Short Report

Knowledge and confidence on prescribing antibiotics among medical graduates from a Sri Lankan university

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Abstract

Inappropriate antimicrobial prescription is the main contributory factor to rapidly growing antibiotic resistance. This cross-sectional study was done to assess the knowledge, attitudes, and practices of antibiotic use among medical graduates at the University of Peradeniya using an online questionnaire.

The medical graduates rated their education in cardiology to be 'sufficient' or 'more than sufficient' compared to infectious diseases and antimicrobials ($p<0.05$). Confidence in diagnostics was higher than therapeutics in infectious diseases. Most were aware of local antimicrobial guidelines but nearly half (46.1%) believed these were used less than 50% in the clinical setting. The average knowledge score was 57.5% and participants scored well (>75%) in deciding when not to use antibiotics and scored less (<50%) in therapeutics of less common infections

Poor knowledge and confidence amongst medical graduates were observed in antimicrobial prescribing. Antibiotic stewardship should be emphasized in medical curricula to improve the prescribing practice among doctors.

Keywords: Antibiotics, Antimicrobial resistance, prescribing, Perception, Sri Lanka

Introduction

Antimicrobial resistance is ever-increasing making it a global concern including in Sri Lanka. Inappropriate antimicrobial prescription is one of the major modifiable causes of antimicrobial resistance. A high level of inappropriate antimicrobial prescription is observed among medical practitioners in Sri Lanka.[1] Increasing antimicrobial resistance with very limited emergence of new antimicrobials is of global concern.

Many studies have been carried out locally and globally to identify antibiotic prescribing practices among health care professionals. Some studies suggest that irrespective of the level of experience and expertise, doctors struggle with inappropriate antimicrobial prescribing,

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contributing to antibacterial resistance.[2,3] A Sri Lankan study among doctors on antibiotic use found that practice scores were lower than knowledge scores, suggesting that solely promoting knowledge of antibiotic use may not bring the desired behaviour.[1]

Only a few studies have been done to assess knowledge, attitudes, and practices of antibacterial prescription among medical students or medical graduates awaiting practice. A study from Europe found a low level of confidence in the selection of an antibiotic for treatment, dose, when to use combination therapy and when not to use antibiotics.[4] In a few surveys done in Europe, students reported that they would benefit from additional education on infectious diseases and antibiotic use as a part of their medical curriculum.[5,6] An interesting study from Australia showed that 25% of errors among medical interns were related to antimicrobial prescribing.[7] It is therefore important to inculcate the concept of antibiotic stewardship to medical students prior to graduation. Prescribing practices are formed during the undergraduate period and may be difficult to change later, making it vital that the medical curriculum is geared to improve knowledge, attitudes, and practices regarding antibiotic use.

This study was done to assess the knowledge, attitudes, and practices of antibiotic use among recently qualified medical graduates awaiting internship at the University of Peradeniya.

Materials and Methods

Medical graduates who completed the MBBS degree at the University of Peradeniya in 2022 and were awaiting internship were selected for the study. Of the 212 medical graduates who qualified, 102 responded. An online questionnaire was emailed to the university email of the medical graduates (can be obtained from author on request).

The survey tool consisted of six sections:

1. Demographics related to age and sex.
2. Perception of formal education received and mode of teaching in prescribing (level of satisfaction about the different domains in education and usefulness of teaching methods assessed)
3. Confidence in antibiotic prescribing (5-point Likert scale was used to assess the confidence in antibiotic prescribing in different clinical situations)
4. Knowledge and attitudes towards antimicrobial prescribing guidelines
5. Perceptions of antimicrobial resistance (5-point Likert scale was used to assess the perception of antimicrobial resistance)
6. Clinical cases to assess knowledge of antimicrobial prescribing. (10 single best answer questions on antimicrobial prescription based on clinical scenarios were assessed and correct answers were based on currently available Sri Lankan antimicrobial guidelines)

The medical graduates' perception of the sufficiency of education and level of confidence in therapeutics in infectious diseases was compared to that of the same in cardiology. The Mann-Whitney U test was used to compare differences between different categories. Participation in this survey was completely voluntary, and completing the survey was taken as implied consent. Data were entered into an Excel sheet and percentages and proportions were calculated across the different categories.

Results

Demographics of the study population

Of the 212 students who qualified, 102 responded. Among them 44.1% were males. All the participants were aged between 25-30 years.

Sufficiency of education and confidence in antimicrobial prescribing

The sufficiency of formal education and training received in infectious diseases and antimicrobials was compared to cardiology. More participants reported their education in cardiology to be 'sufficient' or 'more than sufficient' (n=88) compared to infectious diseases and antimicrobials (n=40) ($p<0.05$). The level of confidence (confident or most confident) in the medical graduates' knowledge of cardiology was 71% compared to 60% in infectious diseases and antimicrobial prescribing. this was statistically significant($P<0.05$).

Modes of teaching

Clinical rotations, informal teaching by house officers, registrars, senior registrars, and consultants and attending patient care rounds/ward rounds were stated as most useful (55%, 49% and 60% respectively) in gaining and retaining knowledge of medicines and prescribing. The majority stated tutorials and lectures are less useful (78%).

Confidence in antibiotic prescribing

Most of the participants were very confident in clinically diagnosing common infections and interpreting pathology and microbiology results. However, most were less confident in knowing the right regimen, duration and when to change or stop antibiotics (Table 1).

Table 1: Confidence in the clinical situations

Confidence in clinical situations	Most confident		Somewhat confident		Not confident	
	n	%	n	%	n	%
Accurately diagnosing community-acquired pneumonia	49	48.0	47	46.1	6	5.9
Accurately interpreting pathology and microbiology results	63	61.8	38	37.3	1	0.98
Knowing the right antibiotic regimen (dose, frequency, and route of administration) for a specific indication such as pneumonia or an exacerbation of COPD	19	18.6	76	74.5	7	6.9
Knowing the right duration for antibiotic treatment for a specific indication such as pneumonia or an exacerbation of COPD	25	24.5	67	65.7	10	9.8
Identifying situations where antibiotic treatment is not necessary	59	57.8	37	36.3	06	5.9
Knowing when antibiotic treatment needs to be adjusted, stopped, or changed	35	34.3	58	56.9	09	8.8

Table 2: Perception on factors affecting antimicrobial resistance

Factors affecting antimicrobial resistance	No impact		Some impact		Great impact	
	n	%	n	%	n	%
Few antibiotics being developed	32	31.4	35	34.3	35	34.3
Prescribing antibiotics when the situation doesn't warrant their use	3	2.9	4	3.9	94	92.2
Using the wrong antibiotic for the situation	4	3.9	6	5.9	92	90.2
Using an inappropriate dose and / or frequency of antibiotic for the situation	9	8.8	5	4.9	88	86.3
Using antibiotic treatment for a longer duration than what is indicated	16	15.7	16	15.7	70	68.6
Not prescribing antibiotics when the situation requires their use	51	50.0	27	26.5	24	23.5
Patient non-compliance with antibiotic treatment (such as not taking it as prescribed, not completing the course, or taking too much)	3	2.9	6	5.9	93	91.2

Knowledge and attitudes towards antimicrobial prescribing guidelines

The majority (n=97) were aware of the guidelines available in Sri Lanka to assist with appropriate antibiotic prescribing. Only 4% believed that these guidelines are practised 100% in clinical practice. Nearly half (46.1%) of the participants believed that antibiotic prescribing guidelines are used less than 50% in clinical practice. The majority (n=100) believed that adherence to antimicrobial prescribing guidelines is important to reduce the risk of antibiotic resistance increasing.

Perceptions of antimicrobial resistance

The medical graduates were aware of common factors contributing to antibiotic resistance. Most students rated many factors having some or great impact on antibiotic resistance (Table 2).

Clinical cases to assess knowledge of antimicrobial prescribing

The average knowledge score among participants was 57.5/100. Among the areas tested, a good score (>75%) was observed in areas where they decided antibiotic use is not clinically indicated. An average score (50-75%) was observed in scenarios where they had to decide on an antibiotic regimen for common or locally prevalent infections (leptospirosis, rickettsial infections, pyelonephritis). A below-average score was observed in areas where they were asked to decide on an antibiotic regimen for not-so-common/uncommon infections (e.g., dental infections, clostridium difficile colitis). They scored below average when they had to decide on changing/switching antibiotics according to the clinical context.

Discussion

Medical graduates who qualified from the Faculty of Medicine, University of Peradeniya, Sri Lanka in 2022 were assessed in this survey. These students completed the MBBS programme over an extended period of 6 and half years due to the Covid-19 pandemic. During the MBBS programme, they had more than 3 years of clinical exposure and formal lectures on microbiology and antimicrobials. Their clinical training was modified in keeping with infection prevention and control requirements associated with the Covid-19 pandemic.

Sufficiency of education and confidence in antimicrobial prescribing

Most of the study participants rated the sufficiency of education in cardiology greater than in infectious diseases. This finding is similar to a recent study from Australia where a similar comparison was made, and the majority felt education in infectious diseases was not sufficient compared to cardiology.[8] Many similar studies from Europe reported less confidence in the knowledge of proper antimicrobial prescribing.[5,6]

Modes of teaching

The majority believed that clinical rotations, informal teaching by seniors, and clinical ward rounds were most useful in teaching of infectious diseases and antimicrobial prescribing. Many (78%) found traditional modes of teaching such as lectures and tutorials less useful. This is similar to observations made in many overseas studies.[9] This is an important observation that needs emphasis in the revision of medical curricula.

Confidence in clinical situations

The medical graduates in the study cohort were confident in interpretation of diagnostic tests in infectious diseases but less confident in specific treatment modalities. Similar observations were made in international studies.[10,11] It is possible that current teaching methods contribute to this lack of confidence as confidence is mainly gained through exposure to different clinical scenarios. The medical curricula should facilitate this exposure to build up confidence.

Knowledge and attitudes towards antimicrobial prescribing guidelines

The vast majority of the participants were aware of local antibiotic guidelines in Sri Lanka and believed adherence to such guidelines would reduce antibiotic resistance. Undergraduate teaching including lectures and tutorials emphasises antimicrobial guidelines. However, during their clinical exposure, most medical students may notice the practice of medical staff including registrars, senior registrars and consultants prescribing antibiotics without following local guidelines. This could have led to the belief that guidelines are used less than 50% in clinical practice.

Knowledge of antimicrobial prescribing

Knowledge in different areas of antimicrobial prescribing was assessed. The average knowledge score was 57.5%. We report a higher knowledge score among the participants in deciding when not to use an antibiotic. Most of the participants also believed that prescribing antibiotics when it is not relevant accounts for antimicrobial resistance. The study participants scored well in deciding on antibiotic regimens for locally relevant and common infections compared to uncommon infections. This is likely due to the exposure they had during their medical student period.

Conclusion

Antibiotic stewardship by the medical profession is one of the most important aspects to reduce antimicrobial resistance.[12] Good practice of antibiotic prescribing by doctors reflects learning, training, and exposure as medical undergraduates. It is important to emphasise antibiotic stewardship in the medical curricula. Ward teaching with clinical scenarios is recognised as most useful to train in good medical practice of antibiotic prescribing

Limitations

The results of the study may be limited by the small sample size. The study was an online survey and voluntary. Medical graduates interested in the subject area may have contributed more and thereby introduced some bias to the results.

Declarations

Acknowledgement: Not applicable
Conflicts of Interest: Authors declare that they do not have conflicts of interests.
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Ethics statement: Ethical approval for the research is taken from the Ethics Review Committee of the Faculty of Medicine, University of Peradeniya and is available for submission on request by the Editor-in-Chief. Ethical Clearance certificate number- 2022/EC/70
Author contributions: The online survey was emailed to each student with an information sheet and participation in the survey was implied as informed consent
Availability of data and materials: The Questionnaire, and dataset of the current study is available from the corresponding author on reasonable request.
Authors' contributions: CD and KG designed the study, analysed the results, and contributed to writing the manuscript. Both authors read the manuscript and approved it.

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