"Assessment of Nurse's Knowledge about the Impact of Heparin on Patients with Renal Dialysis in Prince Sultan, and Diaverum Health Center "

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Abstract

Background: Heparin is often used to prevent blood clotting in the treatment of some of the medical conditions. One hurdle a registered nurse faces while caring for patients undergoing dialysis is keeping up with the latest research. One hurdle a registered nurse faces while caring for patients undergoing dialysis is keeping up with the latest research. And students perform poorly on medications, have poor retention of pharmaceutical knowledge, and have difficulty using their knowledge in clinical settings.

Purpose of the study: The purpose of the study is to assess the nurses' knowledge about the use of heparin in dialysis patients in Prince Sultan, and Diaverum Health Center in the dialysis center the kidneys; and to determine if there is an association between the chosen variables and the nurse's knowledge.

Methodology: Used descriptive sectional research. Data were collected by means of an online questionnaire after applying all ethical considerations to conduct this study. The data were analyzed by a statistical program (SPSS). Descriptive statistics such as frequencies, mean, standard deviation, percentages, Cronbach's alpha analysis, and correlation were used.

Results: Among the 61 respondents, the vast majority were female nurses, under the age of 40 years, and the vast majority of them obtained a university education. Half of the nurses had an experience of fewer than five years, and the sample studied represented their nursing experience between 5-10 years. And nearly half of the nurses received less than two training courses in dialysis. There is an acceptable level of nurses'knowledge of heparin and the significance of heparin and its side effects. Furthermore, there was no statistical association between knowledge of heparin, years of nursing experience, years of nursing experience, years of renal nursing experience, and the

number of courses performed in clinical dialysis. Knowledge also increases with theincrease of these variables. Finally, there is a positive, statistically significant correlation between the knowledge of the side effects of heparin use and the number of training courses that have been conducted in the clinical setting.

Conclusion: The current study concluded that there is an acceptable level of nurses' knowledge of heparin and the significance of heparin and its side effects. But this knowledge is not considered sufficient for renal nursing practice and needs to be refined. Based on the results of the current study, it was recommended to conduct in- service education and training programs for nurses working in the renal unit on the administration of heparin to renal patients.

Keywords: Side effects, knowledge, chronic kidney disease, end-stage kidney failure, hemodialysis, pharmacology, practice, renal unit practitioner, and heparin.

1 Chapter I: Introduction

1.1 Introduction

This study examines the knowledge of renal unit practitioners using heparin therapy for patients in the dialysis unit in Prince Sultan, Diaverum Health Center in the hemodialysis in the Kingdom of Saudi Arabia. Heparin has anticoagulant properties, which means that it prevents the formation of new clots and the dilation of existing clots in the bloodstream. While heparin does not break up clots that have already formed (unlike tPA) (Al-Ghadi, 2018), it enables the body's natural clot-dissolving mechanisms to work regularly in order to break up clots that have already formed. Heparin is often used to prevent blood clotting in the treatment of the following medical conditions (Matthew, 2020).

Nurses must be taught how to analyze all sources of information and how to become critical thinkers in order to expand the quantity and quality of nursing knowledge available to them. Nurses may also be asked to consider practice factors and to draw lessons from their own experiences (Uoda, 2019). This study will inform the renal unit management teams and renal staff about determining the nurses' knowledge in the use of heparin therapy for patients, including whether there are any deficiencies. The study will provide results about the nurse's Knowledge about the Impact of Heparin on Patients with Renal Dialysis in Selected Hospitals. So, the results will help to provide comprehensive education program to support nurses' knowledge.

1.2 Background

Chronic kidney disease (CKD) describes deteriorating kidney function. CKD classification is in stages, depending on the estimated glomerular filtration rate (Mohammed, 2013).

In order for hemodialysis to operate, blood must be removed from the client's arterial access site and circulated via a tube system to reach a dialyzer (Ragab, Abd-Elkader, Fathy, & Ahmed, 2021). Fluids, electrolytes, and toxins are taken from the blood by means of convection, osmosis, and diffusion in the dialyzer, which behaves like a semipermeable membrane and removes them from the blood. Patients with stage five adult end-stage kidney disease who need chronic hemodialysis are the most prevalent recipients of renal replacement therapy End-Stage Renal Disease (ESRD) (Hadi & Alreda, 2021).

In order to live until they get a kidney transplant or die, patients with ESRD rely on safe, high-quality chronic hemodialysis treatment as a life-long supportive therapy. The primary goal of chronic hemodialysis treatment is to restore the body's natural state of equilibrium. Patients undergoing chronic hemodialysis get therapy for 3-4 hours twiceor three times a week for a total of 3 – 4 hours (Tan et al., 2021).

Hemofiltration, central or peripheral venous catheters that are left in place. Heparin is an acid chemical that occurs naturally in various bodily tissues, particularly the liver, and which has the effect of preventing blood clotting. In pharmacy, heparin is typically administered as an intravenous injection to prevent blood coagulation. It is extensively used in the prevention and treatment of thrombosis (Melo et al., 2021).

In 2018, nurse lecturers Chu and Park (2018) conducted a study on "innovative strategies for improving medication-related knowledge, attitude, skills, and behaviors.

Nurses in a Malaysian general medication knowledge, attitudes, and practice (KAP) study conducted among 40 nurses working in a renal unit demonstrated that they have limited medication knowledge regarding heparin (mean scores: knowledge 8.8, attitude
8.4, and practice 7.7), but they lacked in-depth knowledge of aspects of the mechanism of action and monitoring mechanism of the medication (bin Mahdzir, 2019).

1.3 Problem statement

One of the obstacles that the registered nurse encounters while caring for patients who are on hemodialysis is keeping up with the latest research. A study has been conducted by Mohammed (2013) to assess the knowledge of nurses on the use of heparin in hemodialysis and determine the relationship between this knowledge and the demographic characteristics of the nurse's staff in departments of dialysis. The study recruited a sample of the research (30) nurses working in hemodialysis departments. The study showed that the majority of nurses are female and most of them are aged between (26-30) and most of them are graduates from institutes and they have working experience between (1-5) years and their knowledge of the drug heparin was moderate. In another context, a study assessed the physician attitudes of the physicians in Saudi Arabia toward the use and monitoring of heparinization in hemodialysis patients. The results revealed that a protocol to guide the heparinization in dialysis in Saudi Arabia is lacking in many centers and there is a need to provide them

with automated bedside devices that monitor the clotting time for better implementation of the protocols (Souqiyyeh & Shaheen, 2003).

1.4 Purpose of the Study

The primary purpose of the study is to assess nurse's knowledge about the impact of heparin on patients with renal dialysis in Prince Sultan, and Diaverum health center at the Hemodialysis Unit.

1.4.1 Specific Objectives:

- To assess nurses' knowledge about the use of heparin in patients with renal dialysis in tPrince Sultan, and Diaverum health center at the hemodialysis center.
- To determine whether there is an association between selected variables (professional category, duration of orientation, years of experience, education level, gender) and the nurse's knowledge about the impact of heparin on patients with renal dialysis.

1.5 Research Questions:

- What is the nurse's knowledge about the impact of heparin on patients with renal dialysis in the prince Sultan, and Diaverum health center at hemodialysiscenter?
- Is there an association between selected variables (years of experience, education level, gender) and the nurse's knowledge about the impact of heparinon patients with renal dialysis?

1.6 Significance to nursing

The research was prompted by a realization that nursing students were not receiving adequate pharmacology instruction. It was discovered that students performed poorly in medication, had poor pharmacology knowledge retention, and had difficulty using their knowledge in clinical settings. In order to establish training programs to advance the knowledge of the staff nurses in the use of heparin treatment for patients in the careof patients on hemodialysis units, it is necessary to first identify the nurses' knowledge in the use of heparin therapy for patients (Masotti, 2021).

1.7 Summary

This chapter discussed the need for a study to assess nurses' knowledge of heparin usein hemodialysis in the context of the paucity of published studies in this field. The attitudes of nurses in the Kingdom of Saudi Arabia towards the use and monitoring of heparin in hemodialysis patients to enhance patient safety were noted. They have difficulty using their knowledge in clinical settings. In order to establish training programs to enhance staff nurses' knowledge of the use of heparin therapy for patients in patient care in dialysis units in the following chapter, the reviewed published literature is presented to report on the need for such a study on determining nurses' knowledge in the use of heparin therapy in a dialysis unit. Kidneys and clarifying gapsin the existing literature.

2 Chapter II: Literature review

1.1 Introduction

The purpose of the study is to assess the nurse's knowledge about the effect of heparin on patients undergoing dialysis in Prince Sultan, Diaverum Health Center in the hemodialysis unit. and whether there was an association between the chosen variables (occupational category, duration of orientation, years of experience, level of education, gender) and the nurse's knowledge of the effect of heparin on dialysis patients. A literature search was conducted to gather information on current and previously available studies on renal unit practitioners' knowledge of the use of heparin therapy for patients. Only literature published in English was included in the review.

1.2 Chronic kidney disease

Chronic kidney disease (CKD) refers to the gradual and irreversible loss of kidney function through disturbance of blood filtration and waste removal processes by the kidneys. CKD is thus fatal, and as kidney function diminishes, CKD progresses to end-stage kidney disease. According to Australian Kidney Health (2020) more than 13,500 Australian patients have received dialysis for Registry of Dialysis and Kidney Transplantation (Kidney Health Australia, 2020). According to statistics that showed that the total number of dialysis patients is 16,897 in the Kingdom of Saudi Arabia by the end of 2017, and that the number is increasing day by day (King Faisal Specialist and Research Center, 2021).

Chronic kidney disease is deteriorating kidney function. CKD classification is in stages, depending on the estimated glomerular filtration rate (Mohammed, 2013). In order for hemodialysis to

operate, blood must be removed from the client's arterial access site and circulated via a tube system to reach a dialyzer (Ragab, Abd-Elkader, Fathy, & Ahmed, 2021). Fluid, electrolytes, and toxins are taken from the blood by means of convection, osmosis, and diffusion in the dialyzer, which behaves like a semipermeable membrane and removes them from the blood. Patients with stage five adult end-stage kidney disease who need chronic hemodialysis are the most prevalent recipients of renal replacement therapy End Stage Renal Disease (ESRD) (Hadi & Alreda, 2021).

In order to live until they get a kidney transplant or die, patients with end-stage renal disease (ESRD) rely on safe, high-quality chronic hemodialysis treatment as a life-long supportive therapy. The primary goal of chronic hemodialysis treatment is to restore the body's natural state of equilibrium. Patients undergoing chronic hemodialysis get therapy for 3-4 hours twice or three times a week for a total of 3 – 4 hours (Tan et al., 2021).

1.3 Heparin and dialysis patients

1.3.1 Heparin

Heparin is an acid chemical that occurs naturally in various bodily tissues, particularly the liver, and which has the effect of preventing blood clotting. In pharmacy, heparin is typically administered as an intravenous injection to prevent blood coagulation. It is extensively used in the prevention and treatment of thrombosis (Melo et al., 2021).

Heparin is an anticoagulant medicine that patients use to prevent blood clots from forming. Heparin works faster than other anticoagulants, so it is very useful in emergency situations, patients

undergoing open-heart surgery, and patients undergoing dialysis to prevent blood clots. And heparin, like many other medicines, an overdose ofit can be fatal. The bioavailability of heparin is through its administration to determinethe effectiveness of this drug. The half-life is 35 to 120 minutes and it takes seven timesthat to remove more than 98% from a single intravenous injection of heparin.

Approximately 35% is excreted by healthy kidneys, and heparin is not excreted in patients undergoing chronic dialysis. Which means it stays in the circulatory system (Algadi, 2018).

Heparin has anticoagulant properties, which means it prevents the creation of new clots and the expansion of existing clots in the bloodstream. While heparin does not break down clots that have already formed (as opposed to tissue plasminogen activator), it does enable the body's natural clot lysis mechanisms to function regularly in order to break down clots that have already developed. Heparin is often used for anticoagulation in the treatment of some medical conditions (Mathew, 2020).

Like all anticoagulants, the most serious side effect of heparin is the possibility of severe bleeding, usually due to an overdose. Therefore, the ability of the blood to clot is carefully monitored and under medical supervision. There may be internal bleeding around the injection site. One of the serious side effects of heparin is a decrease in the number of platelets. Currently, modern preparations of low molecular weight heparin are used to avoid these complications, and therefore the likelihood of these effects is reduced (Claudel et al., 2021).

1.3.2 Types of Heparin

Heparin is usually extracted from pig intestines in two forms. It is unfractionated heparin, which is used in some operations such as hemodialysis, while low molecular mass heparin is used to prevent blood clotting. Researchers have developed a new type of low molecular mass heparin that can reverse its effect in cases of overdose and may be safer for patients with kidney problems. This form of the drug has improved the drug's properties and is more cost-effective. More than 5% of heparin users develop severe bleeding, as users of unfractionated heparin are less likely to develop this condition due to the presence of the antihistamine protamine, but it is not effective in reversing the effect of low molecular mass heparin. Low molecular mass heparin is eliminated by the kidneys, making it unsafe for people with reduced kidney function, and the new drug may be a suitable alternative instead of using unfractionated heparin, after approval by the US Food and Drug Administration. The specialists mentioned that there is a need to develop a new drug to be an alternative to unfractionated heparin due to the side effects caused by unfractionated heparin, in addition to containing impurities and not being completely controlled as it is from animal sources (Da et al., 2020).

1.3.3 Heparin side effects in hemodialysis patients

Anticoagulation is necessary for hemodialysis, which includes determining the appropriate dose of heparin for each patient according to weight and low dose for patients at risk of bleeding. It is worth noting that there are two types of heparin, fractionated and unfractionated, which are more common in the USA (Claudel et al., 2021).

One of the side effects of heparin is bleeding and it may threaten the patient's life. It should be noted that an emergency department should be sought immediately in case of bleeding, severe headache, or loss of consciousness. In the event of an overdose, the effect of the overdose can be overcome by a drug called protamine sulfate, under medical supervision (Azim et al., 2018).

Another serious side effect of heparin is thrombocytopenia, which causes an immune reaction. Elevated transaminases occur in 80% of dialysis patients, in addition to osteoporosis as a side effect of chronic heparin use, hyperlipidemia or anaphylaxis. Also, hyperkaliemia occurs in 5% to 10% of patients on hemodialysis and has cathetersepsis (Nasiripour et al., 2019).

1.3.4 Heparin dose in hemodialysis patients

The dose of heparin is based either on clotting studies or on body weight. Because patients with uremia and chronic kidney disease will need less heparin. In addition to the difference in the rate of metabolism of heparin with different patients. Thus, performing baseline-clotting studies helps in determining their individual dose. With the need for strict laboratory monitoring of heparin to determine therapeutic doses for patients and to prevent over - or under-anticoagulation. However, renal guidelines tend to specify standard heparin doses for all patients rather than individual doses. Continuous therapy begins at the beginning of the dialysis procedure usually with a bolus (25-30 IU/kg) followed by a continuous infusion i.e., followed by a lower hourlydose (500-2000 IU) moved until the end of treatment for patients with catheters, or stopped 1 hour before One of the finished. With the last dose given no later than one hour before completion. In general, there is no standard for long-term dose of

heparin, and it varies from one dialysis center to another. Heparin is often used intermittently 1cm every hour plus an ampoule during line passage, providing more control levels to prevent blood clots (and reduce the risk of Bleeding). Therefore, heparin should be avoided in the last hour of the hemodialysis session to reduce the possibility of needle site bleeding. For heparin and hemodialysis patients, it should be noted that heparin is important and indispensable during a hemodialysis session to prevent blood clots (Claudel et al., 2021).

1.3.5 Precautions for using heparin

Heparin should be used with caution in the elderly and in patients who have decreasedliver function, decreased kidney function, chronic renal failure, elevated blood potassium levels, increased blood acidity (metabolic acidosis), or hypersensitivity to low molecular weight heparin. As well as patients with congestive heart failure and patients with diabetes (Baleguli et al., 2021).

To enhance the safety of a patient receiving unfractionated heparin it is necessary to monitor the following parameters: platelet count, hemoglobin/hematocrit, activated partial thromboplastin time, clotting times, serum potassium, fecal guaiac, and urinalysis. There is a risk of bleeding up to 20% after infusion with unfractionated heparin and therefore renal unit practitioners should be vigilant when managing and monitoring patients receiving unfractionated heparin. Since it can be associated with anumber of potentially serious adverse effects after administration, this underlines the importance of monitoring anticoagulant effects during hemodialysis by performing coagulation studies. It should be noted that it is important to closely

monitor patients during heparin administration for signs of heparin-induced thrombocytopenia and earlydetection (Mattioli et al., 2021).

It is important to know that there is a risk associated with heparin dialysis as immediate and potentially life-threatening hypersensitivity reactions, especially if patients do not comply with dietary restrictions and treatment. that immediate hypersensitivity reactions such as; Urticaria, edema of the face, and bronchospasm caused by the following administration of heparin. This includes the potential problem ofhyperkalemia. Also, for catheter prophylaxis with unfractionated heparin, it can cause systemic effects and be associated with excessive bleeding. There should be aware regarding the relative contraindications to heparin administration or contraindications to heparin therapy. It is also important to know that there is a risk associated with heparin dialysis, such as accidentally overfilling when closing the tunnel catheter and thus renal unit practitioners should exercise caution when closing the tunnel catheter after dialysis (Rabbani et al., 2021).

1.4 Nurse's knowledge

1.4.1 Knowledge

Knowledge can be defined as the tacit knowledge gained through experience, observation and practice and is the knowledge of the process. Practical and hypothetical understanding of patient care is knowledge in the nursing context through a formal, evidence-based theoretical understanding of a topic that is qualitative knowledge. They also know the problems and risk factors and how to prevent them in private practice. Nursing requires the incorporation of practical and qualitative knowledge in order to beproficient in practice. Knowledge is linked with attitudes as they are principles to the specific knowledge

needed to understand science, research, specificity of treatments, and levels of scientific evidence. By using skills to access and apply various sources of knowledge in key situations and to adjust nursing care plans and priorities according to clients' needs. Nurses require a thorough knowledge of the principles and regulations related to nursing practice and ethics when performing their duties within the scope of their practice. Lack of nursing knowledge has caused nurses to fail to adopt modern or state-of-the-art dialysis nursing care (Masotti, 2021).

In order to expand the quantity and quality of available nursing knowledge, nurses must be taught how to become critical thinkers by considering factors of practice and drawing lessons from their own experiences and they must be taught how to analyze all sources of information (Uoda, 2019). Nurses in a Malaysian General Study on Medical Knowledge, Attitudes and Practice (KAP) conducted among 40 nurses working in the renal unit showed that they had limited drug knowledge regarding heparin (mean score: knowledge 8.8, attitude 8.4, practice 7.7), but lacked in-depth knowledge Aspects of the mechanism of action and the mechanism of drug monitoring (Bin Mohdhir, 2019).

In 2018, nurse lecturers Chu and Park, conducted a study on "Innovative Strategies to Improve Medication-Related Knowledge, Attitudes, Skills, and Behaviors." The research was motivated by the realization that nursing students did not receive adequate instruction in pharmacology. It was discovered that students perform poorly on medications, have poor retention of pharmaceutical knowledge, and have difficulty using their knowledge in clinical settings.

Lack of nursing knowledge has caused nurses to fail to adopt modern or state-of-the- art dialysis nursing care. This creates a sense of need to develop a planned educational program for dialysis. Lack of desired knowledge in dialysis and related units can be avoided through a planned teaching program that gives effective outputs in increasing the knowledge of nurses working about dialysis. The results of the studies recommend that complementary pharmacy education programs should be implemented to ensure that nurses continue to strive to update their knowledge of medications and to be qualified in drug management (Mathew, 2020).

1.4.2 Nurse's knowledge about heparin use

It should be noted that a study was conducted in Cape Town on the use and effects of unfractionated heparin in selected adult chronic dialysis centers where a descriptive survey was conducted to describe the subjective knowledge and experience of renal unit practitioners to determine whether there is a relationship between knowledge and practical and professional experience within using and effects of unfractionated heparin. The results of the study indicated that there is a direct relationship between years of experience and the quality of dialysis practice and that the occupational category affects the knowledge and use of unfractionated heparin (Ockhuis, 2016).

In the study of Muhammad, (2013) to determine and evaluate the relationship between nurses' knowledge about the use of heparin in dialysis and the demographic characteristics of nursing staff in dialysis departments for (30) nurses working in dialysis departments. The study showed that the majority of the sample are females, most of whom are graduates of the institute and have practical experience

ranging from (1-5) years, and their ages range between (26-30), and their knowledge of heparin wasbelow the required level.

There is a dearth of published information about the knowledge of renal unit practitioners, about the effects of heparin and no published studies have been found in Saudi Arabia. It should be noted that in the study of Souqiyyeh & Shaheen, (2003) the attitudes of physicians in Saudi Arabia towards the use of heparin were evaluated and monitored in hemodialysis patients. The results of the study indicated that there is no protocol for guiding heparin in many dialysis centers. In order to better implement the protocols, the study recommended providing the centers with automated devices to monitor the clotting time.

In order to establish training programs to advance the knowledge of the staff nurses in the use of heparin treatment for patients in the care of patients on hemodialysis units, itis necessary to first identify the nurse's knowledge in the use of heparin therapy for patients. Keeping up with the latest research is one of the obstacles that the nurse faces while caring for patients undergoing dialysis (Masooti, 2021).

A systematic review of empirical evidence in health care settings indicated a higher incidence of intravenous drug administration errors as used with heparin compared to other methods. Despite the growth in improving drug safety, adverse drug effects remain common (Arnold et al., 2020).

A descriptive study was conducted in Turkey to determine nurses' knowledge regarding the administration of low molecular weight heparin (LMWH) by subcutaneous injection to 77 nurses and 66 volunteer nurses working in hospitals. Through a survey that

inquiries about the descriptive characteristics of LMWH and the steps of parenteral administration. The results indicated that the nurses did not transfer their theoretical knowledge about low molecular weight heparin to adequate practice, and targeted training should be conducted with the reasons for not transferring the theoretical knowledge to practice (TURAÇ & ÜNSAL, 2018).

1.5 Summary

A literature review is included in this chapter to gather information on existing and prior studies available on renal unit practitioners' knowledge of the use of heparin therapy for patients and the conceptual framework. A review of the published literature on general studies of heparin was performed. This chapter highlighted internationally published evidence regarding pharmacology, dosage, and control.

3 Chapter III: Methodology and Implementation Plan

1.1 Introduction

This chapter discusses the research methodology used to assess nurses' knowledge of the effect of heparin on patients on hemodialysis. Study design and study preparation include the study population, inclusion and exclusion criteria, sample size, sampling technique, data collection technique, data collection tools, key variables and metrics, data management and processing, and ethical and management considerations.

1.2 Study design

The research employed descriptive cross sectional, hospital-based quantitative approach to assess of nurse's knowledge about impact of heparin on patients with renaldialysis in the in Prince Sultan, and Diaverum health center at Hemodialysis Unit.

1.3 Study Setting

The current study was conducted in the Hemodialysis Unit in Prince Sultan, and Diaverum health center at hemodialysis center at hemodialysis center in Saudi Arabia.

Prince sultan is part of King Khaled hospital with bed capacity of 28 beds and hemodialysis machine. It serves around 130 patients. Nurses are working 8 hours shift daily. It also has two isolation room occupied with three beds and machine. Diaverum health center is located next to Hafer Albaten general hospital, and it accommodates 80patients. There are 30 beds and machine. Nurse is working over two shift morning andevening.

1.4 Study population

The study population is composed of Nurses working in Hemodialysis at Prince Sultan, and Diaverum health center at Hemodialysis Unit. The study will include male and female nurse, Saudi or non-Saudi.

1.5 Inclusion criteria

The study will involve nurses who:'

- working in the hemodialysis unit in Prince Sultan, and Diaverum health center athemodialysis Center.

- Have certified license from Saudi Commission for Health Specialty.

1.6 Exclusion criteria

- Nurses who have been working in any unit rather than hemodialysis
- Nurses who do not have a certified license from Saudi Commission for Health Specialty.
- Training students.

1.7 Sample size and Sampling technique:

A non-probability consecutive sampling will be used. The rational of choosing this sampling is obtaining large and representative participants numbers. In Prince sultan, there is around 37 nurses and 24 nurse in Diaverum center. The total number of expected nurses will be 61.

3.8 Data Collection technique:

Data were collected by an online questionnaire.

3.9 Data Collection Tools:

The research student designed a questionnaire by herself based on previous studies for research purposes with the confidentiality of data is stated. We sent the questionnaire to three faculty members to evaluate the questionnaire in order to assess the efficiency of the questions. The evaluation was done by the members and the evaluation was excellent. The questionnaire included two main parts.

Part 1: Demographic Data Form: A demographic data sheet, consists of (5) items, which included, age, gender, level of education, years of experience in hospital, years of experience in hemodialysis Unit.

Part II: The second part of the questionnaire is comprised of twenty-one questions were closed-ended items that concerned with nursing staff knowledge throughout heparin treatment for patients with hemodialysis at Prince Sultan hemodialysis center.

3.10 Main variables and measures:

The main variables in the study involve participant's knowledge toward Renal Dialysis. Part1: Socio-demographic knowledge of participants.

Part2: Knowledge about Renal Dialysis.

3.10.1 Dependent variables:

Dependent variables involve participant's knowledge toward Renal Dialysis.

3.10.2 Independent variables:

Independent variables involve participant's demographic and working factor such as: gander, age, experience, etc.

3.11 Validity

To validate the questionnaire Five experts in the clinical field and a nephrologist were appointed to judge the review of the questionnaire to validate the content. A standardized approach was taken by them and they were given a checklist with a scale to measure

the validity of the content. The changes were then made and presented to them and expert reviewers returned the completed questionnaire within two weeks of receiving the questionnaire.

3.12 Reliability test

As for the reliability of the questionnaire, it means that if we redistribute this questionnaire to another sample of the same population and with the same sample size, the results will be close to the results we obtained from the first sample and the results between the two equal samples with a probability equal to the reliability coefficient. A random sample was taken (the experimental group) of 10% of the study sample size (from renal unit practitioners) who would not participate in the main study. They answered the questionnaire to determine the credibility and validity of the questionnaire.

3.13 Data Management and Processing:

Data analyzed by a statistical program (SPSS); the researcher will develop questionnaire to achieve the study outcomes. The study will use descriptive statistics such as frequencies, mean, standard deviation, percentages, Cronbach's alpha analysis and person correlation.

3.14 Ethical and Administrative Consideration:

The researcher applied all ethical considerations to conduct this study. Ethical approval was obtained from Institutional Review Board (IRB). Also, the study will take the approval from the hospital administration before accessing the study participants. Informed

consent will be obtained from all of the nurses before filling up the questionnaire. The study data will be anonymous, explanation for the research processwill be done for the participants.

3.15 Summary

This chapter examined the procedures followed for the study methodology, including the research design, study population, sample size, sampling method, recruitment, data collection instrument (design, validation, and reliability testing), and pilot study. A discussion followed on the data collection method, data management, and statistical analysis methods, quality assurance of data entries, and ethical considerations of the study

4 Chapter IV: Results

1.1 Introduction

This chapter presents the results of the study. The research questions, general objective, objectives, and hypotheses of the study contributed to directing the results. Settings which participated in the current study are: the dialysis unit in Prince Sultan, and the Diaverum Health Center the dialysis center in the Kingdom of Saudi Arabia.

The primary purpose of the study was to assess nurses' knowledge about the effect of heparin on hemodialysis patients in Prince Sultan, Diaverum Health Center in the hemodialysis unit. The secondary purpose was to assess the nurses' knowledge about the use of heparin in hemodialysis patients and to determine whether there was an association between the chosen variables (occupational category, duration of orientation, years of experience, education level,

and gender) and the nurse's knowledge about the effect of heparin on hemodialysis patients.

The first research question dealt with the knowledge and skill of the renal unit practitioners regarding the effect of heparin on hemodialysis patients in Prince Sultan, Diaverum Health Center in the Hemodialysis Center. The second research question dealt with the association between the selected variables (years of experience, education level, gender) and the nurse's knowledge about the effect of heparin on dialysis patients.

First in this chapter, we provide an overview of the responses to the questionnaire. This is followed by a presentation of the guidelines used for recording the questionnaire and then the actual total results of the respondents' self-reported answers, including the various tests used to describe and analyze the objectives.

Overview

The questionnaire was passed to 61 male and female nurses who work in the dialysis unit in the prince Sultan region, and the Diaverum Health Center and the dialysis center and who hold a license approved by the Saudi Commission for Health Specialties. This is after the nurses who worked in any unit instead of dialysis and nurses who did not have a license approved by the Saudi Commission for Health Specialties were excluded.

Main variables and measures:

The main variables in the study involve participant's knowledge toward Renal Dialysis.

Part1: Socio-demographic knowledge of participants.

Part2: Knowledge about Renal Dialysis.

Dependent variables:

Dependent variables involve participant's knowledge toward Renal Dialysis.

Independent variables:

Independent variables involve participant's demographic and working factor such as: gander, age, experience, etc.

Reliability and validity:

The validity of the questionnaire means that it represents the well-studied community, that is, the answers we get from the questionnaire questions give us the information forwhich the questions were developed. As for the reliability of the questionnaire, it meansthat if we redistribute this questionnaire to another sample from the same community and with the same sample size, the results will be close to the results we obtained from the first sample, and the results between the two samples are equal with a probability equal to the reliability coefficient.

A random sample of 10% of the study sample size was taken. They answered the questionnaire to determine its reliability and validity of the questionnaire. Cronbach's alpha analysis was 0.861. Thus, we can say that the questionnaire is stable to a very high degree. And when we take the root of the reliability coefficient, we get the validity coefficient, which is equal to 0.927, which indicates that the questionnaire is valid and represents the community from which the sample was drawn.

1.2 Descriptive statistics:

1.2.1 Part 1: Socio-demographic characteristics of participants

The number of respondents to the questionnaire was 61, including 13 males and 48 females as shown in figure1. The percentage of Saudi nurses was 63.9%, and the non- Saudi nurses were 36.1% as shown in figure2 and table1. The highest number of respondents had university and diploma education, with 54.1% and 41%, respectively,as shown in figure3 and table1.

Table 1: Nursing qualification

Variables	Category	Frequency	Percentage %
Nationality	Saudi	39	63.9
	Non-Saudi	22	36.1
	Total	**61**	**100**
Nursing qualification	Diploma	25	41
	Bachelor	33	54.1
	Mater's	2	3.3
	Other	1	1.6
	Total	**61**	**100**

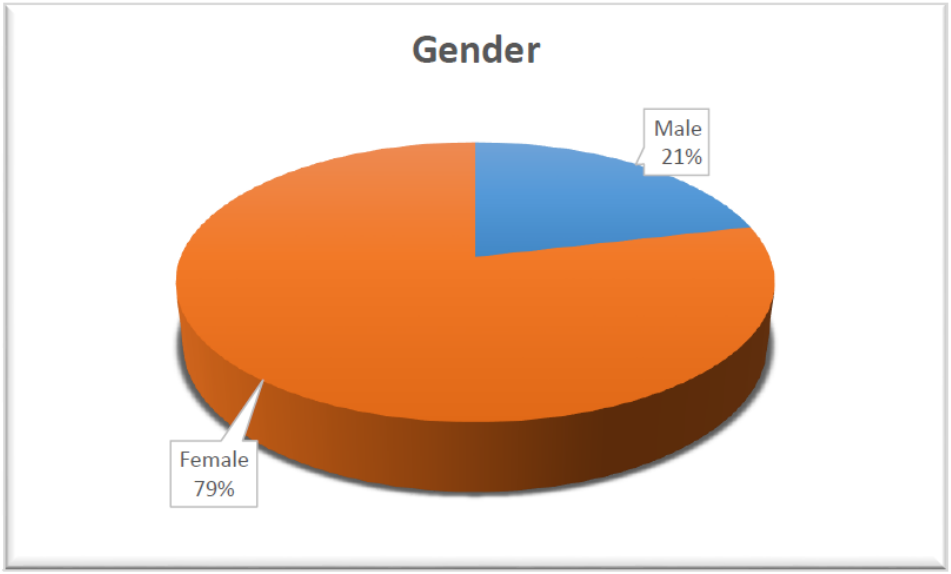

Figure 1: Gender

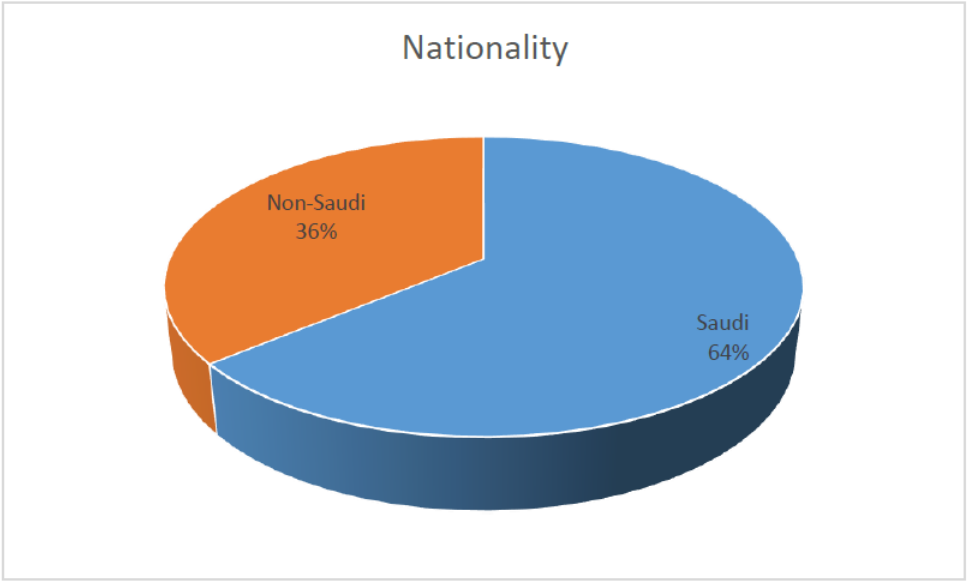

Figure 2: Nationality

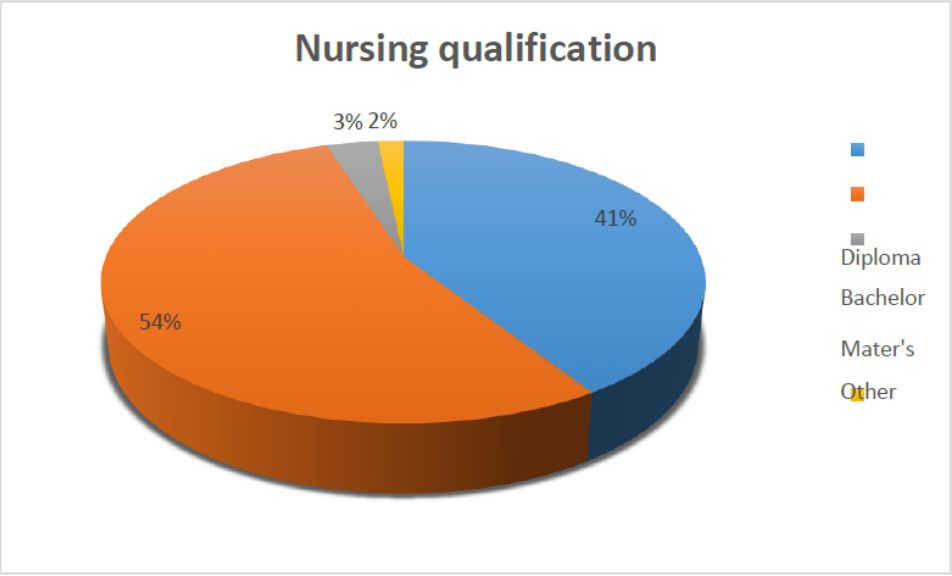

Figure 3: Nursing Qualification

The highest percentage of respondents between the ages of 31-40 years was 52.4%, as shown in the table 3 and figure 4. The mean age of the respondents was 33.4 with a standard deviation of 5.817 (range 23-45 years) as shown in the table 2.

Table 2: Age distribution

Variables	Category	Frequency	Percentage %
Age	20-25	8	13.1
	26-30	14	23
	31-35	15	24.5
	36-40	17	27.9
	41-45	7	11.5
	Total	61	100

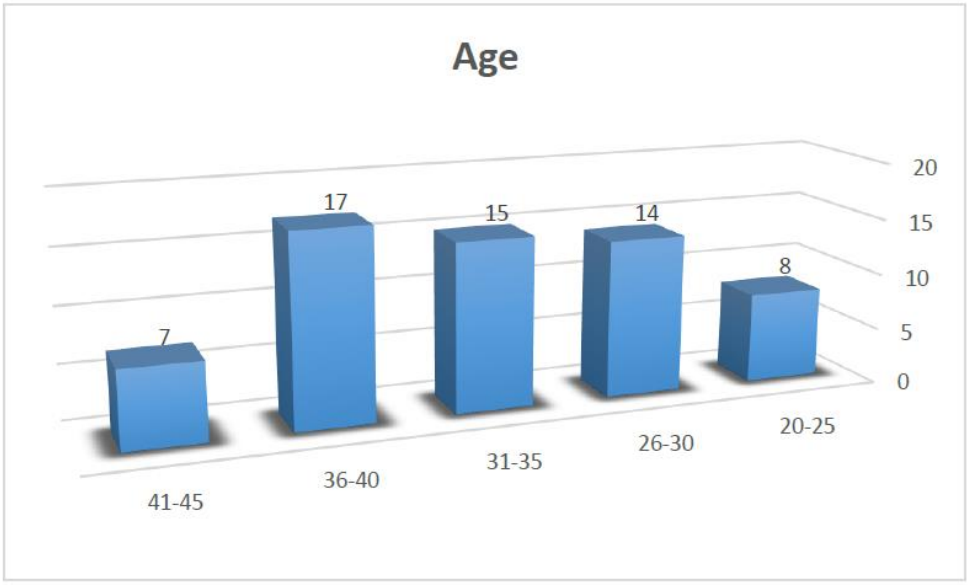

Figure 4: Age distribution

The years of respondent nursing experience and the clinical responder experience of renal nursing were pooled into 5-year intervals. The data presented in Table.4 indicate that most of the respondents had 0-5 years of nursing experience with a percentage of 49.2%. Respondents whose experience from 6 to 10 years amounted to 21 respondents. The data indicate that most respondents' clinical experience of renal nursing was less than five years (70.5%). A quarter of the respondents did not get training courses in clinical dialysis, while nearly half got less than 3 courses.

Table 3: Mean age, years of experience, and training

Variables	Mean	Standard Division
Age	33.39	5.817
Years of nursing experience	6.56	4.522
Years of Nursing Clinical Renal Experience	3.74	2.909
Undertaken Training courses in Clinical Dialysis	1.75	0.434

1.3 Knowledge about Heparin and Renal Dialysis

The data in Table 4 indicate that nearly half of the respondents reported knowing that heparin is a substance present in the human body and that the liver is responsible for its excretion. While 70.5% of the subjects had knowledge that heparin acts as an anti- thrombin, which prevents the transfer or conversion of prothrombin to thrombin and thus prevents the formation of fibrin to fibrinogen. While the rest of the respondents answered "No" or "I don't know", which means that they have no knowledge.

Fifty-one out of 61 respondents reported that heparin is an important process for dialysis, while 16.6% of the respondents had no knowledge of it. On the other hand, nearly two-thirds of the respondents reported that heparin is given in small quantities to elderly patients and that heparin should be avoided to women during menstruation, which is an indication of their knowledge of the importance of heparin for dialysis and contraindications during menstruation.

Table 4: Information about Heparin

Items	Yes	No	I don't know
Heparin is substance found in the human body.	33 (54.1%)	19 (31.1%)	9 (14.8%)
The liver is responsible for the secretion of heparin.	28 (45.9%)	15 (24.6%)	18 (29.5%)
Heparin works as an antidote thrombin.	43 (70.5%)	7 (11.5%)	11 (18%)
Heparin is an important process of hemodialysis.	51 (83.6%)	4 (6.6%)	6 (9.8%)
Heparin is given in small amounts for older agepatients.	40 (65.6%)	10 (16.4%)	11 (18%)
Heparin must not be mixed with other drugs.	44 (72.1%)	6 (9.8%)	11 (18%)
Heparin must be avoided to be given for womenduring menstruation.	39 (63.9%)	4 (6.6%)	18 (29.5%)
Heparin must be given based on examinationPTT.	47 (77%)	9 (14.8%)	5 (8.2%)
The maximum dose of the heparin given to thepatient is (10000) units.	40 (65.6%)	11 (18%)	10 (16.4%)
Beginning efficacy of the (Heparin) after 15minutes of giving it.	49 (80.3%)	2 (3.3%)	10 (16.4%)
Heparin is given under the skin of patients andnot intravenously.	38 (62.3%)	18 (29.5%)	5 (8.2%)
The warfarin is a group of Heparin.	40 (65.6%)	14 (23%)	7 (11.4%)
When giving Heparin you must press for 15minutes.	50 (82%)	7 (11.5%)	5 (8.2%)

Nearly three-quarters of respondents also reported that heparin should not be mixed with other medications and that heparin should be given based on a pressure-talk test. While the remaining quarter of the respondents did not have clear knowledge in this regard.

Forty out of 61 respondents correctly reported that the maximum dose of heparin to be administered to a patient was 10,000 units, while 11 of 61 and 10 of 61 respondents answered no and I don't know, respectively.

The statement that (heparin) begins to work after 15 minutes of giving it is correct, as 80.3% of the respondents answered correctly about this statement, while 3.3% were not correct, and 16.4% did not have any knowledge in this regard.

Approximately 30% of the respondents answered that heparin is not given subcutaneously to patients and not intravenously, and this is not true, while 62.3% answered correctly about this statement.

As 65.5% of the respondents reported that warfarin is a group of heparins and is considered a wrong answer, while nearly a quarter of the respondents answered no which is a correct answer. Where heparin (Heparin) is an anticoagulant drug and is taken by patients to prevent the formation of clots in the blood and prevent the continuation of the formation of existing clots, Heparin works faster than other anticoagulants (warfarin), and therefore it is very useful in emergency situations, for example, to prevent Additional clotting when the clot has reached the lungs. Also, 82% reported that when giving heparin, pressure should be applied for 15 minutes, while 11.5% reported that this statement was incorrect and that when the heparin was fully injected, light pressure should be applied to the area

for a few minutes. The references did not indicate that you should press for 15 minutes.

1.4 Indication of Heparin

The results in table 5 indicated that 50.8% reported that heparin is given to patients with arrhythmia or atrial septal defects. Anticoagulants are especially important for patients with atrial fibrillation - a disorder in which an injection of an anticoagulant (usually a type of heparin rather than warfarin).

Table 5: Indication Heparin

Items	Yes	No	I don't know
Heparin is given to patients who suffer fromirregular heartbeat or the so-called atrium Bergvan.	31 (50.8%)	14 (23%)	16 (26.2%)
Heparin is given in the event of a pulmonaryembolism or thrombus leg.	48 (78.7%)	4 (6.6%)	9 (14.8%)
Heparin is used to clean the venous catheter.	49 (80.3%)	5 (8.2%)	7 (11.5%)
Heparin is given to all diseases without exceptionas an Anticoagulant.	35 (57.3%)	14 (23%)	12 (19.7%)

For several decades, low molecular weight heparin or unfractionated heparin followed by oral vitamin K antagonists has been the traditional treatment for pulmonary embolism. Forty-eight of 61 respondents reported the validity of the statement that heparin should be administered in the event of pulmonary embolism or leg

thrombosis. While 4 respondents denied this statement and 9 respondents stated that I do not know. Heparin is used to clean intravenous catheters. 49 of 61 respondents knew that used this medication to keep IV catheters open and free-flowing. Heparin helps keep blood flowing smoothly and from clotting in the catheter by making a certain natural substance in the body (an anticoagulant protein) work better. While 7 out of 61 respondents answered incorrectly and 5 respondents had no knowledge. Although there are some studies that recommend not using a heparin syringe to flush (clean) an intravenous (IV) catheter, otherwise fatal bleeding may result. Heparin is given to all diseases without exception as an anticoagulant. This paragraph is considered incorrect as 35 out of 61 respondents reported this statement as correct and 14 respondents reported that it was incorrect. Heparin should not be used if the patient has uncontrolledbleeding or severe thrombocytopenia.

1.5 Side Effects of Heparin

The results in table 6 indicated that 67.2% of the respondents reported that a possible complication of taking heparin for a long time is the patient's sensitivity (itching). On the other hand, 14.8% of the respondents relied on the answer no, and 18% reported it after knowing that. And 77% of respondents reported that the side effects of heparin were bleeding - headache or loss of consciousness.

Table 6: Side effects of Heparin

Items	Yes	No	I don't know
A possible complication of taking heparin for a long time is the patient's allergy (itching).	41 (67.2%)	9 (14.8%)	11 (18%)
Side effects of heparin is bleeding - headaches or loss of Consciousness.	47 (77%)	3 (5%)	11 (18%)
Patients' temperature rises after giving heparin.	35 (57.4%)	17 (27.9)	9 (14.8%)
Bleeding under the skin occurs as a result of Heparin after administration.	47 (77%)	7 (11.5%)	7 (11.5%)

This indicates that respondents had knowledge of the potential complications of heparin. Also, about half of the respondents answered correctly that the patients' temperature rises after the administration of heparin. As 11.5% of the respondents also reported that there is no subcutaneous bleeding as a result of taking heparin after taking it, and the same percentage of respondents reported that they did not know about this, while 77% of the respondents were correct on this statement.

1.6 Variables associated with knowledge

There is a positive significant correlation at the level of 0.01 between the variables of knowledge about heparin and the side effect of using heparin and the Indication of Heparin. Increasing the variable of knowledge leads to an increase as shown in table 7.

Table 7: Correlation between Knowledge, Side Effects, and Indication of Heparin

Variables	Knowledge	Side Effects	Indication of Heparin
Knowledge	1	0.816**	0.714**
Side Effects	0.816**	1	0.618**
Indication of Heparin	0.714**	0.618**	1

**** Correlation is significant at the level 0.01**

The results of Table 8 indicate a positive significant correlation between knowledge of heparin and nursing qualification at the 0.05 level of significance. And a positive significant correlation at the 0.01 level between knowledge about heparin, years of nursing experience, years of nursing clinical renal experience, and the number of undertaken training courses in clinical dialysis. As knowledge increases with the increase of these variables. On the other hand, there is no correlation between knowledge about heparin, an indication of heparin, knowledge of the side effect of heparin use, and nursing qualification. Since knowledge about heparin exists regardless of the degree level of the qualification.

Also. there is a significant positive correlation between indication of heparin and yearsof nursing clinical renal experience and undertaken training courses in clinical dialysisat the significance level of 0.05 and 0.01, respectively. That is, the knowledge about the indication of heparin increases the more years of nursing clinical renal experience andUndertaken training courses in clinical dialysis.

Table 8: Correlation between Knowledge, Side Effects, Indication of Heparin, Years of Experience, Qualification, and Number of Courses.

Variables		Knowledge	Indication of Heparin	Side Effects
Nursing Qualification	Correlation Coefficient	0.114	0.70	0.713
	Sig. (2-tailed)	0.381	0.593	0.576
Nursing experience	Correlation Coefficient	0.288*	0.248	0.095
	Sig. (2-tailed)	0.025	0.054	0.468
Clinical renal experience	Correlation Coefficient	0.428**	0.322*	0.049
	Sig. (2-tailed)	0.001	0.011	0.708
Taking courses	Correlation Coefficient	0.485**	.348**	0.306*
	Sig. (2-tailed)	0.000	0.002	0.017

**** Correlation is significant at the level 0.01**

*** Correlation is significant at the level 0.05**

It is clear from the above table that there is a positive significant correlation between knowledge of the side effect of heparin use and the number of undertaken training courses in clinical at the significance level of 0.05. That is, the knowledge of the side effect of

heparin use increased with the increase in the number of undertaken training courses in clinical.

There is a positive significant correlation at the level of 0.01 between the three variables, that is, between knowledge about heparin and the side effect of using heparin and the Indication of Heparin. Increasing the knowledge variable increases the height of the other two variables**.**

5 Chapter V: Discussions and Conclusions

1.1 Introduction

The purpose of the study is to assess the nurse's knowledge about the effect of heparin on patients undergoing dialysis in Prince Sultan, Diaverum Health Center in the hemodialysis unit. and whether there was an association between the chosen variables (occupational category, duration of orientation, years of experience, level of education,gender) and the nurse's knowledge of the effect of heparin on dialysis patients. The fifth chapter will discuss the findings about the nurse's knowledge about the effect of heparin on hemodialysis patients in the prince Sultan dialysis unit, and the Diaverum Health Center in the hemodialysis center in the dialysis center in Saudi Arabia. Therefore, the outputs of this chapter will help to provide a comprehensive educational program to support the knowledge of nurses.

1.2 Discussions

1.2.1 Socio-demographic characteristics of participants

The current study documented that the percentage of Saudi nurses was almost double that non-Saudi nurse. The vast majority of them obtained a university education and a diploma in close proportions. As for the gender, nearly one-fifth of the sample studied were males, which indicates that the vast majority were female nurses. As regards to the age of the vast majority of nurses under the age of 40 years, it was more than half of the studied sample, whose ages ranged from 31-40 years. As for the years of nursingexperience, half of the nurses had an experience of fewer than five years, and the sample studied represented their nursing experience between 5-10 years. The data for this studyindicate that clinical experience in renal nursing for most of the study sample was less than five years. As regards to training courses in dialysis, a quarter of the nurses did not receive any training course, and nearly half of the nurses received less than two trainingcourses in dialysis.

These results are in agreement with Ahmed et al., (2015); who reported that most of the sample studied were female, aged between 30-40 years, and had not attended previous training or educational program. Also, these results are in line with Dolan & Dolan, (2017); noting that most of the participating nurses hold a Bachelor of Science degree in Nursing. As for the results of years of clinical experience in renal nursing, they are in agreement with Uger et al., (2017); who indicated that two-thirds of the nurses had never participated in the dialysis training course. This gives a clear indication that thereis a lack of training in dialysis centers. It is good practice in dialysis centers to ensure that nurses are trained and educated before they are assigned to

patient care. Ockhuis, (2014); indicated that although respondents reported that induction training was conducted over a period of months, this did not include in-service education on heparin. Also, the results of this study were in identical line with Muhammad (2013), who stated that the majority of the sample are females, most of whom are graduates of the institute and have practical experience ranging from (1to 5) years, and their ages range between (26-30), and their knowledge of heparin was below the required level.

1.2.2 Knowledge about Heparin and Renal Dialysis

The results of this study indicated that the nurses have an acceptable level of knowledge about heparin and dialysis. Almost half of the respondents reported knowing that heparin is a substance present in the human body and that the liver is responsible for its excretion. Most of the studied sample reported that they know that heparin acts as anti-thrombin, preventing the transfer or conversion of prothrombin to thrombin and thus preventing the formation of fibrin to fibrinogen. Lankshear et al., (2010); indicated that heparin inhibits clot formation, but it does not break the clots formed because it is not considered a fibrinolytic agent. These findings do not agree with Ockhuis, (2014); Report that more than half of the respondents were not familiar with the type of unfractionated heparin used in hemodialysis centers.

The results of this study also indicated that most of the studied sample know that heparin is an important process for dialysis. These results can justify that the studied sample has basic knowledge about dialysis and these results agree with the study of Souqiyyeh & Shaheen, (2003); Where they studied the attitudes of physicians in

charge of dialysis centers in the Kingdom of Saudi Arabia toward heparin in chronic dialysis patients. They stated that there was consensus among respondents on the importance of heparin in the extracorporeal dialysis circuit as nearly all of them used conventional heparin.

As a result of another important study, nearly two-thirds of respondents reported that heparin is given in small amounts to elderly patients and that heparin should be avoided in women during menstruation, an indication of their knowledge of the importance of heparin for hemodialysis and contraindications during menstruation. But they did not know the antidote or the correct dose to manage an overdose of heparin. These findings are in line with Ockhuis, (2014); who reported that 59.7% (46/77) of respondents did not know the correct antidote or dose for managing an overdose of unfractionated heparin. These results indicate that they must possess good knowledge, and this indicates the importance of continuous learning and training to maintain an optimal level of safety.

The results of this study indicated that approximately three-quarters of the respondents also indicate that heparin should not be mixed with other drugs and that heparin should be given based on a partial thromboplastin time (PTT) examination. This indicates a good knowledge of heparin administration based on the PTT examination. These results are in agreement with (Claudel et al., 2021) that performing baseline coagulation studies helps determine their individual doses. With the need for strict laboratory monitoring of heparin to determine therapeutic doses for patients and to prevent hyper or hypo - anticoagulation. It is important to closely monitor

patients during heparin administration for signs of heparin-induced thrombocytopenia and early detection (Mattioli et al., 2021).

The results of the study showed that the study group did not have good knowledge about the maximum dose of heparin. Where two-thirds of the sample reported that the maximum dose of heparin that should be administered to a patient is 10,000 units. It should be noted that the dose of heparin depends either on coagulation studies or on body weight. Because patients with polyuria and chronic kidney disease will need less heparin. In addition, the metabolic rate of heparin differed in different patients. Approximately 35% is excreted by healthy kidneys, and heparin is not excreted in patients on chronic dialysis. Which means that it remains in the blood circulation (Al-Ghadi, 2018). However, renal guidelines tend to specify standard heparin doses for all patients rather than individual doses. Continuous therapy is started at the beginning of the dialysis procedure usually with a bolus (25-30 IU/kg) followed by a continuous infusion i.e., followed by a lower hourly dose (500-2000 IU) stirred until the end of treatment for patients with catheters or stopped an hour earlier One of the finished. The last dose is given no later than 1 hour before completion (Claudel et al., 2021).

The results of this study indicated that there is the knowledge that heparin begins to work after 15 minutes of giving. On the other hand, more than half of the nurses were not aware that warfarin is not considered a group of heparins. As heparin (heparin) is an anticoagulant drug and is taken by patients to prevent clots from forming in the blood and prevent the formation of existing clots, heparin works faster It is another anticoagulant (warfarin), and therefore it is very useful in emergency situations, for example, to

prevent further clotting when the clot reaches the lungs. We can say that health care workers in a dialysis setting should regularly review and update their information regarding heparin cannot be overstated. This includes teaching renal unit practitioners how to do drug calculations.

The results showed that 62.3% of the study sample that heparin is given subcutaneouslyto patients and not intravenously, and this result does not agree with (Mello et al., 2021); who reported that heparin is usually given as an intravenous injection to prevent blood clotting and is widely used in the prevention and treatment of thrombosis. This indicates that the subjects of the studied sample working in the health care field in the dialysis environment do not have sufficient knowledge of the method of administration of heparin. This result agrees with Souqiyyeh & Shaheen, (2003); they reported that therewas no consensus on the method of administration of heparin which was continuous infusion or repeated bolus injection.

1.2.3 Indication Heparin

The results of this study revealed that the nurses had a good level of knowledge about the significance of heparin. Half of the know-how sample reported that heparin is administered to patients with arrhythmias or atrial septal defects. While more than three-quarters of the nurses reported that Heparin is given in the event of a pulmonary embolism or thrombus leg and is now used to clean the cardiac catheter. While their knowledge was substandard as more than half of the respondents led that heparin is given to all diseases without exception as an Anticoagulant.

Heparin should be used with caution in the elderly and in patients with decreased liver function, decreased kidney function, chronic renal failure, elevated blood potassium levels, increased blood acidity (metabolic acidosis), or hypersensitivity to low molecular weight heparin. As well as patients with congestive heart failure and patientswith diabetes (Baleguli et al., 2021). Catheter prophylaxis with unfractionated heparin can cause systemic effects and is associated with excessive bleeding. There should be aware of the relative contraindications to heparin administration or contraindications to heparin therapy. It is also important to know that there is a risk associated with heparindialysis, such as accidentally overfilling when the tunnel catheter is closed, and thus renal unit practitioners should exercise caution when closing the tunnel catheter after hemodialysis (Rabbani et al., 2021). It should be noted that it is important to closely monitor patients during heparin administration for signs of heparin-induced thrombocytopenia and early detection (Mattioli et al., 2021).

1.2.4 Side Effects

The results of this study indicate that the nurses have a good level of knowledge aboutthe side effects of heparin in dialysis. Nearly three-quarters of the respondents reportedthat a possible complication of taking heparin for a long time is the patient's sensitivity(itching) and that the side effect of heparin is the appearance of bleeding under the skinand the side effects may develop into bleeding - headache or loss of consciousness. While about half of the respondents answered correctly that the patients' temperature rises after taking heparin. These results indicate that respondents have knowledge of the potential complications of heparin. There should be aware regarding

the relative contraindications to heparin administration or contraindications to heparin therapy (Rabbani et al., 2021). Like all anticoagulants, the most serious side effect of heparin isthe possibility of severe bleeding, usually due to an overdose. Therefore, the ability of the blood to clot is carefully monitored and under medical supervision. There may be internal bleeding around the injection site. One of the serious side effects of heparinis a decrease in the number of platelets. Currently, modern preparations of low molecular weight heparin are used to avoid these complications, and therefore the likelihood of these effects is reduced (Claudel et al., 2021). Another serious side effect of heparin is thrombocytopenia, which causes an immune reaction. Elevated transaminases occur in 80% of hemodialysis patients, as well as osteoporosis as a side effect of chronic heparin use, hyperlipidemia, or anaphylaxis. Also, hyperkalemia occurs in 5% to 10% of patients undergoing dialysis who have catheter sepsis (Nasiripour et al., 2019).

1.3 Variables associated with knowledge

The results of this study indicate that there is a positive significant relationship between knowledge of heparin and nursing qualifications at the significance level of 0.05. The higher the level of nursing qualifications, the more knowledge about heparin. The explanation for this is that baccalaureate nurses received more training in the restriction even though they were undergraduates as a measure included in the core nursing track and others. There is a statistically significant positive correlation at the 0.01 level between knowledge of heparin, years of nursing experience, years of nursing experience, years of renal nursing experience, and the number of training courses

performed in clinical dialysis. Knowledge also increases with the increase of these variables. also. There is a significant positive correlation between heparin use and years of renal and nursing clinical experience and training courses in clinical hemodialysis at the 0.05 and 0.01 significance levels, respectively. That is knowledge of the heparin index rises with the increase in years of renal clinical experience, nursing and training courses in clinical hemodialysis. There is also a positive, statistically significant correlation between knowledge of the side effects of heparin use and the number of training courses conducted in the clinical setting at the 0.05 level of significance. This means that knowledge of the side effects of heparin use increased with the number of training courses conducted in the clinical field.

These results are in agreement with Ockhuis, (2016); who indicated that there is a direct relationship between years of experience and quality of dialysis practice and that qualification levels influences knowledge and use of unfractionated heparin. These findings are in accordance with Muhammad, (2013), who showed that the majority of the sample are females, most of whom are graduates of the institute and have practical experience ranging from (1-5) years, and their ages range between (26-30), and their knowledge of heparin was below the required level.

6 Chapter VI: Conclusions and Recommendations

1.1 Conclusion

The current study concluded that there is an acceptable level of nurses' knowledge of heparin and the significance of heparin and side effects at Prince Sultan Health Center in the dialysis unit in the Kingdom of Saudi Arabia. But this knowledge is not considered sufficient for renal nursing practice and needs to be refined. As nurses must possess good knowledge, this indicates the importance of continuous learning and training to maintain the optimum level of safety. Healthcare workers in a dialysis setting should review and update their information regularly regarding heparin cannot be overemphasized. This includes teaching renal unit practitioners how to do drug calculations.

Furthermore, there was no statistical association between knowledge of heparin, years of nursing experience, years of nursing experience, years of renal nursing experience, and number of courses performed in clinical dialysis. Knowledge also increases with the increase of these variables. Finally, there is a positive, statistically significant correlation between the knowledge of the side effects of heparin use and the number of training courses that have been conducted in the clinical setting.

1.2 Limitations

The study sample was few due to the small number of nurses in the dialysis centers in Hafr Al-Batin.

1.3 Implications for Nursing

The study findings have implications for renal patient care practice and clinical management, education, and research teams. Study results confirm that health care workers in a dialysis setting should regularly review and update their information regarding heparin and this cannot be overstated. It includes teaching renal unit practitioners how to do drug calculations. They must possess good knowledge, and this indicates the importance of continuous learning and training to maintain an optimum level. of safety.

Study results show that safety measures regarding the use and administration of heparin may not be optimal, and this includes hemodialysis patients who do not have a set schedule for screening coagulation studies to assess their risk profile for bleeding or thrombosis. There was little evidence that respondents were up to date with the literature on heparin.

1.4 Recommendation

Based on the results of the current study, the following was recommended:

- For the management team to function optimally, it is recommended that the questionnaire regarding all aspects of heparin be given to new and existing renal unit practitioners to assess their knowledge and monitor their progress.
- Management teams must be proactive, ensuring a well-coordinated and active in- service education program that includes aspects such as pharmacology, pharmacokinetics, pharmacodynamics, drug accounting and drug therapies. Teaching should be problem-based and applicable to the

clinical field of dialysis.

- This educational approach to practice should aim to improve evidence-based renal practice. The management team of renal units and renal unit practitioners shouldenroll in programs such as the webinar by Improving Drug Safety through Staff Education and Competency Assessment:
- The results of the study should help renal unit practitioners to critically review their current practice regarding unfractionated heparin and adopt safe practice measures.
- Staff should be aware of the increased risk of patient death that can lead to statutory medical responsibilities and increased financial claims and losses against them as individuals and the organization for which they work.
- It is important for the clinical management team to include heparin pharmacokinetics and simulated or problem-based patient management scenarios in thementoring program.
- Before new staff members administer heparin to a patient, their level of proficiency should be assessed before and after orientation. If renal unit practitioners do not pass the pre-determined cohort score, the curative intervention must be part of the in-service education program. It is also recommended that employee competency tests be conducted annually. If employees are performing poorly, retraining and re- testing should be introduced to eliminate poor quality practices.
- Develop an evidence-based written protocol for guidelines or policies regardingthe use of heparin for patients in patient care in dialysis units so that it can be accessed by all nurses and clinicians in order to follow.

- Conducting future studies on determining nurse's knowledge of heparin therapy for patients in order to establish training programs to enhance nurses' knowledge of using heparin therapy for patients in patient care in dialysis units.

7 Chapter VII: References

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8 APPENDICE 1:

Part I: Sociodemographic data of the study participants:

Sociodemographic data
Age:( )
Gender: Male- Female
Levels of education:Diploma **Bachelor** **Mater's** **Other:**
Years of experience: ( )
Trainings courses; if yes how many ( )

Part II: Questions Related to the nurses Knowledge about the Use of Drug Heparin inHemodialysis:

Question	Trues	False	I do notknow
Heparin is substance found in the human body.			
The liver is responsible for the secretion of heparin.			
Heparin works as an antidote thrombin.			
Infected patient sensitivity (itching) when using heparin for a long time.			
The drug heparin is an important process of hemodialysis.			
A drug given small amounts of heparin for patients older age.			
Heparin must not be mixed with other drugs.			
Must be avoided to be given for women during menstruation.			
Must be given based on examination PTT.			
the maximum dose of the heparin is given to the patient (10000) units.			
Beginning efficacy of the (Heparin) after 15 minutes of giving it.			
Side effects of heparin is bleeding - headaches or loss of Consciousness.			
Heparin is given under the skin of patients admitted to the unit revive the lung and not intravenously.			
The warfarin is a group of Heparin.			