Effect of Instructional Guidelines on Nurses' Performance regarding Robotic Total Knee Arthroplasty among Patient with Tri Compartmental Osteoarthritis Knee with Various Deformities

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Abstract:

Background: Robotic total knee arthroplasty uses certain software to convert anatomical images into a virtual three-dimension reconstruction of joints, might enhance nursing clinical education and patient care. **Aim:** To investigate the effect of instructional guidelines on Nurses' performance regarding robotic total knee arthroplasty among patient with tri compartmental osteoarthritis knee with various deformities. **Design:** A quasi-experimental (pre/post-test) research design was used to conduct the study. **Setting**: The study was conducted in the orthopedic departments at Sohag University Hospital. **Sample**: The study subjects were included a convenient sample of all available staff nurses working in previous selected settings and who agreed to participate in the study. **Tools**: Two tools were used for data collection: **Tool I:** Nurses' knowledge **questionnaire:** It consisted oftwo parts as the following: **Part 1:** included personal data of the studied nurses; **Part 2:** Structured multiple-choice questionnaire to assess nurses' knowledge regarding robotic total knee arthroplasty among patient with tri compartmental osteoarthritis knee with various deformities, and **Tool II:** Nurses' reported practices regarding robotic total knee arthroplasty (pre/posttest). **Results:** The results of the study showed that the nurses' overall practice scores and knowledge scores before and after the implementation of instructional guidelines regarding (0.001 and 0.003), respectively, had a highly statistically significant positive correlation. **Conclusion**: Instructional guidelines have a favorable impact on nurses' knowledge and practice on robotic total knee arthroplasty among patients with tri compartmental arthritic knees with varied deformities, according to the study's findings. **Recommendations**: To increase their proficiency, nurses should have access to in-service training courses and continuing education opportunities on robotic total knee arthroplasty.

Keywords: Instructional guidelines, Nurses' performance, Patient with tri compartmental osteoarthritis knee with various deformities, Robotic total knee arthroplasty.

Introduction:

Robotic assisted procedures with trauma products offering comprehensive approach to orthopedic care. With this advanced surgical solutions an N number of orthopedic cases are operated which shown a speedy recovery than traditional method of Surgical intervention. This case series report explains about observation for the speedy recovery rate who opted for robotic total knee arthroplasty (TKR) diagnosed with Tri Compartmental osteoarthritis knee with varus deformity in Preethi Hospitals at Madurai. This case series may explain about history, physical findings, techniques used and advantages of orthopedic Robotic surgery (**Quattrini et al., 2024**).

Acute or chronic joint inflammation is referred to by the general term "arthritis." The degenerative, non-inflammatory joint disease known as primary osteoarthritis is typified by the creation of new bone at the joint borders and surfaces and the degradation of articular cartilage. Overall prevalence of knee osteoarthritis among Indian population was 28.7% with women having higher prevalence (31.6%) than men. By 40 years of age, 90 % of population has degenerative joint changes in the weight bearing joints (**Tompkins et al., 2022**).

Primary osteoarthritis is caused by genetics, inheritance, and fat. occupation that involves a lot of standing, sports, and other metabolic and endocrine conditions. Early in the morning, patients may complain of stiffness, which goes away throughout the day after some activity. Very advanced cases may have genu varum deformity (**Fozo et al., 2023**).

An examination of the knee joint by radiography is the most crucial diagnostic procedure. Other tests that aid in the diagnosis of osteophytes include bone scans, MRIs, CT scans, and synovial fluid studies. Disease symptoms are frequently treated

conservatively for many years. Surgery may be recommended, though, given the patient's diminished joint function, untreated pain, and greater reliance on self-care (**Batailler et al., 2021**).

A robotic TKR is intended to reduce errors related to bone cutting and prosthesis alignment and position in orthopaedics. Compared to traditional TKR, robotic TKR provides superior surgical and clinical patient outcomes. In the UK, the first robotically assisted total knee arthroplasty was carried out in 1988. Preethi Hospital is the first ever Robotics Knee Replacement Surgery in Southern Tamil Nadu, particularly in the vibrant city of Madurai and utilizes Smith+ Nephew's cutting-edge robotic-assisted technology, marking a transformative milestone in the regions of healthcare landscape (**Andriollo et al., 2024).**

With robotic total knee arthroplasty, anatomical pictures are transformed into a virtual three-dimensional joint reconstruction using specific software. Pre-operative CT scans or intraoperative tibia and femur mapping are typically requested to obtain the anatomy. Based on the patient's anatomy, the surgeons utilize this model to determine the ideal bone cut, implant placement, limb alignment, and bone covering. The intraoperative robotic device reduces the risk of iatrogenic bone and soft-tissue damage. In order to provide a longer prosthesis lifespan, robotic TKR was created to increase bone preparation accuracy and reduce the likelihood of outliers. Reduced polyethylene wear and a decreased rate of revision arthroplasty are linked to adequate mechanical axis restoration in total knee arthroplasty (TKA) (**Alesi et al., 2022**).

Advantages of robotic surgery included All native ligaments are preserved, no medullary drills, less soft tissue dissection, lesser bone resection, less pain, better mobility, and ability to squat and sit cross legged (**Rossi& Benazzo, 2023**). Getting the various parts of the artificial joint in the ideal alignment to mesh and function as a unit is one of the most challenging parts of joint replacement surgery. To help the surgeon achieve the required orientation, the robotic arm offers tactile, visual, and aural input, which can improve mobility and stability (**Massé et al., 2023).**

Numerous studies comparing the outcomes of conventional and robotic-assisted unicompartmental knee arthroplasty have found that, in terms of knee alignment and function, robotic-assisted surgery may offer certain advantages over conventional surgery. Almost all the patients had presenting complaints of pain over bilateral knee for around 2-9 months, difficulty in day to day activity, pain is insidious in onset and pricking type of pain aggraded on walking and relieved by rest (**Siddiqi et al., 2021**).

Following findings are present among almost all the patients such as Genu varum present, 50 – 90% of Range of Motion present with pain, Bilateral legs pitting edema upto knee, Active toe movements, Distal sensation present, and Multiple hyper pigmented – lesions on bilateral legs present. Preoperative orders and preparation included skin preparation, anesthetic opinion, nil per os (npo or NPO) from 12 pm onwards prior to surgical day, obtained consent, 18 G cannula was inserted, 14 – G foley's catheter, Inj. Tranexemic acid 1 g is maintained on flow, antibiotic (after test dose), sedation, IV fluids, and continuous volumetric epidural pump is connected (**Sappey-Marinier et al., 2020).**

In many nations, robotic surgery is becoming a more and more common method in several medical specializations. However, nurses working in such a technologically advanced setting can focus too much on the robot and lose sight of the patient. The Perioperative Patient Focused Model is proposed as a theoretical framework to guide nursing perioperative care towards a patient centered approach based upon 4 dimensions: Health System, Safety, Behavioural Responses and Physiological Responses (**Sun et al., 2023).**

Nursing care during the perioperative phase of robotic surgery is primarily concerned with the dimensions of safety, behavioral reactions, and health systems. There is little difference in the physiological reactions compared to open surgery, and the rate of complications is much lower. This occurrence means that, unlike in a standard open surgery, the perioperative nurse's primary responsibility is not to identify and treat physiological consequences from the procedure (**Bonnin et al., 2022**).

On the other hand, fear and anxiety are typical behavioral reactions that are also seen in open surgery and also show up in robotic surgery. The main distinction is where the dread or worry comes from. When patients undergo robotic surgery, the primary concern is whether the robot is operating autonomously. In order to respond appropriately to this response, nurses need to be ready. However, considering the patient's quick departure, both behavioral and physiological reactions necessitate ongoing care. Accordingly, these results provide

credence to the notion of a perioperative nurse's duty being extended outside of the hospital, into the community, consulting, or office (**Rossi et al., 2024**).

Physical activity such as Active Ankle toe movements, Static quadriceps, straight leg raise (SLR) test, Knee Hip range of motion (ROM), Vastus Medialis Oblique (VMO) muscle and Abductor, strengthening exercise, High sitting, and Full weight bearing with walker are very important. The following present and potential Problems are identified among most of the patients such as Pain, Impaired physical mobility, Imbalanced nutritional Status less than body requirement, Impaired Elimination, Insomnia, Impaired Hygiene, Potential for Infection, and Risk for fall (**Sangaletti et al., 2024**).

A nurse's role in treating osteoarthritis in the knee joints Some strategies to educate the patients include the following: Consider using a taller chair, which requires less effort to get in and out of. Bathroom modifications include installing western toilets, bath accessories, and a handrail for mobility. Climb steps with your strong leg first, then descend stairs with your weak leg one at a time, Use walking stick, Reduce overweight to reduce load on joints, and Teach knee exercises such as Mobility exercises, Strengthening exercises, Quadriceps exercises, Straight leg raising exercises. The purpose of osteoarthritis exercises is to improve stability, shock absorption, and range of motion, strengthen the quadriceps muscle, prevent deformity, improve posture, and reduce pain and stiffness (**Rivero-Moreno et al., 2023).**

Significance of the Study:

For patients with degenerative, tri-compartmental, or end-stage osteoarthritis, total knee arthroplasty (TKR) yields consistent results. Given that millions of Americans suffer from osteoarthritis, the knee is particularly affected by this progressive ailment, which is typified by a slow loss of articular cartilage and degradation. An estimated 400,000 primary total knee arthroplasty procedures are carried out in the US each year, and the incidence of symptomatic knee osteoarthritis is estimated to be 240 per 100,000 patients (**Arulmozhi et al., 2024**).

In Egypt, **El-Ganzouri (2023**), stated that there are many reasons for artificial joints, the most important of which is joint osteoarthritis, particularly in knee joints. Annual incidence of total knee arthroplasty with approximately 10,000 to 15,000 joints in Egypt.

Operational definition:

Nurses' performance:

It means the act of successfully carrying out a task while utilizing knowledge, as opposed to merely processing it. In this study, "performance" refers to assessing the practice and knowledge of the participating nurses in the care of robotic total knee arthroplasty.

Aim of the study:

The study aimed to investigate the effect of instructional guidelines on Nurses' performance regarding robotic total knee arthroplasty among patient with tri compartmental osteoarthritis knee with various deformities through:

Assessing Nurses' understanding of robotic total knee replacement is evaluated both before and after teaching.

Evaluating nurses' reported practices for robotic complete knee replacements both before and after training

Instructional guidelines are designed and implemented according to the needs of nurses. Assessing the impact of educational guidelines on nurses' understanding and proficiency in robotic total knee replacement.

Research hypothesis:

Total Nurses' knowledge and practices mean scores who are receiving instructional guidelines regarding robotic total knee arthroplasty among patient with tri compartmental osteoarthritis knee with various deformities anticipated to be better post the intervention than pre.

Subjects and Method:

Research design:

This study was carried out using a quasi-experimental design (one group was pre/post-tested).

Setting:

The study was conducted in the orthopedic departments at Sohag University Hospital.

Subjects:

The study subjects were a representative sample of all staff nurses who had worked in certain settings in

the past and gave their agreement to be included in the study.

Data collection tools:

Two tools were used for collecting data in this study.

Tool I: Nurses' knowledge questionnaire: It was developed by the researchers after reviewing the national and international related literature (**Arulmozhi et al., 2024, Haring et al., 2022, Brunner & Suddarth, 2022; Mancino et al., 2020**).

This tool was made up of the following two parts:
Part 1: This section contained the personal information of the nurses under study, including their years of experience, education, gender, and age.
Part 2: Structured multiple-choice questionnaire to assess nurses' knowledge regarding robotic total knee arthroplasty among patient with tri compartmental osteoarthritis knee with various deformities (pre- and after one month) to assess the nurses' knowledge about robotic total knee arthroplasty. It included questions related to compartmental osteoarthritis knee such as definition, causes, symptoms, investigation, physical examination, pre-operative preparation, present and potential Problems are identified among the patients.

Scorings system
A correctly completed item received a score of (2), an incomplete item received a score of (1), and an incorrect item received a score of (0). Total knowledge was categorized to: satisfactory and unsatisfactory. Unsatisfactory knowledge was defined as a nurse's score of less than 70%, and satisfactory knowledge was defined as a score of more than 70%.

Tool II: Nurses' reported practices regarding robotic total knee arthroplasty (pre/posttest). It was developed by the researchers after reviewing the national and international related literature (Arulmozhi et al., 2024, Deepak, 2022, Shatrov& Parker, 2020) to assess the nurses' reported practices about robotic total knee arthroplasty. It included questions related to compartmental osteoarthritis knee such as Role of a nurse in the management of osteoarthritis of the knee joints such as use of higher chair, which require less effort to get in and out should be considered, changes to be made in bathrooms such as western toilets, bath aids, railing for movement, climb stairs leading the good leg taking one stair at a time to descend the stairs leading with weak legs, use walking stick, reduce overweight to reduce load on joints, and teach knee exercises such as mobility exercises, strengthening exercises, quadriceps exercises, straight leg raising exercises.

Scoring system
While nurses who checked the wrong answer received a score of (0), those who checked the right response received a score of (1) for the practice items. To calculate the average score for the section, the totals and item scores for each practice domain are added up and divided by the total number of items. Nursing practices can be divided into two categories: competent and inept. When a nurse's score was below 80%, it was considered incompetent practice; when it was over 80%, it was considered competent practice.

Tool validity and reliability:

Five medical-surgical nursing and medical specialists assessed the data collection tool's validity based on its comprehensiveness, appropriateness, relevance, and clarity. The internal consistency approach was employed in the current study to assess the reliability of the two scales. Both tools demonstrated outstanding dependability, with Cronbach alpha ratings of 0.97 and 0.91 for the first and second, respectively.

Procedures: The actual study included three phases:

I-Preparatory phase:

The researchers developed the tools for data collection and education by looking at the current and related literature that was accessible through textbooks, journals, periodicals, and internet searches. An Arabic handout was made, printed, and distributed to the study participants following the implementation of the instructional principles.

Pilot study:

Ten percent of the nurses from the selected unit (5 nurses) participated in a pilot research to evaluate the tools' applicability, clarity, and projected time for each. The nurses that participated in the pilot study were the main study participants.

Ethical consideration:

Ethical approval was obtained from the Research Ethics Committee of the Faculty of Nursing - Sohag University with number (76/ 2023). The conduct of the study was formally approved by the dean of the nursing faculty through a letter. Following notification of the study's goals, the directors of the

previously chosen settings provided their written consent. The researchers obtained the nurses' consent before beginning the trial and briefly reviewed its goals. They also signed contracts that guaranteed their secrecy and anonymity, and they told the participants that they could stop participating in the study at any time without having to provide a reason.

II. Planning phase:

Based on the results of the previous phase, the goals, priorities, and expected results were formulated to address the practical requirements, knowledge gaps, of the nurses about robotic total knee arthroplasty. The researchers organized four sessions for the nurses under study.

II-Implementation phase:

Books, journals, periodicals, and internet searches were among the accessible literature that the researchers looked at. The data collection period, which began in February 2024 and ended in July 2024, lasted six months and was completed following the conclusion of the subsequent phases. The nurses were briefed on the study's nature, objectives, and expected outcomes prior to the interview.

The researchers began data collection by first obtaining personal data. Next, as a baseline measure, each participant's knowledge of robotic total knee arthroplasty among patients with tri compartmental arthritic knees with different deformities was assessed using tool I. Tool II then assessed the participants' stated behaviors. To assess how the instructions affected the nurses' performance, the results served as a pretest. Along with spoken instructions, the researchers were given written materials that contained illustrations. This illustrative handout was developed by the researchers using content testing, the opinions of healthcare experts, the results and suggestions of previous research, and a review of the pertinent literature.

Instructional guidelines were implemented for eight weeks at this period for robotic total knee arthroplasty. For the subject, four sessions have been planned: two for practice and two for theoretical substance. Each of the ten groups of nurses who took part in the study lasted for around two hours in total. Five nurses were on each team. Various teaching techniques, including lectures, brainstorming sessions, small group discussions, photographs, demonstrations, re-demonstrations were used in the education program. Handouts, PowerPoint, figures, flipcharts, and animated films regarding robotic total knee arthroplasty among patient with tri compartmental osteoarthritis knee with various deformities were among the teaching resources used.

Contents of sessions

Session 1: Each researcher gave an introduction that outlined the subjects and learning objectives of the session. To ensure the nurse could understand, the researchers performed the session in Arabic. The researchers start assessing nurses' understanding and proficiency with robotic total knee replacement with the pretest.

Session 2: The theoretical portion of the lesson covered knowledge on compartmental osteoarthritis knee such as definition, causes, symptoms, investigation, physical examination, pre-operative preparation, present and potential Problems are identified among the patients. The data-collecting tools took nurses, on average, about 50 minutes to complete.

Session 3: The practical part focused on robotic total knee arthroplasty and compartmental osteoarthritis knee such as Role of a Nurse In The Management Of Osteoarthritis Of The Knee Joints such as Climb stairs leading the good leg taking one stair at a time to descend the stairs leading with weak legs, Use walking stick, Reduce overweight to reduce load on joints, and Teach knee exercises such as Mobility exercises, Strengthening exercises, Quadriceps exercises, Straight leg raising exercises,

Session 4: In the practical section, information about contemporary nursing practices was covered. This included the role of a nurse in managing osteoarthritis of the knee joints, including the use of higher chairs that require less effort to get in and out of and bathroom modifications like western toilets, bath aids, and railings for mobility. Lectures, posters, and instructional movies regarding robotic complete knee replacement were used to implement it.

IV: The Evaluation phase:

One month following the implementation of the instructional guidelines, the research sample's knowledge and practice regarding robotic total knee arthroplasty were evaluated. The same format of the tools used in the pre-test was used to examine the impact of the instructional guidelines on nurses' performance regarding robotic total knee arthroplasty

among patients with tri compartmental osteoarthritis knee with various deformities.

Statistical analysis:

Using a PC, the data gathered from the sample under study was updated, coded, and input. The statistical program for social sciences (SPSS) version 20 was used to do statistical analysis and computerized data entry. Descriptive statistics were used to display the data as percentages and frequencies. Correlation sufficiency was employed to test for correlation between variables, and the paired t-test was utilized for comparisons between qualitative variables. A p-value of less than 0.05 was deemed statistically significant.

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Results:

According to **Table 1**, 66% of the nurses in the study were female, and 42% of them were between the ages of 20 and under 30. Their mean age was 35.56±8.6. According to their qualifications, 42% of the nurses in the study have completed secondary nursing school. In the study, 48% of the nurses had less than 10 years of experience.

Figure 1 indicates that none of the studied nurses (0) had previously received any training sessions regarding robotic total knee arthroplasty among patient with tri compartmental osteoarthritis knee with various deformities.

Table 2 demonstrates a statistically significant improvement in all knowledge items following instructional guidelines (P<0.001). Before instructional guidelines, the total knowledge mean scores were 8.55±2.33, but after instructional guidelines implementation, the score improved to 15.9±2.8.

As seen in **Figure 2**, 6% of the nurses in the study had satisfactory knowledge pre- instructional guidelines implementation, while 92% had satisfactory knowledge post- instructional guidelines implementation.

Table 3 shows that there were highly statistically significant differences between nurses' total reported practice mean scores regarding robotic total knee arthroplasty among patient with tri compartmental osteoarthritis knee with various deformities pre and post instructional guidelines implementation (P<0.001).

Figure 3 portrays the nurses' total reported practice regarding robotic total knee arthroplasty among patient with tri compartmental osteoarthritis knee with various deformities among the studied nurses showed that 13% of the nurses in the study had a competent level of reported practice both before and after the implementation of instructional guidelines. Pre-instructional guidelines, but after the guidelines, things got better, and 90% of them reported practicing competently.

Table 4 revealed a highly substantial positive association between the study nurses' total reported practice scores and their overall knowledge scores before and after the application of the instructional guidelines regarding robotic total knee arthroplasty among patient with tri compartmental osteoarthritis knee with various deformities (p-value <0.001, <0.003) respectively.

Table (1): The Studied Nurses' Distribution regarding to their Personal Data (n=50)

Personal Data	Studied Nurses	
	N	%
Age:		
20 < 30	21	42.0
30 < 40	14	28.0
≥40	15	30.0
(X±SD): 35.56±8.6		
Gender:		
Male	17	34.0
Female	33	66.0
Qualification:		
Nursing Diploma	21	42.0
Bachelor of nursing	19	38.0
Master of Nursing	10	20.0
Years of experience:		
< 5	8	16.0
<10	24	48.0
>10	18	36.0

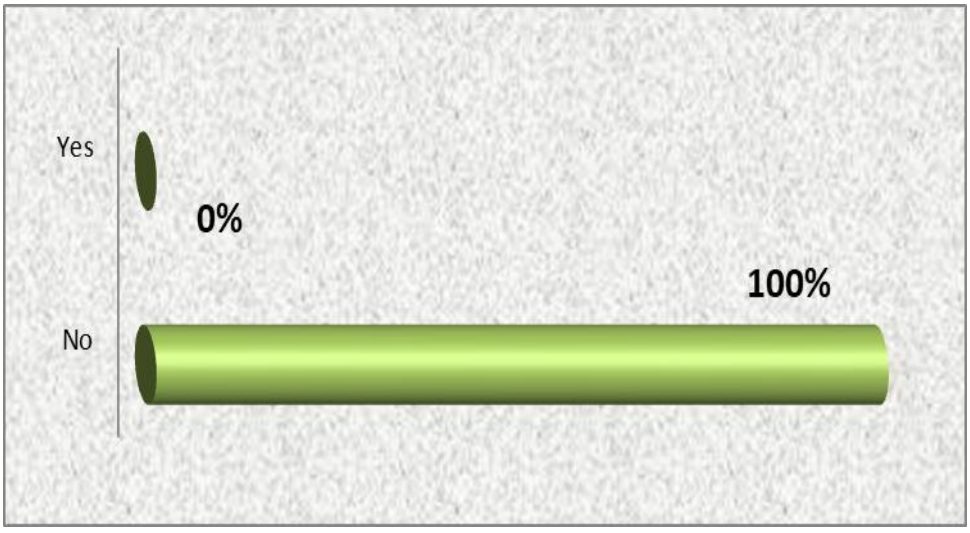

Figure (1): Previous training sessions regarding robotic total knee arthroplasty among patient with tri compartmental osteoarthritis knee with various deformities among the studied nurses (N=50)

Table (2): Comparison between nurses' total knowledge mean scores regarding robotic total knee arthroplasty among patient with tri compartmental osteoarthritis knee with various deformities pre and post instructional guidelines implementation (N = 50)

Nurses' knowledge	Study Group (n= 50)		t-test	P-value
	Pre	Post		
Total Knowledge score	8.55±2.33	15.9±2.8	χ^2=54.4**	P<0.001*

(*) Statistically significant at p≤0.001, (**) Paired t- test

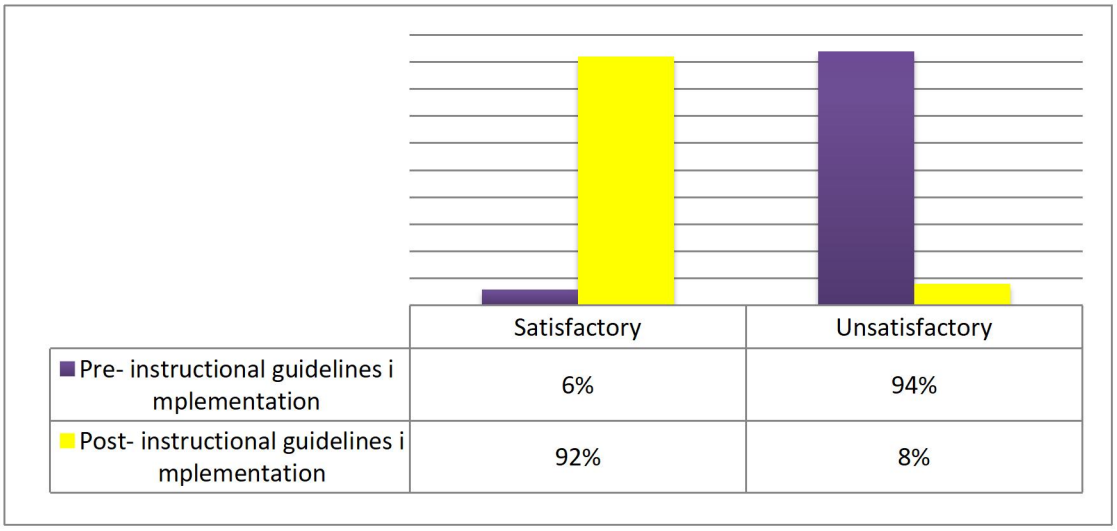

Figure (2): Total knowledge level among the studied nurses pre and post- instructional guidelines implementation (N = 50)

Table (3): Comparison between nurses' total reported practice mean scores regarding robotic total knee arthroplasty among patient with tri compartmental osteoarthritis knee with various deformities pre and post instructional guidelines implementation (N = 50)

Nurses' practical knowledge	Study Group (n= 50)		t-test	P-value
	Pre	Post		
Total practical knowledge score	12.22±4.05	20.07± 2.34	33.04	< 0.001**

(*) Statistically significant at p≤0.001, (**) Paired t- test

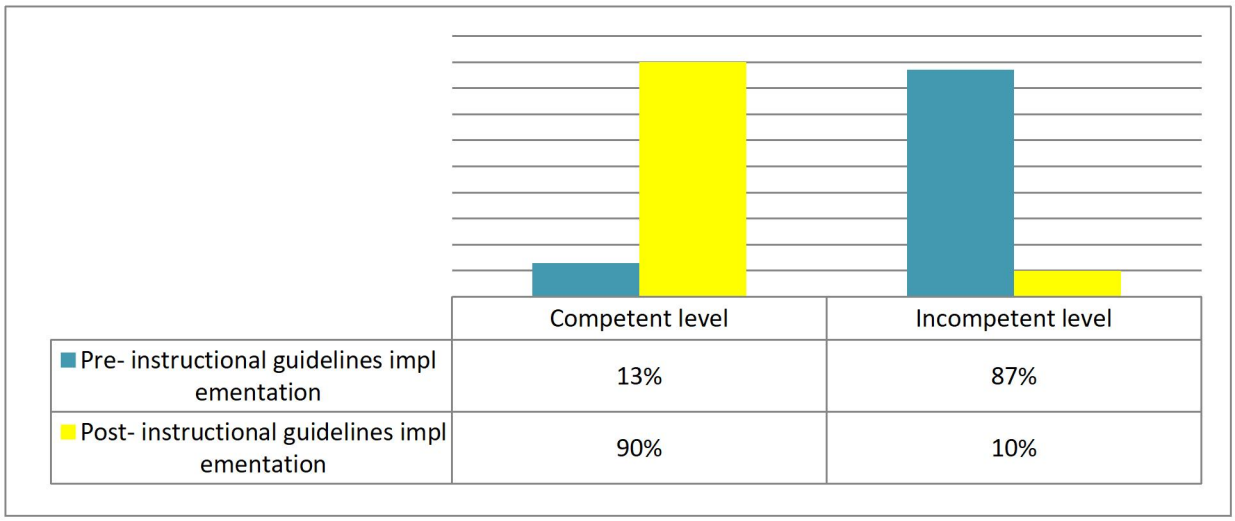

Figure (3): Total reported practice level regarding robotic total knee arthroplasty among patient with tri compartmental osteoarthritis knee with various deformities among the studied nurses pre and post-instructional guidelines implementation (N = 50)

Table (3): Correlation between Total Knowledge and Reported Practices scores **Pre- and Post- Instructional Guidelines Implementation (n=50)**

Items	Total Knowledge scores			
	Pre		Post	
	r	p-value	r	p-value
Total Practices scores	0.86	0.001**	0.45	0.003**

(**) Pearson's correlation, (**) Statistically significant at p≤0.001

Discussion:

One essential treatment for diseases including osteoarthritis (OA), rheumatoid arthritis, and post-traumatic arthritis is total knee arthroplasty. In order to reduce discomfort, increase mobility, and improve the general quality of life for those who are impacted, injured or diseased knee joints are replaced with prosthetic components (**Rossi et al., 2024**). The need for knee arthroplasty treatments is anticipated to increase dramatically in the upcoming years due to the aging of the world's population and the rise in the prevalence of degenerative joint illnesses (**Varacallo et al., 2024).** Therefore, the researchers set out to examine how nurses' performance in relation to robotic total knee arthroplasty among patients with tri compartmental arthritic knees and varied deformities was affected by instructional guidelines.

With a mean age of 35.56±8.6, a significant portion of the nurses in the study were between the ages of 20 and under 30. This finding was consistent with that of **Aldakheel (2021**), who discovered that over half of the nurses in the study were between the ages of 20 and 29. Similarly, this result was consistent with the **El-Sayed et al. (2019**) study, which indicated that about half of the nurses in the study were above 30, with a mean age of 31.3667. According to this conclusion, which differs from that of **Saad et al. (2020)**, almost half of the nurses in the study were between the ages of 45 and 61, with a mean ±SD of 34.266±2.52.

Approximately two-thirds of them were female, according to the current study's findings. The results of this study may be explained by the fact that, until recently, nursing was only offered to girls at Egyptian colleges; this may account for the large proportion of female students.

In terms of credentials, the current study's findings showed that almost two-fifths of the nurses were graduates of secondary nursing schools. This finding is consistent with that of **Taha & Ibrahim (2021**), who found that two-thirds of the nurses in the study had completed secondary school. However, this finding runs counter to El **Shemey & Elsaay's (2019**) assertion that the majority of the nurses in the study held a baccalaureate degree in nursing education.

Concerning years of experience in orthopedic unit, less than half of studied nurses have less than 10 years of experience, these results was in line with **Aldakheel, (2021**), that revealed that most of studied nurses had between 1 to 8 years of experience. Also, those results concur with a study done by **Causey-**

Upton, et al (2020) who revealed that most of nurses working in the orthopedic units ranged from 1-10 years of experience. The nurses of the present study had decreased years of experience in orthopedic units and this may reflect increasing level of nurses‟ transmission between units and increasing turnover rate, as well as the old nursing staff directed to the critical areas in the hospital. The fact that the majority of the nurses have been stable in their positions since joining the orthopedic unit may be the cause of this finding.

The results of the current study revealed that none of the studied nurses had previously received any training sessions regarding robotic total knee arthroplasty among patient with tri compartmental osteoarthritis knee with various deformities. According to the researchers, it proved how important it is to put instructional guidelines for nurses into place to improve their performance regarding robotic total knee arthroplasty among patient with tri compartmental osteoarthritis knee with various deformities. This finding is not similar with **Aldakheel, (2021**), that revealed that less than quarter of studied nurses participated in training courses related to knee replacement nursing care. This finding is supported by **saad et al. (2020**), who stated that almost all of the nurses under study were not attending the training sessions.

The results of the current study revealed that a statistically significant improvement in all knowledge items following instructional guidelines than before instructional guidelines. This could be due to the influence of instructional guidelines that enhance caregivers' understanding. This demonstrated, in the researcher's opinion, the positive impact of instructional guidelines.

As per the current study's findings, 92% of the nurses in the study had sufficient knowledge after the implementation of instructional guidelines, compared to just 6% before. Despite the fact that most staff nurses did not participate in official training programs for total knee replacement surgery, the study's nurses' lack of education and training may be the cause of the unsatisfactory level of knowledge prior to the implementation of instructional guidelines. Furthermore, the majority of nurses had merely completed high school with a nursing degree. However, after the application of the instructional guidelines, a satisfactory level of knowledge indicated that the theoretical sessions had a beneficial impact on nurses' knowledge, as evidenced by the statistically significant improvement in the knowledge elements' mean score and the total throughout the instructional guidelines implementation.

These findings support those of **Elkattan and Elderiny (2019),** who found that following the implementation of nursing care guidelines, the nurses in the study showed statistically significant gains in nearly every knowledge item. These findings also support those of **El Shemey and Elsaay (2019**), who reported that the mean scores of nurses' knowledge regarding hip joint replacement before, during, and after the study period showed a notable improvement.

These findings are corroborated by **Das et al. (2024**), who found that the majority of staff nurses lacked sufficient knowledge prior to the planned training program's implementation, but that knowledge improved after the program. It also supported the findings of **Saad et al. (2020**), who reported that the majority of the nurses in the study possessed inadequate knowledge prior to implementation, which improved after implementation. These results lend credence to the initial portion of the research hypothesis.

Regarding the overall score of nurses' practices, the current study's findings showed that, both before and after the implementation of instructional guidelines, nurses' total reported practice mean scores for robotic total knee arthroplasty among patients with tri compartmental osteoarthritis knees and various deformities differed in highly statistically significant ways. This finding is consistent with a study by **Taha and Ibrahim (2021)** that found that less than one-third of the nurses in the study had competent practice scores. These findings also support those of **Elkattan and Elderiny (2019),** who claimed that all nurses were practicing at a subpar level before nursing care guidelines were established. However, more than two-thirds of them had a strong level of practice once it was implemented. The second part of the study hypothesis is supported by these findings.

According to the current study's findings, nurses' overall reported practice of robotic total knee arthroplasty for patients with tri compartmental osteoarthritis knees and other deformities improved both before and after the implementation of instructional guidelines, and the majority of them demonstrated a competent level of reported practice. The necessity of ongoing education and on-the-job training for nurses is reflected in this study.

The present findings were not in line with those of **Healy et al. (2019**), who demonstrated that most of the nurses in the study had inadequate preoperative care practices for patients undergoing hip replacements. A study by **Tse & So (2018), Causey-Upton et al. (2020), and Bazezew et al. (2023**)

found that nurses' attitudes and behaviors regarding preoperative care were incompetent with regard to preoperative preparation and postoperative expectations. These findings were consistent with those findings.

The result of the current study revealed a highly significant positive correlation between the study nurses' total reported practice scores and their overall knowledge scores before and after the application of the instructional guidelines regarding robotic total knee arthroplasty among patient with tri compartmental osteoarthritis knee with various deformities. This finding suggests that practice can be readily enhanced, particularly given a foundation of pertinent scientific information. Additionally, it resolves the beneficial impact of educational programs on enhancing nurses' practice and understanding. **Das et al. (2024**) observed a statistically significant positive link between nurses' total practice score and their overall knowledge before and after adopting a teaching program, which is consistent with this result. The overarching research premise is supported by these findings.

Conclusion:

- Instructional guidelines have a favorable impact on nurses' knowledge and practice on robotic total knee arthroplasty among patients with tri compartmental arthritic knees with varied deformities, according to the study's findings.

Recommendations:

Based on the current study findings, it can be recommended that:

- Nurses should be able to further their knowledge in robotic total knee arthroplasty through in-service training programs and continuing education opportunities.
- Utilizing nursing manuals and illustrated brochures, the nurses were instructed to enhance their knowledge and procedures.
- A larger sample of nurses from different contexts may have a more widespread impact if the study is replicated.

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