCWs to accept influenza vaccinations (Najera & Reiss, 2015).

Researchers adopting critical stances towards mandatory vaccination have also argued that if HCWs were required to receive the vaccines, the same should apply to all visitors to the hospital (Kitt et al., 2020:293). The underlying assumption is that influenza transmitted in hospital settings can only be effectively reduced if all individuals coming into contact with the facilities and patients are immunised. Empirical support has also been provided to show that drastic measures such as mandatory vaccinations may not be necessary as it is only recommended for people at higher risk of other infections and diseases as a response to contracting influenza (CDC, 2019). The report by Shafti (2021:02), for instance, found that while some HCWs may object to receiving vaccines, active refusals are unlikely to be a significant factor contributing to low adherence rates. Factors affecting HCWs in the UAE might ultimately be similar or different to the already identified ones elsewhere.

2.10.2 Access to the influenza vaccine

Access to the vaccine is one aspect for consideration, but a further challenge is the staff needed to administer the vaccines to HCWs, as it can be instrumental in increasing adherence rates (Dettori, Arghittu, Deiana, Azara, Masia, Palmieri, Spano, Serra & Castiglia, 2021:976). In other words, hospitals face challenges in providing adequate human resources to improve vaccination rates (Williams, Edem, Calnan, Otwombe & Okeahalam, 2021:5).

Increasing the number of HCWs providing the vaccine to fellow HCWs also reduces the likelihood of individuals declining to receive the vaccine due to time pressures (Gostin, Salmon & Larson, 2020:2). Staff members can assist in facilitating a quick check of informed consent, while others administer the vaccine and staff can quickly resume their responsibilities (Dini et al., 2018:772).

The availability of mobile carts that serve as a digital way of managing healthcare records is a different strategy that can be effectively applied to increase vaccination uptake (CDC, 2021). The effectiveness of mobile carts has been attributed to the observation that going directly to the HCWs while in their own settings places indirect pressure on them to receive the vaccine, thereby promoting higher adherence rates (Dini et al., 2018:772).

Easily accessible and available vaccines are important to ensure adherence (Wouters, Shadlen, Salcher-Konrad, Pollard, Larson, Teerawattananon & Jit, 2021:1023); the unavailability of vaccines is a concern as research findings indicated a lack of vaccines to be administered to willing HCWs (Rastegar, Tavana, Meraj & Mina, 2020:496). Yi et al. (2021:2185) recommended that HCWs receive free vaccinations to increase their access to influenza vaccinations. Free service delivery will ultimately improve vaccination rates (WHO, 2022). Therefore, removing the cost barrier will lead to an increased adherence rate among HCWs.

2.10.3 Knowledge about the importance of adherence

Knowledge about disease and prevention measures is known to impact health promotion (Van den Broucke, 2020:182) and health-seeking behaviour (Hayward et al., 2021:7). Ensuring adequate access to information about the importance of the seasonal influenza vaccine uptake has therefore been considered as an effective way of achieving high adherence rates (Shahrabani et al., 2009:230; Ryan, Filipp, Guirka, Zirulnik & Thompson, 2019:2604).

The management within institutions, such as hospitals, relies on resources provided by influenza vaccine-producing companies to increase visibility about the importance

of annual immunisation (Bozorgi & Fahimnia, 2021:6157). These are also helpful as awareness campaigns (Nasar, Matassov, Seymour, Latham, Gorchakov, Nowak, Leal, Hamm, Eldridge, Tesh & Clarke, 2017). Hospitals can use a combination of flyers, newsletters and emails to increase the spread of information and health education (Stubbs, Achat & Schindeler, 2021:6; Heinrich-Morrison, McLellan, McGinnes, Carroll, Watson, Bass, Worth & Cheng, 2015:1). Ultimately, proactive hospitals have adopted multiple strategies for providing their HCWs with applicable information (Barello, Falcó-Pegueroles, Rosa, Tolotti, Graffigna & Bonetti, 2020:10).

Other more innovative information-provision techniques have included pop-up screen reminders, booths in cafeterias, and messages at the back of payslips (Stubbs, Achat & Schindler, 2021:5). Social media has also been shown to influence vaccine adherence rates among HCWs, whereby misinformation has increased vaccine hesitancy. Newly appointed HCWs should preferably receive the annual influenza vaccine, as well as other preventive vaccinations, during orientation (De Sarro, Papadopoli, Cautela, Nobile, Pileggi & Pavia, 2021:753).

Despite researchers advocating for the use of the above-mentioned strategies, there is little empirical evidence indicating their effectiveness in increasing adherence rates (Nwafor, singh, Collier, Deleon, Osborne & DeYoung, 2021:3). It has been indicated that the only time HCWs are eager to take the influenza vaccines is when there are widespread pandemics, as was the case with swine flu, bird flu, and Severe Acute Respiratory Syndrome (SARs) (Wang et al., 2020:482). The same phenomenon was described during the COVID-19 pandemic, where HCWs around the globe were vaccinated (Dettori, Arghittu & Castiglia, 2022:4363).

As such, greater research efforts are required to suggest and describe how information-provision measures could be effective in increasing adherence rates among HCWs.

2.10.4 Cultural change

Hesitancy in taking up influenza vaccines has also been studied from a cultural dimension. Cultural change involves modifying existing rules, behaviours, belief

systems and systems of values as a form of adaptation (Grosman, Raz & Friesem, 2020). Addressing this barrier will lead to enhanced rates of influenza vaccinations among HCWs.

Researchers supporting the cultural change strategy base their argument on the fact that adherence rates remain low, even in healthcare settings where adequate resources have been provided (Butt, Mohammed, Butt, Butt & Xiang, 2020:111). It is anticipated that increased acceptance of the vaccine can thus be achieved when a change in the organisation's culture occurs, from hesitancy to support for vaccinations. According to the proponents of this strategy, cultural change should ideally be initiated by the national health department. As the topmost health institution, it should campaign to support vaccine adherence as a shift from the culture of scepticism and the view of requirements to take the vaccine as a violation of their rights. As part of the cultural change, hospital managers are also encouraged to show enthusiasm and urge senior HCWs to be at the forefront of ensuring the annual uptake of the vaccine among peers (CDC, 2021).

In addition, social media campaigns can result in cultural change and remove the barriers to influenza vaccination uptake. HCWs' delay or refusal to take or retake the influenza vaccine has prompted researchers to underscore the need to engage in social marketing as a possible strategy to increase adherence rates. Briefly, social marketing involves the application of commercial marketing principles in activities meant to influence the target audience to adopt behaviours that are beneficial to society (Lee & Kotler, 2019:105). The use of social marketing has been supported on the basis that it provides a highly effective framework that can be used to create, communicate, deliver and exchange offerings that have a positive impact on the target audience within the constraints of existing resources. This is especially relevant as most hospitals cite inadequate resources as one of the barriers to creating awareness campaigns (Geerligs, Rankin, Shepherd & Butow, 2018:16). Therefore, social marketing can be of use when attempting to change the culture of the healthcare setting and increase adherence to influenza vaccination.

The use of a social marketing approach implies using strategies similar to those in commercial marketing that influence the acceptability of ideas about vaccine

adherence (Nowak, Gellin, MacDonald & Butler, 2015:4204; OECD, 2021:15). More so, social media remains a popular platform for marketing based on its heavy use on a global scale (Nowak et al. 2015:4206). Evidence of social media's efficacy in supporting a vaccination programme can clearly be seen in the most recent COVID-19 pandemic (OECD, 2021).

When applied to immunisation programmes, social marketing advocates for a need to ensure that the benefits of the vaccine be promoted from the perspective of hesitant individuals, as opposed to the programme planner's perspective (Nowak et al., 2015:4204). In addition, social marketing considers the segmentation of the targeted population based on various demographic characteristics. More specifically, it underscores the importance of going beyond recipients' background characteristics to an analysis of their demographic and psychological characteristics and subjective experiences (Abu-Akel, Spitz & West, 2021). Other unique aspects regarding social marketing include the need to consider immunisation convenience, problematic barriers, positive behaviours and their determinants, as well as a focus on end-user outcomes (Abu-Akel, Spitz & West, 2021).

Social marketing's application in increasing vaccine adherence rates is not without its own set of challenges. Previous studies, although scant, have noted that financial costs may escalate, especially when the vaccination campaign is large. Restricting campaigns to the four Ps (product, place, price and promotion) has also been found to lead to ignorance of contextual factors, such as culture (Nowak et al., 2015:4204; Butler & MacDonald, 2015:4178).

2.11 SUMMARY

Using the HBM model as a point of departure and conducting a thorough literature review allowed for evidence-based information to be obtained for the development of a questionnaire and presentation and discussion of the findings. Several factors were identified, such as perceived benefits versus perceived risks, perceived threats, self-efficacy, and cues to action as potential barriers affecting the likelihood of HCWs getting vaccinated.

Chapter 3 describes the study's adopted methodology utilising an appropriate research approach to suit the research's aims and objectives.

CHAPTER 3
METHODOLOGY AND RESEARCH DESIGN

3.1 INTRODUCTION

In the preceding chapter, the literature review that was used to develop the questionnaire was presented. The HBM underpinning the research was also described. This chapter presents the research design and methodology that guided the collection and analysis of data from HCWs in a specifically selected hospital in the UAE. The chapter commences with a discussion of the chosen research design and the underlying justifications, followed by the research methods employed. The specific aspects discussed include the population, sampling, data collection, data analysis, scientific rigour and ethical considerations.

3.2 RESEARCH DESIGN

3.2.1 Research strategy

Depending on the nature of the research objectives, a researcher may opt to conduct a quantitative or qualitative study. The choice of either of these strategies significantly influences the procedures undertaken during the process of collecting and analysing data. In this dissertation, the factors associated with influenza vaccine adherence among HCWs were investigated through a quantitative approach. Bloomfield and Fisher (2019:46) define a ‘quantitative approach’ as one that involves the investigator primarily using positivist claims for developing knowledge.

In brief, the positivist paradigm is based on the view that reality is stable, and researchers can thus observe it effectively and objectively. It further presumes that the social world and the phenomenon being investigated exist externally and can therefore be explained through a cause-and-effect relationship (Saunders, Lewis & Thornhill, 2018:124). In the present study, similar presumptions are held. It is, for instance, assumed that a cause-and-effect relationship exists that explains why adherence to influenza vaccines has been low in the hospital under study and in most hospitals around the world (Butts & Rich, 2015:124).

Measuring such a relationship necessitates the use of empirical methods that can yield statistical data. Unlike the qualitative strategy, the quantitative strategy also offers an opportunity to statistically evaluate the current practices on influenza vaccine adherence. The HBM (see Chapter 2 for the discussion), a psychological model that seeks to explain and predict health behaviours, was used to guide the investigation of factors influencing vaccine adherence among HCWs in the hospital under study.

3.2.2 Cross-sectional descriptive study

Quantitative studies may be descriptive, experimental or correlational. A descriptive research design best fits this research because it offers opportunities to collect statistical data that lead to the development of a more conclusive study. Such a design is used to describe the characteristics of the research respondents and emphasise the importance of obtaining data in an accurate way (Saunders et al., 2012:128). The characteristics in consideration included factors depicted by HCWs in the hospital under study that could affect adherence to the influenza vaccine.

The descriptive research design is used when the research problem is well understood and representative samples are required. This study was cross-sectional as it involved collecting information from respondents at only one time, as described by Saunders et al. (2012:153).

3.2.3 Research technique

Achieving consistency between the research objectives, the theoretical framework and the research design requires the researcher to adopt the right research strategy or technique. The research strategy within this context refers to the general plan of how the researcher went about obtaining data to answer the research objectives (Bryman, 2016:50). In this study, quantitative data pertaining to influenza vaccine adherence among HCWs were collected through questionnaires.

Questionnaires are often preferred data collection methods due to their ability to facilitate the collection of data from a large sample, and there is easy generalisability of the research results. However, they are criticised on the basis that they lead to

superficial knowledge creation (Easterby-Smith, Thorpe & Jackson, 2012:53). Overall, questionnaires were the most optimal research technique for this study since they permit wide coverage at a minimum expense of both effort and money. Wider coverage is crucial in increasing the validity of the results; this occurs by selecting a large and representative sample. As referred to in the literature, the following advantages motivated the use of questionnaires in this study.

3.2.4 Advantages of using questionnaires

Questionnaires offer several advantages, including ease of use as well as the ability to collect data in a short time span (Saunders et al., 2018:172). This was the case in the present study, as the hospital under consideration was easily accessible. Further, Bryman (2016:220) showed that when the period of study is short, a questionnaire is an ideal approach that saves time without compromising the quality of the data being collected.

Literature pertaining to research ethics also shows that questionnaires are complemented by their ability to ensure complete anonymity (Saunders et al., 2018:505). In this study, a significant advantage of the questionnaire was the ability to collect data from a relatively large sample of HCWs (N=1018). This was advantageous as a large sample is considered more representative. It is also associated with a lower level of uncertainty in the variables being measured (Saunders et al., 2018:508).

Adopting questionnaires in the current study offered convenience in the collection of data since the HCWs could complete the questionnaire at a time most convenient for them. Convenience is important in a healthcare setting due to busy work schedules, and it can contribute to a higher response rate. The response rate of this study was 48.94%.

Lastly, Polit and Beck (2008:352) emphasise the expenses of using questionnaires are also low. Therefore, the researcher incurred few expenses, primarily the costs of printing the questionnaires and travelling to the hospital for data collection since the questionnaires were circulated by gatekeepers within the department (see section

3.3.1.1). However, questionnaires also have some disadvantages that were addressed, as described.

3.2.5 Disadvantages of using questionnaires

Questionnaires have disadvantages that must be taken into consideration. Respondents can provide unjust information when completing the questionnaire (Evans & Mathur, 2018:854) – an aspect that can lead to the collection of skewed data. To prevent false or inaccurate answers, the respondents were informed that their responses would be treated with confidentiality and anonymity to dissuade them from providing false answers. They were also asked to be as honest as possible, as there were no right or wrong answers.

According to Saunders et al. (2018:206), questionnaires, specifically self-administered surveys, can lead to a low response rate. The current study counteracted this limitation by collaborating with department administrators and supervisors as gatekeepers to distribute the questionnaires. Through such measures, a response rate of 48.94% (see section 3.5) was achieved, which was below the expected response rate of 50%, but still higher than the acceptable response rate of 35%, as suggested by Ali et al. (2020:105).

3.2.5 Development of the questionnaire

The researcher developed the questionnaire after a thorough review of the literature was conducted on the topic (see Chapter 2). In terms of the design, both closed-ended (22 questions) and open-ended questions (13 questions) were included in the questionnaire (see Annexure E). Closed-ended questions were necessary to allow for some comparison of the results (Easterby-Smith et al., 2012:147). Open-ended questions were posed at the end of the questionnaire (for individual opinions) for specific aspects that needed additional information that could not be captured in the pre-determined responses. Thus, qualitative enhancement of the data was obtained.

To ensure that all research objectives were met, five main parts were included in the questionnaire (see Table 3.1).

Table 3.1: Structure of the questionnaire

Section	Contents	Questions
A	Demographic/general information	1-7
B	Level of influenza vaccine uptake	8-20
C	Factors affecting adherence rates of the annual influenza vaccine	21 (1 – 6)
D	Factors that prevent regular uptake of the influenza vaccine	22 (1 – 5)
E	Intervention measures	23 – 35

3.2.7 The research setting

The UAE is a small country located in the continent of Asia. The UAE comprises seven emirates; Abu Dhabi, Dubai, Sharjah, Ras Al Khaimah, Ajman Umm al Quwain and Fujairah. Abu Dhabi is the capital city of the UAE (see Figure 3.1.).

Figure 3.1: Map of the United Arab Emirates

Al Ain is the fourth largest city in the UAE, located in the eastern region of Abu Dhabi Emirate. Al Ain is dubbed the Garden City of the UAE and is considered central to the country's cultural heritage. There are 11 hospitals in Al Ain, serving a population of 5 314 317. Two of these hospitals are government hospitals, while the other nine are privately owned.

This study was conducted in the largest academic tertiary care teaching hospital in Al Ain. The choice of this hospital was threefold: It was convenient to the researcher in terms of both geographical proximity and permission to access the HCWs. The large size of the hospital (the largest academic tertiary care teaching hospital; 500-bed capacity), and the fact that this hospital has a very diverse healthcare workforce also made it possible to access different HCWs. This promoted diverse perspectives regarding the factors influencing vaccine adherence.

3.2.8 Population

Easterby-Smith et al. (2012:232) define the study population as the subjects in the research setting that meet set inclusion criteria. Thus, in the context of this study, there was a total population of 2 080 HCWs in the research setting.

The accessible population is reached after removing all individuals from the target population who refuse or may not participate, or cannot be accessed during the study period (Saunders et al., 2018:362). It is the final group of participants from which data is collected by surveying either all its members or a sample drawn from it. The accessible population represents the sampling frame (Saunders et al., 2018:362) if the intention is to draw a sample from it.

Therefore, for this study, the accessible population of possible respondents comprised **nurses and midwives** (1 100); **physicians** (536); **pharmacists** (102); and **clinical staff** (342) (comprising of dieticians (49), respiratory therapists (37), radiographers (127), physiotherapists (57) and radiotherapy technicians (72)). In this study, the total assessable population of 2 080 HCWs were recruited by the gatekeepers (see section 3.3.1) to take part in the study.

3.2.9 Sampling

A sample, from a research perspective, is a subset of the study's target population from which the researcher intends to identify representatives of the whole population (Saunders et al., 2018:84). In this study, sampling the HCWs from the selected hospital had relevance. Since the researcher wanted to ensure generalisation within

the research context, total population sample for each stratum (nurses and midwives, physicians, pharmacists and clinicians) was done. In other words, the entire population was invited to participate in the research. Total population sampling is a type of purposive sampling technique that involves examining the entire population that have a particular set of characteristics (Canonizado, 2021). Researcher bias and a large population is the main disadvantage of total population sampling. To overcome this, the researcher targeted clinical staff only and had gatekeepers to collect the data.

As aforementioned, the sample frame of HCWs at the hospital that qualified to participate in the study was 2 080 employees. Table 3.2 illustrates the population size of each of the classes of HCWs and the actual sample size in each stratum. Total population sampling was applied was applied, where the gatekeepers (see section 3.3.1) invited the entire workforce (N=2 080) to participate. Based on Bryman's (2016:170) guidelines, a minimum response rate of 30% was required in order to ensure the study's generalisability, but in this study, a 50% rate was anticipated. As illustrated in Table 3.2, out of the sample size of 2 080, responses (completed questionnaires) were received from 1 018 HCWs, bringing the effective response rate to 48.94%.

Table 3.2: Population and sample

Class of HCWs	Population	Actual Response rate (% of and Sample Size	
		n	%
Nurses and midwives	1 100	544	26.15
Physicians	536	228	10.96
Pharmacists	102	46	2.211
Respiratory therapists	37	30	1.44
Radiographers	127	94	4.52
Physiotherapists	57	48	2.31
Radiotherapy technicians	72	21	1.001
Dieticians & Others	49	7	0.34
Total	**2 080**	**1 018**	**48.94**

3.2.10 Pre-test

After receiving ethical approval from the Health Research Ethics Committee at the University of South Africa (see Annexure A) and the Al Ain Medical District Human Research Ethics Committee (see Annexure B), a pre-test with a sample of 42 respondents was done. The pre-test sample comprised six respondents from each of the seven classes of HCWs (42 respondents). The pre-test sample was conveniently selected by the gatekeepers (see section 3.2.10) from those who volunteered and were conveniently available at the time of the pre-test to represent each of the seven classes of HCWs in the hospital. Out of the 42 respondents recruited to participate, all 42 took part in the pre-test. The respondents who participated in the pre-test did not take part in the actual study.

The pre-test assisted the researcher in understanding whether the respondents understood the questions and gave the expected responses. Problematic questions were reformulated in terms of changing questions' wording if respondents indicated they did not understand the question. For instance, it was noted that the respondents took some time before understanding sentences that used American phrasing. Such sentences were replaced with their British equivalents. See Table 3.3 for the changes made.

Table 3.3: Changes to the questionnaire (N=42)

Pre-test questions	Changes after pre-test
4. How long have you been working?	Formulation changed to read: 4. For how long have you worked as a health care provider?
5. What is your tenure in this hospital?	Formulation changed to read: 5. How long have you been working in this Hospital?
6. Doctor	Doctor changed to: 6. Physician
7. On an average, how long are you engaged with the patient on a daily basis?	Formulation changed to read: 7. On an average, how much contact time do you have with your patients on a daily basis?

3.3 DATA COLLECTION

3.3.1 Data-gathering procedures

3.3.1.1 Step one: Role definition

The senior management was significant role players in the communication stage. Their main role was to grant the researcher permission to conduct the study and communicate with the respective departments in the hospital (see Annexure C). The researcher requested that the various department heads act as gatekeepers and communicate all the relevant data collection dates with each stratum of HCWs. The gatekeepers received an information letter, describing their roles and responsibilities, inviting them to participate. Their duties included liaising with the department supervisors and administrators on how to facilitate questionnaire disbursement and collection. Data collectors also shared the information letter (see Annexure D) with all HCWs to ensure they could make an informed decision regarding participation.

The researcher delivered and collected the required materials (questionnaires, information letter and consent forms) to and from the respective heads of departments (gatekeepers).

3.3.1.2 Step two: Communication with HCWs

Prior to distributing the questionnaire, the department notice boards in break rooms were used as a medium to inform all HCWs about the nature of the study. The notice board was imperative to complement the messages (information letters) gatekeepers sent to the participants through their emails. The respondents were given an opportunity to voluntarily participate or decline participation in the study by providing written informed consent (see Annexure D).

3.3.1.3 Step three: Data collection activities

The questionnaires were distributed to the respective sites by the researcher. To avoid a time-consuming data collection process, all surveys were self-administered. The respondents were also informed about the opportunity to seek clarification from the

researcher in case of difficulties in completing the questionnaire. The researcher's contact information was thus provided in the information letter (see Annexure D).

The respondents were allowed four days to complete the questionnaire. After filling out the questionnaire, the gatekeepers requested the HCWs to return the forms (questionnaire and consent forms) to a drop box in their specific units. This box was provided at each health unit manager's office where the HCWs could physically return the questionnaires (with no names attached, and the consent form separate from the questionnaire); thus, the information remained confidential.

3.3.2 Data analysis

Data gathered from the questionnaires were mainly quantitative in nature, with some qualitative enhancements in the form of open-ended answers. As a result, statistical data analysis methods were used to extract useful information from the closed-ended questions that could be presented in numbers, charts and graphs. The statistical analysis process was undertaken by the researcher with the assistance of a statistician and statistical tools, specifically the SPSS version 22 and Excel spreadsheets. Using these tools, descriptive statistics such as frequency, means and correlation analysis were done in order to identify possible relationships between different study variables affecting influenza vaccine adherence.

The researcher used open coding to identify and summarise important themes, categories and sub-themes on adherence to the influenza vaccine from the open-ended questions. As Ashby, Ryan, Gray and James (2013:59) explain, open coding involves looking for distinct concepts, themes and categories from the data. For example, the reasons behind the motivation to take the influenza vaccine were identified and highlighted. Similar reasons were highlighted in the same colour for ease of collation, and to identify themes and categories; thus, the data were open-coded.

3.3.3 Validity

Validity in a study refers to the robustness of the research instrument and whether it can truly measure what it sets out to measure (Easterby-Smith et al., 2012:109).

Content validity can be defined as the extent to which each item measures the specified construct (Bryman & Bell, 2011:27). Content validity, in this study, was achieved by ensuring that the formulation of the research instrument was based on evaluated literature. In addition, face validity can be defined as the extent to which the measure appears to quantify the construct at face value (Bryman, 2016:159).

A pre-test was conducted to improve the internal validity of the questionnaire, as described in section 3.2.10. Conversely, face validity was achieved through a discussion of the questionnaire with the supervisor for an opinion on whether the data-gathering instrument was sufficient in investigating factors associated with HCW vaccine adherence rates in a specific context. A scientific review committee also assessed the questionnaire for face validity. Feedback obtained from these individuals was used to enhance the validity of the questionnaire.

3.3.4 Reliability

Reliability refers to the extent to which the results of the study constitute an accurate representation of the target population and is consistent over time (Saunders et al., 2012:156). As mentioned in section 3.2.10, reliability was achieved through the pre-test, which was done in mid-September 2018. Correlations were then computed in order to establish the level of reliability in the study findings. The pre-test reliability coefficient was 0.84, which is an acceptable level of reliability (Bryman & Bell, 2015:169).

3.3.5 Ethical considerations

The researcher ensured that the following principles pertaining to the protection of human participants in research (Ajemba & Arene, 2022:48) were adhered to:

3.3.5.1 Minimising the risk of harm

The risk of harm relates to the possibility that the participants could be harmed during the course of undertaking the study or put in a position that causes discomfort (Hunt, Lathlean, Gerrish & Lathlean, 2015:38). In this study, the only risk of harm was the

possibility that the HCWs would be upset about vaccine adherence as a sensitive subject.

This risk was minimised by ensuring that all HCWs were fully informed (see Annexure D) about the topic of the study before completing the questionnaire, and they were assured that results would only be used for research purposes. In addition, they were informed that they could choose not to answer any question or leave the study at any time without any negative consequences, as explained in the information letter (see Annexure D).

3.3.5.2 Obtaining voluntary informed consent

The researcher ensured that the participants had an adequate understanding of the research purpose and what the research required of them, as suggested by Parahoo (2014:103). The gatekeepers shared an information letter that contained all relevant and important information about the research (see Annexure D) attached to the questionnaire that was distributed to all HCWs from the accessible population. The respondents were required to volunteer and freely give consent before taking part in the study.

3.3.5.3 Protecting anonymity and confidentiality

Based on the principle of anonymity and confidentiality, respondents have a right to expect that the information they provide will be kept in the strictest confidence and that the researcher cannot link the individual respondent to the data they provided (Polit & Beck, 2008:248). The HCWs under study were informed that no identifying information, such as their name and address, was required on the questionnaire. The consent form was also collected from the respondents in a separate box. The questionnaires were stored in a numbered format so that each respondent's data were stored accurately. With regard to confidentiality, the respondents were assured that only aggregate data for all respondents would be reported in the dissertation and other publications.

3.3.5.4 Avoiding deceptive practices

Deceptive practices may involve a failure to provide the observer's identity or withholding important information about the purpose of the study (Butts & Rich, 2019:152). Deception was avoided by ensuring that everyone involved in the study was fully informed about the research and its purpose (see Annexure D).

3.3.5.5 Providing the right to withdraw

One of respondents' rights is the right to withdraw from the research process (Polit & Beck, 2013:151). All HCWs participating in the study were informed that they could withdraw from the research at any stage without giving reasons and without any negative consequences (see Annexure D).

3.3.5.6 Sharing and disseminating of results

Researchers should not withhold the research results from research participants (Plemmons & Barker, 2009:107). Accordingly, respondents who wished to access the results were required to provide an email address through which the results could be shared. The results were aggregated and did not include identifiable data in order to uphold the dignity, safety and privacy of the research participants. The results were also shared with the entire hospital in order to ensure free accessibility. No identifiable data were revealed in the publication of the findings in both the dissertation and additional publications in scientific journals.

3.4 SUMMARY

This chapter sought to illustrate the research design and methodology that was adopted by the researcher during the collection and analysis of data. The setting of the study was a hospital located in the UAE. It is explained in this chapter that a quantitative strategy was adopted in order to facilitate the collection of objective and quantifiable data from a large sample. A cross-sectional descriptive research approach was adopted to effectively identify and describe challenges and opportunities related to influenza vaccine adherence among HCWs in the sampled

hospital. Questionnaires were chosen as the main research technique to ensure a comprehensive study. The sample frame of interest in the hospital comprised nurses, midwives, physicians, pharmacists and clinical staff. A total population sampling method was applied, and the entire population (N=2 080) was invited to participate; a final response rate of 48.94% was achieved. Chapter 4 presents the data analysis, interpretation and discussion of the findings.

CHAPTER 4
DATA ANALYSIS AND INTERPRETATION OF FINDINGS

4.1 INTRODUCTION

Chapter 4 is set to answer the research questions. The first section of the chapter introduces the data collected and the data preparation process. To understand the respondents' backgrounds, their demographic characteristics were analysed and presented. The second section contains the research questions, arranged systematically, and the relevant data used to answer the research questions. Available literature is used to extrapolate the results and place the findings in the literature context, while the theoretical framework guided the overall data analysis plan. The literature that was used to critically analyse and synthesise the research findings was pivotal as it aided in developing crucial discussions to ensure the study's findings were reliable, interpreted and not just presented.

4.2 RESPONSE RATE

In total, 2 080 questionnaires were distributed, as explained in Chapter 3. Only 1 018 (48.94%) of the questionnaires were received back and were valid and suitable for further analysis after data cleaning. Despite sending reminders to the respondents through the departments' supervisors and administrators (the gatekeepers), the response rate did not increase. Therefore, the duly filled and returned responses represented a 48.94% response rate; it is deemed a very good response rate, as a 35% response rate is acceptable (Baruch, 1999:421). The sample size (N=1 018) was fit to generate findings with a robust statistical strength as well as high generalisability capability.

4.3 DATA PREPARATION

Data preparation was a necessary step to make sure the data could be exported into SPSS version 22 void of errors. The researcher performed various data preparation activities that entailed data cleaning, formatting variable names, as well as coding and

recoding. A statistician helped in counterchecking the accuracy of the entered data, and checked for outliers and other variances in the data. All these activities were done in an Excel spreadsheet and later exported to SPSS for analysis. Out of all the returned questionnaires, only three had several blank spaces. Such data were deleted and exempted from further analysis.

To promote the means analysis of the four-point Likert scale, the following data ranges were used to analyse the computed means: “Strongly disagree” was represented by the range of 1 to 1.74; “disagree” from 1.75 to 2.49; “agree” from 2.5 to 3.24; and finally, “strongly agree” was represented by the values between 3.25 and 4.0. For the open-ended qualitative question, 90 respondents provided comments, which were open-coded.

4.4 FINDINGS

4.4.1 Demographic data

The demographic variables included gender, age group, experience in the provision of healthcare, employment period and professional position in the hospital. The information is illustrated in Table 4.1.

4.4.2 Gender (N=1018)

The findings revealed that 664 (65.2%) respondents were female, and 354 (34.8%) were male (see Table 4.1). The gender ratio in this study is in accordance with the ratio given by worldwide health workforce studies (Liu, Goryakin, Maeda, Bruckner & Scheffler, 2017:16), where it was found that the number of men practising nursing has remained relatively low. In the Middle Eastern region, the ratio of female to male nurses was predicted to be 79% as of 2022 (Statista, 2020), thus supporting the study’s findings.

Table 4.1: Gender Distribution (N=1018)

Gender	N	f
Female	664	65.2%
Male	354	34.8%
Total	1018	100%

4.4.3 Age (N= 1018)

Respondents younger than 25 years (n=18) and over 55 years (n=115) only represented 1.8% and 11% of the sample, respectively. The HCWs between 26 and 35 years (n=337), as well as those between 36 and 45 years (n=317), represented 33.1% and 31.1% of the respondents, respectively. Finally, respondents between 46 and 54 years (n=231) represented 22.7% of the sample (see Table 4.2).

Table 4.2: Age Distribution (N=1018)

Age	n	f
Under 25 years	18	1.8%
26-35 years	337	33.1
36-45 years	317	31.1%
46-54 years	231	22.7%
Over 55 years	115	11%
Total	1018	100%

Having respondents of various ages was pivotal since Freeman et al. (2020:3) considered age a possible factor affecting influenza vaccine adherence rates. Even though there was a varying difference in the respondents' age brackets, all respondents had vast experience working in the hospital's settings for long periods of time (see Table 4.3), as described below.

4.4.4 Experience (N=1018)

Respondents with healthcare experience of less than 1 year, between 1 and 2 years, and between 3 and 4 years represented 2% (n=20), 3.3% (n=34) and 5.9% (n=60) of the respondents, respectively. Moreover, 10.5% (n=107) of the respondents indicated

they had between 5 and 7 years of experience. Most HCWs had worked in the healthcare industry for more than 7 years (n=797, f=78.3%), indicative of quite an experienced group of HCWs (see Table 4.3). The respondents had different levels of experience, thus making them fit to answer the research questions with a wide range of perceptions based on their experience levels. This approach is reinforced by Shahrabani et al. (2009:227-231), who suggested that HCWs' vaccine adherence experience is significant.

Table 4.3: Experience (N=1018)

Experience	n	f
Less than 1 year	20	2%
Between 1 and 2 years	34	3.3%
Between 3 and 4 years	60	5.9%
Between 5 and 7 years	107	10.5%
More than 7 years	797	78.3%
Total	1018	100%

4.4.5 Position in the hospital (N=1018)

As indicated in Table 4.4, the sample consisted of 22.4% (n=228) general physicians, 53.4% (n=544) nurses, 9.2% (n=94) radiographers, 4.7% (n=48) physiotherapists, 4.5% (n=46) pharmacists, 2.9% (n=30) respiratory therapists, 2.1% (n=21) radiotherapy technicians, and 0.7% (n=7) medical lab technologist and occupational therapists ('others').

Table 4.4: Position Held (N=1018)

Position Held	n	f
Physicians	228	22.4%
Nurses	544	53.4%
Physiotherapists	48	4.7%
Respiratory Therapists	30	2.9%
Radiographers	94	9.2%
Pharmacists	46	4.5%
Radiotherapy Technicians	21	2.1%

Position Held	n	f
Others	7	0.7%
Total	1018	100.00%

Having respondents with various positions in the hospital provided the researcher with an opportunity to cover the research gap depicted in the literature, since some authors tended to focus only on nurses and excluded other important HCW positions (Ha, Park, Jung, Lee, Kim, Sim, Choi & Kwon, 2020:5). It was important to ensure representativeness of a diverse group of HCWs. Other HCWs, including doctors, pharmacists, radiology technicians, and 'others' play a crucial role in delivering quality services to patients, and ensuring that there is a focus on clinical health and illness prevention (Zenzano, Allan, Bigley, Bushardt, Garr, Johnson, Lang, Maeshiro, Meyer, Shannon & Spolsky, 2011:267).

4.4.6 Contact time with patients

Understanding how much time HCWs spend with patients is important since contact time poses a great risk of infection to both the HCWs and patients (Miranda-Schaeubinger et al., 2020:2-5). The longer the contact time, the greater the chance of infection (Miranda-Schaeubinger et al., 2020:2-5). It is, therefore, important to note that, as illustrated in Table 4.5, most HCWs had more than four hours of daily contact with patients.

Table 4.5 illustrates physicians (n=228, F=214, f=93.9%), nurses (n=544, f=84.2%, F=458), physiotherapists (n=46, F=40, f=87%), respiratory therapists (n=30, f=86.7%, F=26), radiographers (n=94, f=63.8%, F=60), pharmacists (n=46, f=56.5%, F=26), and radiotherapy technicians (n=21, f=90.5%, F=19) respectively have had more than four hours of daily contact with patients. Approximately 5.9% (n=32) of nurses spent less than an hour per day with patients, while 6.6% (n=36) spent between 1-2 hours per day in direct contact with patients.

Table 4.5: Daily Direct Contact Time with Patients (N=1018)

Position	Contact time with patients per day							
	N	Less than an hour:		1-2 hours:		3-4 hours		More than 4 hours:	
		F	%	F	%	F	%	F	%
Physicians	228	14	6.1	0	0	0	0	214	93.9
Nurses	544	32	5.9	36	6.6	18	3.3	458	84.2
Physiotherapists	48	6	13	0	0	0	0	42	87.5
Respiratory Therapists	30	0	0	2	6.7	2	6.7	26	86.7
Radiographers	94	18	19.1	10	10.6	6	6.4	60	63.8
Pharmacists	46	18	39.1	0	0	2	4.3	26	56.5
Radiotherapy Technicians	21	2	9.5	0	0	0	0	19	90.4
Others	7	4	57.1	0	0	0	0	3	42.85

Overall, 83.3% (n=848) of the HCWs came into contact with patients for more than four hours per day, 2.8% (n=28) HCWs had 3 to 4 hours of daily contact, 4.7% (n=48) HCWs had 1 to 2 hours of daily contact, and 9.2% (n=94) if HCWs had contact of one hour or less. Most HCWs, therefore, had the potential to transmit the influenza virus to inpatients (Tamo, Turk, Boni, Kouyos, Schmutz, Huer, Shah, Bischoff-Ferrari, Distler, Battegay, Giovanoli, Guckenberger, Kohler, Muller, Petry, Ruschitzka, McGer, Sax, Weber & Trkola, 2021:317) or could contract it themselves from patients (Al-zoubi, Obeidat, Al-Gazo, Hayajneh, Alomari, Mazahreh, Al-Faouri, Obeidat, Issa, & Aleshawi). Moreover, any amount of contact time with patients, even as little as an hour, has the potential to increase the patients' relative risk to acquire the influenza virus from staff (Imai, Hall, Lambert & Merollini, 2020:358).

The average time HCWs spent with patients was more than four hours, irrespective of their job roles, as illustrated in Figure 4.1.

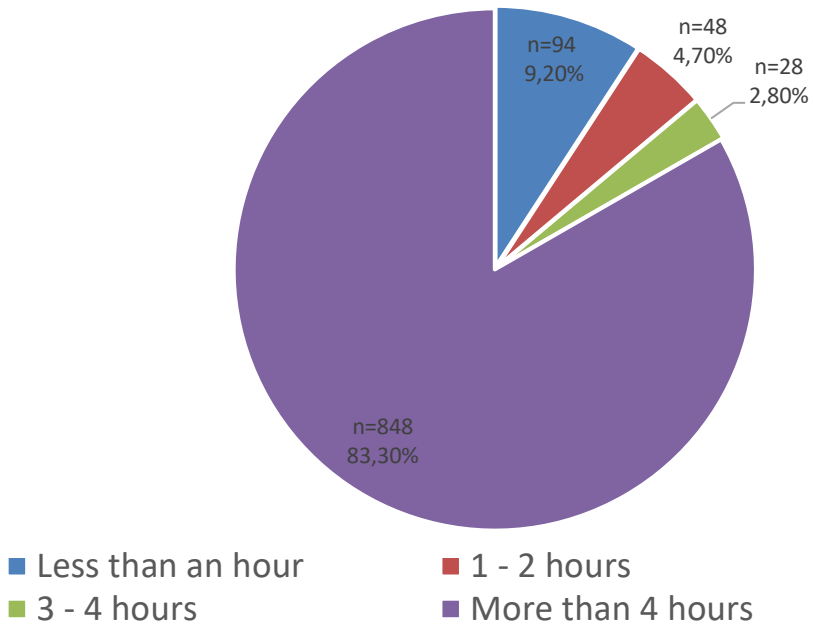

Figure 4.1: HCW Daily direct Contact Time with the Patients (N=1018)

Contact time of more than five hours (n=848; f=83.3%) placed parties at a greater risk of contracting influenza (Tamò et al., 2021:317; Al-zoubi et al., 2020:15). Due to the high risk to both parties, it is crucial that HCWs be vaccinated to protect themselves and patients (Symons, Matthews & Tobin, 2021:5). Being appropriately vaccinated will also allow them to reduce their rates of absenteeism due to sickness and enhance HCWs' productivity (Maltezou, Ioannidou, De Schrijver, Francois & De Schryver, 2021:7021).

4.4.7 Annual influenza uptake

To establish the rate of vaccine adherence in the study hospital, an assessment of the HCWs' annual vaccine uptake was done. The minimum requirement for vaccine adherence, as stipulated by the CDC, is 90% (CDC, 2010). As illustrated in Figure 4.2, 82% (n=835) of HCWs indicated that they were vaccinated on an annual basis, while 18% (n=183) were not vaccinated on an annual basis (see Figure 4.2).

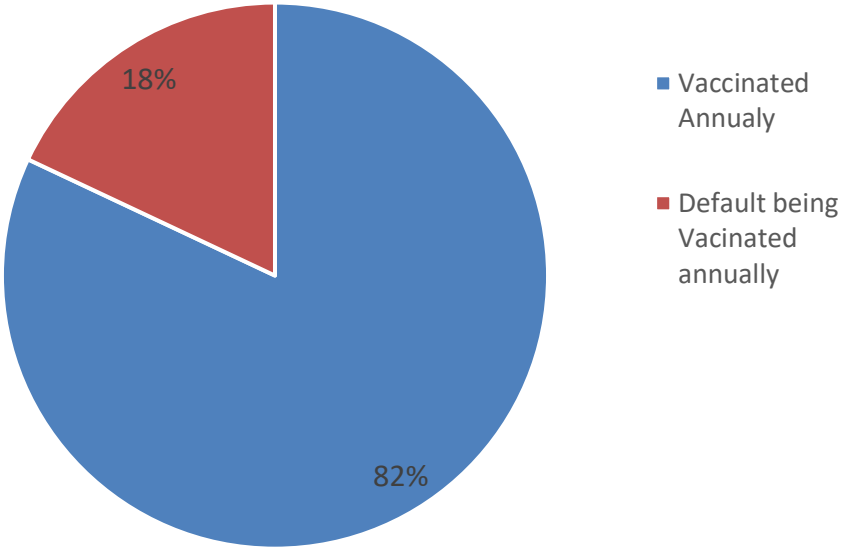

Figure 4.2: Annual influenza vaccine adherence rate of HCWs (N= 1018)

The UAE has depicted a higher (82%) influenza vaccination rate than the US, which reported vaccination rates of 77.3% (CDC, 2016). The findings contradict those by Wang, Jing, Lai, Zhang, Lyu, Knoll and Fang (2020:482) and Youssef et al. (2022:3), who indicated that in regions where influenza epidemics have not been experienced in recent years, coverage rates have fallen below 50%. The UAE is such a region that has never experienced influenza epidemics, yet this study recorded a rate of 82% – well above the threshold rate (below 50%).

Despite the 82% adherence rate in the hospital under study, it was not satisfactory as the CDC guidelines outlined that healthcare centres should ensure vaccine adherence rates greater than 90%. Therefore, there was still an 8% margin that needed to be attained in order to reach the recommended threshold (CDC, 2021).

It is illustrated in Table 4.6 that 79.04% (n=544, F=430) of nurses, 96.5% (n=228; F=220) of physicians, 65.96% (n=94; F=62) of radiographers, 95.83% (n=46; F=46) of physiotherapists, 93.33% (n=30; F=28) of respiratory therapists, 47.83% (n=46; F=22) of pharmacists, 95.24% (n=21; F=20) of radiotherapy technicians, and 100% (n=7; F=7) of medical lab technologists and occupational therapists (‘others’) adhered to the annual influenza vaccination. Alarmingly, nurses (the frontline workers responsible for

direct nursing care), pharmacologists, and radiographers had the lowest vaccination rate in the hospital. This finding is supported by Adane, Ademas and Kloos (2022:12), who also noted that nurses, radiographers, and pharmacologists had the lowest rate of vaccination uptake in their study.

While physicians had a high vaccine adherence rate, it is still concerning that 4.35% (n=228; F=8) did not consider it necessary to vaccinate. Such findings were also noted by Kose et al. (2020:2), who reported that physicians who either practised or believed in alternative forms of medicine, such as homoeopathy, had low vaccine adherence rates.

Table 4.6: Annual vaccine adherence rate among the different HCWs (N= 1018)

Position	Total	Vaccine Adherence			
		Yes		No	
	n	F	%	F	%
Physicians	228	220	96.5	8	4.35
Nurses	544	430	79.04	114	20.96
Physiotherapists	48	46	95.83	2	4.17
Respiratory Therapists	30	28	93.33	2	6.7
Radiographers	94	62	65.96	32	34.04
Pharmacists	46	22	47.83	24	52.17
Radiotherapy Technicians	21	20	95.24	1	4.76
Others	7	7	100	0	0
Total	**1018**	**835**	**82.02**	**183**	**17.98**

Putting these findings into the region's context, the UAE's adherence rate increased in 2018 to 82.2%, from a very low 24.7% in 2010 (Abu-Gharbieh et al. 2010:319-25). Thus, adherence more than tripled in the UAE within the last eight years. This improvement also supersedes the adherence rate of 37.6% in the UAE, as shown by a recent study (Tamimi et al., 2022:10).

Babcock, Gemeinhart, Jones, Dunagan and Woeltje (2010) noted that hospitals with a voluntary vaccination programme recorded vaccine adherence rates of 40% and below. This study's findings are thus significant, considering that a vaccine adherence rate of 82% was achieved at a hospital that strongly encourages vaccination for all its HCWs (as depicted in the open-ended responses), though it is still a voluntary vaccination uptake hospital.

As indicated in Table 4.7, 77.9% (n=793, N=1018) of the HCWs did not use any other drugs to boost their immunity. Of the 225 HCWs who used other drugs, 210 indicated they mostly used multivitamins, followed by Vitamin C, Vitamin D, Zinc, herbal medicines, and B12 injections.

Table 4.7: Use of other drugs to boost immunity

Other drugs to boost immunity	n	f
Multivitamins	138	65.7%
Multivitamins and mineral supplements	4	1.9%
Vitamin B12 Injection	1	0.5%
Vitamin C	49	23.3%
Vitamin C and D	2	1.0%
Vitamin C and Multivitamins	4	1.9%
Vitamin C, Magnesium and Calcium	2	1.0%
Vitamin C, Zinc and other herbal remedies	8	3.8%
Vitamin D	2	1.0%
Total	210	100.0%

4.5 CHALLENGES TO INFLUENZA VACCINE ADHERENCE

As indicated, the HBM (Figure 2.1) was identified as appropriate when dealing with behaviour, such as the behaviour of HCWs and their choice to undergo vaccination (see section 4.5.2). This model was therefore the departure point that guided the interpretation of the research findings. All the findings of the study were hedged on the theoretical framework, and the presentation of the findings is organised according to the theoretical model's constructs, as portrayed in the HBM.

The challenges to vaccine adherence were identified using open-ended and close-ended questions. The factors presumed to pose challenges for HCWs in the study hospital were considered as the aspects that might influence health-seeking behaviour.

4.5.2 Perceived susceptibility to influenza

Perceived susceptibility is a key factor in the HBM and was evaluated using open-ended questions in the survey. Biswas et al. (2021:1244) found that HCWs were reluctant to adopt the role of the patient. The results were also supported by Butler and MacDonald's (2015:4177) findings, indicating that most HCWs do not identify themselves as an at-risk group that needs to take precautionary measures. An individual will only take action when they perceive their personal susceptibility to a health risk is high enough to cause serious health consequences (Clark, Davila, Regis & Kraus, 2020:76-82).

Several respondents offered comments in the open spaces provided in the questionnaire, which were open-coded. Themes, underpinned by categories, were identified, and direct quotations were used to illustrate how the categories were formed. The identified themes were **perceived susceptibility to influenza, perceived benefits to immunisation,** and **perceived threats** (barriers), as suggested by the health belief model (see Table 4.8).

Table 4.8: Susceptibility, benefits and threats to vaccine adherence

Theme	Category	Direct quotations
4.5.1 Perceived susceptibility to influenza	Personal immunity (4.5.1)	"*I have never got infection with influenza, I think my immune system is good/I don't think I need it".* "*I never get the flu*" "*I don't think I need it*"

Theme	Category	Direct quotations
4.5.2 Perceived benefits to immunisation	Self-protection (4.5.2.1)	*"For my protection"* *"As a protection from acquiring flu"* *"For protection in times of seasonal influenza"* *"Protection against respiratory illnesses and flu"* *"It is for my own good and protection"* *"It provides protection"* *"Extra protection against different influenza strains"* *"For protection in times of seasonal influenza"*
	Protecting friends and family from flu (4.5.2.2)	*"To protect myself, family and colleagues"* *"I am motivated to take the vaccine not only to protect myself but my family and patients as well"* *"As a responsible nurse and role model, I need to protect myself, family and patients by getting vaccinated"*

Theme	Category	Direct quotations
		"Avoid spreading flu to my patients, friends and family as per the hospital advice, avoid being absent from work"
	Protecting Patients (4.5.2.3)	*"To protect myself and my patients from potential cross infection"* *"I am motivated to take the vaccine not only to protect myself but my family and patients as well"* *"Mandatory and to protect myself and patients"* *"It is mandatory and also necessary for us because we are in contact with influenza patients"* *"Personal, patient and institutional safety"* *"Prevent infecting my patients"*
4.5.3 Barriers to acceptance of vaccination	Perceived ineffectiveness of the vaccine (4.5.3.2)	*"Due to the vaccine being ineffective and I easily acquired flu-like symptoms for prolonged periods/ I don't believe in the vaccine"* *"I don't believe in the vaccine"*

Theme	Category	Direct quotations
	Personal choice (4.5.3.3)	*"Personal reasons"* *"I avoid manufactured products and medicines as much as I can"*
	Lack of time (4.5.3.4)	*"I was busy that time and not able to get vaccinated"* *"I don't have time to get the vaccine and deal with the general malaise it causes as I cannot take sick leave"*
4.5.4 Perceived threats	Scared of the effects (4.5.4.3)	*"I am Afraid of Side Effects"* *"I'm really worried about side effects"* *"I'm scared to put manufactured things in my body"* *"Suppress immunity and in spite of taking the vaccine, you still get flu every season"* *"Paralysis, muscle soreness, palpitations"* *"Pain at injection site, fever and body malaise"* *"Neurological and muscular side effects"*

Theme	Category	Direct quotations
		"Myalgia, local reactions, fever, rare systemic reactions" *"Guillain Barre Syndrome"* *"Generally mild local pain at the injection site, possible reactive allergic side effects"* *"Flu-like symptoms and sick"*
	Allergies and health issues (4.5.4.4)	*"Egg allergy, skin rashes and severe bronchospasms when I took the vaccine"* *"Egg allergy"* *"I have asthma so I am not inclined to take the shot"* *"Health issues"*
4.5.5 Cues to action	The vaccine is recommended by the employer (4.5.5.1)	*"Free vaccine"* *"Education sessions"* *"Seeing all my colleagues take the vaccine and being reassured by doctors that there is no side effects"* *"Health awareness"*
	My employers enforced vaccination (4.5.3.3)	*"My department forced me to take it"* *"It was enforced"*

Theme	Category	Direct quotations
		"I was forced to take the vaccine" *"Compliance with hospital policy"* *"Mandated by the hospital"* *"It's not my choice, it was mandated for me to take It"* *"Due to pressure from the management"* *"Mandatory from the hospital administration"*
4.5.6 Self-efficacy	Interventions provided by the hospital (4.5.6)	*"Advertising for all healthcare workers to be vaccinated"* *"Adverts during flu season"* *"Announcement posters"* *"Annual campaigns"* *"Assigning staff to administer the vaccine"* *"Awareness sessions led by infectious disease team and occupational health team"* *"By emails and flyers"*

Theme	Category	Direct quotations
		"By giving lectures every mornings" *"If not vaccinated, we have to wear masks during the flu season"* *"Massive campaigns and regular reminders through mails"* *"Through emails"* *"Yearly notification, department meeting"*

Respondents noted (see Table 4.8) that they believed in their own immune system and did not think they needed vaccination:

"*I have never got infection with influenza, I think my immune system is good/I don't think I need it".*

"*I never get the flu*"

"*I don't think I need it*"

To clarify if perceived susceptibility had an impact on vaccine adherence among HCWs in the hospital, correlational analyses are tabulated in section 4.6, and described.

4.5.3 Perceived benefits to immunisation

One of the factors in the HBM mentioned to affect health-seeking behaviour is the perceived benefits of immunisation; thus, in this study's context, the motivation to be

vaccinated. The identified perceived benefits were self-protection, protecting friends and family, and protecting patients, which are discussed in the following sections. As such, these factors indicate the underlying reasons and motivations that prompted HCWs to receive annual influenza vaccinations.

4.5.2.1 Self-protection

Self-protection from influenza is one of the primary motivations for vaccination uptake and adherence (Costantino et al., 2020:686; Dorribo, Lazor-Blanchet & Zanetti, 2015:739-745). In this study's context, 71.4% (n=7; F=5) of the medical lab technologists and occupational therapists, 95.6% (n=228; F=218) of physicians, 72.4% (n=544; F=394) of nurses, 87.5% (n=48; F=42) of physiotherapists, 80% (n=30; F=24) of respiratory therapists, 66% (n=94; F=62) of radiographers, 47.8% (n=46; F=22) of pharmacists, and 95.2% (n=21; F=20) of radiotherapy technicians were motivated to get vaccinated to protect themselves from the flu (see Table 4.9 below).

Table 4.9: Self-protection

Benefit to immunisation	Job role	Percentages		
		N=	F	f=
Self-protection	Other (Medical Lab Technologists & Occupational Therapists)	7	5	71.4%
	Physician	228	218	95.6%
	Nurse	544	394	72.4%
	Physiotherapist	48	42	87.5%
	Respiratory Therapist	30	24	80.0%
	Radiographer	94	62	66.0%
	Pharmacist	46	22	47.8%
	Radiotherapy Technician	21	20	95.2%

In addition to the responses, several respondents provided open-ended feedback (see Table 4.8) that indicated self-protection was one of the key factors and core benefits of immunisation.

"*For my protection*"

"*As a protection from acquiring flu*"

One of the main incentives for vaccine uptake and adherence is the desire to protect oneself against influenza (Costantino et al., 2020:686; Dorribo, Lazor-Blanchet & Zanetti, 2015:739-745). This was also indicated in the statistical results (see Table 4.9), validated with the open-coded responses (see Table 4.8). Several HCWs indicated that they adhere to vaccination uptake due to their desire to protect themselves and reduce the severity of a future influenza infection.

Immunisation benefit factors that motivated HCWs to adhere to vaccination in the hospital under study aligned with factors covered in the literature. Champion and Skinner (2008:46-50) expressed individuals will adopt healthy behaviours to the extent that they believe their actions will reduce the risk of infection. Such HCWs were motivated to adopt healthy behaviours (influenza vaccine adherence) in order to protect themselves (Alhammadi et al., 2015:3824), friends and family from the flu. Likewise, all the studied HCWs were perceived to be motivated by the need to ensure self-protection, though physicians were most (95.6%) motivated by the aspects of self-protection. Pharmacists' motivation also arose from the need to protect themselves (47.8%), which was the lowest among the HCWs.

4.5.2.2 Protecting friends and family from flu

Perceived benefits of immunisation include reducing transmission to family and friends (Al-Metwali, Al-Jumaili, Al-Alag & Sorofman, 2021:1112-1122), and act as a motivator for the HCWs to receive the vaccination. Table 4.10 indicates 71.4% (n=7; F=5) of medical lab technologists and occupational therapists, 94.7% (n=228; F=216) of physicians, 58.1% (n=544; F=316) of nurses, 66.7% (n=48; F=32) of physiotherapists, 73.3% (n=30; F=22) of respiratory therapists, 51.1% (n=94; F=48) of radiographers,

39.1% (n=46; F=18) of pharmacists, and 95.2% (n=21; F=20) of radiotherapists stated that they were motivated to take the vaccine because they need to protect their friends and family from the flu.

Table 4.10: Protecting friends and family from flu as a benefit of immunisation

Benefit to Immunisation	Job role	Percentages		
		N=	F	f=
Protecting friends and family from flu	Other (Medical Lab Technologists & Occupational Therapists)	7	5	71.4%
	Physician	228	216	94.7%
	Nurse	544	316	58.1%
	Physiotherapist	48	32	66.7%
	Respiratory Therapist	30	22	73.3%
	Radiographer	94	48	51.1%
	Pharmacist	46	18	39.1%
	Radiotherapy Technician	21	20	95.2%

The open-coded responses validated the above statistical results (see Table 4.8). HCWs could be prompted to be vaccinated by a number of popular triggers, including the potential consequences of their own influenza transmission on their friends and loved ones (Al-Metwali et al., 2021:1112-1122). HCWs in this study also indicated that they were motivated to receive the influenza vaccination (see Table 4.8) due to their need to appear as a role model and protect their friends and family from potential influenza infections:

"*I am motivated to take the vaccine not only to protect myself but my family and patients as well*"

"*As a responsible nurse and role model, I need to protect myself, family and patients by getting vaccinated*"

The literature depicted that HCWs' actions are guided or based on the Hippocratic Oath to 'first do no harm' (Najera & Reiss, 2015). The Hippocratic Oath explains why HCWs are motivated to reduce exposure to other individuals, such as patients and their families. Similarly, the current study determined that 95.2%, 94.7%, 73.3%, 71.4% and 58.1% of radiotherapy technicians, physicians, respiratory therapists, 'others' and nurses, respectively, were motivated to protect their friends and families. However, the findings contradict Shahbari, Gesser-Edelsburg and Mesch's (2020:29-38) suggestions that few nurses consider the community's health as one of their reasons for receiving the influenza vaccine. The divergence in findings is eminent as more than half (58.1%) of the nurses were motivated by the need to protect their family and friends. As such, the study shows that the UAE has regional specificity and uniqueness, where more than two-thirds of the HCWs consider community health as a motivator to adhere to influenza vaccination.

4.5.2.3 Protecting patients

Instead of being forced to take vaccines, several HCWs are motivated to do so in order to protect patients, as indicated by Petek and Kaminic-Jug (2018:18, 53). HCWs, in general, will want to protect and care for patients due to their caregiving roles and because many HCWs made this career choice to help others (Billings et al., 2021:1-17). This study's findings were similar, as 71.4% (n=7; F=5) of medical lab technologists and occupational therapists, 95.6% (n=228; F=218) of physicians, 59.6% (n=544; F=324) of nurses, 62.5% (n=48; F=30) of physiotherapists, 53.3% (n=30; F=16) of respiratory therapists, 48.9% (n=94; F=46) of radiographers, 39.1% (n=46; F=18) of pharmacists, and 95.2% (n=21; F=20) of radiotherapists stated they were motivated to be vaccinated because they wanted to protect their patients (see Table 4.11). Nevertheless, it is of concern that only 59.6% of nurses who spend several hours per day in direct personal contact and are responsible for being advocates for their patients (Anders, 2020:89-94) stated they would get vaccinated to protect their patients.

Table 4.11: Protecting patients as a benefit of immunisation

Benefits of Immunisation	Job role	Percentages		
		N=	F	f=
Protecting patients	Other (Medical Lab Technologists & Occupational Therapists)	7	5	71.4%
	Physician	228	218	95.6%
	Nurse	544	324	59.6%
	Physiotherapist	48	30	62.5%
	Respiratory Therapist	30	16	53.3%
	Radiographer	94	46	48.9%
	Pharmacist	46	18	39.1%
	Radiotherapy Technician	21	20	95.2%

The open-ended results indicate that protecting patients from potential harm is one of the ways in which the HCWs are motivated to uptake vaccinations (see Table 4.8). In order to safeguard patients, numerous HCWs are incentivised to get vaccinated rather than being required to do so (Petek & Kaminic-Jug, 2018:18,53). As a result of their caring responsibilities and the fact that many HCWs choose this profession to assist others, HCWs typically want to safeguard and care for patients (Billings et al., 2021:1-17).

"*To protect myself and my patients from potential cross infection*"

"*I am motivated to take the vaccine not only to protect myself but my family and patients as well*"

"*Mandatory and to protect myself and patients*"

HCWs do not want to harm any individual or patients (Najera & Reiss, 2015). Respondents in this study (See Table 4.8) confirmed that they do not want to harm

patients, and Najera and Reiss (2015) concurred that HCWs were motivated by the Hippocratic Oath to adhere to vaccination. Nevertheless, the study found only 59.6% of the sampled nurses wanted to protect their patients and get vaccinated against influenza in this study.

4.5.3 Barriers to acceptance of vaccination

4.5.3.1 Convenient time for taking the vaccine

Lack of appropriate time to take the vaccine has been recognised as a challenge affecting vaccine adherence rates (Gostin, Salmon & Larson, 2020:2; Petek & Kaminic-Jug, 2018:18,53). Time, as a challenge, has been noted in several health-related interventions (Ostermann, Brown, de Bekker-Grob, Muhllllllbacher & Reed, 2017:511). Several HCWs emphasised they had insufficient time to take the vaccination when it was being provided in the hospital:

"*I was busy that time and not able to get vaccinated*".

"*I don't have time to get the vaccine".*

The study's findings indicated that many HCWs (except for the physicians) recognised the lack of a convenient time as a barrier to their vaccine adherence (see Table 4.12).

Table 4.12: Convenient time for taking the vaccine

Barriers to acceptance of vaccination	Job role	Percentages		
		N=	F	f=
Convenient time for taking vaccines	Physicians	228	8	3.51%
	Nurses	544	152	27.94%
	Physiotherapists	48	12	25%
	Respiratory Therapists	30	6	20%
	Radiographers	94	8	17.39%
	Pharmacists	46	4	19.05%
	Radiotherapy Technicians	21	4	19.05%

Barriers to acceptance of vaccination	Job role	Percentages		
		N=	F	f=
	Others (Medical Lab Technologists & Occupational Therapists)	7	4	57.41%

Only 3.51% (n=228; F=8) of physicians, 27.94% (n=544; F=152) of nurses, 25% (n=48; F=12) of physiotherapists, 20% (n=30; F=6) of respiratory therapists, 36.17% (n=94; F=34) of radiographers, 17.39% (n=46; F=8) of pharmacists, 19.05% (n=21; F=4) of radiotherapy technicians, and 57.14% (n=7; F=4) of 'others' faced the challenge of a lack of convenient time to receive the vaccine. Mobile carts were an appropriate solution mentioned in the literature to improve vaccine adherence rates by offering HCWs on-the-spot vaccinations (Dini et al., 2018:772). The practice enabled HCWs to stick to their tight schedules while adhering to influenza vaccination protocols (Short, Zimmerman & de Mortel, 2020:212).

4.5.3.2 Perceived ineffectiveness of the vaccine

Several HCWs do not believe the vaccine provides any benefit to them against influenza (Ofstead et al., 2008:103; Little, Goodridge, Lewis, Lingard, Din, Tidley & Hayes, 2015:760; Gualano et al., 2021). Similar trends were noted for COVID-19 vaccines, whereby Spinewine et al. (2021:469) reported that some HCWs do not perceive the COVID-19 vaccine to be beneficial. In this study, some respondents also did not believe in the effectiveness of the vaccine, as indicated by their responses (see Table 4.8):

"*Due to the vaccine being ineffective and I easily acquired flu-like symptoms for prolonged periods/ I don't believe in the vaccine".*

"*I don't believe in the vaccine*"

4.5.3.3 Personal choice

Several respondents provided open-coded responses and mentioned personal reasons for not wanting to be vaccinated, without any explanation:

"*I have personal reasons*"

Many did not provide any further indication of why they chose not to take the influenza vaccination. It is a common trend in research for respondents not to provide further reasons for their answers (Alabdulla et al., 2021:365).

However, a respondent stated that:

"*I avoid manufactured products and medicines as much as I can".*

Thus, personal preferences regarding manufactured products and medicines also influenced HCWs' acceptance of vaccinations (see Table 4.8).

4.5.4 Perceived threats

4.5.4.1 No previous cases of influenza-infected HCWs

Petek and Kamnik-Jug (2018:18,53) provided evidence that when no cases of influenza occurred in the hospital, HCWs perceived that health staff were at low risk, and the vaccination rates dropped. The study's findings revealed (see Table 4.13) that 4.39% (n=228; F=10) of physicians, 23.16% (n=544; F=126) of nurses, 25% (n=48; F=12) of physiotherapists, 33.33% (n=30; F=10) of respiratory therapists, 19.15% (n=94; F=18) of radiographers, as well as 100% (n=7; F=7) of 'others' agreed that there had been previous cases of infections among HCWs in the hospital. However, none of the pharmacists and radiography technicians reported previous infections.

Table 4.13: No perceived cases of influenza-infected HCWs

Factors that pose challenges to vaccine adherence	Healthcare Workers	n	Agree		Disagree	
			F	%	F	%
No previous cases of influenza-infected HCWs	Physician	228	10	4.39	218	95.61
	Nurse	544	126	23.16	418	76.84
	Physiotherapist	48	12	25.00	36	75.00
	Respiratory Therapist	30	10	33.33	20	66.67
	Radiographer	94	18	19.15	76	80.85
	Pharmacist	46	0	0.00	46	100.00
	Radiotherapy Technician	21	0	0.00	21	100.00
	Other	7	3	42.86	4	57.14

4.5.4.2 Fear of injection

Patients sometimes fear being injected (McLenon & Rogers, 2019:30-42), and despite the perception of this not being the case, HCWs are no different to the general population. In this study, 6.58% (n=228; F=15) of physicians, 25% (n=544; F=136) of nurses, 33.3% (n=48; F=12) of physiotherapists, 40% (n=30; F=10) of respiratory therapists, 17.02% (n=94; F=18) of radiographers, 26.09% (n=46; F=12) of pharmacists, 28.57% (n=21; F=6) of radiography technicians, and 42.86% (n=7; F=3) of 'others' indicated their fear of injections prevented them from getting vaccinated (see Table 4.14). Rabi et al. (2021:781) also reported the fear of injections as one of the barriers to HCWs' decision not to be vaccinated in their study.

Table 4.14: Fear of Injection

Factors that pose challenges to vaccine adherence	Healthcare Workers	n	Agree		Disagree	
			F	%	F	%
Fear of injection	Physician	228	15	6.58	213	93.42
	Nurse	544	136	25.00	408	75.00
	Physiotherapist	48	16	33.33	32	66.67
	Respiratory Therapist	30	12	40.00	18	60.00
	Radiographer	94	16	17.02	78	82.98
	Pharmacist	46	12	26.09	34	73.91
	Radiotherapy Technician	21	6	28.57	15	71.43
	Other	7	3	42.86	4	57.14

4.5.4.3 Scared of the effects

Some HCWs perceive vaccination as a threat to their health (Qattan et al., 2021:10), as was the case during the COVID-19 pandemic, where HCWs and members of the public expressed their fear of vaccinations (Sherman et al., 2020:2). Respondents indicated they were afraid of the side effects of influenza vaccinations (see Table 4.8), and this fear influenced their decision not to take the vaccine:

"*Afraid of side effects"*.

"*I'm really worried about side effects"*

"I'm scared to put manufactured things in my body"

When the HCWs were asked about their awareness of the side effects and whether or not they were informed of the side effects by their doctors, 35.9% (n=365, N=1018) strongly agreed, 51% (n=519, N=1018) agreed, 12.8% (n=130, N=1018) disagreed, and the remaining 0.4% (n=4, N=1018) strongly disagreed, as indicated in Table 4.15.

Table 4.15: Awareness of the side effects (N=1018)

Responses	n	f
Strongly Agree	365	35.9%
Agree	519	51%
Disagree	130	12.8%
Strongly Disagree	4	0.4%
Total	**1018**	**100%**

HCWs showed concerns regarding the safety and efficacy of the influenza vaccine (Grochowska et al., 2021:475). When asked to elaborate on the side effects they perceive would occur following the vaccination, several HCWs mentioned allergies, fever and flu-like symptoms, soreness, headaches, nausea, pain and swelling at the injection site, as well as body aches and fatigue. Some HCWs also indicated neurological and muscular side effects, dystonia, myalgia, rare systemic reactions, paralysis, Guillian Barre Syndrome, and palpitations. Others outlined the ineffectiveness of the vaccine, stating that one of the side effects of getting vaccinated for influenza includes the suppression of the immune system, which is counterproductive and leads to additional influenza infections (see Table 4.8):

"*Suppress immunity and in spite of taking the vaccine, you still get flu every season*"

"*Paralysis, muscle soreness, palpitations*"

"*Pain at injection site, fever and body malaise*"

"*Neurological and muscular side effects*"

"*Myalgia, local reactions, fever, rare systemic reactions*"

"*Guillain Barre Syndrome*"

"*Generally mild local pain at the injection site, possible reactive allergic side effects*"

"*Flu-like symptoms and sick*"

These side effects as a reason for non-adherence have also been noted in past research. Over a third (31%) of doctors maintain the opinion that influenza vaccinations might really cause the disease. The misunderstanding is based on the fact that some persons have reported flu-like symptoms after vaccination (Geoghegan, O'Callaghan & Offit, 2020:372). This is a psychological factor wherein side effects are deemed a perceived threat and are known to be significant predictors of non-adherence (Cleevely, Susskind, Vines, Vines & Wills, 2020:3).

4.5.4.4 Allergies and health issues

Butts and Rich (2015:238) noted that when the benefits of the vaccine outweigh the costs, HCWs will more likely take the vaccination, and vice versa. However, an allergic response after receiving the vaccination is a probability (Petek & Kaminik-Jug, 2018:18,53; Chiang et al., 2022:100622), and the 'health' cost of taking a vaccine can be perceived as high, thus negatively impacting some's willingness to uptake the influenza vaccine. Some respondents stated that they have allergies, which will likely create complications with the influenza vaccination and therefore will not take the risk (see Table 4.8):

"*Egg allergy, skin rashes and severe bronchospasms when I took the vaccine"*

"I have asthma so I am not inclined to take the shot"

4.5.5 Cues to action: Social influence from colleagues

As illustrated in Table 4.16, 6.14% (n=228; F=14) of physicians, 20.96% (n=544; F=114) of nurses, 20.83% (n=48; F=10) of physiotherapists, 13.3% (n=30; F=4) of respiratory therapists, 34.04% (n=94; F=32) of radiographers, 43.48% (n=46; F=20) of pharmacists, 9.52% (n=21; F=2) of radiotherapy technicians, and 57.14% (n=7; F=4) of 'others' indicated that they are socially influenced by their colleagues. These findings are similar to the challenges identified in a study conducted by Al-Metwali et al. (2021:1122), indicating that the absence of cues to action (the positive influence of

colleagues to motivate vaccine adherence) was among the main barriers to adherence rates.

Table 4.16: Social influence from colleagues

Factors that pose challenges to vaccine adherence	Healthcare Workers	n	Agree		Disagree	
			F	%	F	%
Social influence from colleagues	Physician	228	14	6.14	214	93.86
	Nurse	544	114	20.96	430	79.04
	Physiotherapist	48	10	20.83	38	79.17
	Respiratory Therapist	30	4	13.33	26	86.67
	Radiographer	94	32	34.04	62	65.96
	Pharmacist	46	20	43.48	26	56.52
	Radiotherapy Technician	21	2	9.52	19	90.48
	Other	7	4	57.14	3	42.86

4.5.5.1 The employer recommends the vaccine

HCWs were willing to increase their adherence rates if the vaccine was recommended by the hospital's occupational health unit (Dini et al., 2018:77). Similar trends have been noted with other types of vaccines, such as hepatitis, rubella, and COVID-19 (Bianchi et al., 2020:369). Table 4.17 reflects that 42.9% (n=7; F=3) of medical lab technologists and occupational therapists, 92.1% (n=228; F=210) of physicians, 54.4% (n=544; F=296) of nurses, 75% (n=48; F=22) of physiotherapists, 86.7% (n=30; F=26) of respiratory therapists, 42.6% (n=94; F=40) of radiographers, 34.8% (n=46; F=16) of pharmacists, and 85.7% (n=21; F=18) of radiotherapy technicians stated they feel motivated to take the influenza vaccine because it is recommended by their employer.

Table 4.17: Vaccine is recommended by their employer

	Job role	Percentages		
		N=	F	f=
The vaccine is recommended by the employer	Other (Medical Lab Technologists & Occupational Therapists)	7	3	42.9%
	Physician	228	210	92.1%
	Nurse	544	296	54.4%
	Physiotherapist	48	22	75.0%
	Respiratory Therapist	30	26	86.7%
	Radiographer	94	40	42.6%
	Pharmacist	46	16	34.8%
	Radiotherapy Technician	21	18	85.7%

As long as the hospital's occupational health section suggested the vaccination, healthcare staff were eager to enhance their adherence rates (Dini et al., 2018:77). Other vaccinations, such as those for hepatitis, rubella, and COVID-19, have shown similar tendencies (Bianchi et al., 2020:369). This finding was also evident in the statistical results of the study and was validated by the open-ended responses (see Table 4.8). These responses also indicated that regular educational sessions, providing free vaccinations, creating health awareness, seeing peers getting vaccinated, and being reassured by the doctors that there are no side effects are some strategies that can prompt HCWs to uptake vaccination:

"*Free vaccine*"

"*Education sessions*"

"*Seeing all my colleagues take the vaccine and being reassured by doctors that there are no side effects*"

"*Health awareness*"

4.5.5.2 Lack of follow-up by the hospital administration

According to Petek and Kaminik-Jug (2018:853), as well as Weber, Orenstein and Rutala (2016:61), nurses were willing to increase their adherence rates if the vaccine was recommended by the hospital's occupational health unit. In this study, 3.51% (F=8; n=228) of physicians, 15.44% (n=544; F=84) of nurses, 12.5% (n=48; F=6) of physiotherapists, 20% (n=30; F=6) of respiratory therapists, 21.8% (n=94; F=20) of radiographers, 8.7% (n=46; F=4) of pharmacists, 9.52% (n=21; F=2) of radiography technicians, and 100% (n=7; F=7) of 'others' perceived a lack of follow-up by the hospital's administration as a barrier to their influenza vaccination (see Table 4.18).

Table 4.18: Lack of follow-up by the hospital administration

Lack of follow-up by the hospital administration	Physician	228	8	3.51	220	96.49
	Nurse	544	84	15.44	460	84.56
	Physiotherapist	48	6	12.50	42	87.50
	Respiratory Therapist	30	6	20.00	24	80.00
	Radiographer	94	20	21.28	74	78.72
	Pharmacist	46	4	8.70	42	91.30
	Radiotherapy Technician	21	2	9.52	19	90.48
	Other	7	7	100.00	0	0.00

The study's findings supported literature that indicated the lack of a cue to action in hospital settings acted as a barrier to HCWs' vaccination rates. However, not all HCWs perceived the lack of follow-up by the hospital's administration as a barrier. Flanagan et al. (2020:1748) outlined that HCWs' perception of influenza as a threat was not influenced by the presence of cues, such as hospital billboards and notification messages from management.

4.5.5.3 Employers' enforced vaccination

Mandatory influenza vaccination is one of the ways to motivate and increase adherence rates among HCWs (Edmond, 2019:1-5). However, in some countries, such as the USA, mandatory vaccination policies for COVID-19 led to several protests and strikes (Chen et al., 2021:1-11). The present study also found that not all the respondents had the same perception of forced vaccination. Table 4.19 indicates that 42.9% (n= 7; F=3) of 'others' (medical lab technologists & occupational therapists), 89.5% (n=228; F=204) of physicians, 47.8% (n=544; F=260) of nurses, 45.8% (n=48; F=22) of physiotherapists, 46.7% (n=30; F=14) of respiratory therapists, 38.3% (n=94; F=36) of radiographers, 21.7% (n=46; F=10) of pharmacists, and 85.7% (n=21; F=18) of radiotherapists stated that their employers forced them to get vaccinated. It was strange that within this context, only the physicians (n=228; f=89.5%; F=204) indicated that a policy that described mandatory vaccination led to an increased uptake of influenza vaccines. The other HCWs did not favour mandatory vaccination potentially due to the significance they place on having a choice, as reported by Kitt et al. (2020: 292-296).

Table 4.19: Employers forced vaccination

	Job role	Percentages		
		N=	F	f=
Employers enforced vaccination	Other (Medical Lab Technologists & Occupational Therapists)	7	3	42.9%
	Physician	228	204	89.5%
	Nurse	544	260	47.8%
	Physiotherapist	48	22	45.8%
	Respiratory Therapist	30	14	46.7%
	Radiographer	94	36	38.3%
	Pharmacist	46	10	21.7%
	Radiotherapy Technician	21	18	85.7%

The HCWs adhered to vaccination since their employers forced them (see Table 4.19). To inspire and boost adherence rates amongst HCWs, mandatory influenza vaccination is thus an appropriate strategy (Edmond, 2019:1-5). Contrarily, in certain jurisdictions like the USA, where vaccines against COVID-19 are mandated, the laws have sparked several strikes and demonstrations (Chen et al., 2021:1-11). The statistical results presented in Table 4.8 also reflect the same.

"*My department forced me to take it*"

"*It was enforced*"

"*I was forced to take the vaccine*"

4.5.6 Self-efficacy: Knowledge about the hospital's policy regarding influenza uptake

Knowledge is one of the important aspects known to influence health-seeking behaviour (Levin-Zamir & Bertschi, 2018:1643) and is an important motivational factor that enhances vaccination uptake (Smith, Amlôt, Weinman, Yiend & Rubin, 2017: 6059-6069) (see Table 4.20).

Table 4.20: Knowledge about the hospital's policy regarding influenza uptake

	Healthcare Workers	**n**	**Agree**		**Disagree**	
			F	**%**	**F**	**%**
Knowledge about the hospital's policy regarding influenza uptake	Physician	228	37	16.23	189	82.89
	Nurse	544	472	86.76	60	11.03
	Physiotherapist	48	48	100.00	0	0.00
	Respiratory Therapist	30	24	80.00	6	20.00
	Radiographer	94	78	82.98	16	17.02
	Pharmacist	46	40	86.96	6	13.04
	Radiotherapy Technician	21	21	100.00	0	0.00

	Healthcare Workers	n	Agree		Disagree	
			F	%	F	%
	Other	7	7	100.00	0	0.00

Similarly, knowledge about the hospital's policies is expected to influence influenza vaccination uptake (Gualano et al., 2021:912). Table 4.6 depicts that 16.23% (n=228; F=37) of physicians, 86.76% (n=544; F=472) of nurses, 100.00% (n=48; F=48) of physiotherapists, 80.00% (n=30; F=24) of respiratory therapists, 82.98% (n=94; F=78) of radiographers, 86.96% (n=46; F=40) of pharmacists, 100.00% (n=21; F=21) of radiography technicians, and 100.00% (n=7; F=7) of 'others' agreed they had knowledge about the hospital's policy regarding influenza uptake.

In addition, 82% (n=804, N=982) of the HCWs noted that the hospital has an influenza policy, while 17% (n=170, N=982) were unsure whether there is an influenza policy in the hospital (see Table 4.21). The remaining 1% (n=8, N=982) of HCWs stated that their hospital had no influenza policy. Thus, there is a need to increase HCWs' awareness of the hospital's policies.

Table 4.21: Awareness of policy on influenza vaccination

Policy on influenza vaccination	n	f
No	8	1%
Unsure	170	17%
Yes	804	82%

These findings are similar to those obtained by Moretti et al. (2020:1851), who found that low adherence rates may be explained by other factors, such as unawareness of recommendations for annual influenza immunisation. Therefore, a lack of knowledge reduced vaccine adherence rates (Moretti et al. 2020:1851).

The provision of adequate resources can play an instrumental role in increasing adherence to vaccinations (Dettori et al., 2021:976; Williams et al., 2021:5; Gostin, Salmon & Larson, 2020:2). Therefore, it is important to assess if the study hospital provided adequate resources as a way of enforcing the policies' efficiency.

The HCWs indicated several interventions were provided by the hospital to increase awareness of the importance of adhering to the annual influenza vaccine (Table 4.8). When asked whether the hospital engages in promotional campaigns, 96.07% (n=978, N=1018) noted that it does. Community interventions, such as those described below by the HCWs, have been shown to increase vaccine uptake in past research (Tao, Lu, Wang, Han, Li & Wang, 2019:5):

"*Advertising for all healthcare workers to be vaccinated*"

"*Adverts during flu season*"

"*Announcement posters*"

"*Annual campaigns*"

"*Assigning staff to administer the vaccine*"

The hospital seems to be combining both instructional (such as meetings and campaigns) and promotional (such as emails and flyers) interventions, which are known to be highly effective (Dini et al., 2018:780). However, despite the above cues to action, the overall vaccination rate remains low, with only 82% (n=835) of HCWs adhering to the annual vaccination.

4.6 RELATIONSHIP BETWEEN FACTORS THAT POSE CHALLENGES FOR VACCINATION AND VACCINE ADHERENCE RATES

HCWs were asked if they perceive the influenza vaccine to be highly effective in reducing their risk of acquiring the infection. As indicated in Table 4.22, 65.4% (n=666, N=1018) maintained a neutral opinion, 16.1% (n=164, N=1018) disagreed, 13.8% (n=140, N=1018) agreed, and the remaining 4.7% (n=48, N=1018) strongly disagreed.

Table 4.22: Perception that influenza vaccine is effective (N=1018)

Responses	n	F
Strongly Agree	0	0%
Agree	140	13.8%
Neutral	666	65.4%
Disagree	164	16.1%
Strongly Disagree	48	4.7%
Total	1018	100%

Furthermore, HCWs were asked if possible interactions with influenza-infected patients would determine their decision to take the vaccine (see Table 4.23). In response, 43.1% (n=439, N=1018) maintained a neutral position and neither agreed nor disagreed, 39.2% (n=399, N=1018) disagreed, 9% (n=92, N=1018) strongly disagreed, and the remaining 8.6% (n=88, N=1018) agreed with the same.

Table 4.23: Interaction with an infected patient influences decision (N=1018)

Responses	n	F
Strongly Agree	0	0
Agree	88	8.6%
Neutral	439	43.1%
Disagree	399	39.2%
Strongly Disagree	92	9%
Total	1018	100%

Next, the respondents were asked if they had any awareness about the importance of the influenza vaccine; 35.6% (n=362, N=1018) strongly disagreed, 32.8% (n=334, N=1018) disagreed, 28.7% (n=292, N=1018) stayed neutral, and the remaining 2.9% (n=30, N=1018) agreed (see Table 4.24).

Table 4.24: Importance of influenza vaccine (N=1018)

Responses	n	F
Strongly Agree	0	0%
Agree	30	209%
Neutral	292	28.7%

Responses	n	F
Disagree	334	32.8%
Strongly Disagree	362	35.6%
Total	1018	100%

The HCWs were also asked if they thought the influenza vaccine had no benefit for a healthy person. On this question, 41.3% (n=420, N=1018) disagreed, 38.8% (n=395, N=1018) strongly disagreed, 14% (n=143, N=1018) remained neutral, and 5.9% (n=60, N=1018) agreed (see Table 4.25).

Table 4.25: Influenza vaccine is not beneficial to a healthy person (N=1018)

Responses	n	F
Strongly Agree	0	0%
Agree	60	5.9%
Neutral	143	14%
Disagree	420	41.3%
Strongly Disagree	395	38.8%
Total	1018	100%

HCWs were asked if their duty as an HCW to 'do no harm' influenced their decision to take the influenza vaccine (see Table 4.26). In response, 63.4% (n=645, N=1018) remained neutral, 21.5% (n=219, N=1018) disagreed, 9% (n=92, N=1018) agreed, and the remaining 6.1% (n=62, N=1018) strongly disagreed.

Table 4.26: Duty to do no harm influences the decision (N=1018)

Responses	n	F
Strongly Agree	0	0%
Agree	92	9%
Neutral	645	63.4%
Disagree	219	21.5%
Strongly Disagree	62	6.1%
Total	1018	100%

The HCWs were asked if they perceived the influenza vaccine to have significant side effects (see Table 4.27). Among the respondents, 37.9% (n=386, N=1018) remained

neutral, 30.3% (n=308, N=1018) disagreed, 24.5% (n=249, N=1018) strongly disagreed, and the remaining 7.4% (n=75, N=1018) agreed.

Table 4.27: Vaccine side effects perception (N=1018)

Responses	n	f
Strongly Agree	0	0
Agree	75	7.4%
Neutral	386	37.9%
Disagree	308	30.3%
Strongly Disagree	249	24.5%
Total	1018	100%

In addition, HCWs were asked to indicate what factors influenced their rate of vaccine uptake. More specifically, HCWs were asked to indicate whether social influence has hindered them from regularly taking the influenza vaccine (see Table 4.28). On this question, 42% (n=428, N=1018) of the HCWs disagreed, 38.5% (n=392, N=1018) strongly disagreed, 16.2% (n=165, N=1018) remained neutral, and the remaining 3.2% (n=33, N=1018) agreed.

Table 4.28: Social influence has hindered from taking the vaccine (N=1018)

Responses	n	f
Strongly Agree	0	0%
Agree	33	3.2%
Neutral	165	16.2%
Disagree	428	42%
Strongly Disagree	392	38.5%
Total	1018	100%

With respect to there being no convenient time to take the vaccine, 43.6% (n=444, N=1018) disagreed, 34.2% (n=348, N=1018) strongly disagreed, 18.3% (n=186, N=1018) remained neutral, and the remaining 3.9% (n=40, N=1018) agreed (see Table 4.29).

Table 4.29: No convenient time for taking the vaccine (N=1018)

Responses	n	f
Strongly Agree	0	0%
Agree	40	3.9%
Neutral	186	18.3%
Disagree	444	43.6%
Strongly Disagree	348	34.2%
Total	1018	100%

Of the respondents, 45.4% (n=462, N=1018) disagreed, 41.9% (n=427, N=1018) strongly disagreed, 11% (n=112, N=1018) remained neutral, and the remaining 1.7% (n=17, N=1018) agreed that the hospital administration does not follow up on vaccine uptake among members of the healthcare team (see Table 4.30).

Table 4.30: Hospital administration does not follow-up (N=1018)

Responses	n	f
Strongly Agree	0	0%
Agree	17	1.7%
Neutral	112	11%
Disagree	462	45.4%
Strongly Disagree	427	41.9%
Total	1018	100%

Some literature determined prior influenza cases in the hospital have a negative effect on influenza vaccination uptake (Alhalaseh, Fayoumi & Khalil, 2020:7374). When asked if there had been any previous cases of influenza-infected HCWs in this hospital, 46.9% (n=477, N=1018) disagreed, 35.7% (n=363, N=1018) strongly disagreed, 14.5% (n=148, N=1018) remained neutral, and the remaining 2.9% (n=30, N=1018) agreed (see Table 4.31).

Table 4.31: No previous cases of influenza vaccine (N=1018)

Responses	n	f
Strongly Agree	0	0%
Agree	30	2.9%

Responses	n	f
Neutral	148	14.5%
Disagree	477	46.9%
Strongly Disagree	363	35.7%
Total	1018	100%

Finally, 40.9% (n=416, N=1018) of HCWs strongly disagreed, 38.4% (n=391, N=1018) disagreed, 16.6% (n=169, N=1018) remained neutral, and the remaining 4.1% (n=42, N=1018) agreed that their fear of infection was a factor in their decision to get vaccinated (see Table 4.32).

Table 4.32: Fear of infection was a factor for adherence (N=1018)

Responses	n	f
Strongly Agree	0	0%
Agree	42	4.1%
Neutral	169	16.6%
Disagree	391	38.4%
Strongly Disagree	416	40.9%
Total	1018	100%

A correlation test was conducted and deemed fundamental in aiding the researcher in determining if the challenges affecting influenza vaccine adherence rates were significant or not (see Table 4.33).

Table 4.33: Correlation coefficients on the relationship between factors that pose challenges for vaccination and vaccine adherence rates (N= 1018)

		Annual influenza vaccination	Social influence by colleagues has hindered me from regularly taking the influenza vaccine	No convenient time for taking the vaccine	Hospital administration does not follow up on vaccine uptake among members of the healthcare team	No previous cases of influenza-infected healthcare workers in this hospital	Fear of the injection influence my decision to go for vaccination
Annual influenza vaccination	Pearson Correlation	1	.319**	.228**	.123**	.086**	.117**

		Annual influenza vaccination	Social influence by colleagues has hindered me from regularly taking the influenza vaccine	No convenient time for taking the vaccine	Hospital administration does not follow up on vaccine uptake among members of the healthcare team	No previous cases of influenza-infected healthcare workers in this hospital	Fear of the injection influence my decision to go for vaccination
	Sig. (2-tailed)		.000	.000	.000	.006	.000
	N	1018	1018	1018	1018	1018	1018
Social influence by my colleagues has hindered me from regularly taking the influenza vaccine	Pearson Correlation	.319**	1	.663**	.563**	.543**	.558**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	1018	1018	1018	1018	1018	1018
No convenient time for taking the vaccine	Pearson Correlation	.228**	.663**	1	.527**	.486**	.471**
	Sig. (2-tailed)	.000	.000		.000	.000	.000
	N	1018	1018	1018	1018	1018	1018
No follow-up on vaccine uptake among members of the healthcare team	Pearson Correlation	.123**	.563**	.527**	1	.542**	.498**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	1018	1018	1018	1018	1018	1018
No previous cases of influenza-infected healthcare workers in this hospital	Pearson Correlation	.086**	.543**	.486**	.542**	1	.526**
	Sig. (2-tailed)	.006	.000	.000	.000		.000
	N	1018	1018	1018	1018	1018	1018
Fear of the injection influence my decision to go for vaccination	Pearson Correlation	.117**	.558**	.471**	.498**	.526**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	1018	1018	1018	1018	1018	1018
**. Correlation is significant at the 0.01 level (2-tailed).							

Correlation coefficients above +4 indicated a strong positive relationship, while those below -.4 indicated a strong negative relationship. Correlations between +2 and -.2 denote a moderately positive or negative relationship, respectively. Finally, correlation coefficients below +2 or -.2 represent a weak positive or negative relationship, respectively. The stronger the coefficient's relationship, the higher the chances that

the dependent variable is controlled by the independent variable in either a positive or negative direction. In the current context, an increase in the magnitude of the factors that pose challenges to vaccine uptake will lead to low rates of influenza vaccine adherence, and vice versa.

Table 4.33 illustrates that social influence by colleagues (r=.319) and the lack of a convenient time to receive the vaccine (r=.228) had a moderate ability to affect the rate at which HCWs adhered to vaccine uptake. Furthermore, cues to action also moderately influence vaccine adherence rates (r=0.123), as does fear of injections (r=0.117), and no previous cases of HCWs being infected in the hospital (r=0.086).

4.7 RECOMMENDATIONS TO INCREASE VACCINE ADHERENCE USING CUES TO ACTION

The HCWs provided quantitative data to suggest possible interventions that might increase vaccine adherence rates (see Table 4.34). Most of these interventions were supported by available literature (see Chapter 2). Mandatory vaccination, as suggested in the literature (Gualano et al., 2021:901), was also mentioned by respondents as one of the ways to improve vaccination rates. The study's findings revealed that 75.3% (N=1018; F=767) of all HCWs suggested mandatory vaccination would increase their vaccine adherence rate (see Table 4.34). Consequently, they supported the findings from the literature on the topic.

Table 4.34: Recommendations to increase vaccination rates (N=1018)

		n	f
Mandatory vaccination	Yes	767	75.3%
	No	251	24.7%
Providing health workers with time to take the vaccine	Yes	733	72.0%
	No	285	28.0%
Use of occupational health posters	Yes	695	68.3%
	No	323	31.7%
Providing the vaccine free of charge	Yes	708	69.5%
	No	310	30.5%

HCWs also indicated that (N= 1018; F=733; f=72%) if time is allocated and made available for vaccination purposes (see Table 4.34), it would increase the rate of influenza vaccination uptake, as supported by Gostin, Salmon and Larson (2020:2) and Lim and Seale (2014:608). These authors confirmed that by providing health workers time to get the vaccine, an intervention is created that can improve adherence rates.

Of the HCWs, 68.3% reported that the use of occupational health posters to motivate vaccination uptake would influence their decision to get vaccinated (see Table 4.34). Also, 69.5% reported that they would be more likely to take the vaccine if it was provided free of charge (see Table 4.34).

HCWs were of the opinion that increased hospital coverage about the rate of influenza vaccinations would urge them to comply with the annual influenza vaccination drive (see Table 4.35).

Table 4.35: Hospital coverage of vaccine increases the rate of adherence (N=1018)

Responses	n	f
Strongly Agree	214	21%
Agree	675	66.3%
Neutral	0	0%
Disagree	103	10.1%
Strongly Disagree	26	2.6%
Total	1018	100%

As indicated in Table 4.35, 66.3% (n=675, N=1018) of the HCWs agreed, and 21% (n=214, N=1018) strongly agreed that increasing hospital coverage of influenza vaccinations would motivate them to undergo vaccination. However, 10.1% (n=103, N=1018) of the HCWs disagreed, and 2.6% (n=26, N=1018) strongly disagreed that increasing hospital coverage of influence vaccination would motivate them to vaccinate.

Of the HCWs, 65.3% (n=665, N=1018) agreed, and 18.1% (n=184, N=1018) strongly agreed that feedback on vaccination coverage within the hospital influenced their vaccine adherence (see Table 4.36).

Table 4.36: Influence of feedback on adherence (N=1018)

Feedback	n	f
Agree	665	65.3%
Disagree	137	13.5%
Strongly Agree	184	18.1%
Strongly Disagree	32	3.1%
Total	1018	100%

The narrative data from open-ended questions (see Table 4.37) revealed that "awareness of the importance of vaccination" can be an intervention to improve adherence rates. For instance, some respondents noted:

"*Providing awareness sessions about the benefits and complications of the vaccine*"

"*More education sessions on the importance of vaccinations and visit departments to administer the vaccine*".

Table 4.37: Narrative responses regarding awareness of the importance of vaccination

Category	Direct quotations
Interventions provided by the hospital	"*Providing awareness sessions about the benefits and complications of the vaccine*" "*More education sessions on the importance of vaccinations and visit departments to administer the vaccine*"

Awareness regarding the benefits and side effects of the influenza vaccine is, according to Abalkhail et al. (2017:644-648), associated with higher vaccination uptake among HCWs.

4.7.1 Recommendations to increase vaccine adherence through perceived barriers and perceived benefits

Most (75.1%) HCWs were convinced that, in order to increase the adherence rate (see Table 4.38), vaccinating over multiple shifts was preferable over a one-day vaccination opportunity, which limited the time and place provided to the HCWs. Thus, among the two approaches to increasing adherence, HCWs preferred vaccinating over multiple shifts as a feasible option.

Table 4.38: Preferred time for vaccination (N=1018)

Feedback	n	f
Setting a single day aside for the influenza vaccine	253	24.9%
Provision of the vaccine over multiple shifts	765	75.1%
Total	1018	100%

Of the respondents, 998 indicated that specific months for vaccination were preferable: 22.5% (F=225, n=998) of the HCWs stated that October is preferred, 21.4% (F=214, n=998) of the HCWs preferred September, 20.1% (F=201, n=998) preferred between September and October, as indicated in Table 4.39.

Table 4.39: Preferred month for vaccination (n=998)

Months	F	f
October	225	22.5
September	214	21.4
September - October	201	20.1
November	66	6.6
Winter	34	3.4
December	24	2.4
October - November	22	2.2
Any month	18	1.8
Before winter	16	1.6
January	16	1.6
December - January	14	1.4
October - January	14	1.4

Months	F	f
July	12	1.2
August - October	10	1
September - October	10	1
December - February	8	0.8
Winter	8	0.8
Anytime	6	0.6
First quarter of the year	6	0.6
June - July	6	0.6
November - December	6	0.6
October to December	6	0.6
Summer	6	0.6
August - January	4	0.4
August - September	4	0.4
January or the employee's birth month	4	0.4
June	4	0.4
March	4	0.4
October - December	4	0.4
September - October	4	0.4
Before flu season	2	0.2
During flu season	2	0.2
February/November	2	0.2
March or April	2	0.2
May - August	2	0.2
October/November	2	0.2
October - March	2	0.2
October - November	2	0.2
September - October	2	0.2
September - January	2	0.2
October - December	1	0.1
Total	998	100

HCWs also suggested preferable locations where annual vaccination should occur (see Table 4.40). As indicated, the most recommended location (venue) was at work (n=874, f=5.9%, N=1018). Of the HCWs, 6.5% (n=66, N=1018) were comfortable

receiving the vaccination in the doctor's office, and 4.1% (n=42, N=1018) in the pharmacy/drugstore. Other mentioned locations included occupational health clinics (n=6, f=0.6%, N=1018), cafeterias and main lobbies (n=12, f=1.17 %, N=1018), clinics (n=7, f=0.7%, N=1018), any convenient location (n=6, f=0.6%, N=1018), and some recommended to have it in a place that is accessible, preferably at the end of their shift (n=5, f= 0.5%, N=1018).

Table 4.40: Recommendations for the location (venue) of vaccination (N= 1018)

Location	n	f
At work	874	85.9
Occupational health clinic	6	0.6
In the pharmacy/drugstore	42	4.1
In the doctor's office	66	6.5
Cafeteria and main lobby	12	1.17
Clinics	7	0.7
Place of convenience	6	0.6
I prefer to have it at the end of my shift before going home and somewhere accessible to employees	5	0.5
Total	1018	100.0

4.8 SUMMARY

The chapter presented the research results in a sequential manner, based on the HBM. The factors posing as challenges to vaccine adherence, such as a lack of time, were outlined as limiting HCWs' vaccine adherence rates. The motivations, such as self-protection, the protection of families, and the protection of patients motivated the HCWs to get vaccinated. The efficiency of intervention measures to increase adherence rates was found not to be fully effective. Moreover, commonly disregarded factors, such as the cost of the influenza vaccine, lack of time, perceived inefficacy, allergies and health issues, personal choice, and perceived susceptibility to influenza were shown to have the potential to improve vaccine adherence rates, if addressed. The study's conclusion and recommendations are discussed in Chapter 5.

CHAPTER 5
CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

While the global influenza vaccination rate among HCWs has remained low, the dangers of influenza transmission have increased. The associated health risks with influenza infection and complications pose dangers to HCWs and their patients. In countries that have not experienced an influenza outbreak, the vaccination rate is typically 50% (Haghpanah et al., 2021:100863). As one of these countries, the UAE has a vaccination rate below 40%, which is significantly less than the required 90% (Abu Hammour & Al-Saleh, 2019:6; Tamimi et al., 2022:10). It was therefore important to outline the challenges and motivational factors associated with influenza vaccine adherence among HCWs.

To deliver tangible results in an orderly manner, the following research objectives were met:

- Identify challenges with influenza vaccine adherence among HCWs in the hospital.
- Identify opportunities for influenza vaccine adherence among HCWs in the hospital.
- Describe interventions meant to promote influenza vaccine adherence among HCWs in the hospital.
- Identify and describe ways to promote influenza vaccine adherence among HCWs.

The literature stated that HCWs have a higher risk of contracting influenza than the general population due to their direct contact with afflicted patients (Ottenberg et al., 2011:212). Moreover, the detrimental impacts of influenza on nursing practice extend beyond high mortality rates and affect HCWs' absenteeism and tardiness, negatively impacting patient care outcomes.

The HBM was the theoretical framework guiding the study. The HBM was resourceful as it outlined perceived susceptibility, perceived severity, perceived benefits and barriers to adherence, perceived threats, cues to action, and self-efficacy. Among all

the recommended approaches to increase the rate of HCWs' vaccination, mandatory vaccination was considered effective. However, some scholars vehemently criticised its suitability due to their ethical perspectives.

The study adopted a positivist approach, and data were quantitatively collected, analysed and presented. The data were collected from the total population, referred to as a total population sample, consisting of 2 080 HCWs in a selected hospital with a diverse healthcare workforce in the UAE. Of these 2 080 HCWs, 1 018 responded, reflecting an effective response rate of 48.94%.

5.2 CONCLUSIONS

Among the 1 018 HCWs who volunteered and participated, 65.2% (n=664) were female, and 34.8% (n=354) were male.

Physicians were the group of HCWs that spent more than four hours per day in direct contact with patients, and, understandably, pharmacists spent the least time with patients. Nurses spent varied time with patients, which could be attributed to some nurses having managerial responsibilities in addition to patient care. Overall, 82.9% (n=843) of the HCWs (N=1 018) were in contact with patients for more than four hours per day.

The findings revealed that 82% of the HCWs adhered to the yearly vaccination programme, which is below the 90% minimum adherence required by the CDC (2020). The HCW group that failed to adhere the most were pharmacists, with 52% of respondents not adhering to the annual vaccination requirements. The findings are discussed to illustrate their relevance to the study's objectives.

5.2.1 Objective One: Identify challenges with influenza vaccine adherence among HCWs in the hospital

Social influence from colleagues and the lack of a convenient time (see Table 4.6) to receive the vaccine were identified as significant factors that posed challenges to vaccine adherence among HCWs. While the literature recognises several barriers to

vaccine adherence, not all the barriers had a significant impact on the HCWs in this study's context.

Perceived benefits to immunisation were identified as self-protection, protection of friends and family, and protection of patients. Self-efficacy beliefs, such as knowledge about hospital policies and awareness of available interventions also influenced HCWs' acceptance of the influenza vaccination. Similarly, self-efficacy beliefs have been proven to influence vaccine adherence rates among HCWs (Moretti et al., 2020: 1851). Barriers to vaccination acceptance outlined in this study included convenient times to receive the vaccine, perceived inefficiency of the vaccine, and personal choice. Dini et al. (2018:772) similarly found that time was a significant factor that hindered HCWs from getting the influenza vaccine since HCWs have extremely busy schedules.

The perceived threats, such as no previous cases of influenza, fear of injection, being scared of the side effects, and allergies and health issues also influenced the rate of influenza vaccine acceptance in this study (see Chapter 4, section 4.5.4). As indicated by Rabi et al. (2021:781), fear of injections as a perceived threat also influenced their participants from adhering to annual vaccinations.

The cues to action affecting the HCWs' adherence to annual vaccinations in this study included social influence from colleagues, a recommendation from their employer, lack of follow-up by the hospital's administration (which had a negative effect on adherence rate), and mandatory vaccination. The absence of cues to action, namely a lack of follow-up by the hospital's administration, was outlined as a primary challenge preventing HCWs from adhering to influenza vaccine uptake (Al-Metwali et al. 2021:1122).

5.2.2 Objective two: Identify opportunities for influenza vaccine adherence among HCWs in the hospital

HCWs who indicated that they were motivated to get vaccinated shared that they would do so for their personal safety, and the safety of their patients, friends and

family. Their decision was also based on the recommendation from their employers to be vaccinated, and the hospital policy. These serve as cues to action as per the HBM.

5.2.3 Objective Three: Describe interventions meant to promote influenza vaccine adherence among HCWs in the hospital

Despite the hospital having a vaccination policy (see Chapter 4, section 4.7), respondents indicated that the policy was ineffective in promoting influenza vaccine adherence among HCWs. The hospital had several policies to promote adherence, such as advertisements, email reminders, annual campaigns, meetings, and educational sessions (see section 4.8.7). However, these were not effective in promoting vaccine uptake. They did nothing to curb the perceived threats and barriers to vaccine adherence, which is a possible reason for their lack of effectiveness.

5.2.4 Objective Four: Identify and describe ways to promote influenza vaccine adherence among HCWs

The respondents indicated that influenza vaccine adherence rates could be improved through mandatory vaccination; educational health posters; providing the vaccinations for free; providing HCWs with recovery time after the vaccination; creating awareness on the importance of vaccinations; making the HCWs aware of the cost to benefit analysis of failing to be vaccinated; vaccinating HCWs over multiple shifts rather than hosting one-day vaccination activities; vaccinating the HCWs in September, October and November; and finally, conducting vaccinations in the workplace environment and while on duty (see Chapter 4, section 4.9).

Employee workshops and additional human resources (staff) during vaccinations were suggested to enhance influenza vaccine rates (see Chapter 4, section 4.6.2). Despite respondents discussing the existing ineffective advertisements, email reminders, annual campaigns, meetings, and educational sessions to create awareness, they suggested that awareness must be created to alleviate concerns regarding perceived threats and barriers to adherence in order for the initiatives to be successful.

5.3 RECOMMENDATIONS

The researcher will negotiate to present the research findings and discuss the recommendations at a general management committee meeting at a convenient time and approved by the hospital's management team. The members of the committee include the CEO, the department heads, the chief of surgery, and the members of the infection control department.

The findings will electronically be shared with the medical director of the hospital, as well as the infection control department. The following aspects will be emphasised:

A: Health education material must be developed to provide scientific evidence about annual vaccination advantages. The educational material must be shared on all electronic resource planning platforms within the hospital.

B: An ad hoc committee should be appointed to be responsible for social media updates on influenza vaccinations. The topics to be addressed should include:

- **Social influence:** It is recommended that social media awareness campaigns and other related tools be used to positively influence the healthcare community's health and that of the community in general. Social media groups can be established to promote adherence to vaccinations.
- **Benefits of vaccination:** Greater cognizance of the benefits of vaccination (like the protection of friends, family members and patients) must be emphasised among HCWs. Online training to improve knowledge can be made available.
- **HCWs must be informed of the hospital's available policies** on annual influenza vaccinations. An awareness campaign, including a social media campaign, must be initiated by the quality manager and held every six months to inform HCWs of policy changes or implementation within the hospital.

C: Mandatory vaccination: The hospital policy must stipulate mandatory vaccinations for all HCWs. Those who can provide a medical certificate indicating their reasons for exclusion will be excused, or should not work where they have direct patient contact. Clear guidance on this exception process must be included in the policy document.

- **D: Incentives:** Monetary incentives or time off should be offered to motivate vaccination compliance.

- **E: On-duty vaccination:** Vaccinations must be scheduled during on-duty times to accommodate all HCWs while they are on duty. The allocated times must cater for all shifts so every HCW can be vaccinated while on duty.

- **F: Free vaccination service:** All HCWs and other staff members who have contact with patients must receive vaccinations for free.

- **G: Post-vaccination recovery time:** Special sick leave must be allowed for all staff after vaccination if they require recovery time.

- **H: Appropriate time for vaccination:** Sufficient vaccines should be available to vaccinate all staff between September, October and November in the context of the UAE. In other countries, the winter season, which is generally the influenza season, can be considered the appropriate time for providing vaccinations.

- **I: Professional development sessions:** Training and education sessions that focus on available policies, knowledge to prevent misconceptions, possible side effects, and the benefits of vaccinations must be scheduled at regular intervals. These sessions must be compulsory for all newly appointed HCWs.

5.3.1 Recommendations to the department of health

The study's findings will be electronically shared with the infection control department within the UAE's health department.

The infection control department must launch a survey to determine the number of HCWs in the country and assess the vaccination rate in all healthcare settings.

The recommendations stipulated in section 5.3 will be shared electronically as it would be beneficial if a country-wide campaign could be launched.

5.3.2 Dissemination of findings

An abstract will be submitted to present the research findings at health conferences like the Arab Health Conference in the UAE. The Global Public Health Conference is another relevant symposium to which an abstract for possible presentation will be submitted.

The research findings will be published in scientific health-related journals. The findings will also be electronically shared with infection control departments of other hospitals within the UAE.

5.3.3 Recommendations for future research

The following suggestions for further research are appropriate:

- The research study can be duplicated in all regions in the UAE.
- Research that specifically focuses on the effectiveness of influenza vaccinations in the UAE can be beneficial.
- Research on the vaccination rate of other staff members working in healthcare facilities can be undertaken to compare HCW vaccination rates and determine whether the same factors affect vaccination rates.

5.4 LIMITATIONS OF THE STUDY

The study was conducted in only one very large hospital. Despite being a large hospital with a diverse workforce that caters for an entire city in an Emirate, the findings might not be 100% similar to other settings due to possible cultural differences and diversities among HCWs. However, it is known that the hospital chosen has a diverse healthcare staff.

5.5 CONCLUDING REMARKS

Adherence to vaccination is a global concern as not all HCWs have been known to receive their annual immunisation for influenza. HCWs are prone to higher infection rates as they routinely deal with sick patients (Hayward et al., 2021:1-8). The HBM was appropriate to guide the researcher in identifying the challenges to influenza vaccine adherence. Cues to action are necessary parameters in order to change HCWs' attitudes and behaviours.

Maintaining and protecting one's own health as an HCW is crucial to protect the individual, and those who are vulnerable. The health and well-being of those under care must be promoted.

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ANNEXURE A: UNISA ETHICS CERTIFICATION

UNISA

UNIVERSITEIT VAN SUID-AFRIKA
PRETORIA
UNIVERSITY OF SOUTH AFRICA

UNIVERSITY OF SOUTH AFRICA
Health Studies Higher Degrees Committee
College of Human Sciences
ETHICAL CLEARANCE CERTIFICATE

REC-012714-039

HSHDC/481/2015

Date: 25 November 2015 Student No: 4845-610-1

Project Title: Factors associated with influenza vaccine adherence among healthcare workers in a hospital in Abu Dhabi.

Researcher: Premilla Keerthy

Degree: MA in Nursing Science Code: MPCHS94

Supervisor: Prof L Roets
Qualification: PhD
Joint Supervisor: -

DECISION OF COMMITTEE

Approved [√] **Conditionally Approved** [ ]

Prof L Roets
CHAIRPERSON: HEALTH STUDIES HIGHER DEGREES COMMITTEE

Prof MM Moleki
ACADEMIC CHAIRPERSON: DEPARTMENT OF HEALTH STUDIES

PLEASE QUOTE THE PROJECT NUMBER IN ALL ENQUIRES

ANNEXURE B: AL AIN MEDICAL DISTRICT APPROVAL

UAEU College of Medicine and Health Sciences

جامعة الإمارات العربية المتحدة
United Arab Emirates University

19th September, 2016

Ref: DT/fa/16-48

Premilla Keerthy
Charge Nurse
Tawam Hospital

Dear Keerthy

Re: A Study to determine the factors affecting influenza vaccine uptake among healthcare workers in Tawam CRD 426/15 ERH-2016-4365 16-48

Thank you for submitting your application to the Ethics Committee. The application has been reviewed by Al Ain Medical District Human Research Ethics Committee (AAMDHREC) and I am pleased to provide you ethical approval of your project.

The AAMDHREC is an approved organization of Federal Wide Assurance (FWA) and compliant with ICH/GCP standards.

The Committee must be informed if there is deviation from the approval protocol or if you have any other concerns.

Annual reports plus a terminal report are necessary and the Committee would appreciate receiving copies of abstracts and publications should they arise.

I wish you success with this important study.

With kind regards,

Yours sincerely,

Prof. Dennis Templeton
Chair, Al Ain Medical District Human Research Ethics Committee

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ANNEXURE C: OPERATIONAL APPROVAL

TAWAM HOSPITAL
JOHNS HOPKINS

Memorandum

Nursing Department

Date : 7th September 2015

To : The Nursing Research Committee

Thru : Yvonne Kathleen Duff
(A) Associate Director of Nursing

Thru : Catherine Williams
Director of Nursing

From : Premilla Keerthy
Charge Nurse
Employee No: 6387

Subject : PERMISSION TO CONDUCT A RESEARCH STUDY IN TAWAM HOSPITAL

I am a post graduate student undertaking a Master of Arts Nursing Science Degree at the University of South Africa (UNISA). The title of my research study is: Factors associated with influenza vaccine adherence among healthcare workers in Tawam Hospital. The purpose of my study is to identify and critically examine the factors associated with the low adherence rates of the annual influenza vaccine among healthcare workers in Tawam Hospital in order to recommend a vaccination strategy to contribute to the enhancement of adherence rates.

I am requesting permission to recruit healthcare workers who have direct contact with patients in your organisation. Possible respondents will be requested to complete an anonymous self-administered questionnaire. No identifiable data will be made known in the reporting of the data, thus confidentiality will be ensured.

All efforts will be made to ensure that conducting the study does not disrupt the hospital's working environment. The study results might be published in peer reviewed journals, but without any identifiable data. Hope to receive your favourable consideration for conducting this study. For any more information please feel free to contact myself, Premilla Keerthy or my supervisor Prof Lizeth Roets (roetsl@unisa.ac.za: +27 12 429 2226)

Yours Sincerely,
Premilla Keerthy
Mobile: 0556025039
Email: pparthab@tawamhospital.ae

ANNEXURE D: INFORMATION LETTER FOR CONSENT TO PARTICIPATE

Information Letter: Consent to Participate

Research Title: Factors associated with influenza vaccine adherence among healthcare workers in Tawam Hospital

Dear Respondent

My name is Premilla Keerthy, a post graduate student at the University of South Africa (UNISA). I invite you to volunteer to participate in my study with the title: *Factors associated with influenza vaccine adherence among healthcare workers in Tawam Hospital.*

Your participation will involve completing the attached questionnaire. All possible measures will be undertaken to ensure that the information you will provide will remain confidential and that the responses will be anonymous. Your name should not appear on the questionnaire to ensure confidentiality. You can choose not to participate, by just not completing the questionnaire without being discriminated against. You can also withdraw from the study at any given time without any penalties. You will receive no remuneration, as your participation is voluntary. You will be able to request the study results after completion of the study by e-mail at pparthab@tawamhospital.ae . The research results will be published, but no identifiable information will be revealed.

Your participation will be highly appreciated, as it will contribute to an understanding of the underlying causes of the current low influenza vaccine uptake and how the situation can be improved.

I do not anticipate any risks to you participating in this study other than those encountered in day-to-day life.

If you have any questions or concerns about this research please contact the research Ethics Committee of the Department of Health Studies at the University of South Africa at roetsl@unisa.ac.za or myself at pparthab@tawamhospital.ae .

If you agree to participate, please complete the questionnaire and drop it in a sealed box provided for that purpose.

Kindly keep this information letter as proof that you did receive this information and can contact any of the persons, refer to in the information letter.

Kind regards

Premilla Keerthy
Occupational Health
Mobile: 00971556025039
Extension: 5892

ANNEXURE E: RESEARCH QUESTIONNAIRE

QUESTIONNAIRE

Factors associated with influenza vaccine adherence amongst heath care workers in Tawam Hospital

Dear Colleague,

Thank you for your willingness to participate in this research study.

Please complete the questionnaire as honestly as possible and follow the instructions when answering the questions.

Indicate your answer with a tick in the block provided next to the questions and where space is provided, please add your comments.

e.g. Do you like apples?

a. Yes ☒

b. No ☐

Part A: Demographic Data

01. Please indicate your gender
    a. Male ☐
    b. Female ☐

02. Please indicate to which age group do you belong to
    a. Below 25 years ☐
    b. 26-35 years ☐
    c. 36-45 years ☐
    d. 46-54 years ☐
    e. Over 55 years ☐

03. Please state your nationality ……

04. For how long have you worked as a heath care provider?

a. Less than 01 year ☐
b. 1-2 years ☐
c. 3-4 years ☐
d. 5-7 years ☐
e. Over 7 years ☐

05. How long have you been working in this hospital?

a. Less than 01 year ☐
b. 1-2 years ☐
c. 3-4 years ☐
d. 5-7 years ☐
e. Over 7 years ☐

06. What position do you hold in this hospital?

a. Physician ☐
b. Nurse ☐
c. Physiotherapist ☐
d. Respiratory Therapist ☐
e. Midwife ☐
f. Dietician ☐
g. Radiographer ☐
h. Pharmacist ☐
i. Radiotherapy Technician ☐
j. Other ☐

If other, please specify …….

07. On an average, how much contact time do you have with your patients on a daily basis?

    a. Less than an hour ☐
    b. 1-2 hours ☐
    c. 3-4 hours ☐
    d. More than 4 hours ☐

Part B: Level of influenza vaccine uptake

08. Are you aware of the hospital policy regarding influenza uptake?

    a. Yes ☐
    b. No ☐

09. If you marked the above question as a yes, what does this policy stipulate?

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    ……
    ……

10. If your answer is a no, please provide a reason why you think there should be a policy or not.

    ……
    ……
    ……

11. Have you ever taken the influenza vaccine?

    a. Yes ☐
    b. No ☐

12. If you have marked the above question as yes, please provide a brief reason as to what motivated you to take the vaccine.

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13. If you have marked the above question as no, please provide a brief reason as to what motivated you to not take the vaccine.

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14. Do you take the influenza vaccine every year?

    a. Yes ☐
    b. No ☐

15. If you have answered yes to the above question, please provide all the reasons applicable to you.

    a. To provide myself from flu ☐
    b. To protect my family and friends ☐
    c. The vaccine is recommended by my employer ☐
    d. My employers enforced me to take the vaccine ☐
    e. To protect my patients ☐

16. If you are not taking the vaccine annually, please provide a reason why not.

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17. I feel that I am adequately informed about the side effects of the influenza vaccine. Please indicate your choice in the appropriate box.

    a. Strongly agree ☐
    b. Agree ☐
    c. Disagree ☐
    d. Strongly disagree ☐

18. Please describe the side effects that you are aware of.

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19. Do you use other drugs to boost your immunity?

    a. Yes ☐
    b. No ☐

20. If you have marked yes to the previous question, please list what you use.

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Part C: factors affecting adherence rates of the annual influenza vaccine

21. Please indicate your level of agreement with respect to the following statements.

(1- Strongly disagree) (2- Disagree) (3- Agree) (4- Strongly agree)

S. No	Statement	Rating			
		1	2	3	4
1.	Influenza vaccine is highly effective in reducing the risk of acquiring the infection				
2.	Possible interaction with an influenza infected patient will determine my decision to take the vaccine				
3.	I have little awareness on the importance of the influenza vaccine				
4.	The influenza vaccine has no benefit to a healthy person				
5.	The duty of a health worker to “do no harm” will influence my decision to take the influenza vaccine				
6.	The influenza vaccine has significant side effects				

Part D: Factors that affect regular uptake of influenza vaccine

22. To what extent do the following factors prevent your regular uptake of the annual influenza vaccine?

(1-Strongly disagree) (2- Disagree) (3- Agree) (4- Strongly agree)

S. No	Statement	Rating			
		1	2	3	4
1.	Social influence by my colleagues has hindered me from regularly taking the influenza vaccine				
2.	There is not a convenient time for taking the vaccine				
3.	The hospital administration do not follow up on vaccine uptake among members of the healthcare team				
4.	There have been no previous cases of influenza infected healthcare workers in this hospital				
5.	Fear for the injection influence my decision to go for vaccination				

Part E: Intervention measure

23. Which of the following measures do you think will be the most effective way to enhance the uptake of the influenza vaccine among health care workers? (You can tick more than one box)

a. Mandatory vaccination ☐

b. Use of occupational health posters ☐

c. Providing the vaccine free of charge ☐

d. Providing health workers with time to take the vaccine ☐

e. Others ☐

If others, please specify

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24. Which months of the year do you consider as the most appropriate to receive the annual influenza vaccine?

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25. Which of the following approaches would help increase your uptake of the influenza vaccine?

a. Setting a single day aside for influenza vaccine ☐

b. Provision of the vaccine over multiple shifts ☐

26. At which of the following place would you prefer to receive the annual influenza vaccine?

a. At work ☐

b. At the pharmacy ☐

c. In the doctor's office ☐

d. Other places ☐

Others please specify

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27. Does the hospital's management engage in active promotion of the influenza vaccine?
    a. Yes ☐
    b. No ☐

28. If your answer to the above question is yes, please provide a reason.
    ……
    ……
    ……

29. If your answer to the above question is no, please provide a reason.
    ……
    ……
    ……

30. Would measurement of vaccination coverage within the hospital influence your adherence to influenza vaccine?
    a. Strongly agree ☐
    b. Agree ☐
    c. Strongly disagree ☐
    d. Disagree ☐

31. Please motivate your answer.
    ……..
    ……

32. Would feedback of vaccination coverage within the hospital influence your adherence to influenza vaccine?

a. Strongly agree ☐

b. Agree ☐

c. Strongly disagree ☐

d. Disagree ☐

33. Please motivate your answer.

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34. Does the hospital have a policy on influenza vaccination?

a. Yes ☐

b. No ☐

c. Unsure ☐

35. Please write down any comments or advice for improvement of the current influenza vaccine uptake.

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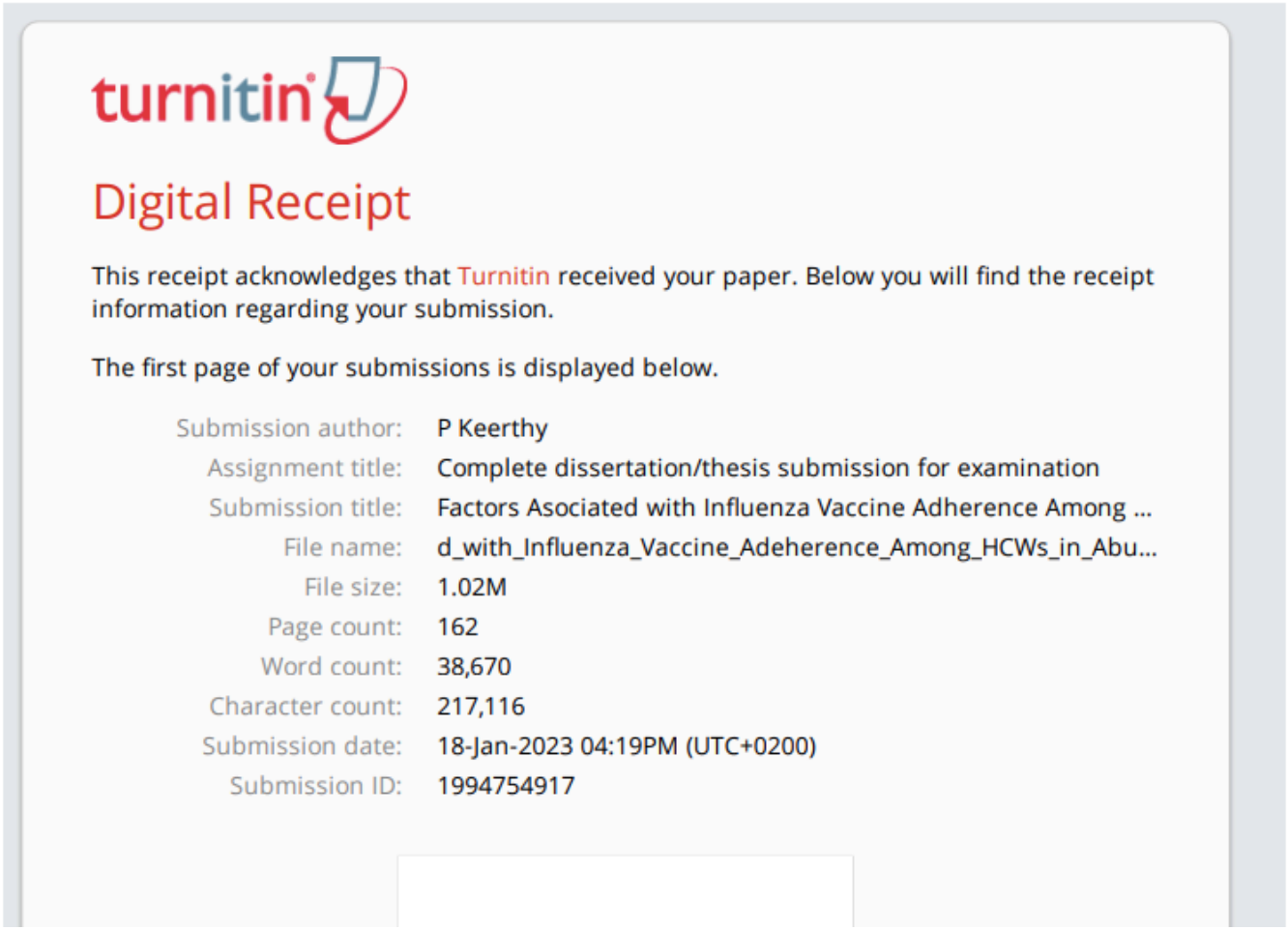
Thank you for taking time to complete the questionnaire. Your efforts are greatly appreciated.

Premilla Keerthy

ANNEXURE F: LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
CDC	Centres for Disease Control
COVID-19	Coronavirus Disease of 2019
FDA	Food and Drug Administration
HA	Hemagglutinin
HBM	Health Belief Model
HCW	Healthcare Worker
HIV	Human Immunodeficiency Virus
H1N1	Hemagglutinin 1 Neuraminidase 1
LAIV	Live Attenuated Influenza Vaccine
LASAG	L-lysine-acetylsalicylate Glucine
NA	Neuraminidase
NAI	Neuraminidase Inhibitor
NICE	National Institute for Health and Care Excellence
PMT	Protection Motivation Theory
RNA	Ribonucleic Acid
SARS	Severe Acute Respiratory Syndrome
SARS-CoV-2	Severe Acute Respiratory Syndrome Coronavirus 2
SPSS	Statistical Package for Social Studies
UAE	United Arab Emirates
WHO	World Health Organisation

ANNEXURE G: DIGITAL TURNITIN RECEIPT



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File size:	1.02M
Page count:	162
Word count:	38,670
Character count:	217,116
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Submission ID:	1994754917

ANNEXURE H: EDITING CERTIFICATE

Between the lines editing

Leatitia Romero
Professional Copy Editor and Proofreader
(BA HONS)

Cell: 083 236 4536
leatitiaromero@gmail.com
www.betweenthelinesediting.co.za

30 January 2023

To whom it may concern:

I hereby confirm that I edited the dissertation entitled: "FACTORS ASSOCIATED WITH INFLUENZA VACCINE ADHERENCE AMONG HEALTHCARE WORKERS IN ABU DHABI". Any amendments introduced by the author hereafter are not covered by this confirmation. Participants' verbatim quotes were not edited. The author ultimately decided whether to accept or decline any recommendations I made, and it remains the author's responsibility at all times to confirm the accuracy and originality of the completed work. The author is responsible for ensuring the accuracy of the references and its consistency based on the department's style guidelines.

Leatitia Romero

Affiliations

PEG: Professional Editors Group (ROM001) – Accredited Text Editor
SATI: South African Translators' Institute (1003002)
REASA: Research Ethics Committee Association of Southern Africa (104)