Effect of Team Strategies and Tools to Enhancement Performance and Patient Safety on Maternity Nurses' Knowledge and Teamwork Performance

Amal Khalifa Khalil1, Heba Ali Aboelyzed Ali 2, Fatma Mohamed Abdallah Elshobary3

1Assistant Professor of Maternal and Newborn health nursing, Faculty of Nursing, Menoufia University, Egypt

2Lecturer of nursing administration Faculty of Nursing. Misr University for Science and Technology

3Follow of Maternal Health and Newborn, National Liver Institute, Menoufia University, Egypt.

Abstract

Abstract: The implementation of the strategies and tools to enhancement performance and patient safety approach in the delivery unit has proven to be crucial in enhancing maternity nurses' knowledge and performance, and reducing nursing errors, increasing team awareness, clarifying team roles, resolving conflicts, improving information sharing, enhancing the quality of care, and ensuring mothers safety in maternity settings. **Aim:** This study aims to assess the effect of strategies and tools to enhancement performance and patient safety on maternity nurses' knowledge and performance related to teamwork. **Settings:** The study was conducted in selected maternity units, including word units, the operating rooms, and laboring units, at a teaching hospital and a university hospital in Shebin El-Kom, Menoufia, Egypt. Design**:** A quasi-experimental research design was utilized. **Sample:** A convenient sampling technique was used to recruit 80 maternity nurses from the study settings. **Tools:** Two tools were used for data collection: the Team STEPPS Knowledge Questionnaire and the Team Performance Observation checklist tool. **Results:** Post-intervention, the study group showed a significant improvement in knowledge of the Team STEPPS approach (95% vs. 0.0% respectively) and in performance (85% vs. 0% respectively) compared pre intervention. Conclusion: implementation of the Team STEPPS significantly enhanced maternity nurses' knowledge about teamwork. Moreover, the maternity nurses who received Team STEPPS training would have a higher level of performance toward Teamwork STEPPS. **Recommendations:** The study recommends the reinforcement of the Team STEPPS strategies training to include all maternity units within the healthcare facility.

Keywords: Strategies and tools to enhancement performance and patient safety (team STEPPS), maternity Nurses' knowledge, teamwork Performance.

Introduction

Maternity care is inherently collaborative, requiring the integration of various healthcare professionals, including obstetricians, midwives, nurses, anesthetists, and pediatricians. Each of these professionals plays a critical role in ensuring the safety and well-being of both the mother and the newborn. However, the effectiveness of their efforts largely depends on how well they work together as a team. Poor communication, unclear roles, and inadequate teamwork can lead to delays in care, medical errors, and adverse outcomes. Therefore, fostering effective teamwork is not just beneficial but essential in maternity care settings (Mercader et al., 2021).

Despite the critical importance of teamwork in maternity care, several challenges can hinder its effectiveness. These include hierarchical structures that can impede open communication, varying levels of experience among team members, and the high-stress nature of labor and delivery, which can lead to communication breakdowns and mistakes. In such a dynamic and often unpredictable environment, the need for a structured approach to improving teamwork becomes apparent. This is where the Team STEPPS approach can provide a valuable framework for overcoming these challenges (Grose & Burney, 2022).

Team STEPPS is an evidence-based program developed by the Agency for Healthcare Research and Quality (AHRQ) and the Department of Defense. It is designed to optimize team performance across the healthcare continuum. The approach is based on five key principles: team structure, communication, leadership, situation monitoring, and mutual support. By focusing on these principles, Team STEPPS aims to improve the quality and safety of patient care by enhancing the skills and knowledge of healthcare teams, making it particularly

relevant for use in high-pressure environments like maternity care (Arrogante et al., 2023).

One of the primary benefits of the Team STEPPS approach is its impact on the knowledge and skills of maternity nurses. Through structured training sessions, nurses are equipped with tools and strategies to improve their understanding of teamwork and communication. This includes learning how to effectively delegate tasks, communicate more clearly with other team members, and anticipate the needs of both patients and colleagues. As a result, nurses are better prepared to handle the complexities of labor and delivery, leading to more efficient and effective care (Shen et al., 2020).

Improved teamwork through the Team STEPPS approach has been shown to have a direct impact on patient outcomes. In maternity settings, where every second can count, the ability to work seamlessly as a team can make the difference between a positive and negative outcome. By enhancing communication and coordination among team members, Team STEPPS helps reduce the likelihood of errors, ensures timely interventions, and ultimately leads to better maternal and neonatal outcomes. This approach not only improves the performance of individual nurses but also strengthens the overall functioning of the maternity care team (Khoshnoodifar et al., 2024).

The adoption of the Team STEPPS approach in maternity care settings represents a significant step forward in improving the quality of care provided to mothers and newborns. By fostering better teamwork, enhancing communication, and equipping nurses with the necessary skills, this approach addresses many of the challenges that can arise in labor and delivery. The positive impact on both knowledge and performance underscores the importance of integrating Team STEPPS into regular training programs for maternity nurses. As healthcare continues to evolve, the need for effective teamwork in maternity care will only become more critical, making the principles of Team STEPPS invaluable for ensuring the highest standards of patient safety and care (Milanovich et al., 2020).

Significance of the study

The implementation of the Team STEPPS approach in the delivery unit has proven to be crucial in enhancing maternity nurses' knowledge and performance in teamwork. This approach focuses on improving team dynamics through structured interventions in team structure, situational monitoring, leadership, mutual support, and communication. By clearly defining roles and responsibilities, it ensures that all team members understand their duties, leading to more coordinated care. Enhanced situational monitoring allows nurses to maintain awareness of the laboring room environment, enabling them to identify potential issues before they escalate. Effective leadership fosters prompt and accurate decision-making, especially in high-pressure situations common in labor. Mutual support encourages a collaborative environment where nurses can rely on each other, thereby reducing errors and improving patient outcomes. Finally, improved communication streamlines the flow of critical information, ensuring that all team members are aligned in their actions. Collectively, these improvements lead to better maternal and fetal outcomes, demonstrating the importance of the Team STEPPS approach in the delivery unit (Karlsen et al., 2022).

This study aims to assess the effect of the Team STEPPS approach on improving maternity nurses' knowledge and performance in teamwork. By implementing the Team STEPPS strategies, this study seeks to enhance the teamwork skills of maternity nurses, thereby improving the overall safety and quality of care provided to mothers and their newborns.

The aim of the study

This study aims to assess the effect of strategies and tools to enhancement performance and patient safety on maternity nurses' knowledge and performance related to teamwork.

Research hypotheses:

H1: Maternity nurses who receive the strategies and tools to enhancement performance and patient safety (Team STEPPS) intervention (study group) will have a higher level of knowledge about teamwork compared to those who do not receive the intervention (control group).

H2: Maternity nurses who receive the strategies and tools to enhancement performance and patient safety (Team STEPPS) intervention (study group) will

demonstrate a higher level of performance in teamwork compared to those who do not receive the intervention (control group).

Operational definition:

Team STEPPS Approach: The **Team Strategies and Tools to Enhance Performance and Patient Safety (Team STEPPS)** In this study, the Team STEPPS approach refers to the structured training and implementation of key teamwork principles, including team structure, leadership, situational monitoring, mutual support, and communication, to improve maternity nurses' knowledge and performance in a clinical environment.

Maternity Nurses' Teamwork Knowledge: This refers to maternity nurses' understanding of team structure, communication skills, leadership, situation monitoring, and mutual support. Knowledge was assessed using the Team STEPPS Knowledge Questionnaire, developed by Rockville (2014).

Maternity Nurses' Teamwork Performance: This refers to the performance of maternity nurses in applying team strategies and tools to enhance performance and women's safety. Performance was assessed using the Team Performance Observation Instrument, developed by the Agency for Healthcare Research and Quality (AHRQ, 2012) and reviewed by Rockville (2019).

Method

Research Design: A quasi-experimental research design was conducted using pre-test and post-test measurements for both the control and study groups.

Settings: The study was conducted in selected maternity units, including word units, the operating room, and laboring units, at Teaching Hospital and a University Hospital in Shebin El-Kom, Menoufia, Egypt.

Sample: A conveniente sample of 80 maternity nurses was recruited from the mentioned settings. The nurses were randomly assigned into two groups: the study group (40 nurse) and the control group (40 nurse). The study group, consisting of 30 staff nurses, 6 head nurses, and 4 nurse supervisors, received the Team STEPPS intervention. The control group, with a similar composition, did not receive the intervention.

Sample Size caculation: The sample size was calculated using the following equation:

Sample size=2×SD2×(Zα/2+Zβ) 2d2\text {Sample size} = \frac{2 \times \text{SD}^2 \times (Z_{\alpha/2} + Z_{\beta})^2}{d^2}

Sample size=d22×SD2×(Zα/2 +Zβ) 2

Where:

- **SD** is the standard deviation, obtained from either a pilot study or previous related studies.
- **Z_{\alpha/2}** is the Z-value for a 95% confidence level (1.96).
- **Z_{\beta}** is the Z-value for 80% power (0.842).
- **D** is the effect size, or the difference between the means of the study and control groups.

The calculation yielded a total sample size of 80, with 40 nurses in each group.

Data Collection Instruments:

Team STEPPS Knowledge Questionnaire: Developed by the researchers based on a modified Team STEPPS questionnaire) and a review of relevant literatures (Rockville, 2014).

Part 1: Personal data of the study sample (age, educational, job title, years of experience, and unit of work).

Part 2: Sixteen items assessing nurses' knowledge of the Team STEPPS approach.

Scoring System: Each item was scored on a 2-point Likert scale: 0 for incorrect answers or "don't know," and 1 for correct answers. The total score ranged from 0 to 16, with scores of 0–5 indicating poor knowledge, 6–10 indicating moderate knowledge, and 11–16 indicating good knowledge.

Team Performance Observation of checklist: Developed by the Agency for Healthcare Research and Quality (AHRQ, 2012) and reviewed by Rockville (2019). It consisted of 23 items across five principles: team structure (4 items), communication (4 items), leadership (6 items), situation monitoring (5 items), and mutual support (4 items).

Scoring System: Each item was rated on a 6-point Likert scale: 0 for not applicable, 1 for very poor, 2 for poor, 3 for acceptable, 4 for good, and 5 for excellent.

Scores were categorized as follows: **Team Structure:** Poor (0–7 points=30%), acceptable (8–14 points=70%), excellent (15–20 =100% points).

Communication: poor (0–7 points=30%),), acceptable (8–14 points=70%),), excellent (15–20 points=100%).

Leadership: poor (0–10 points=33.33%), acceptable (11–20 points=66.67%), excellent (21–30 points=100%).

Situation Monitoring: Poor (0–8 points=32%), acceptable (9–17 points=68%), excellent (18–25 points=100%).

Mutual Support: Poor (0–7 points=33%), acceptable (8–14 points=70%), excellent (15–20 points=100%).

Overall Performance:

The grand total score ranged from 0 to 115 points, with poor performance indicated by 0-38 points=33.04%, acceptable performance by 39-76 points=66.09% and excellent performance by 77-115 points=100%.

Validity and reliability

The instruments used in this study were tested for face validity by a panel of five experts from the Faculty of Nursing in Menoufia Governorate. The panel included two professors and three assistant professors specializing in maternal and new-born health nursing. Their feedback ensured that the instruments were appropriate, clear, and relevant for assessing the effect of the Team STEPPS approach on maternity nurses' knowledge and performance in teamwork. The reliability of the Team STEPPS Knowledge Questionnaire was assessed using Cronbach's alpha, resulting in a reliability coefficient of 0.84, indicating a high level of internal consistency and the reliability of the Team Performance Observation instrument was also measured using Cronbach's alpha, with a value of 0.80, confirming its reliability in assessing the performance of maternity nurses in teamwork.

Ethical considerations: The study was conducted after receiving approval from the Ethical and Research Committee of the Faculty of Nursing, as well as from the selected hospital. The ethical approval was granted under Decision No. 917-2022. The study adhered to ethical standards by ensuring that all participants' rights were protected. Participation was voluntary, and informed written consent was obtained after explaining the study's purpose, nature, duration, and potential benefits. The data collected were treated with strict confidentiality, and participants' anonymity was maintained as they were not required to disclose their names.

A pilot study: A pilot study was conducted with 10% of the study sample (8 maternity nurses) to evaluate the clarity, applicability, and time required to complete the study instruments. The pilot study also helped to assess the feasibility of the study procedures. The nurses who participated in the pilot study were not included in the main study sample, ensuring that the pilot results did not influence the final outcomes.

Procedure: To initiate the study, a formal request outlining the purpose and methods of data collection was submitted by the Dean of the Faculty of Nursing to the maternity units, including word units, the operating room, and laboring units, at Teaching Hospital and a University Hospital in Shebin El-Kom, Menoufia, Egypt. (Approval No. 8-2023), the study commenced. Before data collection, a coding system was established, and participants were randomly assigned code numbers. The research was conducted over six months, from August 2023 to January 2024through about the following phases.

Assessment phase: In the initial phase, nurses' knowledge regarding Team STEPPS and its key principles—team structure, communication skills, leading teams, monitoring situations and mutual support—was assessed. This was followed by an evaluation of their performance with teamwork strategies and tools.

Planning phase: Based on the initial assessments, the researchers was designed an educational intervention to address the identified gaps in nurses' knowledge and performance. The planning phase began in August 2023 and concluded in early September 2024, focusing on enhancing understanding and application of the Team STEPPS principles among the nurses.

Implementation phase:

The study involved 80 maternity nurses who were divided into two groups of 40. **Random assignment** was used to allocate nurses to either the study group (receiving the Team STEPPS intervention) or the control group (not receiving the intervention). The randomization process was conducted using a simple random sampling method by drawing lots.

Each nurse underwent **16 hours of theoretical instruction**, spread across **eight sessions** of **two hours each**, along with **four practical sessions**. The intervention lasted **four weeks**, with each group completing the training within a month. The training sessions were conducted at **the hospital's training center** in a designated meeting room, ensuring privacy and minimal interruptions.

The training sessions focused on various aspects of the **Team STEPPS (Team Strategies and Tools to Enhance Performance and Patient Safety)** approach and were tailored to enhance skills relevant to maternity nursing work. The sessions were structured as follows:

Session 1: Introduction to Team STEPPS and Its Principles: Provided a foundational understanding of TeamSTEPPS and its importance in fostering collaboration, teamwork, and communication in maternity settings, particularly for labor, delivery, and postpartum care.

Session 2: Team Structure Skills: Covered defining roles and responsibilities among healthcare team members, including nurses, midwives, obstetricians, and pediatricians, to ensure effective patient care during labor and delivery.

Session 3: Communication Skills (SBAR and Handoff Techniques): Focused on using the SBAR (Situation, Background, Assessment, and Recommendations) technique and effective handoff strategies to ensure continuity and clarity of care between shifts.

Session 4: Communication Skills (Call-Out and Check-Back Techniques): Emphasized high-stress communication skills, particularly during emergencies, to confirm understanding and avoid miscommunication in maternity wards.

Session 5: Leading Teams (Briefs, Huddles, and Debrief Techniques): Focused on leadership skills, including preparing teams for patient care (briefs), providing real-time updates (huddles), and reflecting on care outcomes (debriefs) post-delivery.

Session 6: Situation Monitoring Strategies (STEP Framework): Introduced the STEP framework (Status of the patient, Team members, Environment, and Progress), crucial for monitoring rapidly changing conditions in maternity settings.

Session 7: Mutual Support Strategies (Task Assistance and Feedback): Emphasized the importance of mutual support among team members during deliveries and emergencies, fostering a culture of continuous learning and collaboration.

Session 8: Mutual Support (Two-Challenge Rule and Assertive Communication): Covered the Two-Challenge Rule and assertive communication techniques, empowering nurses to speak up for safety concerns and ensuring that protocols are followed.

Various **teaching methods** such as group discussion, lecture, scenario-based learning, and brainstorming were employed. These were supported by teaching aids including **PowerPoint presentations, videos, posters, and case studies**.

Place of Interviews and Sessions:

The **interviews** were conducted in a **private office** near the maternity ward to ensure privacy and a quiet environment. Each session was held at the **hospital's training center**, allowing for practical demonstrations and group activities in a controlled setting.

Method of Data Collection:

Pre-test: Both groups were assessed using a structured questionnaire and observational checklist before the intervention.

Post-test: Three months after the intervention, both the study and control groups completed a post-test to assess the effectiveness of the Team STEPPS training.

Observation: The performance of nurses was evaluated through **non-participant structured observation** during real-time maternity care situations. Observation was conducted in **two phases**: before the intervention and after the intervention post-intervention.

Mean Duration for Completing Study Tools:

On average, it took nurses **20-30 minutes** to complete the structured interview questionnaire and knowledge assessment tool.

The **observational checklist** was completed throughout the nurse's working shift, with each session of observation lasting **approximately 2-3 hours**.

Evaluation Phase:

A post-test was administered to both groups three months after the intervention to measure the impact of the Team STEPPS training on nurses' knowledge and performance.

Statistical Analysis: Data were entered and analyzed using SPSS version 22, with graphical representations created using Excel. Quantitative data were presented as means (X) and standard deviations (SD) and analyzed using the student t-test for comparing two means and analyzed using the chi-square ($\chi 2$) test. For tables with expected cell values less than 5, the Fisher's exact test was used, or the likelihood ratio (LR) test for tables with more than four cells. A significance level of $P < 0.05$ was set for all statistical tests.

Results:

Table 1 presents the personal date characteristics of the participants in both the control (N = 40) and study (N = 40) groups, showing a balanced distribution across various attributes. 65% of the control group and 75% of the study group are aged 20 to <30 years, with 15% of both groups aged 31 to <40 years, and 20% of the control group and 10% of the study group aged ≥40 years. Regarding years of experience, 55% of the control group and 85% of the study group had ≤10 years of experience, while 45% of the control group and 15% of the study group have 11–27 years of experience. The distribution of job titles shows that 75% of both groups are nurses, 15% are head nurses, and 10% are nurse supervisors. In terms of working units, 35% of both groups are in the laboring room, while 50% of the control group and 32.5% of the study group are in the ward unit, and 15% of the control group and 32.5% of the study group are in operations. Educational levels showed that 75% of both groups are from nursing institutes, 75% of the control group and study group have bachelor's degrees, and 40% of the control group and the study group have postgraduate degrees.

Table 2 illustrates the total knowledge level and score of the studied nurses about teamwork strategies and tools before and after the intervention. Before the intervention, most nurses in both the control (95%) and study groups (92.5%) demonstrated poor knowledge levels, with no participants achieving good knowledge level. Post-intervention, a significant improvement is observed in the study group, with 95% of nurses achieving good knowledge, while none remained in the poor knowledge category. In contrast, the control group showed minimal change, with 92.5% still displaying poor knowledge and only 7.5% reaching a moderate level. Additionally, the mean knowledge score in the study group increased dramatically from 3.5±1.7 pre-intervention to 12.6±2.1 post-intervention ($P<0.0001$), while the control group's mean score remained almost unchanged.

Figure 1 illustrates the percentage distribution of the studied sample regarding their total knowledge about teamwork strategies and tools following the intervention. The visual representation indicates that a small proportion of participants, specifically 87.5% and 50.0% of the study and control groups, respectively, attained good levels of knowledge.

Table 3 illustrates the mean performance score of the study and control groups towards the principles of team STEPPS before and after the intervention. Pre-intervention both the control and study groups had similar performance levels across all Team STEPPS principles, with no significant differences between the groups. However, post-intervention, the study group demonstrated substantial improvements in all dimensions compared to the control group. For example, the mean score for "Team structure" increased from 5.3±1.6 to 17.5±1.6 in the study group, while the control group saw only a slight increase from 5.5±1.5 to 5.7±1.4.

Table 4 presents the total performance level and score of the studied nurses towards teamwork teamwork strategies and tools before and after intervention. Prior to the intervention, both the control and study groups predominantly exhibited poor performance levels, with 97.5% of nurses in the control group and 95% in the study group scored poor performance range. Post-intervention, a stark contrast is observed in the study group, where none of the nurses remained in the poor performance category, and 85% achieved excellent performance levels. In comparison, the control group showed no significant improvement, with 97.5% of nurses still exhibiting poor performance and only 2.5% achieving acceptable performance. The mean performance score of the study group increased dramatically from 19.7±3.7 pre-intervention to 99.0±6.10 post-intervention ($P\leq0.0001$), indicating a significant improvement, while the control group's mean score remained nearly

unchanged. These findings underscore the effectiveness of the intervention in significantly enhancing the teamwork performance of the study group nurses compared to the control group.

Table1: Personal Date of Studied Participants (n=80).

Variables	Control group (n=40)		Study group (n=40)		χ^2	P –value
	No.	%	No.	%		
Age (years)					13.170	>0.05
20 - <30 Y	16	40	30	75		
31 - <40 Y	6	15	6	15		
≥ 40 Y	8	45	4	10		
Mean ±SD	29.9 ± 8.3		27.6 ± 6.5		t=34.1	>0.05
Years of experience					8.571	>0.05
≤ 10 Y	22	55	34	85		
11 – 27 Y	18	45	6	15		
Job title					0.000	>0.05
Nurses	30	75	30	75		
Head nurses	6	15	6	15		
Nurse supervisor	4	10	4	10		
Working Units					0.000	>0.05
Laboring room	14	35	14	35		
Word unit	20	50	20	32.5		
Operations	6	15	6	32.5		
Education					0.000	>0.05
Nursing Institute	30	75	30	75		
Bachelor	6	15	6	15		
Postgraduate	4	10	4	10		

Table 2: Total Knowledge Level and Score of The Studied Nurses about Teamwork Strategies and tools before and After the Intervention (n = 80).

Variables	Pre intervention					Post intervention				
	Control group		Study group		P1 value	Control group		Study group		P2 value
	No.	%	No.	%		No.	%	No.	%	
Poor knowledge	38	95	37	92.5	LR=0.84 ns P>0.05	37	92.5	0	0	LR=76.1** P≤ 0.0001
Moderate knowledge	2	5	3	7.5		3	7.5	2	5	
Good knowledge	0	0	0	0		0	0	38	95	
Mean ± SD	3.3±1.2		3.5±1.7		t=1.5 ns P>0.05	3.4±1.7		12.6±2.1		t=12.6** P≤0.0001

N.B., ns non-statistically difference; ** highly statistically difference; P1=Comparison between control and study groups pre-intervention; P2= Comparison between control and study groups post-intervention

Figure 1: Percentage distribution of the studied sample according to their total level of knowledge about Teamwork Strategies and Tools

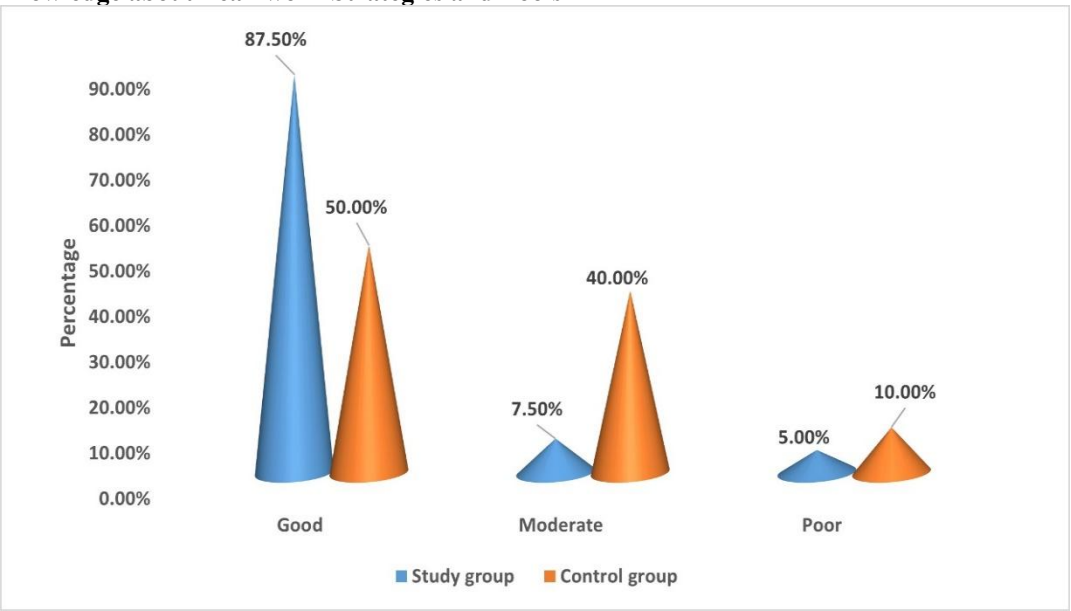

Table 3: The mean performance Score of the study and Control groups towards the principles of Team STEPPS before and After the Intervention (n = 80).

Variables	Pre intervention			Post intervention		
	Control group	Study group	P1 value	Control group	Study group	P2 value
	Mean ± SD	Mean ± SD		Mean ± SD	Mean ± SD	
Team structure	5.5 ± 1.5	5.3 ± 1.6	t=0.49ns P>0.05	5.7±1.4	17.5± 1.6	t=34.1** P≤0.0001
Communication	4.2 ± 1.6	4.1 ± 1.3	t=0.29 ns P>0.05	4.4±1.6	18.9±1.4	t= 41.7** P≤0.0001
Leading teams	6.7 ± 1.3	6.5 ±1.6	t=0.66 ns P>0.05	6.7±1.3	22.7±1.8	t= 44.5** P≤0.0001
Situation Monitoring	5.98±1.8	5.50±1.9	t= 1.11 ns P>0.05	6.10±1.9	22.25±2.0	t=36.5** P≤0.0001
Mutual support	4.33 ± 1.4	3.80 ± 1.4	t=1.6 ns P>0.05	4.53±1.5	17.63±1.51	t=38.8** P≤0.0001

Table 4 total performance level and score of the studied nurses towards teamwork Teamwork Strategies and Tools before and After Intervention (n = 80).

P1= compares pre-intervention performance between groups (study vs. control). **P2=** compares post-intervention performance between groups (study vs. control). **P3=** compares pre- and post-intervention performance in the study group. **P4=** compares pre- and post-intervention performance in the control group

Variables	Pre intervention					Post intervention						
	Control group		Study group		P1 value	Control group		Study group		P2 value	P3 value	P4 value
	No.	%	No.	%		No	%	No.	%			
Poor performance (0 – 38)	39	97.5	38	95		39	97.5	0	0			
Acceptable performance (39- 76)	1	2.5	2	5	LR= 0.0 ns	1	2.5	6	15	LR=74.4 ≤0.0001**		LR=0.5 1 ns P>0.05
Excellent performance (77- 115)	0	0	0	0	P>0. 05	0	0	34	85		LR=73 ≤0.0001 **	
Total	40	100	40	100		40	100	40	100			
Mean ± SD (Grand total performance)	20.7±3. 8		19.7±3.7		t=1. 14ns P>0. 05	21.32 ± 3.9		99.0 ±6.10		t=56.0 ≤0.0001**	t= 76.5, ≤0.0001 **	

Discussion:

Maternity nurses are one of the principal healthcare professionals who provide mothers' healthcare twenty-four hours a day (Rosengarten, 2022). Maternity nurses' teamwork is a process where members interact together and combine resources and efforts to complete assigned nursing tasks (Schmutz et al. 2019). Cooperative teamwork plays a crucial role in safe and high-quality patients' care (Costello, 2022; Kakemam, 2021; Donovan, 2018). Therefore, it is important for first-line nursing managers to encourage effective teamwork. This study evaluates the impact of the Team STEPPS intervention on improving nurses 'knowledge and performance in teamwork. The study reveals that there is poor knowledge about the teamwork (STEPPS) approach among both study and control groups before the implementation of the Team STEPPS intervention.

The implementation of the Team STEPPS intervention resulted in a notable improvement in the level of knowledge about teamwork among the study group. This enhancement was particularly evident in the dimensions of team structure, situational monitoring, leadership, mutual support, and communication.

One possible explanation for this significant improvement is that the Team STEPPS concept is relatively new to various categories of nurses, including nurses, head nurses, and nurse supervisors. The lack of inclusion of Team STEPPS in the nursing curriculum may contribute to the initial low levels of knowledge about this approach. Additionally, the shortage of nurses, a common challenge in many healthcare settings, may impact the focus and training on teamwork principles.

The use of case-method strategies by maternity nurses, especially in critical care units, aligns with these findings. This approach is supported by the study conducted by Khoshnoodifar et al. (2024), which assesses the impact of Team STEPPS strategies and tools on healthcare professionals' knowledge and attitudes about teamwork. Their research demonstrated a low mean score for teamwork

knowledge before the Team STEPPS intervention, with a significant increase across all dimensions—team structure, communication skills, situational monitoring, leadership, and mutual support—following the intervention.

Similarly, Shaw (2023) also supports these findings, highlighting the effectiveness of Team STEPPS in enhancing teamwork knowledge and practice among healthcare professionals. To assess the effect of Team STEPPS on teamwork perceptions among newly graduated nurses, the study found that participants' pre-intervention mean scores were low about teamwork perceptions but improved significantly after Team STEPPS intervention.

The current study's findings align with previous research demonstrating that Team STEPPS training significantly enhances staff knowledge and perceptions of teamwork. Dodge et al. (2021) reported substantial improvements in staff knowledge of teamwork after implementing Team STEPPS in ambulatory reproductive health care centers. Similarly, et al. (2022) found significant improvements in nursing staff performance of teamwork and communication following the Team STEPPS intervention.

In congruence with these findings, Mohsen et al. (2021) observed increased teamwork perceptions and patient satisfaction after implementing Team STEPPS in primary care units in Menoufia Governorate, Egypt. This indicates that nurses who participate in Team STEPPS training recognize cooperation as a crucial element of effective and productive workplaces.

However, not all studies reflect these positive outcomes. Kwon and Duzyj (2022) found that Team STEPPS training did not improve nurses' teamwork perceptions, attributing this to ineffective training methods. Similarly, Ahsan et al. (2021) reported no significant difference in teamwork perceptions between intervention and control groups, suggesting that Team STEPPS training might not always yield significant results.

These discrepancies might be related to variations in sample sizes, which could impact the sensitivity of detecting changes in nurses' views on teamwork. Despite the lack of significant differences in teamwork dimensions between the study and control groups before the intervention, the study group showed significant improvements in all Team STEPPS dimensions post-intervention. This indicates that training in Team STEPPS positively impacts knowledge and practices of teamwork among nurses.

The current study supports findings from Shinae (2021), which showed no significant difference in teamwork performance between experimental and control groups before Team STEPPS training. However, the experimental group exhibited significant improvements in teamwork abilities and performance levels post-training. Similarly, Gunberg et al. (2021) observed poor teamwork performance levels in both groups before the intervention, with only the study group achieving excellent performance levels post-training.

Lee et al. (2021) also reported statistically significant improvements in all dimensions of teamwork among nurses following a two-month Team STEPPS intervention. Qiu et al. (2024) found that practical teamwork skills among nursing students improved significantly in the experimental group compared to the control group after Team STEPPS training. Hill (2020) noted that teamwork training positively affected team performance in obstetrics and gynecology departments.

In contrast, Ahsan et al. (2021) reported no significant effect of Team STEPPS on nurses' teamwork skills and communication behavior, attributing this to factors such as a lack of motivation and commitment during training sessions. This highlights the importance of engaging and motivating participants to maximize the effectiveness of Team STEPPS training.

Curtsinger (2018) observed decline in the communication dimension score post-training, attributed to the absence of discussion activities during the training. Despite this minor decrease, the study revealed significant improvements in all dimensions of the Team STEPPS approach among the intervention group compared to the control group. The study group achieved the highest mean scores in the dimensions of leading teams and situational monitoring. The leading team dimension includes elements such as identifying team goals, efficiently using resources, balancing workloads, delegating

tasks, and conducting briefings and debriefings. These results reflect the positive impact of effective Team STEPPS training.

Conversely, the team structure dimension received the lowest mean score. This dimension involves assembling teams, assigning roles, holding members accountable, and including patients and families. The lower score in this dimension is expected, as these components are primarily the responsibility of nursing managers rather than front-line nurses.

These findings are supported by Khoshnoodifar et al. (2024), which highlighted significant improvements in six micro-skills—call-out and check-back, the I'M SAFE checklist, briefing, debriefing, cross-monitoring, and the two-challenge rule—after Team STEPPS training. The intervention notably enhanced the inter professional team's ability to collaborate during cesarean section surgeries, with increased average scores in both teamwork behaviors and knowledge.

Curtsinger (2018) also reported that the implementation of Team STEPPS led to shifts in unit performance, including mandatory and more organized huddles, which boosted staff morale and inclusion during shifts. Similarly, Ballangrud et al. (2021), found improvements in team function, structure, leadership, mutual support, situational monitoring, and communication. The study indicated that Team STEPPS implementation positively impacted nurses' teamwork behaviors.

The current study's findings align with those of Ballangrud et al. (2021), who highlighted that the use of situational monitoring tools significantly improved teamwork skills. Similarly, Milanovich& Kendall, (2020) reported enhancements across all five Team STEPPS categories—team structure, communication, leading teams, mutual support, and situational monitoring. The study demonstrated that implementing briefs, huddles, debriefs, and SBAR (Situation-Background-Assessment-Recommendation)
can enhance nursing teamwork within units. The use of huddles was shown to be beneficial at all organizational levels, leading to an improved teamwork climate in clinical environments.

These findings are consistent with Curtsinger (2018), who also observed improvements in leadership and situational monitoring following Team STEPPS training, though communication and team structure dimensions showed less progress. However, Cooke (2021) reported that while team structure and leadership scores were high post-training, dimensions such as communication, situational monitoring, and mutual support remained lower. This suggests that while Team STEPPS training may enhance some aspects of teamwork, its impact can vary across different dimensions.

The variation in outcomes may be attributed to the emphasis placed on different elements of the Team STEPPS approach in various settings. The current study suggests that the intervention had a particularly positive impact on teamwork in critical care units, possibly due to the high engagement of participants. This focus on improving team structure, which includes incorporating patient and family input, underscores the importance of considering patients as integral members of the healthcare team.

The present study indicated that implementation of the Team STEPPS approach significantly improved various maternal and birth outcomes among the study group of maternity nurses compared to the control group. Across all indicators, including maternal satisfaction, stress and anxiety levels, complications, empowerment, Apgar scores, and other critical outcomes, the study group consistently showed better performance with highly significant. Write to support other researchers and results.

The findings that the implementation of the Team STEPPS approach significantly improved various maternal and birth outcomes are strongly supported by another research in the field. For example, Shinae (2021) reported that after the introduction of Team STEPPS training, the experimental group of maternity nurses showed marked improvements in teamwork performance, leading to enhanced patient outcomes, like the results observed in this study. The highly significant across all indicators in both studies underline the effectiveness of the intervention.

Gunberg et al. (2021) also documented that maternity units implementing Team STEPPS saw substantial gains in key outcomes such as maternal satisfaction,

reduced stress and anxiety levels, and better Apgar scores, aligning closely with the current study's findings. These improvements were attributed to the enhanced collaboration and communication skills fostered by the Team STEPPS program.

Matzke et al. (2021) further supported these outcomes by showing statistically significant reductions in maternal complications and improvements in empowerment among nurses following Team STEPPS training. Their study, like the current one, found that the training led to a more efficient and supportive clinical environment, ultimately benefiting both maternal and neonatal outcomes.

Moreover, Qiu et al. (2024) observed that nursing students who underwent Team STEPPS training demonstrated significant improvements in practical teamwork skills, which directly translated into better patient care outcomes, including higher maternal satisfaction and lower rates of neonatal complications.

Contrastingly, Ahsan et al. (2021) noted no significant improvements in teamwork or communication among nurses post-Team STEPPS training in their study, attributing this to a lack of motivation and engagement during the training process. This divergence highlights the importance of fully engaging participants in the training to achieve the kind of positive outcomes reported in this and other supportive studies.

Overall, the implementation of Team STEPPS training has demonstrated several beneficial effects on nursing teamwork. It has improved nurses' performance and knowledge of teamwork, although the extent of improvement may vary across different dimensions. The positive outcomes observed reflect the effectiveness of Team STEPPS in enhancing various aspects of team dynamics and collaboration.

Conclusion:

Based on the findings of the current research, it can be concluded that the implementation of the Team STEPPS approach significantly enhanced maternity nurses' knowledge about teamwork. This supports the first research hypothesis. Moreover, the maternity nurses who received Team STEPPS training would have a higher level of performance about teamwork. This supports the second research hypothesis. The study found that nurses in the study group demonstrated notable improvements in various aspects of teamwork, including communication, leadership, and situational monitoring, which supports the second research hypothesis that the Team STEPPS intervention would lead to higher performance levels in teamwork.

Recommendations:

The recommendations following the Team STEPPS intervention, based on improvements in teamwork and performance among maternity nurses, are:

- Expanding the Team STEPPS training to all maternity units is essential to ensuring widespread benefits in collaboration and patient care.
- Tailoring the Team STEPPS content to address the specific needs of maternity nurses will optimize the relevance and effectiveness of the training.
- Scheduling periodic refresher courses will help maintain high levels of knowledge and performance in teamwork over time.
- Incorporating Team STEPPS into orientation programs for new maternity nurses will establish effective teamwork practices from the outset of employment.
- Performing follow-up evaluations will allow for an assessment of the sustained impact of the training and the identification of areas for continuous improvement.

Further recommendations:

- Implement Cross-Disciplinary Team STEPPS Training**:** to include interdisciplinary teams
- Incorporating high-fidelity simulations as part of the Team STEPPS training can better prepare nurses for real-life scenarios.

References

Agency for Healthcare Research and Quality (AHRQ). (2012). *TeamSTEPPS Implementation Guide*. Retrieved from https://www.ahrq.gov/teamstepps/instructor/essentials/implguide.html

Agency for Healthcare Research and Quality (AHRQ). (2021). *TeamSTEPPS for Office-Based Care*. Retrieved from https://www.ahrq.gov/teamstepps/officebasedcare/index.html

Ahsan, A., Setiowati, L., Rahmawati, N., Noviyanti, L., Ningrum, B., & Putra, K. (2021). Nurses' team communication in hospitals: A quasi-experimental study using a modified TeamSTEPPS. *Journal of Public Health Research*, 10, 2156.

Arrogante, Ó., Zaragoza-García, I., Raurell-Torredà, M., Sánchez-Chillón, J., Amaya-Arias, A., Aliberch-Raurell, M., & Rojo-Rojo, A. (2023). TeamSTEPPS-based clinical simulation training intervention for critical care professionals: A mixed-methodology study. *English Journal of Critical Care*, 34(3), 127-136.

Ballangrud, R., Vifladt, A., & Aase, K. (2021). Longitudinal team training intervention in a Norwegian surgical ward: A qualitative study of nurses' and physicians' experiences with implementation. *Health Services Research*, 21(1), 724. https://doi.org/10.1186/s12913-021-06732-6

Cooke, M., & Valentine, N. (2021). Improving teamwork and communication in schools of nursing: A quality improvement approach using TeamSTEPPS. *Journal of Nursing Care Quality*, 36(3), 284-289. https://doi.org/10.1097/NCQ.0000000000000513

Costello, M., Rusell, K., & Coventry, T. (2021). Examining the average scores of nursing teamwork subscales in an acute private medical ward. *BMC Nursing*, 20(1), 1-10.

Curtsinger, A. (2018). Improving teamwork and communication through the use of TeamSTEPPS. *Open Access Library Journal*, 5, e4816. https://doi.org/10.4236/oalib.1104816

Dodge, L. E., Nippita, S., Hacker, M., Intondi, E., Ozcelik, G., & Paul, M. (2021). Long-term effects of teamwork training on communication and teamwork. *Journal of Health Care Risk Management*, 40(4), 7-14.

Donovan, A. L., Aldrich, J. M., Gross, A. K., Barchas, D. M., Thornton, K. C., Schell-Chaple, H. M., Gropper, M. A., & Lipshutz, A. K. (2018). Interprofessional care and teamwork in the ICU. *Critical Care Medicine*, 46(6), 980-990.

Grose, A., & Burney, D. (2022). TeamSTEPPS: Strategies and tools to enhance performance and patient safety. In *Quality Improvement and Patient Safety in Orthopaedic Surgery* (pp. 19-25). Cham: Springer International Publishing.

Gunberg, R. G., Colleen, M., & Bette, M. (2021). TeamSTEPPS curricular-wide integration: Baccalaureate nursing students' knowledge, attitudes, and perceptions. *Journal of Nursing Education*, 46(6), 356-359.

Hill, K. (2020). Using the TeamSTEPPS approach to improve teamwork and communication for abortion care: Lessons from pilots in Bolivia and Ghana. *Ipas*. ISBN: 978-1-7337804-8-3. Retrieved from www.ipas.org.

Kakemam, E., Hajizadeh, A., Azarmi, M., Zahedi, H., Gholizadeh, M., & Roh, Y. S. (2021). Nurses' perception of teamwork and its relationship with the occurrence and reporting of adverse events: A questionnaire survey in teaching hospitals. *Journal of Nursing Administration and Management*, 29(6), 1189-1198.

Karlsen, T., Hall-Lord, M. L., Wangensteen, S., & Ballangrud, R. (2022). Bachelor of nursing students' attitudes toward teamwork in healthcare: The impact of implementing a TeamSTEPPS® team training intervention — A longitudinal, quasi-experimental study. *Nurse Education Today*, 108, 105180. https://doi.org/10.1016/j.nedt.2022.105180

Khoshnoodifar, M., Shokrpour, N., Emadi, N., Mosalanejad, L., & Maghsoodzadeh, S. (2024). A new practical approach using TeamSTEPPS strategies and tools: An educational design. *BMC Medical Education*, 24(1), 22. https://doi.org/10.1186/s12909-024-03482-y

Kwon, C., & Duzyj, C. (2022). The impact of TeamSTEPPS training on obstetric team attitudes and outcomes on the labor and delivery unit of a regional perinatal center. *American Journal of Perinatology*. https://doi.org/10.1055/a-1974-0024

Lee, H., Jones, C., Khanuja, S., Sedgwick, J., Pressimone, K., Blanding, J., & Ficke, R. (2021). Sustaining teamwork behaviors through reinforcement of TeamSTEPPS principles. *Journal of Patient Safety*, 17(7), e583-e584. https://doi.org/10.1097/PTS.0000000000000731

Matzke, M., DeGennaro, R., & Howie-Esquivel, J. (2021). Incorporating TeamSTEPPS training to improve staff collaboration in an academic level I emergency and trauma center. *International Emergency Nursing*, 55, 100959. https://doi.org/10.1016/j.ienj.2021.100959

Mercader, V., Ravina-Ripoll, R., Galván-Vela, E., & Popescu, C. G. (2021). A focus on ethical value under the vision of leadership, teamwork, effective communication, and productivity. *Journal of Risk and Financial Management*, 14(11), 521. https://doi.org/10.3390/jrfm14110521

Milanovich, C. D., & Kendall, H. (2020). Improving team performance and patient safety on the job through team training and performance support tools: A systematic review. *Journal of Patient Safety*, 16(3), S49-S55. https://doi.org/10.1097/PTS.0000000000000746

Mohsen, M., Amer, N., Gab Allah, A., Rashed, A., & Shokr, E. (2021). Team strategies and tools to enhance performance and patient safety at primary healthcare units: Effect on patients' outcomes. *Nursing Forum*, 56(4), 851-858. https://doi.org/10.1111/nuf.12636

Qiu, T., Chen, M., & Gao, S. (2024). Application effect study of a combination of TeamSTEPPS with modularization teaching in the context of clinical instruction in trauma care. *Scientific Reports*, 14, 4711. https://doi.org/10.1038/s41598-024-55509-4

Quinto, A. (2023). *TeamSTEPPS and Organizational Culture* (Doctoral dissertation, Liberty University, School of Business). Retrieved from https://digitalcommons.liberty.edu/doctoral/4391/

Rockville, MD. (2014). *Agency for Healthcare Research and Quality, Teamwork Perceptions Questionnaire*. Retrieved from https://www.ahrq.gov/teamstepps/longtermcare/index.html

Rosengarten, L. (2022). Teamwork in nursing: Essential elements for practice. *Nursing Management*, 29, 22-25.

Schmutz, J. B., Meier, L., & Manser, T. (2019). How effective is teamwork really? The relationship between teamwork and performance in healthcare teams: A systematic review and meta-analysis. *BMJ Open*, 9, e028280. https://doi.org/10.1136/bmjopen-2018-028280

Shaw, B. (2023). *Impact of TeamSTEPPS Training on Teamwork Perception in Two Primary Care Clinics* (Doctoral dissertation, Prairie View A&M University). Retrieved from https://digitalcommons.pvamu.edu/dnp/52/

Shen, W., Hemesath, K., Veit, L., & Skelly, K. (2020). Implementation of TeamSTEPPS concepts at an academic primary care clinic. *Journal of Interprofessional Education & Practice*, 20, 100351. https://doi.org/10.1016/j.xjep.2020.100351

Shinae, A. (2021). Development and evaluation of a teamwork improvement intervention for perioperative patient safety. *Journal of Nursing Research*, 29(6), 180. https://doi.org/10.1097/JNR.0000000000000460