Assessment of Nurses' Knowledge and Practice regarding Management of Infants with Congenital Clubfoot

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Abstract

Background: Clubfoot is one of the most common congenital musculoskeletal deformities. It is defined as a deformity characterized by complex mal-alignment of the foot involving soft and bony structures in the hind-foot, mid-foot, and forefoot. Nurses play a crucial role in the treatment of clubfoot because they offer comprehensive care and assistance for infants. **The aim of the study** was to assess nurses' knowledge and practice regarding management of infants with congenital clubfoot. **Design:** descriptive research design was utilized. **Subjects and Method:** A convenience sampling of 50 nurses who were working in pediatric orthopedic outpatient clinics of Tanta Main University Hospital. **Tools:** two tools were used to collect data: **Tool I:** Nurses' knowledge structured interview regarding infant congenital clubfoot. **Tool II:** Practice observational checklist regarding infant congenital clubfoot cast care. **The results:** Nearly three quarters of the studied nurses had low level of knowledge about congenital clubfoot, while all of them had unsatisfactory practice level regarding care of infant congenital clubfoot. **Conclusion:** Nurses had low level of knowledge and unsatisfactory level of practice regarding infant congenital clubfoot. **Recommendations:** Implementing continuous educational program about infant congenital clubfoot to increase nurses' knowledge and practice.

Keywords: Congenital, Clubfoot, Knowledge, Nurses, Practices, Infants.

Introduction

Clubfoot is one of the most common congenital musculoskeletal deformities that affect the foot's bones and muscles. One or both of the newborn's feet may have a deformity. Clubfoot is a complex, congenital deformity of the foot that if left untreated, can limit the infant's mobility by making it difficult and painful to walk. It is characterized by complex misalignment of the foot involving soft and bony structures in the hind foot, mid foot, and forefoot **(do Amaral., et al . 2024**).

Congenital clubfoot is thought to affect 1 to 4.5 per 1,000 live births globally, with a 2:1 male to female ratio, with about 50 percent of cases being bilateral. Every year, there are about 200,000 children born with clubfoot globally, 80% of whom are in low- and middle-income countries. The etiology of congenital clubfoot is still unknown, but it is believed to be multifactorial with a combination of environmental and genetic factors **(Maghfuri et al., 2024).**

Clubfoot is typically diagnosed during pregnancy through screening or at birth. Ultrasonography can detect clubfoot as early as 12 weeks of gestation. Clubfoot deformity results in pain, walking difficulties, and the inability to wear regular shoes if treatment is not received. Excellent treatment outcomes depend on early detection of clubfoot, accurate assessment, and early management. A functional, pain-free foot with high mobility and no calluses is what clubfoot treatment aims to attain and maintain The majority of clubfeet can be corrected in about six to eight weeks with proper gentle manipulations and casting **(Panza et al., 2023).**

Common complications in infants with cast are most likely to have pain or discomfort at the cast site, skin breakdown, pressure sores, skin inflammation, edema, and stiff joints. Casting also has the dangers of impaired circulation, muscular atrophy, and loss of range of motion. The foundation of the treatment is the critical interpretation of the functional anatomy of the feet in order to gradually correct the position of the legs through casting and manipulation **(Manousaki, 2022).**

The Ponseti method is widely recognized as the gold standard for clubfoot treatment, which has been described as highly suitable for use in resource-limited environments. In order to extend the constricted posteromedial structures and reestablish the anatomical links between the bones, weekly serial manipulation and casting are required until the foot has been clinically and radiologically repaired. The Ponseti technique significantly decreased the need for substantial surgery, making it the most effective treatment for clubfoot **(Rodriguez et al., 2023).**

Nurses are essential in the treatment of clubfoot, because they provide complete care and assistance. Nursing care for infants with clubfoot focuses on assessing, managing, and supporting the infant's physical, emotional, and developmental needs, as well as educating parents about the condition and treatment plan. The primary goal is to promote optimal foot alignment and prevent complications while offering emotional support to the family

(Bent, 2023).

Nursing assessment of an infant with clubfoot includes an extensive evaluation of the infant's physical state with an emphasis on the severity of the deformity and any possible complications. The nurse examines the feet first, noting if they are inwardly turned, downwardly turned, or affecting one or both feet **(Sutanto, Siregar, & Winanto, (2025)**. The flexibility of the deformity and any related stiffness is assessed by looking at joint mobility and muscle tone around the foot and ankle **(Laliotis et al., 2022)**.

To make sure the illness doesn't affect general well-being, the nurse should monitor growth and developmental milestones. Parents are also informed about the significance of adhering to follow-up care and treatment alternatives like bracing, casting, or surgery. This collaborative approach helps ensure the best outcomes for the infant. **(Shahbaz A, Sarwar W, & Javed A (2024).**

Serial casting is frequently used in the first stage of treatment, in which the infant's foot is gradually manipulated into the proper position and secured by casts. The skin integrity, circulation, and sensation distal to the cast are all vitally monitored by nurses. They should look for symptoms of skin deterioration, edema, or temperature and color changes that may indicate compromised circulation. To avoid skin irritation and infection, parents must be taught how important it is to keep the cast clean and dry **(Rehman., et al. 2025).**

Parents should receive instruction from nurses on how to properly use the brace, including how long and how often to wear it. These may vary depending on the treatment plan. To monitor the infant's reaction to the brace and make any necessary adjustments, follow-up sessions are required regularly **(Ghida et al., 2022)**. A parent-based exercise program that is exactly as successful as the foot abduction brace and has a greater compliance rate is recommended as an alternative. After the last cast is removed, the parents will be instructed to start exercise for their infants as a routine at home until they are four years old without needing braces **(Sheta et al., 2022)**.

Nurses should give the infant nutritional support and make sure the infant is eating healthy and developing normally. Alternative techniques could be required if the infant is wearing braces or casts, since they might have trouble with specific feeding positions. Nurses should advocate for family-centered care, involving parents in decision-making and encouraging their active participation in the child's care. This method improves the child's general well-being **(Corbu et al., 2022)**. Working together as a multidisciplinary team to provide coordinated treatment for infants with clubfoot, nurses collaborate closely with physical therapists, orthopedic experts, and other medical specialists. For the best results, teamwork is crucial **(Teklay et al., 2021)**.

Better child care, better results, and greater job satisfaction for nurses can result from educational interventions that improve

nurses' knowledge, skills, and general competence. Continuous education helps them stay updated on advancements in healthcare, ensuring they provide evidence-based and quality care. Furthermore, continuous education encourages a culture of professional development and flexibility among nurses **(Agarwal et al., 2025).**

Significance of the study

Clubfoot is encountered in about one per thousand live births, varying from one race to another. It affects approximately 150,000–200,000 newborns all over the world each year **(Jack & Fitzgerald, 2022).**

Nurses in Egypt face several challenges when providing clubfoot care, particularly in implementing the Ponseti method, which is the gold standard for treatment. Systemic problems, a lack of resources, and deficiencies in healthcare personnel's knowledge and training are the causes of these challenges. Education and training enable nurses to provide evidence-based care, make informed clinical decisions, and implement clinical guidelines effectively **(Wang et al., 2024).** So, the aim of the study was to assess nurses' knowledge regarding management of infants with congenital clubfoot

Subjects and method

Design: A descriptive research design was used to conduct this study.

Setting: The study was conducted at pediatric orthopedic outpatient clinics of the Main Tanta University Hospital's. **Subjects:** convenience sampling of 50 bedside nurses who are working in orthopedic outpatient clinics and manage orthopedic problems.

Tools of date collection

Tool I: knowledge structured questionnaire: The researcher developed it following a review of current relevant literatures **(Memon et al., 2023) & (Rondonuwu, Gessal & Kalangi, 2023)** to assess nurses' knowledge regarding infant clubfoot and congenital clubfoot care measures. It consisted of two parts: **Part (1):** Socio-demographic characteristics of the studied nurses such as age, level of education, years of experience at the pediatric orthopedic outpatient clinic, and previous attendance of training program regarding congenital clubfoot care. **Part (2):** Nurses' knowledge regarding infant congenital clubfoot and ponseti method and management.

Nurses' knowledge was included; definition, etiology, signs and symptoms, complications, diagnosis, and management of clubfoot**.**

Scoring system

Nurses' knowledge was scored as following:

- Correct complete answer that was given a score (1)
- Incorrect, missed or didn't know was given (0)

Total score of nurses' knowledge was calculated as following:

- 80-100 % was regarded as high level knowledge.
- 60- <80% was regarded moderate level knowledge
- less than 60% was considered as low level knowledge

- The total score of the studied nurse's knowledge was 15 grades

Tool II: Observational checklist about nurses' practice regarding infant congenital clubfoot cast care:

The check list was adopted and based on the identified guidelines care **(Miedzybrodzka, 2023).** It was used to assess nurses' practices through direct observation

It was composed of two main sub items, which were: assisting in cast application (11 items), cast care (7 items).

The scoring system for each step of nurses' practice was scored as following:

- Done correct and complete was scored (1)
- Done incorrect or not done was scored (0)
- The sum of all items was (18)

Nurses' practice score was categorized as follows:

- Practice that scored below 80% was considered unsatisfactory
- 80–100% was considered satisfactory level of practice.

Method

1. The study was officially approved for conduct by the Dean of Tanta University's Faculty of Nursing.
2. Ethical and legal considerations:
   - Ethical approval was obtained from Scientific Research Ethical Committee at Tanta University, Faculty of Nursing to conduct the study with code No.: (28-7-21).
   - There was no harm or injury to the entire sample as a result of the study.
   - Confidentiality and privacy were taken into account when collecting the data.
   - Nurses' participation in the study is voluntary, and they are able to withdraw at any time.
3. Content validity had been confirmed by a jury of five experts in the field of Pediatric Nursing before conducting the study.
4. A Pilot study was carried out on 10% of nurses to test feasibility and clarity of tools, which was excluded from the study. Accordingly necessary modification was done. The pilot study was excluded from the study.
5. Cronbach's alpha for knowledge score was 0.81 (high reliability). It was 0.84 for practice score that is indicate good reliability
6. The aim of the study was explained to the studied nurses.
7. The researcher met studied nurses to establish their trust and cooperation by out lining the study's aim.
8. The researcher interviewed the studied nurses at the previously mentioned setting 3 days per week in the morning shift and every interview took about 20 minutes
9. The knowledge questionnaire was translated into Arabic language by researchers and filled by participated nurses in the presence of researcher to clarify any point to them.
10. The researcher observed pediatric nurses while applying care to infant with congenital clubfoot.
11. The data was collected over period of eight months; from from September 2021 to April 2022
12. **Statistical analysis**

The collected data was arranged, tabulated,

and statistically analyzed using the SPSS statistical software, version 26. For the quantitative data, the range, mean, and standard deviation were calculated. Utilizing the Chi-square test ($\chi 2$), qualitative data was compared. The means of two variables within a group were compared using the paired samples t-test. For comparing means for variables over three intervention periods in a group or for more than two variables, the analysis of variance (ANOVA) F-value was calculated. The correlation between the variables was evaluated using R, the Pearson-Spearman correlation coefficient. A significance level of $P<0.05$ was applied in order to assess the results of the significance tests (*). A highly significant at $P<0.01$ was also used to interpret the results of the significance tests. (**). **(White S E. 2019).**

13. **Results**

Table (1): demonstrates percentage distribution of nurses' socioeconomic characteristics; it was found that 38% of the nurses were between the ages of 20 and less than 30 years, and 44% of them were graduated from technical institute. As regards years of experience in orthopedic field, it was observed that more than half of nurses (52 %) had years of experience less than 5 years. Unfortunately, more than half of nurses (56%) did not participate in any congenital clubfoot-related conferences or training courses.

Table (2): shows the percentage distribution of nurses' knowledge about infant congenital clubfoot; It was found that 44% of studied nurses reported correct and complete answers related to definition of congenital clubfoot, while about third of them (40%) reported correct and complete answers regarding causes of congenital clubfoot. Regarding the diagnosis, it was observed that more than half of them (56 %) had not correct or don't know answers. Concerning consequences of neglected clubfoot 68% had not correct or don't know answers. At the same time, about 32%, 48% reported correct and complete answers regards management and recent management of congenital clubfoot respectively. In addition to 44 % and about third of them (34%) reported correct and complete answers relating to numbers of the cast, elements to be checked after casting respectively. Concerning signs of infection in the cast site about 56% of them reported correct and complete answers. It was observed that 78% of them not correct or don't know answers regarding follow up with doctor.

Table (3): illustrates percentage distribution of studied nurses' total knowledge level regarding infant congenital clubfoot. It was clarified that approximately three quarters (64%) of nurses had low levels of total knowledge, 32% had moderate levels of knowledge, and only 4% had high levels of knowledge.

Table (4): illustrates percentage distribution of studied nurses' total practice level regarding infant congenital clubfoot. According to the table, 100% of the nurses had unsatisfactory practice levels regarding care of infant congenital clubfoot.

Table (5): shows correlation between the nurses' total knowledge and practice scores for congenital clubfoot in infants; it was

found that there was a positive statistically significant correlation between total knowledge score and total practice score of studied nurses regarding infant congenital clubfoot whereas p=(0.062) and r=(0.247)

Table (6): shows correlation between the socio-demographic characteristics of nurses and their total knowledge and practice. It was found that the age, knowledge, and practice of nurses were negatively correlated. However, the years of experience, level of education, and practice and knowledge of nurses were found to be positively correlated. Nurses with higher levels of education and more years of experience showed strong practice and knowledge.

Table (I): Percentage distribution of the studied nurses regarding their socio-demographic characteristics.

Socio-demographic characteristics	(n=50)	
	N	%
Age in Years		
Less than 20 years	11	22.0
20: <30	19	38.0
30: 40	9	18.0
More than 40 years	11	22.0
Level of education		
Diploma degree	16	32.0
Technical institute	22	44.0
Bachelor degree	12	24.0
Years of experience in nursing		
Less than one year	9	18.0
1: <5 years	17	34.0
5: <10 years	11	22.0
More than 10 years	13	26.0
Years of experience in orthopedic field		
Less than one year	12	24.0
1: <5 years	26	52.0
5: <10 years	5	10.0
More than 10 years	7	14.0
Training program regarding congenital clubfoot care.		
Yes	22	44.0
No	28	56.0

***Statistically significant difference at P<0.05**

Table (2): Percentage distribution of nurses' knowledge regarding infant congenital clubfoot

Knowledge regarding infant congenital clubfoot	(n=50)			
	Not correct or Don't know		Correct and complete	
	No.	%	No.	%
Definition	28	56.0	22	44.0
Causes	30	60.0	20	40.0
Symptoms	33	66.0	17	34.0
Diagnoses	28	56.0	22	44.0
Consequences of neglected clubfoot	34	68.0	16	32.0
Management	36	72.0	14	28.0
Recent management	26	52.0	24	48.0
Time of management	29	58.0	21	42.0
Method of treating clubfoot	20	40.0	30	60.0
Number of times to change the cast	34	68.0	16	32.0
Numbers of the cast	28	56.0	22	44.0
Elements to be checked after casting	33	66.0	17	34.0
Signs of infection in the cast site	22	44.0	28	56.0
Number of times of clubfoot exercises	37	74.0	13	26.0
Follow up with doctor	39	78.0	11	22.0

Table (3): Percentage distribution of the total score of nurses' knowledge

Knowledge	(n=50)	
	No.	%
High knowledge	**2**	**4.0**
Moderate knowledge	**16**	**32.0**
Low knowledge	**32**	**64.0**

***Statistically significant difference at P<0.05**

Table (4): Percentage distribution total scores of nurses' practice

Variable	(n=50)	
	No.	%
Cast application		
Unsatisfactory	50	100
Satisfactory	0	0
Cast care		
Unsatisfactory	50	100
Satisfactory	0	0
Total practice		
Unsatisfactory	50	100
Satisfactory	0	0

***Statistically significant difference at P<0.05**

Table (5): Correlation between total scores of nurses' knowledge and practice for infant with congenital clubfoot

Total knowledge	Total practice	
	r	p-value
	0.247	0.062

***Statistically significant difference at P<0.05**

Table (6): Correlation between total nurses' knowledge, practice and socio demographic characteristics

Socio demographic	Total nurses' knowledge		Total nurses' practice	
	r	P	r	P
Age	0.213	0.138	0.135	0.327
Level of education	0.217	0.130	0.231	0.136
Years of experience in nursing	0.324	0.022*	0.029	0.876
Years of experience in orthopedic field	0.411	0.003*	0.231	0.136
Training	0.058	0.691	0.103	0.475

***Statistically significant difference at P<0.05**

Discussion

Congenital clubfoot is a complex deformity that is readily apparent at birth and affects the muscles, ligaments, bones, and joints of the developing foot and ankle. Approximately 200,000 children are born with clubfoot each year. Globally, 80% of who are in low- and middle-income countries. The causes of clubfoot are still unknown, but factors that lead to clubfoot are environmental, genetic, an abnormal position in the uterus, and anatomical factors **Wang et al., (2021)**.

The majority of clubfeet can be corrected in about six to eight weeks with proper gentle manipulations and casting. The most common method of clubfoot treatment is the Ponseti approach, which has been described as highly suitable for use in resource-limited environments. **Kiani et al., (2023)**.

Understanding nurses' current knowledge and practice is crucial for improving infant outcomes and ensuring that infant with congenital clubfoot receive the best possible care **Anaraki et al., (2025)**. So this study aimed to assess nurses' knowledge and practice regarding management of infants with congenital clubfoot**.**

Similar to the current findings, **Rastogi & Agarwal (2021),** found that almost half of the nurses in their study had technical institute degrees. According to **Cady et al. (2022),** Two-thirds of them had a nursing bachelor's degree, which contradicted these findings. According to **Kumari et al. (2023),** Majority of the nurses that participated in the study had

nursing degrees from universities, while the fewest had master's and diploma degrees.

As regards studied nurses' total knowledge level about congenital clubfoot the present finding revealed that, about three quarters of nurses had low level of knowledge. This may be attributed to slightly less than half of them are graduated from technical institute and more than half of them didn't attend any conference or training courses related to congenital clubfoot care, in addition to work over load and absence of motivation for nurses to improve their knowledge. **Pavone et al., (2022)** who was consistent with current finding found that more than half of them had poor knowledge scores about congenital clubfoot.

Regarding the studied nurses' total practices level regarding congenital clubfoot care, the current study highlighted that all nurses had unsatisfactory level of practice regarding care of infant congenital clubfoot. Their lack of previous cast care training, the fact that nearly half of them completed technical school, the experience of half of them was less than five years.

According to **Judd (2023),** who concurred with the current findings, the majority of the studied nurses demonstrated poor practice because of inadequate training programs and a heavy workload that might have prevented them from reading to improve their skills. The current study findings contradicted with those of **Khan et al. (2023),** who found that most nurses had satisfactory level of practice regarding congenital clubfoot care.

Regarding association between nurses' overall practice score and knowledge related to congenital clubfoot, According to the current findings, nurses' knowledge and practice scores were positively correlated. This might be because the theoretical component was successful in influencing nurses' practice as they acquired new concepts and were proficient in using them in their work. That might illustrate how crucial it is to integrate theory and practice.

Accordingly, a study conducted by **Olson et al., (2022)**, revealed that there was a strong positive correlation between nurses' total knowledge and total actual practice regarding care of infant with congenital clubfoot. In contrast to **Singh & Mali, (2022)** who noted that, no statistically significant differences were found between total nurses' practice mean scores and their total knowledge score. They added that, these alarming findings revealed that nurses may not follow the best recommended practices, even if they are available.

Regarding correlation between socio-demographic characteristics of the nurses and their overall knowledge and practice scores. It was determined that the age of nurses and their level of knowledge and practice

were negatively correlated. The fact that young nurses had new information while still recalling what they had learned in their academic institution may help to explain this finding. Additionally, younger nurses tend to be more active than older nurses, who are more innovative in their nursing profession and have superior physical health. However, by the middle of their forties, nurses begin to rely more on routine care than on current knowledge, and they are also more likely to gain weight and develop chronic illnesses.

According to **Krestyashin et al. (2023),** older nurses have less access to continuing professional development activities than younger colleagues, which is in line with the results of the present study. However, **Alfaya et al. (2022),** disapproved of the present results, arguing that years of employment in the same or similar situation increase one's level of expertise and practice in this area and may even foster competency.

Furthermore, the results of this study showed that the total of the nurses' knowledge, practice, and education scores varied statistically significantly. Nurses' knowledge and practice were found to positively correlate with their level of education. This might be because highly qualified nurses with bachelor's degrees are better equipped to meet the needs of these children and can offer specialized care. They typically have the necessary knowledge and skills.

The current findings were supported by **Williams et al. (2022),** who stated that nurses with bachelor's degrees in nursing science, had the best knowledge and practice scores because they had access to more material. Additionally, nurses' advancement and ongoing education increase their knowledge, provide chances for colleagues to share experiences, and enhance professional decision-making and action.

Conclusion

Based on the results of this study, it can be concluded that approximately three quarters of nurses had low levels of total knowledge, and all nurses who were studied had unsatisfactory practice levels regarding the care of infants with congenital clubfoot. There was a positive correlation between the total knowledge scores of the nurses who were studied and the total practice scores regarding to nursing care of the infant with congenital clubfoot**.**

Recommendations

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

1. To educate nurses on basic clinical skills, such as cast care and infection control for children with clubfoot, an in-service training program should be held regularly.
2. Further research should be conducted on a large sample to

achieve generalizability.

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