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Original Research Article

Antibiotic awareness and its usage in hospitals: Do our nurses possess adequate knowledge and practice?

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ABSTRACT

Introduction: Antibiotics play a monumental role in infectious diseases control and management and have been used in all drug treatment strategies. But the inappropriate use and practice of antibiotics among health professionals results in adverse effects and accelerates the growth of microbial resistance against the majority of effective antibiotics. This study aimed at assessing the knowledge and practice of antibiotic awareness and its usage among staff nurses working in hospitals and also to identify the association of demographic factors on knowledge and practice of antibiotic awareness and its usage.
Materials and Methods: A descriptive cross-sectional survey design was used. A total of 100 staff nurses (4 males and 96 females) were selected using a convenience sampling method. Data was collected using a questionnaire to assess the knowledge and a rating scale for practice about antibiotics awareness and usage.
Results: About 50 percent of the participants demonstrated good knowledge of antibiotic awareness and its usage, and 72 percent had very good practice of antibiotics usage in hospitals. A highly significant, weak positive correlation (r=0.316, at $p < 0.01$) between knowledge and practice of antibiotic awareness and usage among staff nurses was obtained. A significant association of gender with practice (χ^2 =59.64, p = 0.002) and educational qualification with knowledge was found (χ^2=53.82, p = 0.017).
Discussion: The study results suggested that staff nurses in general have good knowledge of antibiotic awareness and usage and very good practice in antibiotic usage. However, there should be effective training programs to consistently keep the knowledge and practice of staff nurses regarding antibiotic awareness and its practice at a satisfactory level and to raise awareness among those who demonstrated less knowledge and practice for its judicious use and practice.

1. Introduction

Antibiotics have become an inevitable part of human life in this modern world, with an escalation in the use and prescription of these drugs in clinical practice.[1] Among the many drugs which are used in medical treatment strategies, antibiotics play an essential role in patient treatment and in contributing to a speedy recovery from many diseases.[2,3] Antibiotics play a crucial role in infectious disease control and management, and are used in both preventive and curative therapy.[4]Their use has not only saved the lives of innumerable patients but also has improved patient care in general, lessened the patient's hospital stay, reduced mortality, and fasten the recovery of patients, as well as contributed to reduced cost of treatment.[4]

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Antibiotic development has been flourishing in the earlier days, and even when a struggle against its usage was developed, there was always a new drug available to treat the increasingly resistant bacteria.[5–7] But, during the past 30 years, antibiotic development has slowed down considerably, and the options for treating the increasingly resistant bacterial strains are becoming more and more limited.[8–10] The main immediately available strategy to address this problem is to optimize the use of currently available antibiotics, to ensure the protection of the integrity of still-viable antimicrobial options for patient management.[11] Adopting a sensible use of antibiotics will allow time for the development of new alternatives, and helps improve the clinical results by effectively treating the infections while limiting the development and propagation of multi-drug resistant organisms.[9,10,12] In the hospital, antimicrobial stewardship (ASP) teams have emerged and are charged with the important initiative to conserve the antibiotics currently in use.[13] ASP has been defined as "the optimal selection, dosage, and duration of antimicrobial treatment that results in the best clinical outcome for the treatment or prevention of infection, with minimal toxicity to the patient and minimal impact on subsequent resistance".[14] The goal of ASP is to work with health care practitioners to help each patient receive the most appropriate antimicrobial with the correct dose and duration, to prevent antimicrobial overuse, misuse, and abuse to minimize the development of resistance.[8]

However, some misconceptions related to antibiotic use exist among healthcare professionals, which can lead to inappropriate and excessive use of antibiotics by medical practitioners, resulting in adverse events that could harm the patients and accelerate the growth of microbial resistance against the majority of effective antibiotics.[15] A nurse's role in antibiotic use and practice in the hospital has a wide impact on the proper administration of antimicrobial therapy to patients. Even though timely antibiotic ordering and administration are purely regarded as a physician prescribing event, nursing staff play a key role in the rational use of antibiotics.[16] They educate the patients and perform practices that influence therapeutic decision-making and optiization of antibiotic therapies.[17] It is the staff nurse who receives the order for antibiotics, submits the order to the pharmacy, administers the medication, records its dose and timing, and monitors the effects of treatment and adverse events.[16,17] Likewise, although cultures are also ordered by a physician, or occasionally by protocol, early and appropriate collection and submission of specimens for culture are almost universally performed by nurses.[18,19] Early and appropriate collection of specimens for culture is the first link of a chain leading to a microbiological diagnosis and antimicrobial susceptibility determination, therapeutic drug measurements, antimicrobial adjustment and de-escalation, intravenous to oral or to outpatient intravenous antimicrobial therapy, and ultimately directly to an impact on patient discharge and length of stay.[17] The failure in implementing basic infection control practices has been one of the principal causes of the emergence and the dissemination of drug-resistant organisms.[18,19]

Improper use and practice of antibiotics have been identified as the major contributing factor leading to antibiotic resistance.[20–22] To contribute in solving the problems of antibiotic resistance, there is a need to ensure the appropriate use of these drugs[21,23] Nurses can play an important role in the communication and management of antibiotics, for example, in prompting, reminding, checking, and querying prescribers' decisions.[1] Moreover, nurses hold considerable potential for optimizing the use of the antibiotic, particularly in monitoring the timing, duration of its use, dosage, following hospital protocols and guidelines for antibiotics' implementation strategies, and taking quality and safety initiatives towards improvement in infection prevention and control practices.[8] But, evidence showed that most nurses have moderate or poor knowledge and practice regarding antibiotic awareness and its usage.[24,25] Thus, this study aims to assess the knowledge and practice of staff nurses working in hospitals about antibiotic awareness and its usage, to identify the correlation between knowledge and practice among the staff nurses, and to determine the association of demographic factors with knowledge and practice.

2. Materials and Methods

The study was conducted as a part of the research project, as partial fulfilment of the requirement of completion of the academic degree course in the Bachelor of Science in Nursing Program. The study used a quantitative approach, using a descriptive, cross-sectional survey design. The study was conducted in Kerala, India. The participants were 100 adult nurses, both male and female, aged between 21 and 46 years, and working in various private hospitals in the Ernakulum district. The data collection was carried out in February 2022.

The study participants were recruited using a convenience sampling method, through a formal method of approaching the hospitals and the participants and seeking permission for performing the study. The participants were registered staff nurses, who were directly involved in patient care and currently work in selected hospitals, in medical, surgical inpatient units, including intensive care units (ICUs), and other areas including obstetric and gynecology wards, and labor room. They were included if they can read and write English, had a minimum work experience of 6 months, and if they were willing to participate in the study. Participants were excluded if they were not directly involved with inpatient care or if they are working in pediatric, psychiatric units, operation theatre, community health care centers, and outpatient departments. Written

consent was taken from all the nurses, who agreed to participate in the study.

2.1. Tools of data collection

The following tools were used in data collection:

1. Demographic and knowledge questionnaire: A structured knowledge questionnaire with a few demographic items was used to assess information regarding the knowledge related to antibiotic awareness and its usage among the staff nurses. The first part of the tool had five demographic items (which included age, gender, educational qualifications, years of experience, and the practice area) and the second part had 25 questions related to antibiotic awareness and its usage. The correct answers were given a score of 1 and the incorrect, zero. The scores were categorized as very good (score range of 21-25), good (16-20), average (11-15), poor (6-10), and very poor (0-5). The test-retest reliability of the tool was 0.93.
2. Antibiotic awareness and practice rating scale: Developed and adopted by the researchers, this32-item scale assessed the antibiotic awareness and practice among the staff nurses on a 5-point Likert scale. The response was categorized as 5 (always), 4 (often), 3 (sometimes), 2 (rarely), and 1 (never). The total score summed up gave a score of 160 and was graded as very good (144-160), good (120-143), moderate (80-119) poor (56-79), and very poor (less than 56). The scale demonstrated test-retest reliability of 0.85.

2.2. Data collection process

After obtaining formal permission from the hospital authorities, the data collection was carried out during February, from 09/02/2022 to 14/02/2022 in three private hospitals in Ernakulum District, Kerala, India. All the participants were recruited after explaining the purpose of the study and the study procedure. The participants who gave informed consent were approached and the questionnaires were distributed. Completed questionnaires were collected 30 minutes after their administration.

3. Results

3.1. Sample characteristics

The details of sample characteristics are given in Table 1.

A total of 100 staff nurses participated in the study (96 females and 4 males). A majority of the participants belonged to the age group of 26-30 years (35%) and were B.Sc. Nurses (52%). Most of them were working in surgical units (41%) and were having an experience of more than 5 years (51%).

Table 1: Demographic characteristic of the participants

Demographic Variables	Frequency (N= 100)	Percentage
Age in Years		
21-25	17	17
26-30	35	35
31-35	30	30
36-40	11	11
41-45	7	7
Gender		
Male	4	4
Female	96	96
Educational Qualification		
B.Sc. Nursing	52	52
M.Sc. Nursing	3	3
General Nursing and Midwifery	45	45
Experience		
6 months-< 1 year	12	12
≥ 1-≤ 5 years	37	37
More than 5 years	51	51
Practice area		
Medical Unit	35	35
Surgical Unit	41	41
Others*	24	24

Note: Others include obstetrics and gynecology wards, labour room and casuality

3.2. Knowledge of antibiotic awareness and its usage among staff nurses

As illustrated in Figure 1, a majority of the participants (50 percent) had good knowledge, 21 percent had very good knowledge, 24 percent had average knowledge and the remaining 5 percent had poor knowledge. None of them belonged to the category of very poor knowledge.

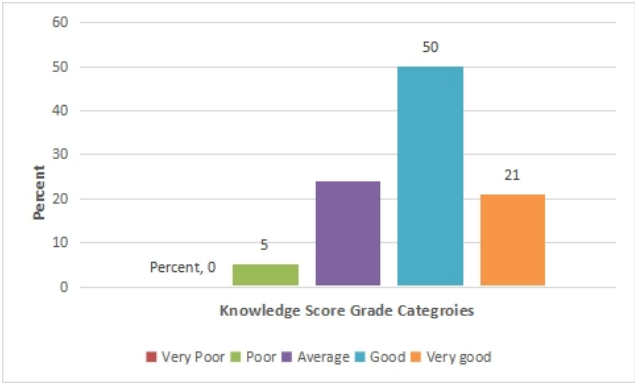

Fig. 1: Distribution of participants' knowledge scores with regard to antibiotic awareness and its usage

To sum up, the study results revealed that a majority of the participants had very good knowledge about the

purpose of using antibiotics, awareness of the time for de-escalation of antibiotics after their introduction, the route of administration of test dose, and the time for de-escalation of antibiotic after its introduction. They demonstrated good knowledge of the result of over usage of antibiotics, the purpose of taking culture and sensitivity before antibiotic administration, hypersensitivity reaction, and the signs of hypersensitivity reaction. But, they only had average knowledge regarding identification of the drug coming under the aminoglycoside category and the nurses' immediate response when the patient shows any adverse effect while an intravenous antibiotic is administered, and comparatively a poor knowledge regarding the antibiotics to be taken before food, the impact of widespread and prolonged use of antibiotics leading to the emergence of drug-resistant strains and about using antacids in antibiotic therapy.

3.3. Practice regarding antibiotic awareness and usage

The details of the score categories of participants are given in Figure 2. Most of the participants had a very good practice (72%), and 25 percent were having good practice. Three percent of the participants reported having moderate practice regarding antibiotic awareness and its usage. No one reported having poor or very poor practice.

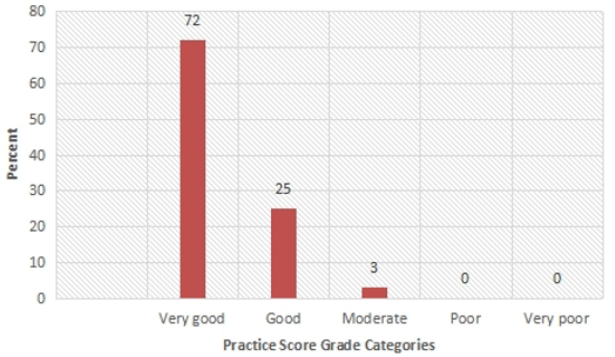

Fig. 2: Distribution of participants practice scores with regard to antibiotic awareness and its usage

Overall, the study results showed that a majority of the participants demonstrated very good practice in areas like reviewing the doctors' orders before administering antibiotics, checking patients' names to ensure the right patient, following correct dilutions while preparing antibiotics, and checking the patency of the cannula before and after administration of antibiotics. They also had a good practice in doing prior checks before administering antibiotics, notifying the physician about the culture and sensitivity test results, sending samples for culture and sensitivity before antibiotic administration, assessing contraindications before antibiotic administration, and adhering to the protocol about changing the intravenous route to oral route while tapering the dose. But, they demonstrated a lack of practice in areas such as reading manufacturer's instructions while administering antibiotics and reviewing the antibiotic awareness or its updates.

3.4. Correlation between knowledge and practice scores regarding antibiotic awareness and its usage among staff nurses

There was a highly significant, weak positive correlation ($r = 0.316$) between the knowledge and practice of participants about antibiotic awareness and its usage.

3.5. Association of demographic factors with knowledge and practice among staff nurses

Among the demographic variables, educational qualification was significantly associated with knowledge, and gender was significantly associated with practice among the participants ($\chi 2 = 53.82$, $p = .017$, and $\chi 2 = 59.64$, $p = .002$ and respectively).

No significant association of age, experience in years, and practice area with knowledge or practice were observed (all, $p \geq 0.5$).

4. Discussion

This study provides useful information regarding the knowledge and practice among staff nurses regarding antibiotic awareness and its usage in hospitals. The results had shed a light on the nurses' common practice area, to demonstrate how much aware they are while administering antibiotics to patients on an everyday basis. In general, the study results supported studies conducted about antibiotic awareness and knowledge and the practice, where a majority of the nursing staff had comparatively good knowledge concerning its usage.

In the present study, a majority of the participants were females, which was similar to a study conducted in China, where a female predominance was observed.[26] In contrast to the current study results, a study carried out in India among the paramedical staff had demonstrated no significant gender differences in knowledge and perceived practices about antibiotic usage and resistance.[2]

The present study demonstrated a significant association of education with knowledge, which was similar to the study conducted by Sadasivam et al. (2016),[2] where the staff with medical training had 4 times better knowledge compared to others. Similarly, age did not demonstrate any significant association with knowledge or practice related to antibiotic awareness and usage in the present study, whereas, age was associated with better knowledge among the participants, with 2.8 times improved understanding of antibiotic usage in a study conducted in India.[2]

A high percentage of staff nurses demonstrated very good knowledge regarding the purpose, route, and adverse effects of over usage of antibiotics as well as signs of hypersensitivity reactions and the purpose of taking culture and sensitivity tests, whereas their knowledge was average or poor when it came to the identification of a drug in various categories, antibiotic resistance, use of antacids with antibiotics, and the immediate response if the patient demonstrates an adverse reaction on an intravenous antibiotic administration. The study results support the study conducted in Italy, where 95.2% of the participants had good knowledge about the purpose and indication of antibiotics.[27] In the present study, the participants' knowledge about antibiotic resistance associated with its prolonged use was comparatively poor, which was in contrast with a study conducted by Khan et al. (2013),[28] in which 93% of the participants demonstrated correct knowledge concerning antibiotic resistance.[28]

The study results of the practice related to antibiotic usage were similar to studies conducted across different parts of the world, where a majority of the participants demonstrated good practice toward antibiotic use and resistance.[27,29,30] In contrast, two studies conducted in India had demonstrated a lack of awareness of the proper use and dosage of antibiotics.[2,31]

4.1. Strengths and limitations of the study

The study addresses a major problem area in which much research has not been conducted. The major limitations of the study were that it was conducted only in three private hospitals, which may not be a true representation of the target population. We could not include government hospitals due to the time restrictions in completing the research, as Government sectors take a comparatively long time for getting permission and sanction for performing research. Other limitation includes the sample size, as it was only 100 subjects who had participated, and less representation of the male participants in the study. It is also possible that in the present study, there could be some self-reporting/ self-rating bias, thus the results of this study need to be used with caution while generalization.

There was a paucity of studies evaluating the knowledge or awareness and practice in the area of nursing, which made the comparisons difficult.[16] (Rábano-Blanco et al., 2019).

5. Conclusion

The study assessed the knowledge and practice of staff nurses on antibiotic awareness and usage. The results suggested that staff nurses have good knowledge of antibiotic awareness and usage and are very good on practice antibiotic usage. This gives an insight into the promotion of antibiotic awareness teaching programs among healthcare workers especially staff nurses for the judicious use of antibiotics. Future studies need to be conducted in areas related to antibiotic knowledge and practice, antibiotic stewardship, and nurses' role.

6. Source of Funding

None.

7. Conflict of Interest

None.

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