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KNEE REPLACEMENT SURGERY: THE ROLE OF THE NURSE IN PATIENT SAFETY IN THE OPERATING ROOM, THE NIGERIAN PERSPECTIVE

AIKABELI, PRISCILLA O. & ENUNWAONYE, HOSSANNA C.

ABSTRACT

Avoidable complications occur in the perioperative and postoperative periods of the patient's surgical experience resulting in morbidity and mortality. However, implementation of evidence-based practice is a challenge in perioperative practice where there are complex organisational challenges. The aim of this study was to investigate the role of perioperative nurses in achieving patient safety in total knee replacement surgery in Nigeria. A qualitative study design was utilized in analysing data collected through semi structured interviews. A total of 20 perioperative nurses were selected with at least 1year experience. The inductive data analysis was done using qualitative content analysis. is used to interpret similarities and differences in the latent content in the phenomenon under exploration. Three major themes (Organizational, Team and Individual levels) and five sub themes (Reliable Procedural Plan, Functional Reporting and Documentation Practices, Collaboration, Being Respected by other Team Members, Having Shared Goals and Common Expectations and Professional Knowledge, Skills and Experience) were adjudged important for patient safety practice. Major finding in this study is that deviation from established practice standards were observed, requiring constant performance appraisal and relying on individual corrective measures for good results. The study therefore concluded that there was inconsistency in practice of patient safety during knee replacement surgery. It was recommended that the inconsistency in practice be addressed for patient safety during surgery. Surgeons and perioperative nurses could work out a system where too many cases are not booked for operation on a day for knee replacement surgery. This will give room for proper utilization of the Surgical Safety Checklist which is the gold standard for patient safety in the operating room.

Keywords: Knee replacement; perioperative; perioperative nurses; infection; patient safety.

INTRODUCTION

Avoidable complications occur in the perioperative and postoperative periods of the patient's surgical experience resulting in morbidity and mortality. There are guidelines and treatment recommendations for preventing these complications. However, implementation of evidence-based practice is a challenge in perioperative practice where there are complex organizational challenges. Therefore, good, professional knowledge and skills are required to minimize and manage threats to patient safety. The World Health Organization (WHO, 2009) Surgical Safety Checklist (SSC) is an example of such evidence-based guidelines developed to integrate individual, team and organizational planning and control in minimizing the danger of preventable complications and enhance patient safety.

Knee replacement is a delicate operation, and complications can be life threatening for the patient. According to Nyberg et al. (2021) steps are optimized in operative management to reduce the burden of Surgical Site Infection (SSI) or Periprosthetic Joint Infection (PJI) in current arthroplasty operations as these would be devastating for patients where they occur. Operating room nurses are continually working to prevent harm with the aim of achieving infection free perioperative and postoperative surgical experience for the patient. However, these events still occur frequently due to alterations in best practice, although it is unclear to what extent these will increase the risk for complications. Perioperative nurses work to minimize risks by taking practical steps where commonly accepted or established good practice is difficult to follow. According to Maya (2022), perioperative nursing dates to 1873 when schools of care were created in the United

States of America as a field of specialization. Although this field of specialisation was acknowledged before 1889, however, the first mention of nurses in a surgical setting was found in the text notes on Nursing by Florence Nightingale which stated that "the surgical nurse must always be alert, on guard against the lack of cleanliness, musty air, lack of light…". Additionally, the Association of Operating Room Nurses (AORN, 2023) defined perioperative nursing as the process of care during the perioperative period temporarily experienced by patients during the three phases of the surgical experience. AORN Guidelines for Perioperative Practice are the gold standard in evidence-based recommendations to deliver safe perioperative patient care and achieve workplace safety.

Howard-Hill (2018) revealed that the occurrence of periprosthetic joint infection and the impact on patients and the healthcare system is significant due to the resultant patient morbidity and mortality, highlighting the role of the perioperative nurse in the management of patients with periprosthetic joint infection. The demand for total joint arthroplasty is increasing worldwide, with the USA projecting an increase of 673 percent in the demand for total knee arthroplasty in that country by the year 2030. Additionally, Katchy, et. al. highlighted that the demand for total need replacement in Nigeria is growing by the day due the increasing number of end stage osteoarthritis patients in the country. According to the World Health Organization (WHO, 2016), Surgical site infections are a great concern as the second most common healthcare associated infection and the most common cause of failure in total knee arthroplasty. Mortality rate for revision arthroplasty for infection is five times greater after five years with an estimated cost four times higher for an infected revision procedure than a primary arthroplasty (Howard-Hill, 2018). Inadequate diagnosis and treatment of infection in its early stages will lead to further interventions that increase the overall cost, resulting in an inferior functional outcome for the patient. In China, Sun, et. al. (2021) also highlighted that effective nursing methods contribute to the improvement of the recovery of knee joint function and postoperative quality of life for patients undergoing artificial knee replacement during the peri- operative period. Additionally, studies in Nigeria (Olowo-Okere, 2019; Dayo-Dada, et. al., 2022) also suggested that surgical site infection (SSI) is a major patient safety concern in hospitals. Against this backdrop, the researcher decided to investigate the role of perioperative nurses in achieving patient safety in total knee replacement surgery in Nigeria.

This study aimed to explore current role of perioperative nurses focused on their routine workplace activities regarding patient safety factors that they can influence. The specific aims of the study were to analyse and determine the role of perioperative nurses in patient safety and prevention of perioperative mishaps and the risk of SSI for a knee replacement operation in Nigeria where individual, team and organizational factors are vital. Therefore, this study explored the clinical application of perioperative nursing care for patients with artificial knee replacement in Nigeria, with the goal of providing a theoretical basis for clinical nursing care.

METHOD

Design: A qualitative study design was utilized in analysing data collected through semi structured interviews with reporting compliance with Consolidated Criteria for Reporting Qualitative Research as suggested by LoBiondo-Wood and Haber (2018).

Setting: The interviews were conducted in three hospitals, one university hospital, one public general hospital and one private orthopaedic hospital in Southern part of Nigeria. There are international differences concerning areas of responsibility in the operating room. In Nigeria, perioperative nurses are responsible for preparing instruments and implants for the operation, patient positioning, and operating room asepsis. The perioperative nursing training in Nigeria starts as a registered nurse and a 1-year post basic specialist programme in perioperative nursing certification.

Participants: The study included certified and practicing perioperative nurses who met the following inclusion criteria: at least 1 year of experience in knee replacement surgery.

Sampling Technique: A purposive sampling technique was employed and perioperative

nurses who met the inclusion criteria were identified by nurse leaders in the various hospitals. Twenty perioperative nurses were interviewed with a median age 40 years (range 27–59), 4 males and 16 females. Median experience as perioperative nurses were 7 years (range 2–40).

Data collection: The semi structured interview guide consisted of three questions: 'In perioperative care, what does patient safety during knee replacement surgery include for you?', 'In securing patient safety, what do you see as most essential?' and 'Do you see any areas of weakness in patient safety?'. Probing questions were asked where necessary. All interviews were conducted by the author. Seventeen interviews were done in person, and 3 by telephone. The interviews were recorded digitally and transcribed verbatim.

Data analysis: The inductive data analysis was done using qualitative content analysis is used to describe similarities and differences in the manifest content and to interpret the latent content in the phenomenon under exploration (Nyberg, et. al., 2021). A manifest analysis was performed. The transcripts were imported into SPSS Software version 22. Firstly, the recorded interviews were reviewed, and transcripts read to make sense of the phenomenon. Secondly, the text was divided into units relevant to the aim of the study. Thirdly, the units were carefully condensed to avoid losing content, and each meaning unit was coded. The codes were abridged into groups and subgroups.

RESULTS

From the analysis, three main groups and seven subgroups emerged as shown:

1. Organizational level
   - Reliable procedural plan
   - Effective reporting and documentation
2. Team level
   - Interprofessional and interdisciplinary collaboration
   - Protocol, checklist and standards implementation
   - Compliance with Aseptic Techniques
3. Individual level
   - Professional knowledge, skills and experience
   - Personal commitment

Organisational level

The organisational level conditions of significance that were featured comprised of a reliable plan for the procedure, reporting and documentation practices to enable effective exchange of information.

Reliable procedural plan

Perioperative nurses expressed the need for a effective preoperative plan to ensure a safe procedure. The time for a surgical procedure could be reduced by proper planning and preparation. They stated that they often needed to confirm the information for surgical planning with the orthopaedic surgeon before preparing for the procedure to avoid occurrence of failure in updating the plan which was perceived as unsatisfactory and time-consuming. However, the participants adapted to the incomplete plan instead of addressing the problem.

You require extra work when something is not right. When you suspect something wrong, extra time is wasted in calling and talking to the surgeons who are going to. (Participant16)

Getting instruments and implants available for a planned procedure was perceived as challenge when procedural planning not updated and special instruments or implants for the procedure are not available. Then the operating room nurse need to prepare for another surgical procedure instead. This was perceived a hindrance in operating room workflow and made it challenging to accomplish the list of operations scheduled for the day. The main source of patient-related information for some participants was the operation list and the anaesthetic preoperative assessment. They had no time to get information from orthopaedic ward nurses routinely on patients at risk for pressure ulcers and poor nutritional status, thereby reducing the chance of preparing for a safe surgery.

Effective reporting and documentation

Challenges of reporting and documentation practices threatening continuity of patient care were highlighted. Some participants complained of documenting perioperative care both in the computer and on paper which was viewed as both time-consuming and a risk for patient safety. The documentation on paper was considered important as perioperative nurses rarely reported in person to colleagues on the postoperative ward. The nurses on the postoperative and orthopaedic wards were working in the main health record system, not in the planning system where perioperative nurses documented their care, and thereby could not consult the information the perioperative nurses had documented. The participants suggested that the planning system should be seen merely as a planning system and not as a tool for documentation.

Documentation is a problem as we are not used to each other's recording system so the nurses on the postoperative wards seldom read. So, if we had written: Check course on our records system, they don't care about it because they think it is hard to get into it because it is not a system they usually work with. So, you have to either say it or write it on paper, making it a double documentation, which is unnecessary time wasting when we have little time for patient care. (Participant 7)

Reporting to a colleague and keeping the surgery on course at the same time was perceived as a risk. Perioperative nurses tried to avoid changing personnel during surgery. However, it is sometimes inevitable, especially during revision knee replacement surgery that can last a whole day. It was considered a challenge to remember to report everything and some recalled the need to call the operating room on their way home to fill in missing information in their report.

The participants in this study did not believe that reporting incidents resulted in actual improvement in patient safety. Operating room management sent information about new routines and incidents that were sometimes perceived not to reach the appropriate operating room personnel. The perioperative nurses shared a desire to get feedback on the treatment results of patients. They wanted to know if there had been injuries for patient who had intraoperative challenges. If the orthopaedic surgeons were asked for the results for one specific patient, they shared the result with the perioperative nurses. However, there was no systematic feedback on results or complications. Some participants stressed the desire to know the infection rates of their specific department.

Team level

Team collaboration established safety protocols and compliance with aseptic techniques were stated as vital aspects of safety practice. Compliance with aseptic techniques varied among different professionals within the team.

Interprofessional and interdisciplinary collaboration

All participants stressed the significance of teamwork and collaboration in patient safety. The professional expertise of team members was a vital contribution in the shared goal to do the best for each patient. The perioperative nurses expect all team members to perform responsibly, and it caused a strain in the workplace if anyone behaved otherwise. The perioperative nurses felt that their professional knowledge was respected in this team collaboration. Steady communication with other operating room personnel was seen as vital.

We need a lot of teamwork because without my anaesthetist, anaesthetic nurse, scrub nurse, assistant surgeon and without me there will be no surgery and without the patient there will be no surgery either. So, there are many people and it gives a sense of security in fact that everyone tries to think of how best to void injuries not to cause harm. (Participant 1)

The perioperative nurses constantly need to develop their skills and improve their work steadily. Perioperative nurses being alone in their profession in the operating room limits opportunities to ask colleagues for advice and support. In situations where two perioperative nurses collaborate during surgery, they have opportunity to support and learn from each other, thereby improving their work.

Protocol, checklist and standards implementation

All participants expressed that they were accountable for the safety guidelines, ensuring instruments and other sterile materials and equipment needed were available and functioning. They also asserted their responsibility for surgical count, with the first count done before the surgery began as a base line. Another count was performed during the procedure before closing the wound to ensure that no surgical items were accidentally left in the wound. Another vital role of perioperative nurses was the verification of the patient's identity when entering the operating room and the verification of the operating site on the patient with the x-rays. the participants confirmed the preparation with the orthopaedic surgeon using the timeout in the WHO Surgical Safety Checklist. However, they highlighted that the Surgical Safety Checklist was not always implemented as designed as the checklist was often performed while the perioperative nurses were busy with final preparations for the surgery and not participating with full attention. The utilisation of timeout was dependent on the preference of the orthopaedic surgeon which differed from one surgeon to another.

... I know that I have the right patient to begin with, that planning is consistent with the x-rays or when we do 'Sign in', it is consistent with the patient records, the identity bracelet, operation site and the operation is performed on the right site (Participant 11)

The participants agreed that safety protocols were important in ensuring the right implant was available, a step usually taken by the orthopaedic surgeon and the perioperative scrub nurse, reading the implant package before it is opened unto the sterile field. Participants viewed standard procedures as a safety measure. They explained that they constantly assessed what was best for each patient, judging with existing routines and standards.

Compliance with Aseptic Techniques

The participants stated their responsibility for sterility and infection control as they guarded the sterile field during the entire surgical procedure by watching the activities of other team members which sometimes could be challenging. Participants also noted that the prerequisites for work in an aseptic environment were present, national guidelines for preventing Prosthetic Joint Infections were established and complied with. One of such guidelines was the control of traffic to reduce the number of persons in the operating room and avoid disruption of the ventilation by opening the doors too frequently. However, some participants observed that compliance with guidelines varied within the team as some orthopaedic surgeons followed the guidelines more strictly than others and controlling the number of personnel in the operating room was disregarded by some surgeons whenever there was an interesting surgical procedure.

The participants also emphasised the need to improve staff behaviour adhering to the aseptic techniques as insistence was viewed as a disturbance of work flow, delaying both the surgical procedure and the operation schedule for the whole day. These procedures could be handling of specimens and urinary catheters. Some participants perceived that they were seen as annoying and disturbing when they notified others of break in aseptic techniques.

It is uncomfortable when someone is reprimanded or called a hygiene-witch/wizard... Even if people think you're irritating, I think you still get some kind of respect as you would be seen as competent and what you say is important. Even if you are considered awkward, you are trusted as competent professional working for the common good the group and the patient.

(Participant 10)

Individual level

The perioperative nurses had a feeling of personal responsibility towards the patients and felt guilty if they failed protecting them from harm by using their professional knowledge and skills with the confidence to speak up if the patient was at risk. This is known as the surgical conscience.

Professional knowledge, skills and experience

Perioperative nurses knew what was expected of them to preserve patient safety as they used professional knowledge and skills to protect patients from harm which included safe positioning of the patient on the operating table before surgery. They had a responsibility for what they saw during the procedure by being a part of the operating team and to speak up if a situation occurred that put the patient at risk. They experienced that notifying the orthopaedic surgeon of near mishaps when unexpected things happen during surgery required confidence which was gained by experience and the team needed to adjust their plan.

If you see something in the surgical field, I feel that you have a responsibility, then it depends on experience, how much experience you have and what you know or have seen before. It is also a part of patient safety that you scrubbed for the operation. (Participant 17)

Personal commitment

Perioperative nurses are responsible for the patient's safety and comfort in perioperative care. They were eager to welcome the patient before surgery began and reassured patients that staff in the operating room was working in their best interest in a dignified manner.

The participants felt guilty if there was occurrence where they failed to protect the patient from harm. Some described occurrences where they would not have wanted to be the patient. Although perioperative nurses recognise that many factors can lead to infection, however, they felt accountable if a patient acquired Surgical Site Infection or Periprosthetic Joint Infection.

As perioperative nurses, there must be something in us. As soon as there is an infection, you go straight into the old medical records to check if you were there during the first surgery as you think you bear the responsibility. Then I understand that there are many factors that come into play…… I think many of us feel responsible…. have I done something wrong? .... is it my mistake that caused this patient's infection? (Participant 8)

Discussion

The findings of this study show that perioperative nurses recognise diverse ways of improving safety measures in the operating room at different levels during knee replacement surgery (organisational, team and individual). These events disrupt the workflow, sometimes threatening patient safety. Additionally, the findings highlight how impending problems were solved from day to day to maintain safety. To ensure a safe surgical procedure, the perioperative nurses recognised the need for a dependable preoperative plan confirming previous findings (Nyberg A, et al., 2021). This is in line with Iflaifel, et.al. (2020) study which revealed that predictive information is needed in resilience engineering to anticipate decision making. Some participants identified problems when confirming the plan between the computerised planning system and the surgeon which they perceived as time-consuming and unsafe. As stated by Sandelin., Kalman., and Åkesdotter. (2019), the aim of computerised planning system is to assemble a workable plan.

However, Rothstein and Raval, (2018) recognised that achieving this requires the engagement of all stakeholders involved in the planning. The risk of disruptions could arise if the plan is not updated, compromising patient safety and affecting organisational productivity. Previous studies (Guerriero and Guido, 2011; Braaf, Riley and Manias, 2015) presented similar findings. Rather than addressing the main problem of inadequate plan update, participants chose to address the immediate problem in order to maintain the workflow in operating room. Smith, Plunkett and People. (2019) saw this as resilience by the frontline workers when the perioperative nurses had to adapt in order to achieve good surgical outcome even with unsatisfactory working conditions. Although the perioperative nurses had good intentions adapting to the situations, Nyberg A, et al., (2021) reasoned that this could create a disconnect between the operating room management work-as-imagined and the perioperative nurses work-as-done. This type of disconnect could restrict the possibility of change which is inevitable. Work-as-imagined means following safety guidelines and

standards. However, Smith, Plunkett and People. (2019) maintained that operating room staff know that undeniable variations are inevitable in safe practice.

In this study, the underlying challenge in poor engagement in planning documentation could linger on if the operating room managers fail to acknowledge or do not have the freedom to address it. The problem of inadequate plan update was perceived by perioperative nurses as annoying, repetitive and frustrating on the long run. Among the front-line staff disillusionment and turnover could impact negatively on the resilience in the system (Rothstein and Raval, 2018)

During the interviews, different computer systems were observed hindering the flow of information, potentially affecting patient care, confirming previous findings regarding documentation (Braaf, Manias & Riley, 2011). The perioperative nurses had no time to access information from the main health record. Therefore, they felt that a technology with quick access to relevant information could be provided by the organisations (Braaf, Riley & Manias, 2015). In order to save time, perioperative nurses in this study did not report directly or in person to postoperative wards to prevent breaks in continuity of care. Some revealed that they developed a way to bypass the documentation practice. This bypass resulted in duplicate documentation in separate systems to ensure the postoperative ward nurses got necessary information. Participants adapted their routine practice to demonstrate resilience to avoid misinformation. Rothstein and Raval (2018) viewed this development of bypass as taking risk that can limit the possibility of change.

It was noted that teamwork and collaboration are essential in averting unfavourable occurrences, which supports findings from previous studies (Howard-Hill, 2018; Rothstein and Raval, 2018). As previously reported by Cumin, Skilton and Weller, (2017), expertise of every profession was viewed as a vital contribution to the process and every team member needed the confidence to speak up when the alert is needed. The perioperative nurses felt they were respected for their professional knowledge in collaboration with other team members. However, previous studies suggested the need for improvement in collaboration between doctors and nurses in the operating room and other areas in the hospital. Their competence, technical skills and experience in patient care informed their patient safety practices which were identified as important as presented earlier by Rothstein and Raval (2018) and Sandelin et. al. (2019). A sense of personal engagement among the perioperative nurses was prominent and feelings of guilt were perceived where a patient was not protected from harm. Additionally, they expected all team members to accept their professional responsibilities and stressed the need for a common purpose. An open dialogue within the team, with established expectations were adjudged important, confirming the report of previous by Gillespie, et. al. (2013). The perioperative nurses identified primary responsibility in assuring compliance with aseptic techniques diverse level of compliance within the team as reported by van Dijk et. al. (2023). Although guidelines for preventing infections were established, experience showed that level of compliance varied among team members. Good leadership and mutual respect, acceptance of workgroup hierarchy with share goals were needed within the team for best effect Gillespie (2016). Some variations in day to day performance is expected, this should not be understood as dangerous since things should still go well, though a team not complying with existing safety protocols is beyond expected performance variability (Hollnagel, Wears and Braithwaite, 2015). Patient safety cannot be improved by introducing safety policies alone without the need for implementation (Megeus, et. al., 2015).

As earlier stated by Göras, et. al. (2020), Checklist was identified as crucial for preserving safety during surgery. Control steps were seen as guidance for safe practice, and specifically SSC as a useful tool to maintain a high level of safety awareness. Findings from other studies, (Nordström and Wihlborg 2019; Göras, et. al. 2020) noted the surgical safety checklist increased communication and teamwork in the operating room and highlighted potential risks. In this study, it was noted that the Checklist was not always used as

designed and its implementation was complicated by the perception of the SSC as nonessential. Reports from previous studies (Nordström and Wihlborg 2019; Göras, et. al. 2020) suggest that the implementation of SSC might be more successful if led by surgeons. Standardisation of procedures was considered a way to improve the perioperative process. Appropriate standardisation and a level of flexibility are needed for the success of an organisation as standardisation protects against predictable and preventable errors and flexibility supports resilience in unpredictable situations, where balance between these is needed (Kolodzey, et. al., 2020). This is in line with the findings of another study by Göras, et. al. (2020) which suggested that to manage the complexity in operating room and maintain safe care necessitates the ability to respond to both the expected and the unexpected. The findings from this study show that resilience exists within the organisations which is not only used in unpredictable situations. The perioperative nurses demonstrated resilience in managing day to day work, showing their ability to make and maintain adjustments. However, where there is every day need for resilience, capacity to respond to new challenges may be restricted (Hollnagel, Wears and Braithwaite, 2015). Resilience is needed to resolve unplanned situations rather than everyday occurrences. Safety threats in everyday work should be recognised and managed as the organisation improves.

Strengths and limitations

During the analysis, there were interactive discussions among the research group which increased credibility for this study. Direct quotes with descriptions were also presented for credibility. The diversity of professionals involved in the analysis also strengthened this study. The degree of transferability is up to the reader. One limitation is that all interviews were conducted by the first author, who is a perioperative nurse professionally known to some of the participants. This dual role of the researcher could potentially influence participant response. However, this dual role may have helped create a safe environment and the shared understanding could have deepened the report.

Conclusion

The conditions for supporting patient safety and minimising the risk for complications during knee replacement surgery continues to be inconsistent, requiring constant performance appraisal. Perioperative nurses make adjustments to solve problems as they arise where there are obvious risks for patient complications. The organisational patient safety management process still seems to allow deviation from established practice standards, relying on individual corrective measures for good results in the current Nigerian situation.

Recommendations

It was therefore recommended that the inconsistency in practice be addressed for patient safety during surgery. Surgeons and perioperative nurses could work out a system where too many cases are not booked for operation on a day for knee replacement surgery this will give room for proper utilisation of the Surgical Safety Checklist which is the gold standard for patient safety in the operating room without seeing it as time wasting. This will go a long way in minimising complications and eventual postoperative infections that may arise. Additionally, it will reduce cost of hospital stay in the present harsh economic situation in Nigeria, for best patient outcomes.

Ethical approval

Ethical approval for this study was obtained from Edo State Health Research Ethics Committee. The perioperative nurses gave their written informed consent to participate before the interviews. Participation was voluntary and they were told that they could withdraw from the study at any time.

Conflict of Interest

The authors declare no conflict of interests.

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