**RESEARCH PAPER**

# Effectiveness of Nurse Empowerment Program on Antibiotic Stewardship: Impact on Nurses' Knowledge and Perceived Patient Outcomes in a Selected Hospital.

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**ABSTRACT**

**Background:** Antimicrobial resistance is a major global health threat resulting from inappropriate antibiotic use. Nurses play a crucial role in antibiotic administration, monitoring therapeutic response, and ensuring safe medication practices. Empowering nurses through structured educational interventions may enhance their knowledge and improve patient-related outcomes. **Objectives:** assess the effectiveness of a Nurses' Empowerment Program regarding Antibiotic Stewardship on nurses' knowledge and perceived patient outcomes. **Methods:** A pre-experimental one-group pre-test and post-test design was adopted for the study. The study was conducted among 30 staff nurses working in selected hospital units. A structured knowledge questionnaire was used to assess nurses' knowledge before and 7 days after the intervention. Perceived patient outcomes were assessed at the end of 1 month using a structured patient outcome checklist. The Nurses' Empowerment Program included structured teaching sessions and educational materials related to antibiotic stewardship practices. Data were analysed using descriptive and inferential statistics, including the Chi-square test. **Results:** The pre-test findings revealed that the majority of nurses (63.3%) had moderate knowledge, 30% required improvement, and only 6.7% had good knowledge. After 7 days of the intervention, 70% of nurses achieved excellent knowledge, and 30% demonstrated good knowledge. The improvement in knowledge level was statistically significant ($p < 0.05$). Furthermore, perceived patient outcome indicators showed improvement at the end of 1 month following the intervention. **Conclusion:** The Nurses' Empowerment Program was effective in significantly improving nurses' knowledge within 7 days and positively influencing perceived patient outcomes after 1 month. Structured educational empowerment interventions should be incorporated into routine clinical practice to strengthen antibiotic stewardship and improve quality of patient care.

**Keywords:** Antibiotic stewardship, Nurse empowerment, Knowledge, Perceived patient outcomes, antimicrobial resistance

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## INTRODUCTION

Antibiotics prevent millions of deaths each year and remain the primary treatment for potentially fatal bacterial infections. Yet inappropriate prescription rates and overuse of antibiotics have led to resistance that has created a global health emergency and kills at least 700,000 people a year. If no action is taken, it is predicted to increase to 10 million deaths per year by 2050 (1,2). Antibiotic resistance can affect any person

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at any stage of life. People receiving health care or those with weakened immune systems are often at higher risk of getting an infection. Antibiotic resistance can complicate the recovery phase of joint replacements, organ transplants, and cancer therapy (3,4). These procedures have a significant risk of infection, and patients will not be able to receive a higher dose of antibiotics. Antibiotic resistance is one of the top infectious disease threats facing the world today. The escalating resistance to antibiotics has been named by the Centers for Disease Control and Prevention as one of the top 5 threats to health in the United States and has led to the development of the national action plan for combating antibiotic-resistant bacteria.

Antibiotic stewardship is essential in promoting appropriate antibiotic use, preventing antimicrobial resistance, and improving patient outcomes (5,6). Nurses play a crucial role in administering antibiotics, monitoring patients, and implementing infection prevention practices (7). Nurses make up the largest segment of healthcare workers and stand at the center of patient care. Nurses spend more time with patients than any other healthcare professionals and are the cornerstone of the patient-care team, providing consistency, continuity, and coordination of care. The most appropriate path to mitigate this menace is a collaborative, multidisciplinary approach combining antimicrobial stewardship with infection prevention. Sustainable efforts to overcome this global problem would require awareness, learning, and coordination at various levels in the health system. Government policies, national guidelines, collaborative functioning in research, online training modules, and media have an important role in combating the threat.

**Need for the study**

Broadening the reach of antibiotic stewardship (AS) activities to include nurses has recently been recognized as important for the success of antibiotic stewardship programs (ASPs) by the American Nurses Association (ANA) and by the Centers for Disease Control and Prevention (CDC)(8). Concomitantly, accrediting and federal agencies have issued calls for interdisciplinary AS perspectives, indicating the need for nursing participation

Nurses generally interact with patients before the AS team, often before primary prescribers, and they are responsible for specimen collection, obtaining initial antibiotic allergy data, and antibiotic administration (9,11). Nurses spend more time with patients and families than most other clinicians; therefore, they are usually the first to observe, document, and report infectious symptoms. Also, they are often the first and most consistent point of contact for patients and families with the healthcare team. Nurses are therefore in a unique position to influence antibiotic decisions in several ways and to ensure safe use of antibiotics (10,12).

Nurses can also contribute to preventing the development of AMR by ensuring that the patients receive the antibiotics for the appropriate duration prescribed, and are converted from intravenous to oral at the earliest opportunity. Reviewing of the medication charts is a part of routine professional practice amongst the nursing staff. The nursing staff are the primary healthcare providers in the hospital setting, and are thus in a key position to collaborate and coordinate with the AMS teams and thus contribute to the multipronged approach of successful AMS implementation in the hospital setting. Safety and quality measures, the pillars of nursing care, are one of the core elements of ASP.

Efficient communication and education about antibiotic stewardship is the cornerstones for strengthening and successful implementation of the antibiotic stewardship program. The main target of this education would be the best assessment of the patient's response to the given therapy, early and safe switch-over to oral therapy, shortening of the duration of hospital stay, and efficient outpatient management of the patients. A structured teaching intervention can enhance nurses' knowledge regarding antibiotic stewardship, which may lead to improved patient care and better patient outcomes as perceived by nurses (13).

**Aim of the study**

The aim of this study is to assess the effectiveness of nurses' empowerment program regarding antibiotic stewardship on nurses' knowledge and perceived patient outcomes.

**Specific Objectives**

1. To assess the level of knowledge on antibiotic stewardship among nurses before and after nurse's empowerment program regarding antibiotic stewardship.
2. To assess the level of perceived patient outcomes before and after the nurse's empowerment program regarding antibiotic stewardship.
3. To compare pre- and post-test knowledge and perceived patient outcome scores of nurses regarding antibiotic stewardship.
4. To determine the correlation between nurses' knowledge and perceived patient outcomes regarding antibiotic stewardship.
5. To find out the association between post-test knowledge scores and perceived patient outcome scores and the selected demographic variables.

## Methodology

### Research Approach

A Quantitative research approach was used for this study.

### Research Design

A pre-experimental one-group pre- and post-test design was adopted to assess the effectiveness of the nurse's empowerment program regarding antibiotic stewardship on nurses' knowledge and perceived patient outcomes.

### Setting

This study was conducted in selected hospitals, namely CSI Kalyani General Hospital, which is a Mission Multi-specialty Hospital with 220-bedded hospitals with all specialties such as Medicine, General Surgery, Orthopedics, Cardiology, Neurology, Urology, ENT, Eye, Gynecology, and Intensive care unit for adult &newborn.

### Population

### Target population

The target population is the group population that the researcher aims to study and to whom the study findings will be generalized. In this study target population will be staff nurses.

### Accessible population

Registered nurses were directly involved in patient care in the selected hospitals during the study period.

### Sample

Samples consist of a subset of the population. In this study sample will be staff nurses who met the inclusion criteria.

### Sample size

The sample size for this study was 30 nurses working in the Medical and Surgical ward.

### Sampling Technique

Sampling is a process of selecting a portion of the population to represent it. The purposive sampling technique was used in this study to collect the data.

### Sampling Criteria

### Inclusion criteria:

- The study will include the staff nurses with GNM, B.Sc. (N) and P. B.BSc (N) qualifications.
- Who will be present during the time of data collection?
- Nurses working in the Medical and Surgical ward.

### Exclusion criteria

- Staff nurses who are not willing to participate in the study.
- Nurses working in OPD and OT.

### Variables

Independent Variables

The independent variable of this study is Nurses Empowerment Program. Empowerment is the process of empowering nurses regarding Antibiotic stewardship.

Dependent Variables

Dependent variables of this study are nurses' knowledge on antibiotic stewardship and perceived patient outcomes (Clinical improvement, infection prevention & HCAI reduction, Antibiotic safety &effectiveness, Patient comfort &satisfaction, and overall perceived patient outcome.

### Description of the tool

Section: A Background variable proforma of the nurses

The background variable proforma consists of variables such as age, professional qualification, years of experience, designation, marital status, area of work, and prior training in the antibiotic stewardship program.

Section: B Structured Questionnaire on Antibiotic Stewardship for Nurses Which consists of 25 multiple-choice questions with one correct option and three distractors. This questionnaire consists of four sections, including Antibiotic resistance, Antibiotic stewardship, Role of nurse in antibiotic stewardship, and Infection control and prevention. The correct answer will be scored as "1" and the wrong response will be scored as "0".

### Structured Questionnaire on Antibiotic Stewardship for Nurses Blue print

| Section | Content | No. of. Items | Items | Weightage in % |
|---|---|---|---|---|
| 1 | Antibiotic resistance | 7 | 1,2,3,4,5,6,7 | 28 |
| 2 | General knowledge on antibiotic stewardship | 7 | 8,9,10,11, 12,13,14 | 28 |
| 3 | Role of Nurse in antibiotic stewardship | 7 | 15,16,17,18, 19,20,21 | 28 |
| 4 | Infection control and prevention | 4 | 22,23,24,25 | 16 |
| | Total | 25 | 1-25 | 100 |

Scoring Interpretation

| Score Range | Percentage Range | Knowledge Level |
|---|---|---|
| 0 – 12 | < 50% | Needs improvement |

| | | |
|---|---|---|
| 13 – 17 | 50 – 69% | Moderate knowledge |
| 18 – 21 | 70 – 84% | Good knowledge |
| 22 – 25 | 85 – 100% | Excellent knowledge |

Section: C Likert-scale to measure nurses' perception of patient outcomes

This Scale is based on the **World Health Organization (WHO)** framework for antibiotic stewardship. Nurse-focused perception scale measuring Clinical improvement, infection prevention & HCAI reduction, Antibiotic safety &effectiveness, Patient comfort &satisfaction and overall perceived patient outcome.

**Likert-scale to measure nurses' perception of patient outcomes**

**Blue print**

| S. No | Statement | No. of items | Items | Items in % |
|---|---|---|---|---|
| 1 | Perceived clinical improvement | 4 | 1,2,3,4 | 20 |
| 2 | Perceived infection prevention and HCAI | 3 | 5,6,7 | 15 |
| 3 | Perceived antibiotic safety and effectiveness | 3 | 8,9,10 | 15 |
| 4 | Perceived patient comfort and satisfaction | 3 | 11,12,13 | 15 |
| 5 | Overall perceived patient outcome | 2 | 14,15 | 10 |
| | Total | 15 | 1-15 | 75 |

**Scoring:**

1 - Strongly disagree
2 - Disagree
3 -Neutral
4 -Agree
5 - Strongly agree

**Scoring Interpretation**

61-75 -High perceived improvement

46-60 -Moderate perceived improvement

<45 -Low perceived improvement

**Data collection**

After getting permission from concerned authority and consent from samples, pretest knowledge was conducted by using structured questionnaire and nurses' perception of patient outcomes was assessed by using five-point Likert scale. Immediately after pretest planned nurse's empowerment program regarding antibiotic stewardship was conducted 2 hours per day in 3 days. A planned teaching module was developed based on related literature includes recent Centre for disease control and prevention &WHO guidelines, the teaching was done through power point presentation, handouts, discussion and clinical scenarios. Posttest was conducted after 7 days to assess knowledge and nurses' perception of patient outcomes was assessed at the end of 1 month by using 5point Likert scale.

**Plan for Data Analysis**

- Descriptive statistics: frequency, percentage, mean, standard deviation
- Inferential statistics:
  - Paired t-test (pre vs post knowledge and pre vs post test perceived patient outcome)
  - Correlation test (post-test knowledge vs perceived patient outcome)

- Chi-square test for association with demographic variables

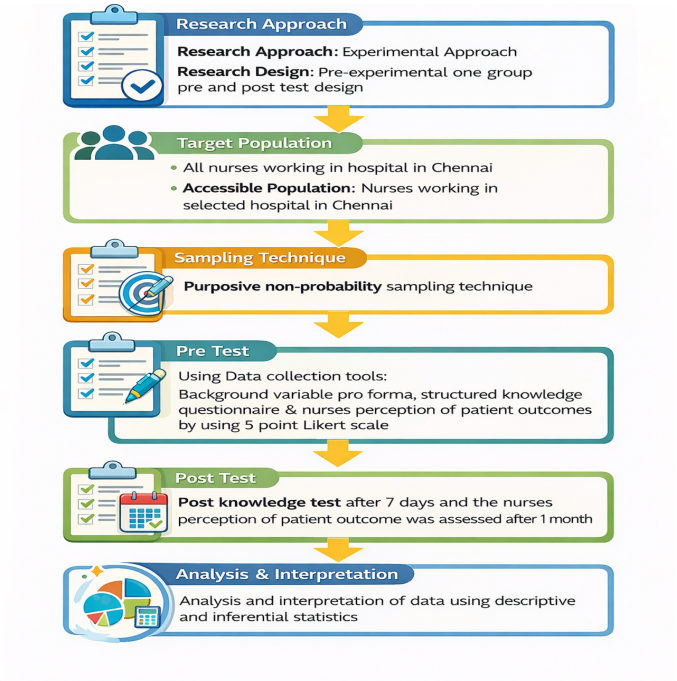



Figure 1. Schematic Representation of Research Methodology

**Table 1: Frequency and Percentage distribution of Nurses according to their background variables (N=30)**

| **Background variables** | ***f*** | ***%*** |
|---|---|---|
| **1.Age**[a] | 28.50±9.14 | |
| **2.Professional Qualification** | | |
| | | |
| 2.1.GNM | 22 | 73.3 |
| 2.2.P.B.B.SC.(N) | 1 | 3.3 |
| 2.3.B.SC.(N) | 7 | 23.3 |
| **3.Years of experience** | | |
| a.1-10 years | 21 | 69.9 |
| b.11-20 years | 9 | 29.9 |
| **4. Designation** | | |
| 4.1. Staff Nurse | 24 | 80.0 |
| 4.2. Nurse supervisor | 6 | 20.0 |
| **5. Area of working** | | |
| 5.1. Medical | 17 | 56.7 |
| 5.2. Surgical | 13 | 43.3 |
| **6.Marital status** | | |
| 6.1. Single | 18 | 60.0 |
| 6.2. Married | 11 | 36.6 |
| 6.3. Separated/Divorced | 1 | 3.4 |

| | | |
|---|---|---|
| **7. Prior ASP** | | |
| a. Yes | 0 | 0 |
| b. No | 30 | 100 |

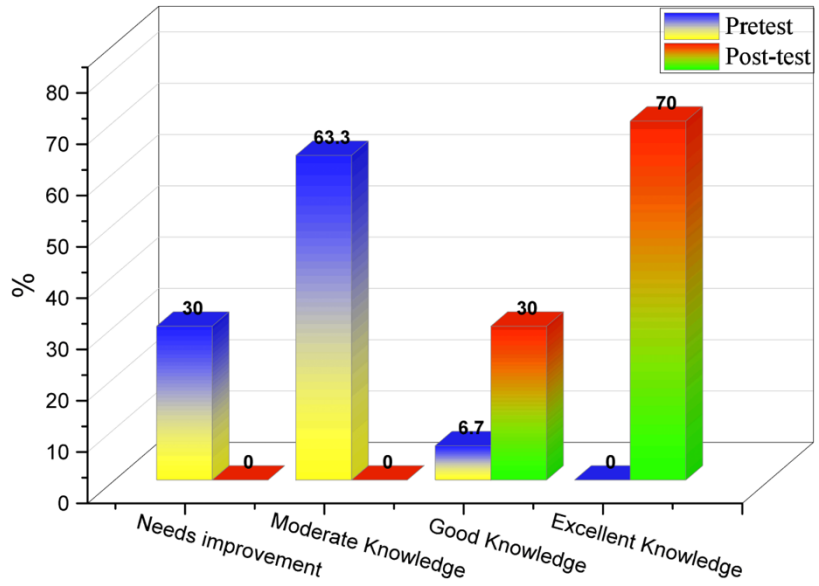
Notes [a] - Mean±SD

Table 1 presents the frequency and percentage distribution of nurses based on their selected background characteristics. The mean age of the participants was 28.50 ± 9.14 years, suggesting that most nurses were young to middle-aged adults. In terms of professional qualification, the majority were GNM qualified (73.3%), followed by B.Sc. (N) nurses (23.3%), and only a small proportion (3.3%) had completed P.B.B.Sc. (N). Regarding years of experience, most of the nurses (70%) had 1–10 years of professional experience, while 30% had 11–20 years of experience, indicating that the sample primarily included moderately experienced nurses. With respect to designation, the majority were staff nurses (80%), whereas 20% were nurse supervisors. Considering the area of work, more than half of the participants (56.7%) were employed in the medical ward, and 43.3% were posted in the surgical ward. In relation to marital status, most nurses were single (60.0%), followed by married (36.6%), and a small proportion (3.4%) were separated or divorced. Notably, none of the nurses (100%) had received prior training in the Antibiotic Stewardship Program (ASP), reflecting a complete absence of formal exposure to ASP among the study participants.

**Table 2: Frequency and percentage distribution of Nurses according to their level of knowledge before and after the intervention**

| **Knowledge variable** | **Pretest** | | **Chi-square *p*-value** | **Post-test** | | **Chi-square *p*-value** |
|---|---|---|---|---|---|---|
| | ***F*** | ***%*** | | ***f*** | ***%*** | |
| 1.Needs improvement | 9 | 30.0 | 14.60 | 0 | 0 | 4.80 |
| 2.Moderate Knowledge | 19 | 63.3 | (0.00)* | 0 | 0 | (0.02)* |
| 3.Good Knowledge | 2 | 6.7 | | 9 | 30 | |
| 4.Excellent Knowledge | 0 | 0 | | 21 | 70 | |

*Shows p<0.05




Distribution of Nurses level of knowledge before and after the intervention

**Fig. 1 Distribution of Nurses level of knowledge before and after the intervention**

Table 2 and Fig. 1 illustrate the distribution of nurses based on their level of knowledge regarding antibiotic stewardship during the pretest and post-test phases. In the pretest, the majority of nurses (63.3%) demonstrated a moderate level of knowledge, while 30.0% required improvement, and only 6.7% exhibited good knowledge. Notably, none of the participants achieved an excellent level of knowledge at this stage. The chi-square analysis indicated a statistically significant difference in the distribution of knowledge levels ($\chi^2 = 14.60$, $p = 0.00$). Following the educational intervention, a marked improvement was noted in the post-test results, where 70% of nurses attained an excellent level of knowledge and 30% demonstrated good knowledge, with no participants falling under the "needs improvement" or "moderate" categories. The chi-square value for the post-test was also statistically significant ($\chi^2 = 4.80$, $p = 0.02$). Overall, these findings highlight a substantial enhancement in nurses' knowledge of antibiotic stewardship after the intervention, underscoring the effectiveness of the educational or empowerment program implemented.

**Table 3: Frequency and percentage distribution of Nurses according to their level of perceived patient outcomes before and after the intervention**

| **Perception variable** | **Pretest** | | **Chi-square *p*-value** | **Post-test** | | **Chi-square *p*-value** |
|---|---|---|---|---|---|---|
| | ***f*** | ***%*** | 8.60 | ***f*** | ***%*** | 2.13 |
| **1.High Perception** | 3 | 10.0 | (0.01)* | 19 | 63.3 | (0.14) |
| **2. Moderate Perception** | 16 | 53.3 | | 11 | 36.7 | |
| **3. Low Perception** | 11 | 36.7 | | 0 | 0 | |

*Shows $p<0.05$

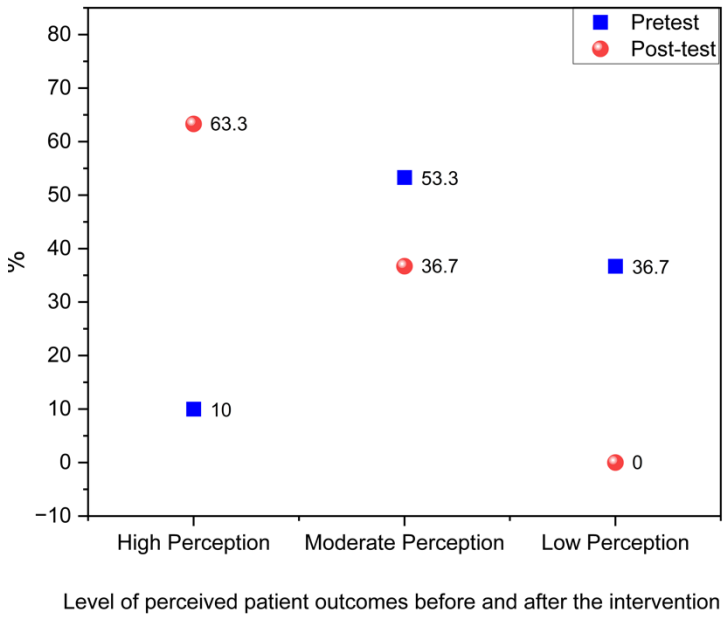



**Fig. 2 Level of perceived patient outcomes before and after the intervention**

Table 3 and Fig. 2 present the distribution of nurses according to their perceived levels of patient outcomes before and after the intervention. During the pretest, more than half of the nurses (53.3%) reported a moderate level of perception regarding patient outcomes, followed by 36.7% who had a low level of perception, while only 10.0% demonstrated a high level of perception. The chi-square analysis indicated a statistically significant difference in the distribution of perceived patient outcome levels during the pretest ($\chi^2 = 8.60$, $p = 0.01$). In contrast, the post-test results reflected a substantial improvement in nurses' perceptions, with the majority (63.3%) reporting a high level of perception and 36.7% indicating a moderate level. Notably, none of the nurses reported a low level of perception in the post-test. However, the chi-square test for post-test perception did not reveal a statistically significant difference ($\chi^2 = 2.13$, $p = 0.14$). These findings suggest that the intervention positively influenced nurses' perceptions of patient outcomes, even though the improvement in the post-test did not reach statistical significance.

**Table 4:** Knowledge level among the nurses before and after the intervention.

| **Variable** | **Pre-test** | | **Post-test** | | **Mean difference** | **Paired *t*-test** | ***p*-value** |
|---|---|---|---|---|---|---|---|
| | ***Mean*** | ***SD*** | ***Mean*** | ***SD*** | | | |
| **Knowledge** | 14.5 | 2.34 | 20.2 | 1.73 | 5.73 | 19.95 | 0.00* |

*Shows $p<0.05$

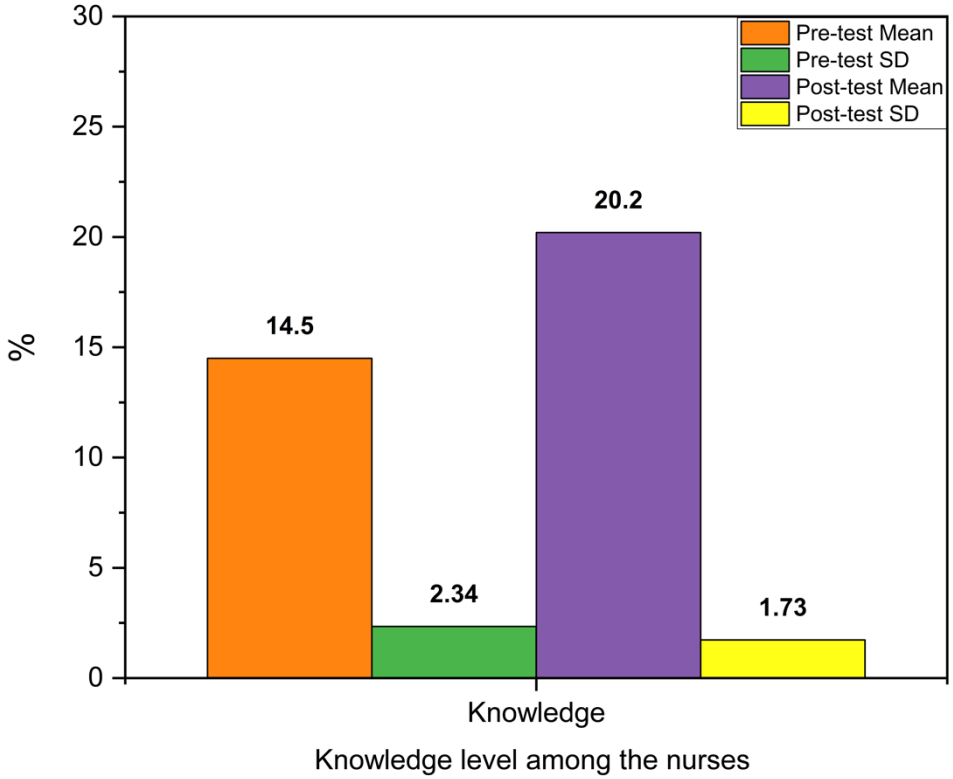



**Fig. 3 Knowledge level among the nurses**

Table 4 and Fig. 3 present a comparison of the mean knowledge scores of nurses before and after the intervention, analyzed using a paired t-test. The mean pretest knowledge score was 14.5 ± 2.34, while the mean post-test knowledge score increased to 20.2 ± 1.73. The observed mean difference of 5.73 between the pretest and post-test scores indicates a substantial improvement in knowledge following the intervention. The paired t-test analysis revealed a statistically highly significant difference between the pretest and post-test knowledge scores (t = 19.95, p = 0.00), confirming that the intervention was effective in significantly enhancing nurses' knowledge regarding antibiotic stewardship.

**Table 5:** Perceived patient outcome level among the nurses before and after the intervention.

| | **Pretest** | | **Post-test** | | **Mean difference (pretest & st-test)** | **Paired *t*-test** | ***p*-value** |
|---|---|---|---|---|---|---|---|
| | ***Mean*** | ***SD*** | ***Mean*** | ***SD*** | | | |
| **Perceived patient outcome** | 52.3 | 7.40 | 62.9 | 7.00 | 10.70 | 16.54 | 0.00* |

*Shows p<0.05

Table 5 presents the comparison of mean perceived patient outcome scores among nurses before and after the intervention, analyzed using a paired t-test. The mean pretest perceived patient outcome score was 52.3 ± 7.40, while the mean post-test score increased to 62.9 ± 7.00. The mean difference of 10.70 between the pretest and post-test scores indicates a substantial improvement in nurses' perception of patient outcomes following the intervention. The paired t-test analysis further revealed a statistically highly significant difference between the pretest and post-test perceived patient outcome scores (t = 16.54, p = 0.00). These results demonstrate that the intervention was effective in significantly enhancing nurses' perceived patient outcomes.

**Table 6:** Association of the knowledge score and perceived patient outcome score among the nurses.

| **Variables** | **N** | **Mean** | **SD** | **Karl Pearson's Correlation coefficient** | |
|---|---|---|---|---|---|
| | | | | ***r*- value** | ***p*-value** |
| Knowledge on Antibiotics | 30 | 20.2 | 1.73 | 0.57 | 0.00* |
| Perceived Patient outcome | 30 | 62.9 | 7.0 | | |

*Shows p<0.05

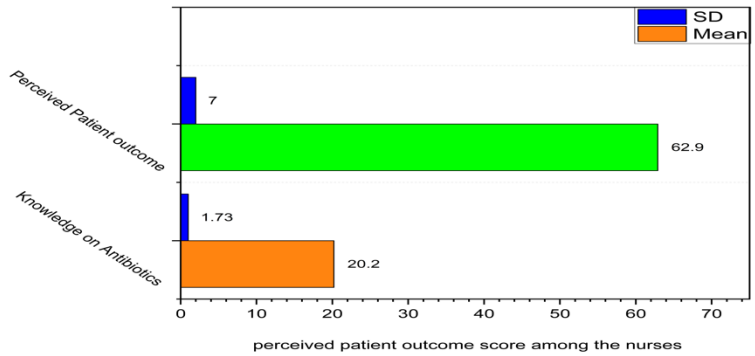



**Fig. 4 Perceived patient outcome score among nurses**

Table 6 and Fig. 4 present the association between post-test knowledge scores and perceived patient outcome scores among nurses, analyzed using Karl Pearson's correlation coefficient. The mean post-test knowledge score was 20.2 ± 1.73, while the mean perceived patient outcome score was 62.9 ± 7.0. The analysis revealed a moderate positive correlation between knowledge and perceived patient outcomes (r = 0.57), which was statistically significant (p = 0.00). This finding suggests that higher levels of knowledge regarding antibiotics and antibiotic stewardship were associated with improved perceived patient outcomes among nurses.

**Table 7:** Association between the Post-test knowledge scores with the background variables

| **Background variables** | **Post-test (knowledge)** | | ***F* value/ *t* value *p*-value** |
|---|---|---|---|
| | ***M*** | ***SD*** | |
| **1.Age** | | | |

| | | | |
|---|---|---|---|
| 1.1.20-30 years | 19.3 | 1.19 | 21.10 (0.00)* |
| 1.2.30-40 years | 22.0 | 0.81 | |
| 1.3.40-50 years | 22.4 | 0.89 | |
| **2.Professional Qualification** | | | |
| | | | 0.63 (0.60) |
| 2.1. GNM | 20.2 | 1.77 | |
| 2.2.P.B.BS.c (N) | 18.0 | | |
| 2.3.B.S.c(N) | 20.6 | 1.71 | |
| **3.Years of experience** | | | |
| 3.1.1-10 years | 19.5 | 1.40 | 24.41 (0.00)* |
| 3.2.11-20 years | 22.1 | 0.83 | |
| **4. Designation** | | | |
| 4.1. Staff nurse | 19.7 | 1.59 | 10.8910 |
| 4.2. Nurse supervisor | 22.0 | 0.89 | 10.101010.89 (0.00)* |
| **5. Area of working** | | | |
| 5.1. Medical ward | 20.6 | 1.87 | 10102.05 (0.16) |
| 5.2. Surgical ward | 19.7 | 1.43 | |
| **6.Marital status** | | | |
| 6.1. Single | 19.2 | 1.06 | 1101 |
| 6.2. Married | 21.5 | 1.50 | |
| 6.3Separated/Divorced | 23.0 | | 014.51 (0.00)* |
| **7. Previous History of attended ASP** | | | |
| 7.1.Yes | 0 | 0 | |
| 7.2.No | 20.2 | 1.73 | --0 |

*Shows $p<0.05$

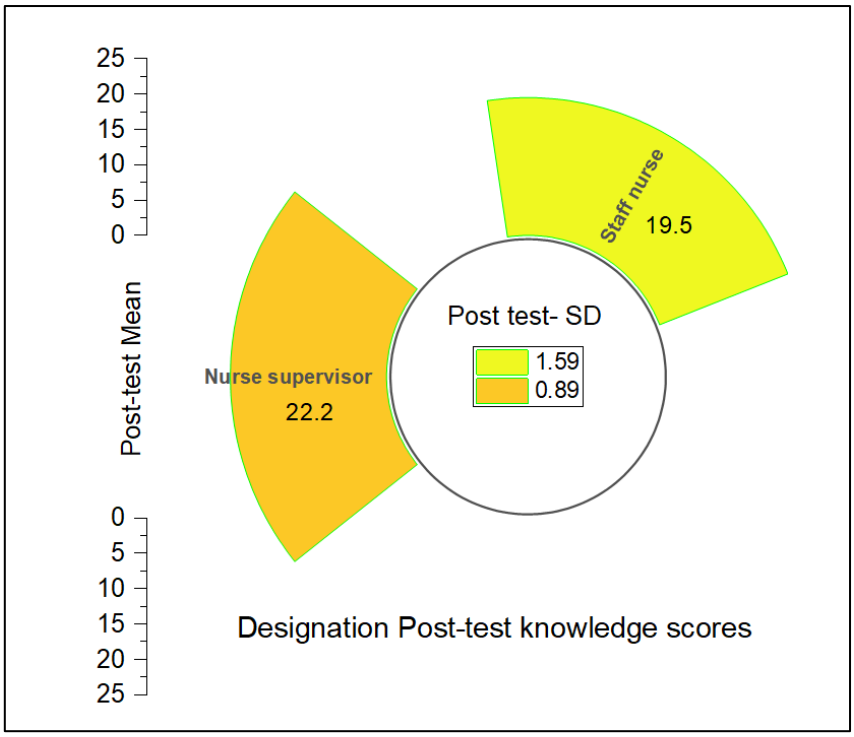



**Fig. 5 Mean of post test knowledge scores of Nurse supervisor and Staff nurse**

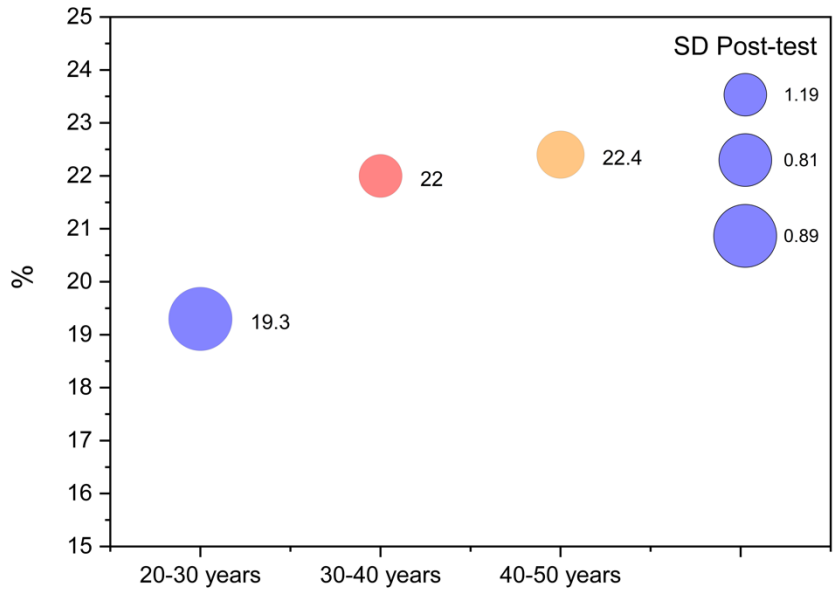



**Fig. 6 Mean and SD of post-test knowledge scores in different age groups**

Table 7 summarizes the association between the post-test knowledge scores of nurses and their selected background variables, analyzed using the t-test and ANOVA. A statistically significant association was observed between post-test knowledge scores and age (Fig. 5 and 6) ($F = 21.10$, $p = 0.00$), indicating that nurses aged 30–50 years had higher mean knowledge scores compared to those aged 20–30 years. Similarly, years of experience showed a significant association with post-test knowledge scores ($F = 24.41$, $p = 0.00$), with nurses having 11–20 years of experience demonstrating higher mean scores than those with 1–10 years of experience. Designation also showed a significant association ($p = 0.00$), as nurse supervisors recorded higher knowledge scores than staff nurses. Marital status was found to be significantly

associated with post-test knowledge scores (p = 0.00). In contrast, no statistically significant association was observed between post-test knowledge scores and professional qualification (p = 0.60) or area of working (p = 0.16). Since none of the nurses had attended prior Antimicrobial Stewardship Program (ASP) training, an association with previous ASP exposure could not be determined.

**Table 8:** Association between the Post-test of perceived patient outcome with the background variables

| **Background variables** | **Post-test Perceived patient outcome** | | ***F* value/ *t* value *p*-value** |
|---|---|---|---|
| | ***M*** | ***SD*** | |
| **1.Age** | | | |
| 1.1.20-30 years | 60.6 | 7.04 | 8.50 (0.00)* |
| 1.2.30-40 years | 67.7 | 2.21 | |
| 1.3.40-50 years | 68.8 | 3.27 | |
| **2.Professional Qualification** | | | |
| 2.1.GNM | 61.8 | 7.77 | 5.44 (0.02)* |
| 2.2.P.B.BSc | 58.0 | | |
| 2.3.BS.C (N) | 66.7 | 3.19 | |
| | | | |
| **3.Years of experience** | | | |
| 3.1. 1-10 years | 60.9 | 7.00 | -4.17 (0.00)* |
| 3.2. 11-20 years | 68.5 | 2.87 | |
| **4. Designation** | | | |
| 4.1. Staff Nurse | 61.5 | 7.04 | 10.8910 |
| 4.2. Nurse Supervisor | 68.6 | 2.80 | 10.1-3.33 1010-3.88 (0.00)* |
| **5. Area of working** | | | |
| 5.1. Medical ward | 63.0 | 7.68 | 10100.03 (0.97) |
| 5.2. Surgical Ward | 62.9 | 6.30 | |
| **6.Marital status** | | | |
| 6.1. Single | 59.8 | 7.00 | 1101 |
| 6.2. Married | 68.0 | 3.74 | |
| 6.3. Separated/Divorced | 63.0 | 7.00 | 16.46 (0.00)* |
| **7. Prior training in ASP** | | | |
| A. Yes | 0 | 0 | 0 |
| B. No | 62.9 | 7.00 | --0 |

*Shows p<0.05

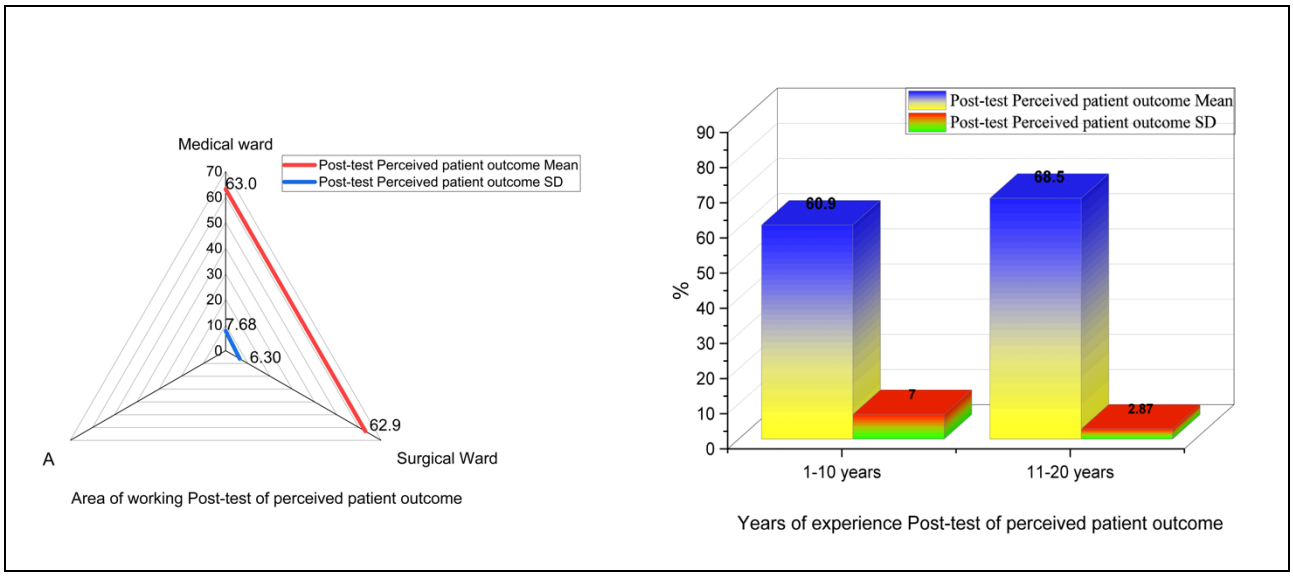



**Fig. 7 Mean and SD values of post-test perceived patient outcome**

Table 8 illustrates the association between post-test perceived patient outcome scores and selected background variables among nurses. A statistically significant relationship was found between perceived patient outcome scores and age (p = 0.00), with nurses aged 30–50 years showing higher mean scores. Professional qualification also demonstrated a significant association with perceived patient outcome scores (p = 0.02), indicating variation in perception across different qualification levels. Similarly, years of experience showed a significant association (p = 0.00), where nurses with 11–20 years of experience reported higher perceived patient outcome scores compared to those with 1–10 years of experience. Designation was another factor significantly associated with perceived patient outcome scores (p = 0.00), with nurse supervisors obtaining higher mean scores than staff nurses. Marital status also exhibited a statistically significant association (p = 0.00). However, the area of working did not show any significant association with perceived patient outcome scores (p = 0.97). Since none of the nurses had prior exposure to ASP training, no association could be assessed for this variable.

## Discussion

Recent research has consistently shown that educational and empowerment programs for nurses lead to significant improvements in knowledge, perceptions, attitudes, and aspects of patient outcomes. For instance, a 2024 quasi-experimental study demonstrated that an educational intervention for clinical leaders about nurses' roles in antibiotic stewardship significantly increased nurses' awareness and engagement, with statistically significant improvement in scores post-training (p < 0.001) (14) Another study focusing on antimicrobial stewardship education among nurses found that training significantly improved nurses' knowledge, perception, and practice, and the gains were sustained at 2-month follow-up, indicating that structured interventions can embed learning into practice (p < 0.01)(15) . A 2025 study on educational empowerment for diagnostic stewardship also reported a significant increase in nurses' knowledge following the intervention, highlighting how structured training improves nurses' competency in stewardship related domains (16).

Moreover, randomized controlled evidence shows that targeted educational programs based on structural and psychological empowerment theories significantly enhanced nurses' perceptions of empowerment, demonstrating that educational empowerment is effective in changing nurses' professional perceptions and confidence levels (17). Additional research underscores that empowerment strategies, including educational interventions, positively influence patient care quality and outcomes, suggesting that nurses who are more empowered and knowledgeable contribute more effectively to patient care experiences and outcomes . (18).Collectively, these studies reinforce the

present findings that empowerment and educational interventions significantly enhance nurses' knowledge, their perceptions/attitudes, and aspects related to patient outcomes following intervention.

Conclusion

This study concludes that the nurse empowerment program regarding antibiotic stewardship was effective in improving nurses' knowledge, perceptions, and attitudes toward stewardship practices. The findings also indicate a positive influence on selected patient outcome indicators following the intervention. The significant improvement observed in post-test scores highlights the importance of structured educational and empowerment strategies in strengthening nurses' roles in antibiotic stewardship. Empowering nurses through targeted training enhances their confidence, engagement, and professional responsibility, which in turn contributes to improved quality of care and better patient-related outcomes. Therefore, nurse-led educational empowerment programs should be integrated into routine clinical practice to promote optimal antibiotic use and improve healthcare.

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**Data Availability**

Data will be made available upon request made to the corresponding author.

**Patient Consent for Publication**

Not applicable.

**Competing Interests**

All authors confirm that they do not have any conflicts of interest to disclose.

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