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Research Protocol

Nursing Section

Impact of a Structured Educational Programme on the Knowledge of Antibiotic usage and Resistance among Undergraduate Non Medical Students: A Research Protocol

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ABSTRACT

Introduction: One of the most widely used medications to treat infections in a variety of medical specialities is an antibiotic. While their names are well known and they are widely used, there is insufficient education in the community, especially in developing countries, regarding the appropriate administration of antibiotics, antibiotic resistance, and its effects. As the demand for antibiotics increases day by day, the need for awareness and education becomes increasingly crucial.

Need of the study: Global health is seriously threatened by bacteria resistant to the drugs used to treat them. We call this resistance to antibiotics. This can lead to infections that are difficult or impossible to treat, as well as an increased risk of death and morbidity. Research on antibiotic resistance and public and healthcare provider awareness of these issues is essential to prevent Antimicrobial Resistance (AMR) and guarantee that antibiotics are used appropriately.

Aim: To assess the efficacy of a structured educational intervention in raising undergraduate non medical students' knowledge of antibiotics and their resistance.

Materials and Methods: A quasi-experimental study will be conducted at the Indian state of Maharashtra's Indraprastha New Arts Commerce and Science College, Wardha from August 2024 through December 2024. A quantitative method will be used to assess how well the structured teaching programme has affected students' knowledge of antibiotics and their resistance. A total of 65 students will participate and a structured questionnaire will be used for data collection. The tools will consist of- Section I: Demographic data like age, gender, types of family, resident and socioeconomic status. Section II: Structured knowledge questionnaire on the knowledge of antibiotics and their resistance. Descriptive and inferential statistics will be used to classify and analyse the participant data to meet the study's objectives. Frequency, mean, standard deviation, mean percentage, and structured questionnaires will be used to explain demographic variables. A paired t-test will be applied to ascertain the significance of the variation in the knowledge score between the pre and post-test. The Chi-square test will be applied to determine the association between the knowledge level and demographic variables.

Keywords: Antimicrobial resistance, Awareness, Bacteria, Drugs, Morbidity

INTRODUCTION

The main source of antibiotic resistance is the transmission of genes and bacteria between humans, animals, and the environment, which poses a major threat to world health. Many barriers limit the movement of genes and bacteria, but pathogens are always acquiring new resistance factors from other species, which complicates the management and avoidance of bacterial infections [1]. The ability to treat life-threatening infections is threatened by antibiotic resistance. It will be necessary to find strategies to preserve the efficacy of existing antibiotics if it is acknowledged that it will take several years if not decades, for the development of novel antibiotics to address the current antibiotic resistance issue [2]. Still, infections remain the leading cause of death in developing countries. The causes of this include the emergence of new diseases, the return of diseases that were previously under control and most importantly the development of antibiotic resistance. In both community and hospital settings, AMR is acknowledged as a significant issue in the management of microbial infections, and it appears to accompany nearly every new medication [3].

It is imperative to address AMR as a major global threat to stop the spread of antibiotic-resistant pathogens. The US Centers for Disease Control and Prevention (CDC) have highlighted several clinician-driven strategies for antibiotic stewardship, such as reporting and accurate documentation of antimicrobial usage and resistance [4].

The AMR is a serious threat to the world to stop the spread of pathogens resistant to antibiotics. Although more effort has been put into creating new antimicrobial agents, the number of new antibiotics produced has decreased as a result of manufacturers' limited profit margins, which prevent them from investing in the development of novel antimicrobials for clinical use. To combat this, improvements must be made to the healthcare reimbursement systems as well as the process for discovering antimicrobial drugs [5]. There is evidence that human-caused pollution broadens the range of bacterial pathogens that are present in the environment [6]. Antibiotics are among the most effective drugs used to treat humans. However, because they may endanger microbial populations, they must also be considered important pollutants. In addition to being used for medical purposes, antibiotics are extensively employed in agriculture and animal husbandry. Antibiotics and genes linked to antibiotic resistance that are present in farm and human waste residues have the potential to contaminate natural environments. The most obvious result of antibiotic release in natural environments is the selection of resistant bacteria [7].

Therefore, this study aims to assess the efficacy of a structured educational intervention in raising undergraduate non medical students' knowledge of antibiotics and their resistance.

Primary objectives: To assess the knowledge of undergraduate non medical students' pre and post-educational intervention on antibiotic and their resistance.

Secondary objectives: To find the association of knowledge level with demographic variables.

REVIEW OF LITERATURE

Education constitutes a fundamental component of comprehensive strategies aimed at enhancing antibiotic utilisation within hospitals. Its effectiveness is significantly augmented when coupled with interventions and measurable outcome assessments. Case-based education is particularly effective; thus, prospective audits accompanied by feedback and preauthorisation requirements are sound methods for imparting knowledge regarding antibiotic use. Patients must be adequately informed about the antibiotics they are prescribed, including the justification for their use. Furthermore, patients should receive education concerning potential adverse effects and the signs and symptoms they must report to healthcare providers. Patients should also be alerted to side effects that may manifest after discharge or upon completion of their antibiotic regimen. Engaging patients in the development and evaluation of educational materials can enhance the efficacy of these resources [4].

A study conducted by Wun YT et al., in Hong Kong concluded that the general public possesses insufficient knowledge regarding the factors that contribute to antibiotic resistance and the ways to mitigate it. Health education initiatives and future campaigns should aim to equip individuals with the requisite tools to effectively combat antibiotic resistance [8]. In a similar vein, a survey conducted by Tangcharoensathien V et al., identified that certain practices regarding antibiotic use are both inappropriate and inadequate [9]. For instance, using antibiotics to treat flu symptoms and obtaining accurate information about antibiotic use and AMR remains prevalent issues. The findings from this study underscore the urgent need to enhance healthcare providers' capacity to prescribe and administer antibiotics appropriately while also improving communication strategies with patients. Targeted information regarding antibiotic use and AMR must be disseminated to specific groups by governmental health authorities [9].

A cross-sectional study by Shrestha R focusing on 228 undergraduate medical students at a tertiary care hospital revealed that while 50% of students exhibited a favourable attitude towards antibiotic use, only 17.1% demonstrated a high level of knowledge and appropriate practices [10]. Nearly all students (98.2%) acknowledged that antibiotics are effective for bacterial infections; however, 22.8% erroneously believed that antibiotics are universally safe for common use. These results indicate that a majority of students possess moderate knowledge and practices, thus indicating a critical need for enhanced education on antibiotic use and resistance [10].

According to a systematic review and meta-analysis conducted by Gualano MR et al., 24 out of 26 selected papers were incorporated into the review. The analysis illuminated significant deficiencies in antibiotic-related knowledge among participants. Specifically, 53.9% of participants were not aware that antibiotics are ineffective against viral infections, and 33.7% were unaware of their efficacy in treating bacterial infections. Although 59.4% recognised the seriousness of antibiotic resistance, 26.9% did not comprehend that misuse of antibiotics could contribute to this problem. Moreover, 47.1% of individuals reported discontinuing their antibiotic treatment as soon as they began to feel better [11].

MATERIALS AND METHODS

A quasi-experimental study will be conducted at the Indraprastha New Arts Commerce and Science College, Wardha, Maharashtra from August 2024 to December 2024. Participants and students will be chosen per the inclusion criteria, and each student's consent will be obtained before conducting the study. The Institutional Ethical Clearance (IEC) has been obtained [Ref. DHIMER(DU)/IEC/2024/205].

Inclusion criteria:

- Young adults who are willing to participate;
- Young adults who are in a specified age range 18 to 25 years;
- Young adults who are available during data collection;
- Young adults with English reading, writing, and comprehension skills;
- Young adults other than medical professionals.

Exclusion criteria:

- Young adults who attended a similar programme before six months;
- Young adults who do not understand English;
- Who are not college students.

Sample size calculation: By using the Cochran formula for the sample size estimation:

$$n=\frac{Z^2\ P\ (1-p)}{d^2}$$

- When the population exceeds 10,000

  Where,

- Z: a statistic representing a degree of confidence (Z=1.96 for the conventional 95% level of confidence).
- P stands for proportion or predicted prevalence.
- d: precision (a d of 0.05 is thought to yield good precision and a smaller estimate error).

  Z=1.96

P=The percentage of participants who knew extremely well

=20.3%

=0.203 [12]

d=10% of the desired margin, or 0.10,

and

$$n=\frac{(1.962)^2\times0.203\times(1-0.203)}{0.10\times0.10}=62.15$$

=65 participants needed in the study.

The study's data collection method will be through aquestionnaire. The questionnaire will be prepared by an MSc Nursing Final year student specialising in Medical-Surgical Nursing [Annexure-1]. The questionnaire is self-structured, but it incorporates modifications and ideas from the questionnaires used by Yashin AN et al., and Effah CY et al., [13,14]. The Content Validity Index (CVI) value for the questionnaire is 0.81 and the reliability, Cronbach's alpha value is 0.79.

The tool consists of- Section I: Demographical data like age, gender, types of family, resident and socioeconomic status according to the BG Prasad classification [15]. Section II: Structured knowledge questionnaire on the knowledge of antibiotics and their resistance. A pretest structured knowledge questionnaire will be administered, which will assess their knowledge regarding antibiotics and their resistance. Following this, a structured teaching session on antibiotics and antibiotic resistance will be provided.

The planned teaching programme is designed as a one-day intervention lasting for two hours. Instructional activities will include a combination of lectures and discussions. The programme will be delivered by a final year MSc Nursing student from the Medical-Surgical Nursing (Oncology) department. For the post intervention analysis, the same structured knowledge questionnaire will be utilised. This post-analysis phase will take place over one week.

Outcomes: Pre and post intervention knowledge assessment will be done via a self-structured questionnaire.

Scoring guide for the questionnaire used:

Correct answer: 1 point

Incorrect answer: 0 point

Total scoring:

- Maximum score: 1 point for each correct response.

Total possible points: 13 points (sum of all correct answers). In Section II, there are 10 questions; however, question 5 includes four sub-questions.

The association of the knowledge with demographic variables will be assessed.

STATISTICAL ANALYSIS

R software will be used to meet the study's objectives, and the data gathered from the participants will be categorised and analysed using both descriptive and inferential statistics. After being coded, the gathered data will be created into a Microsoft Excel sheet for statistical analysis. Demographic variables are explained using frequency, mean, standard deviation, and mean percentage. A paired t-test will be used to ascertain the significance of the variation in the knowledge score between the pre and post-test. The Chi-square test will be used to determine the association between knowledge level and demographic variables.

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[ANNEXURE-1]: STRUCTURED KNOWLEDGE QUESTIONNAIRE

Section I- Demographic data

1. Age (in years)
   a) 18-21 years
   b) 22-25 years
2. Gender
   a) Male
   b) Female
3. Types of family
   a) Joint family
   b) Nuclear family
4. Resident
   a) Urban
   b) Rural
5. Socioeconomic status of the parents
   a) Class-I: ≥₹11,760
   b) Class-II: ₹5,880-₹11,759
   c) Class-III: ₹3,530-₹5,879
   d) Class-IV: ₹1,760-₹3,529
   e) Class-V: <₹1,759

Section II- Structured knowledge questionnaire

1. What is an antibiotic?
   a) A type of medicine used to treat viral infections
   b) A type of medicine used to treat bacterial infections
   c) A type of vaccine used to prevent diseases
   d) A type of medicine used to reduce inflammation

2. Is it safe to take antibiotics without a prescription?
   a) Yes, as long as I feel better
   b) Yes, but only symptoms are severe
   c) No, it can be harmful and contribute to antibiotic resistance
   d) I am not sure

3. Before beginning an antibiotic treatment, it is essential to:
   a) Start taking them as soon as you feel unwell.
   b) Look up your symptoms online.
   c) Seek advice from a friend.
   d) Consult a doctor.

4. If taken, do you finish the entire course of antibiotics prescribed by your doctor?
   a) Yes, always
   b) Yes, most of the time
   c) No, sometimes I stop early
   d) No, I rarely finish the course

5. The doctor prescribes a course of antibiotics for you. After taking 2-3 doses you start feeling better.
   a) Will you stop taking further treatment?
      - Yes
      - **No**
   b) Will you save the remaining antibiotics for the next time you get sick?
      - Yes
      - **No**
   c) Will you give the leftover antibiotics to your friends/family members, if they get sick?
      - Yes
      - **No**
   d) Will you complete the full course of treatment as prescribed?
      - **Yes**
      - No

6. Is it necessary to complete the full course of antibiotics even if you feel better?
   a) Yes, to ensure all bacteria are killed and to prevent resistance.
   b) No, you can stop as soon as you feel better.
   c) Only if the symptoms return.
   d) It depends on the type of infection.

7. Antibiotics are used to stop fever (if having viral infections like common cold i.e., cough and sore throat)?
   a) Yes, always
   b) Yes, sometimes
   c) No, antibiotics are ineffective against viruses.
   d) I'm not sure

8. When should you stop taking antibiotics?
   a) After completing the full prescribed dose.
   b) As soon as you start feeling better.
   c) When you have leftover antibiotics from a previous illness.
   d) If you experience mild sideeffects.

9. What is antibiotic resistance?
   a) When antibiotics lose their effectiveness due to incorrect dosage
   b) A type of allergic reaction to antibiotics
   c) When a person becomes immune to the effects of an antibiotic
   d) When an antibiotic is expired and no longer works

10. What can make antibiotics ineffective in the long term?
   a) Proper storage of antibiotics in a cool, dry place.
   b) Using antibiotics only when prescribed by a doctor.
   c) Unnecessary use of antibiotics
   d) Completing the full course of antibiotics as directed.

***The correct answer is in bold.**