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RESEARCH ARTICLE

The Knowledge and Educational Needs of Nurses Regarding Pain Management of Patients on Maintenance Hemodialysis: A Qualitative Study

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Abstract:

Background:

Nurses are the first to encounter a patient in pain. A nurse's knowledge of pain management in patients receiving hemodialysis allows them to provide optimal pain management.

Objective:

The aim of this qualitative study is to explore the experiences, perceptions, and beliefs of nurses in the hemodialysis unit regarding pain management practices and identify nurses' educational needs to improve nurses' pain management in practice.

Methods:

A purposive sample of 16 nurses working in four out-patient hemodialysis units in Amman, Jordan, was recruited. The data was collected through semi-structured interviews. The interviews were audio-recorded and transcribed manually for the following content analysis scheme.

Results:

The five themes and fifteen sub-categories were extracted from the nurses' experiences regarding nurses' knowledge of pain management. The five categories that emerged from the analysis were (1) nurses' knowledge of pain management, (2) nurses' self-learning pain management strategy, (3) nurses' approach to pain management, (4) patients continue to suffer unrelieved pain, (5) nurses' educational needs.

Relevance to Clinical Practice:

This data will prove to be useful for evaluating pain management practices for patients on maintenance hemodialysis, developing educational programs for nurses working in hemodialysis units with a focus on improving pain management, and providing knowledge regarding these issues. More research is recommended among nurses for understanding pain knowledge in patients on maintenance hemodialysis.

Conclusion:

This qualitative analysis indicated that nurses are not fully aware of various strategies for pain management. Nurses' perception of pain and pain management was found to be limited to pain assessment and some non-pharmacological management strategies. It has been revealed that nurses require educational interventions regarding pain management in practice.

Keywords: Content analysis, Education, Hemodialysis, Nursing, Pain management, Qualitative research.

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1. INTRODUCTION

Patients with End-Stage Renal Disease (ESRD) who tend to undergo Maintenance Hemodialysis (MHD) routinely report pain [1]. The prevalence of acute and chronic pain among

patients receiving Hemodialysis (HD) is 82% and 92% [2], respectively. However, patient pain is not a popular research topic; most data have been derived indirectly from research focused on health-related quality of life. There is minimal research that focuses on knowledge regarding the sources, occurrence, and particularly, management of pain [3, 4]. However, patients on dialysis pain management plans have been inadequately reported [5, 6]. Atkinson *et al.* [5] noted that

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75% of the patients on dialysis perceived their pain management plans to be inadequate; moreover, evidence-based guidelines that provide a framework for the prescription of pharmacological therapies and the evaluation of ESRD patients are lacking.

With worsening kidney disease, patients develop complications, thus being at a high risk of increasing comorbidities and mortality [7]. The pain experienced by chronic kidney disease patients is multidimensional. The etiology of pain diagnosed in patients with chronic kidney disease can be either simple or difficult. Pain may be a consequence of kidney failure, be associated with systemic and comorbid underlying disease, or be a direct consequence of actual hemodialysis or peritoneal dialysis [8]. Understanding the etiology of pain in patients with ESRD is vital to the formulation of effective pain management plans [9]. Various causes of pain among ESRD, including musculoskeletal, dialysis-related pain, peripheral neuropathy and vascular diseases, have been found to be the leading causes of discomfort [10].

1.1. Literature Review

Persistent pain negatively influences ESRD patients' health-related quality of life [11]. The delayed management of ESRD-related pain is associated with significant physical, mental, and social complications that may cause additional morbidities. Persistent pain is attributed to deteriorated sleeping patterns, anxiety and depression, weak memory, and decreased cognitive function. Reduced health-related quality of life is also associated with an increased risk of hospitalization and withdrawal from dialysis [11, 12].

The pharmacological management of pain in patients is often implemented following the World Health Organization (WHO) guidelines [11], which provides a three-step framework for the prescription of opioids based on pain severity. A visual 10-point analog scale is utilized to classify pain as mild, moderate, or severe. The formulation of these guidelines aimed at reducing the prescription of narcotics whose characteristics may influence the removal of medications in dialysis patients [9]. For example, the molecular weight, protein binding properties, and volume of distribution may affect the removal of narcotics by dialysis and increase patients' susceptibility to withdrawal symptoms [5, 9]. Santoro *et al.* [11] noted that ESRD patients had an increased risk of narcotic alteration that could lead to adverse outcomes. Specifically, the alteration of narcotics' pharmacokinetics, biotransformation, and hepatic removal increased the risk of symptom exacerbation in patients with renal failure [11]. The observations were similar to those of Atkinson *et al.* (2014), who noted that care providers should monitor ESRD patients' responses to narcotics to identify potential thresholds beyond which analgesic therapy should be withdrawn.

Non-pharmacological pain management among patients on MHD remains understudied. The utilization of non-pharmacological therapies in pain management is limited by the side effects and difficulty in outcome evaluation [11]. Common non-pharmacological interventions include psychological, cognitive-behavioral, and electrotherapies. Effective psychological and cognitive-behavioral techniques include yoga,

meditation, and relaxation. For example, yoga-based exercise programs were found to reduce pain by 37% among dialysis patients [11]. Patients may also adopt distraction techniques to reduce their attention to pain. Psychological therapies may also be utilized to address mental and social complications, such as anxiety, depression, and deteriorated familial relations, that often follow the onset of persistent pain [11]. Electrotherapy for pain management comprises nerve stimulation and high tone external muscle stimulation that involves the application of electric current of low frequency around the affected area [11].

Educational interventions focusing on pain management have been investigated in hospital settings. Al Qadire and Al Khalailah [13] conducted a survey on nurses' knowledge and attitude towards pain management, and found that nurses with previous pain management education scored higher on the survey. The same authors conducted a different study [14] using the same survey before and after an educational intervention [14]. The total score of nurses' knowledge and attitudes toward pain was higher and the attitudes significantly improved after the intervention. Importantly, nurses were more likely to deliver higher health-related quality care after education, indicating that this method could be useful in improving patients' care.

Pain studies conducted in Jordan indicated that nurses lack pain knowledge [15]. Pain management barriers in Jordan are systemic barriers, such as the unavailability of narcotics due to complicated administrative procedures, and lack of medical and nursing training with respect to pain relief. Patient barriers include social stigma, lack of awareness and education, and the fear of addiction among both patients and health care providers [13, 16].

Patients on MHD report significant chronic pain that is not adequately managed [5]. Knowledge regarding pain management for patients on MHD is challenging for nurses. In an effort to understand this issue, we conducted this qualitative study to (1) explore the experiences, perceptions, and beliefs of nurses in the hemodialysis unit (HDU) regarding pain management practice and (2) identify the nurses' educational needs to improve nurses' pain management in practice.

The main research questions are as follows:

- 1- What are nurses' perceptions and experiences regarding pain management of patients on maintenance hemodialysis?
- 2- What are the nurses' educational needs in this unit?

2. MATERIALS AND METHODS

2.1. Study Design

This study was conducted using content analysis to evaluate and interpret the collected data. Qualitative content analysis is suitable for the research because it allows for systematic evaluation of collected data for the identification of themes, providing a rich description of the findings [17].

2.2. Setting and Participants

The study adopted a qualitative approach using semi-structured face-to-face interviews for data collection. The study was conducted in the outpatient HDU in Amman, Jordan. A purposive sample of 16 registered nurses from four HDU in Amman, Jordan, participated in the study. The sample size was determined when data saturation was attained. The target participants were nephrology nurses working in HDU who had direct experience with patients on MHD. The inclusion criteria for participation included: (i) a minimum of six months experience prior to the interview, (ii) current employment at the HDU, (iii) can carry on a conversation in English, and (iv) agree to participate voluntarily in the study. Nurses who were in administrative positions in the unit were excluded from the sample.

The study was granted institutional board approval from Al Ahliyya Amman University before data collection. The researchers handed flyers to nurses working at four HDUs. The flyers had information on the study that included the study title, purpose, significance, privacy information, and researchers' contact email and phone numbers. Those nurses who agreed to participate contacted one of the research team through email or phone. Researchers answered participants' questions. Participants who agreed to participate met one of the researchers and signed the consent form to participate in the study and gave permission to the researcher to record the interview. The researcher assigned the time, date, and place for each participant's interview. The authors informed participants that their participation was voluntary, that they were free to leave at any time without any consequences, and that participants' information would be kept confidential.

2.3. Data Collection Procedure

Data collection involved a face-to-face semi-structured interview in English with the participants, which began in June 2020. Question probes were *why*, *who*, *what does that mean to you*, *explain more*, and *could you give examples*. Interviews were recorded with participants' permission and lasted for 30-45 minutes.

During the interview sessions, the key points provided by the participants were summarized, and afterward, the participants were provided an opportunity to ask for clarifications on issues raised during the discussion. Data saturation was reached after the thirteenth interview. Three more interviews were conducted after saturation was achieved. The recorded interviews were transcribed verbatim on the same day.

2.4. Data Analysis

The captured text was analyzed using qualitative content analysis. Two researchers assisted in transcribing the interviews and analyzing the information obtained. Qualitative content analysis is applied in nursing studies to describe a phenomenon in a conceptual manner. The three primary phases of the analysis were (1) preparation, (2) organizing, and (3) reporting the findings [18].

The content was aligned with the aim of the research and

formulated questions. From the findings, the role of the preparation phase is to allow the researcher to establish the unit of analysis [19]. The unit of analysis is useful in qualitative research because the researcher is familiar with the dataset. In addition, the preparation phase allows the researcher to become immersed in textual data [19].

The analysis process was conducted by the author, following the content analysis steps recommended by Graneheim and Lundman [20]. The analyses were summarized in five steps:

Step one: recording the interviews, followed by reading them several times to get acquainted with transcribed data.

Step two: splitting the text into units of meaning and labeling the units with codes.

Step three: abstracting and condensing units of meaning with codes and labeling them.

Step four: sorting codes based on similarities and discrepancies into subcategories and categories.

Step five: themes formulation.

The interviews, considered as the units of analysis, were read thoroughly and condensed into meaningful units. The condensation process involved reading through texts and reducing them into those sentences, paragraphs, or phrases related to the clinical question. The condensed text was then aggregated into higher-level headings called categories [20].

Content areas were chunks of the text identified based on theoretical assumptions from previous studies of nurses' perceptions of chronic pain and pain management experiences as well as the transcribed interviews. These content areas were assigned labels known as codes in relation to the described event, feelings, or phenomena. Abstraction of the content areas led to the creation of categories that were labels answering the question *what?* All data in the content areas belonged to a category, and no data belonged to more than one category. Categories with similar underlying meanings were linked together into a theme. Themes were developed to answer the question *of how?* and were not necessarily mutually exclusive. Every category belonged to at least one theme.

2.5. Rigor

The four principles that were taken into consideration for qualitative research are credibility, dependability, transferability, and conformability [21]. Credibility was guaranteed by having an external auditor who did not take part in data collection to evaluate the analyzed data to ensure that nothing was missing.

3. RESULTS

The participants in this study comprised 16 nurses (7 men and 9 women), with Registered Nurse (RN) and Bachelor of Science in Nursing (BSN) degrees, working in 4 different outpatient HDUs in Amman, Jordan. They reported not having attended pain continuing education or taken a course in pain management in the last two years.

The results of the interviews with nurses at the

hemodialysis units are presented in five categories and 15 subcategories: (1) nurses' knowledge of pain management, (2) nurses' self-learning pain management strategy, (3) nurses' approach to pain management, (4) the context in which patients continue to suffer unrelieved pain, (5) nurses' educational needs.

3.1. Nurses' Knowledge of Pain Management

The results indicated that nurses' knowledge of pain assessment and management that is specific for patients on MHD varied across the sampled participants.

All the nurses had knowledge regarding pain assessment. Nursing care of the patient undergoing hemodialysis includes pre-dialysis assessment, intradialytic, and post dialysis; but pain assessment is nurse discretion. There is, however, no documentation for pain assessment that the patient care team can refer to for continuity of care.

3.1.1. Connecting Physical Symptoms to Presence of Pain

With regard to pain assessment before starting HD session, nurses' knowledge varied from routine pain assessment such as using common assessment tools to responding to patients' reports and assessing their pain accordingly. Some nurses reported being able to identify the presence of pain after noting signs of fever or infection during normal routine procedures conducted before dialysis. One nurse reported that they usually check vital signs and fistulas before starting the HD process. "Prior to dialysis, we take a set of vital signs and check the fistula. My patient had a high fever; the left arm fistula site was warm to touch and had pus around the previous needle stick site, aching all over, weak, and feeling sick. These symptoms are usually accompanied by pain. In these situations, I use the numerical rating scale."

Some nurses assess pain after listening to patients' reports of symptoms. A nurse reported, "My patient came yesterday with low-grade fever, left arm where the fistula was warm to touch. He told me he had a high-temperature last night, aching all over, felt very weak, and ill. I know there is an infection."

3.1.2. Knowledge of Underlying Systemic and Comorbid Diseases

The nurses also displayed some knowledge of assessing chronic pain from patients' reports and determining its association with the HD procedure. A nurse reported, "Our patients are always in pain. Constant body pain." The nurses were also able to identify the reasons for reported pain by reviewing patient records to determine the existence of pre-existing conditions. A nurse said, "I looked at patients' old record. We have to help manage patients' pain. I want to say that some of the patients' pain is not associated with the HD procedure and could be related to arthritis, diabetes, COPD, peripheral vascular disease, heart problems, you name it."

3.1.3. Initiate Pain Assessment Based on Patient Complaints

The interviews also revealed that nurses working in HDUs conduct pain assessment due to patient complaints; although in some cases, nurses are able to identify signs of discomfort. In

most cases, nurses are alerted to pain during HD, after a patient's report of pain in the arms, chest, or back, or body aches. One nurse reported, "Two hours into the treatment, the patient asked me to stop dialysis, stating (my arm hurts so badly). I found that the AV shunt was not working." Another nurse reported having had frequent incidences where patients complained of chest pain during dialysis. "I had a patient who seemed like his usual self at the beginning of his hemodialysis session. In the middle of the treatment, the patient complained of chest pain. She had her hands over her chest, moving up and down her jaw. This is not the first time my patients would experience chest pain during dialysis."

3.1.4. General Appearance Pain Assessment

Some nurses are able to identify pain by looking out for signs of discomfort and asking if they are in pain. "I always ask my patients during hemodialysis if they have pain. Many of them will say back pain (I have been sitting in the same position for a long time)." With other patients, the sign of pain is obvious, and the nurse does not need to confirm it. "...taking a deep breath, two hands on her lower back, biting her lip, with teary eyes, guarding the painful area, crying."

3.2. Nurse's Self-learning Pain Management Strategy

The analysis established that HDUs nurses' knowledge of pain management is a self-learning process. Most of the nurses reported not having been trained or informed of protocols for managing patients' pain at outpatient HDU.

3.2.1. Learn on my own to Cover the Gaps in Pain Management

One nurse said, "We were not given an orientation concerning pain medication administration when I started working in this unit," and another one reported, "To be fair to all nurses working in out-patient hemodialysis units, there are no pain management guidelines passed on to us to follow, I teach myself pain medications because some patients are on pain medication at home." "I had no pharmacological pain medication education since I started in this unit."

The nurses, however, expressed having had interest in researching various pain management strategies for HD patients due to the lack of guidelines. "I feel our knowledge of pain management is fading. We, nurses, do not administer pain medications routinely in this unit, but it does not hurt to learn about pain management in general and particularly for patients receiving hemodialysis. I try my best to learn on my own."

3.2.2. The use of Available Informational Pain Management Resources

Nurses use the internet to identify strategies they could use to manage pain for HDU patients. One nurse stated, "If I need any information about pain management and medications for ESRD I do a Google search." Other nurses approach the senior colleagues or doctors to ask about pain management strategies for patients on MHD. A nurse reported, "When I need information, I usually go to more experienced nurses or to the doctors, if available, or recall my previous partner experience in similar situations." In some cases, nurses partner with other

colleagues to find out more from the internet.

3.2.3. Lacking Pain Assessment Documentation

Nurses' knowledge of pain assessment was also portrayed in cases where protocols for pain assessment during HD do not exist at the dialysis unit. One nurse reported taking the initiative to assess patients' pain by asking if they were comfortable, despite the dialysis units lacking established protocols for pain assessment and management. "I do not perform a routine pain assessment. I ask patients if they are comfortable. However, best practice standard for pain assessment and management is not part of nursing care of the patient undergoing hemodialysis, pain assessment is not mandatory, and there is no flowsheet required to fill and to document pain assessment."

3.2.4. Absence of Standing Orders of Pain Management

Most patients use prescribed medications for managing pain at home, while nurses do not have orders to administer those pain medications, and the HD unit does not usually have pain medications for patients when they report pain during the HD session. One nurse reported: "*Honestly, in the absence of standing orders of pain medications in our unit, not knowing how patients metabolize opioids, when to take pain medication before or after dialysis, does dialysis extract opioids or prescription drug, which is better Duragesic patch or oral pain medication, sometimes I feel helpless. I cannot see a patient with excruciating pain without offering her/him anything.*"

3.3. Nurse's Approach to Pain Management

Nurses' strategies for pain management for patients MHD focused generally on using non-pharmacological interventions.

3.3.1. Non-Pharmacological Pain Management Strategies

Most nurses reported that they tried to incorporate non-pharmacological pain management strategies in the care practices for patients during HD. The non-pharmacologic strategies used varied and are usually learned through a Google search and prior experiences. "My hands are tied, but I know there are ways to relieve pain other than medications, you know, using cold or warm packs, turning the radio on to listen to music, changing position, and supporting them with pillows. Even with acute pain during hemodialysis, I noticed these would work as well." Non-pharmacologic interventions are often preferred because nurses do not need the doctors' permission or consultation before applying them to relieve patients' pain. "When I get stuck in a situation that I cannot do much about, I offer my patients' pain management that I can do without doctor's permission and without medication" "I offer them a blanket, or elevate their legs up on a pillow when it is appropriate, make them listen to music, and these work as well, especially when the pain is caused by lying in the chair for four hours."

3.3.2. Limited Capacity to Respond to Patient Pain

Some nurses reported doing nothing to manage patients' pain that increases with being in a fixed position on the dialysis chair when they could not move them, citing a lack of time.

One nurse reported, "Unfortunately, it is difficult to change patients' positions during the treatment. In addition, I do not have time." Another nurse stated, "During dialysis procedure, our focus is on watching our patients' blood pressure and preventing cramps and vomiting. Other types of pain complaints are usually not taken care of, and basically ignored."

3.4. Patients Continue to Suffer Unrelieved Pain

The nurses were disappointed with the inability to integrate adequate pain assessment into patient care strategies, since patient receiving hemodialysis pain is complicated and there is a lack of pain assessment tools, especially for hemodialysis patients. Nurses also noted that patients' physical and social activity in the dialysis unit revolved around pain.

3.4.1. Helplessness and Frustration

The nurses realized their inability to do a thorough pain assessment for the patients on hemodialysis. "I feel helpless when unable to intervene in patients' pain" "I wish we have a relevant specific pain assessment tool especially for our patients, so that we could help them lessen their suffering, and the authority to give pain medication at the dialysis unit." Meanwhile, another nurse described the frustration arising from the inability to incorporate proper pain assessment in patients' care plans: "they have different complaints than those of the other chronic illness patients. When I search for renal patients' pain, I get frustrated; I don't know much about the causes of their pain, even their skin hurt."

3.4.2. Pain Had Stripped Patients' Basic Activities

Nurses recognize that pain controls the patients' activities at the dialysis unit. Participants identified that patients' suffering from pain had stripped their capacity to perform basic activities. One of the participant nurses conveyed a concern stating: "It is sad to see that my patients can't enjoy simple pleasure due to pain." Another participant reflected: "Suffering from multiple aches and pains leaves our patients unable to perform basic tasks: getting in and out of the dialysis chair, walking to the car, talking to or socializing with other patients in the dialysis unit after dialysis. These are basic pleasures that pain has taken away from them."

3.5. Nurses' Educational Needs

Nurses' educational needs were categorized into routine procedures and pain management strategies for patients on MHD. The identified educational needs included protocols for pain management, effect of narcotics on MHD patients, and evidence-based practices for managing pain in HDU.

3.5.1. Pain Assessment and Management

The results of the analysis emphasized that there is a need for established protocols as well as structured training for nurses aimed at managing patients' pain. They also reported having scarce knowledge about how to manage pain among patients on MHD and having to apply practices used in different units because they had not received any specific training on pain assessment or management in the HD unit. A

nurse reported, “I used to work in the ICU unit, and I am fairly new to HD units. I still conduct my pain assessment for the dialysis patients in the same way I did in the ICU unit.”

Some nurses also reported that the knowledge of pain assessment and management at the HD unit had faded with time, indicating the need for refresher courses on the protocols for patient pain management in the unit. One nurse stated, “Our unit is so much different than floors or ICU or even the ER, where nurses administer medication all the time. I feel our knowledge of pain management is fading.” Another nurse also reported, “I have been in this unit for almost five years. I feel my knowledge of pain medication is diminishing.” Such statements strongly indicate the need for periodic educational interventions on pain management strategies.

3.5.2. Nursing Standard of Practice

The analysis also highlighted the need for established protocols and policies on pain assessment and management at the unit. One nurse stated, “We do not have pain management nursing standard of practice in out-patients HDU, which is why nurses depend heavily on the standard pain assessment and management of other units.” Many nurses admitted that they needed educational training on pain assessment, management, and overall guidelines for care routines in the HDU. “Although pain management is very important for this group of patients, I, as a nurse, do not know much about it. Nephrologists and pharmacists are needed to define and share with us the appropriate pain treatment for chronic kidney disease. Do you not think it is a good idea if we can meet and prepare some material to discuss pain management routinely, maybe once a month?”

3.5.3. Evidence-Based Practices

The analysis accentuated the need for nurses to be educated on emerging evidence-based practices for managing pain for patients on MHD. Nurses reported having a hard time locating evidence-based practices to manage patients’ pain when they need such knowledge. A nurse noted, “I do a lot of search on the internet, I did not come across evidence-based practice guidelines for pain medications administration for patients on maintenance hemodialysis.” Nurses can learn about evidence-based practices for pain management through educational sessions and focus group discussions with colleagues. “We can have nurses as a group to discuss our own experiences with patients’ pain management, which could be during lunch breaks or one-to-one discussions, communicating, and sharing knowledge.”

The evidence-based practices covered include medications and non-pharmacological interventions for pain management. Nurses reported having no knowledge of whether patients undergoing dialysis should be treated with narcotics or not. For example, a nurse reported, “We were not educated about pain medication administration for hemodialysis patients when I started working in this unit.” The nurses also recommended routine educational interventions focused on integrating medication and non-pharmacological interventions for pain management in patients with kidney diseases, as recommended by the nephrologist.

4. DISCUSSION

The findings of this study suggest crucial insights on nurses’ knowledge of pain in patients on hemodialysis, nurses’ perception of pain assessment, and the education on pain management. Further, the findings indicate that nurses’ perception of pain and pain management in patients on MHD was limited to pain assessment, pre-dialysis assessment, intradialytic, post dialysis and some non-pharmacological management strategies. These findings are consistent with previous studies [22, 23] that acknowledged that nurses are aware of the pain experienced by patients. The extent of nurses’ perception of pain in patients on MHD was demonstrated by the responses that nurses know when to look out for signs of infections before beginning the procedure. In other cases, nurses seek to know the level of comfort of patients during dialysis, while others look out for signs of discomfort and pain.

The findings reveal that nurses have had to stop HD procedures when patients experience extreme pain; however, nurses’ perception and knowledge of pain management is poor, arising from a lack of guidelines and training provided by the HDU as well as hospital guidelines for pain management and the overall absence of information. The findings of the study are consistent with a previous study [24] which indicated that lack of training, knowledge, and increased workload pressures are obstacles to effective pain management. Lack of required knowledge is a major concern when diagnosing pain in patients using a suitable pain assessment tool. It also negatively affects interdisciplinary communication, leading to ineffective pain management.

The results of this study, specifically relating to knowledge of pain management, are also supported by another study [25] which indicated that attitude and knowledge gap might reflect insufficiencies in pain education, lack of support for nurses to connect theory with practice, and the non-availability of pain scales. Based on the results, they explained that nurse leaders should provide continuous education for healthcare professionals to become effective in pain assessment and management. This study suggests that administrators offer supportive supervision of nurses in the clinical setting to create a suitable connection between nurses’ experiences to improve pain management processes.

This study’s findings portrayed a conflict between nurses wanting to help patients during a dialysis session by relieving patient pain by administering pain medication and the fact that outpatient units have no rule to administer pain medications during dialysis. According to the ANA’s (American Nurses Association) position statement, nurses are ethically responsible for providing optimal care to persons experiencing pain [26]; nurses who participated in this study have been committed to address patient pain and administer pain medication to relieve any avoidable pain and support the patients’ legal right to the alleviation of pain. This may explain nurses’ willingness to manage patients’ pain or discontinue treatment when pain persists.

Nurses’ perception of pain management is unclear. Some questioned the adverse effects of pain relief medication in

patients with kidney failure and cited having looked for information regarding the same without success. Although nurses do not administer any pain medication, some are reluctant to use narcotics to manage patient pain. Experienced nurses demonstrated some levels of awareness that there are non-pharmacological strategies that they can use to manage patients' pain. These findings align with the findings of a study [27] that emphasized that nurses are responsible for effectively managing patients' pain, although this does not strictly imply the use of narcotics.

This study's findings revealed that nurses understand when to assess pain during the dialysis procedure. The reasons for conducting pain assessment are mostly complaints from patients; but in some cases, nurses can look out for signs of patient discomfort. This is consistent with the results of a previous study [28] which found that nurses understand that negotiating fluid removal with dialysis personnel is essential for managing cramps. Understanding of nurses concerning the assessment of pain enables healthcare professionals to adjust dialysis shifts and days to mitigate fatigue. The findings of the same study [28] help explain that nurses' understanding of pain by checking signs and symptoms such as fatigue, cramping, itching, and depression is essential when deciding to assess patient pain.

The study results highlight the deficit in nurses' knowledge regarding pain medication administration. The analysis established that nurses' knowledge of pain management is a result of self-learning efforts. Most nurses reported not having been informed or trained in protocols for managing patient pain before or during dialysis. No orientation was provided for medication administration among nurses starting to work in dialysis units. The findings of this study are supported by Onianwa *et al.* [29], who acknowledged the importance of the role played by nurses in pain management. Education on medication administration is essential to equip nurses with the knowledge required to use a pharmacological approach to managing pain among patients on MHD. The results of the current study are also supported by a previous study [30] which indicates that educational programs lead to the improvement of knowledge regarding non-pharmacological pain management.

The results of the analysis indicate that protocols and policies on pain assessment and management should be established at the unit and that nurses at the HDU unit require refresher courses on the protocols for patient care in the unit to improve nurses' knowledge of pain assessment and management. Based on these findings, newly hired nurses or those transferred to the HDU should be trained on the protocols and procedures for pain assessment and management. Two previous studies [31, 32] support the study results by acknowledging that applying a protocol for timely pain assessment and management ensures that nurses avoid delays in pain treatment and improve the quality of care.

The results of the current study established a need for nurses to be educated on emerging evidence-based practices for managing pain in patients on MHD. The findings indicate that nurses experience a hard time locating evidence-based practices including medication and non-pharmacologic interventions for pain management so that they know whether

patients undergoing dialysis should be treated with narcotics. Tick *et al.* [33] supported the findings of the current study by indicating that the evidence-base for non-pharmacologic therapies includes dietary components and mind-body behavioral interventions. Further, it is essential to train nurses on evidence-based practices of managing pain to improve the health-related quality of care and patient outcomes [33, 34]. The training of nurses working in HDUs is essential for improving knowledge required to choose the most effective method of pain management and increase awareness of the effective use of nonpharmacologic approaches to managing medication side effects.

The wide gap between pain management based on patient needs and poor pain management practices in dialysis unit settings continues to challenge nurses and doctors who are directly accountable for pain management. This necessitates executing pain management guidelines based on evidence-based practices. The study participants exhibited knowledge in identifying their own concerns about their understanding of pain management and suggested possible educational approaches. This knowledge needs to be put into practice. The American Pain Society Quality of Care Committee [35] recommendation regarding pain education was to "move beyond traditional educational and advocacy to focus on increasing pain's visibility in the clinical environment" (p1874). Translating the participant nurses' knowledge and experiences into practice should improve pain education and intervention.

Pain assessment and management of patients receiving hemodialysis is a complex process among nurses, patients, nephrologists, healthcare professionals, and institutions. The balance between patients' pain management and nurses' roles in administering pain medication in clinical practice is essential for nurses in hemodialysis units. Through education and training and ensuring transparent communication between nurses and other members in healthcare team, a pain management policy should be formulated for the nurses at dialysis units, who are part of the pain management team. Moreover, policymaking should be enhanced for improving patient pain management care.

The hemodialysis procedure itself is not a painful procedure although it may cause fatigue and tiredness post dialysis and hence render an exhausting event. Patients may fear pain from frequent needle sticks especially unsuccessful needling attempts causing trauma to adjacent tissue. Additionally, patients occasionally suffer from muscle cramps both during and after dialysis, which are usually associated with excessive fluid removal during dialysis in a short time, as well as headaches that may be related to hyper or hypotension. Meanwhile, psychological factors such as stress, depression, and anxiety may contribute to increased sensations of pain. Psychological distress may be attributed to loss of jobs, loss of autonomy, restricted fluid and diet regimen, anorexia, nausea, fatigue, body image distortion caused by arm fistula and /or dialysis catheter, and more. Some of the above-mentioned symptoms, such as the pain caused by needles, could be reversed by using topical lidocaine before needling. Lifestyle changes, adherence to treatment, fluid and diet restrictions may

also help in decreasing muscle cramps, nausea, fatigue as well as other symptoms. In addition, counseling and psychosocial support are recommended to ease the distress patients may suffer from as a result of being on chronic dialysis treatment.

Patients with End-Stage Renal Disease usually have other chronic illnesses. Atkinson *et al.* reported that nephrologists often address the patients' need for opioids because the nephrologist is the primary care doctor for those patients and because nephrologists would know whether the opioids are safe to use in patients with kidney failure or would cause more harm than good. Also, there is a lack of a clear protocol for pain management for patients on hemodialysis, and there are no published guidelines addressing these medications [5].

Nurses at hemodialysis units have care protocols that include vital signs, patient weight before and after dialysis, assessment of vascular access, and monitoring of the basic metabolic panel, but little knowledge or nothing regarding pain management. Evidence-based recommendations for opioid therapy in the dialysis settings are almost nonexistent. Therefore, studies are needed to establish recommendations for dialysis nurses addressing the clinical practice of pain management to ensure adequate pain management for this population.

4.1. Limitations

The participants were chosen from four HDUs, which may limit the transferability and generalizability of the findings.

4.2. Relevance to Clinical Practice

Nurses in this study acknowledged that outpatient HDU nurses lack relevant pain assessment as well as pain management for patients on MHD. It is imperative for outpatient HDU nurses to use appropriate non-pharmacological interventions for safe practice, the effectiveness of which should be determined by reassessing pain through quality improvement initiatives during maintenance HD sessions.

Moreover, there was also an evident lack of knowledge-established practice guidelines for narcotics administration, pain assessments, pain management documentation, non-pharmacological pain management and assessment, and follow-up care. Thus nurses must also be educated on the narcotics recommended for patients on MHD. The content of educational programs should include pharmacological effects, correct dosing, and route of administration.

There is a need for the development of pain evaluation protocols based on international clinical standards, established procedures, and relevant and credible scientific evidence. A team of physicians, nurses, psychologists, social workers and administrators must collaborate and present recommendations to regulatory agencies regarding pain management interventions.

For healthcare professionals employed in hemodialysis units, we recommend the organization and implementation of educational programs at regular intervals to enable them to identify and assess implantation scales of self-efficacy in pain among patients undergoing HD.

4.2.1. Recommendation for Nursing Practice

Nurses must educate patients about the risk factors associated with prescribed pain medication use and the common signs and symptoms they may experience. For example, respiratory distress and mental status changes are symptoms a nurse must document if they are pre-existing before starting a hemodialysis session. Educating the patient's family members to report any respiratory distress or mental status changes may also be prudent.

Nurses must document any history of previous opioid therapy and any history of adverse side effects. Individualizing patient care plans would ensure that the patient receives safe and high-quality care during hemodialysis sessions.

4.2.2. Recommendation for Nurses' Education

This study has highlighted the inadequacies of nurses working at out-patient HDUs concerning their lack of knowledge about pain medications. A common fear among hemodialysis nurses is the possible accumulation or potential for dialysis extracting opioid drugs. To allay this fear, the content of educational programs should include the pharmacological effects, correct dosing and route of administration, and methods to identify the patients at risk for adverse effects on patients receiving hemodialysis. Nurses, both new and current, should participate in theoretical and practical competency-based learning on opioid therapy.

4.2.3. Recommendation for Quality of Care

Quality improvement initiatives for pain management should focus on ensuring that pain is assessed during every shift, that pain medication is administered in a timely fashion, and that pain is re-assessed to determine medication's effectiveness. Formulating educational interventions for nurses would also help to improve the quality of pain management.

CONCLUSION

The results of the current research show the crucial role that nurses play in pain management at HDU as well as the challenges and barriers they encounter. The data obtained in the course of the study suggest that in addition to relying on the patients' expression of pain, clinical assessments are vital in addressing the barriers associated with self-reporting pain. Our findings also highlight a number of issues that nurses face when managing patients' pain, such as the unknown effects of narcotics on patients with kidney dysfunction and the effect of the HD process on removing medication from blood. A short learning approach was also identified to assist nurses in effectively managing pain.

LIST OF ABBREVIATIONS

ESRD	=	End-Stage Renal Disease
HD	=	Hemodialysis
MHD	=	Maintenance Hemodialysis
HDU	=	Hemodialysis Unit

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study has been approved by Review Board from Al-Ahliyya Amman, Jordan University, Jordan before the data collection (ID number: 10/2019-2020).

HUMAN AND ANIMAL RIGHTS

No animals were used in this research. All human research procedures were followed in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2013.

CONSENT FOR PUBLICATION

Informed consent was obtained from all participants.

AVAILABILITY OF DATA AND MATERIALS

The data supporting the findings of the article are available within the article.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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