Original article

SKILLS OF BULGARIAN MEDICAL STUDENTS TO PRESCRIBE ANTIBACTERIAL DRUGS RATIONALLY: A PILOT STUDY.

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SUMMARY:

Purpose: The purpose of this study was to evaluate the perception of medical students of their level of knowledge about rational drug prescribing and compare this to the evaluation of their practical ability of rational antibiotic prescribing.

Materials/Methods: Medical students in their 10th semester of education from the Medical University of Sofia were asked to complete a self-assessment questionnaire containing 5 questions about their knowledge of rational drug prescribing. After that, they were presented with three simulated patient cases with infectious diseases and were asked to prescribe appropriate therapy. The prescribing competencies of the medical students were assessed by two clinical pharmacologists taking into account three criteria: appropriateness of the drugs chosen for the specific patient cases; appropriateness of drug doses and dosing regimens and conformity of written prescriptions with the accepted rules in Bulgaria.

Results: The results obtained showed that 19.15% of the medical students rated their theoretical and practical knowledge about rational antibiotic prescribing as "good", 65.96% as "satisfactory" and 14.89% as "unsatisfactory". The student's practical skills to prescribe antibiotics rationally as assessed independently by two clinical pharmacologists showed that 50.35% of the written prescriptions were rated as "good", 21.64% as "satisfactory" and 28.01% as "unsatisfactory".

Conclusions: Medical students from the Medical University of Sofia showed an acceptable level of competence to choose and prescribe antibiotics rationally. The factors leading to irrational drug prescribing should be thoroughly analyzed to enable additional improvement of their prescribing skills.

Keywords: prescribing skills, medical students, antibacterial drugs,

INTRODUCTION:

Appropriate use of drugs is an essential element in achieving the quality of health and medical care of patients and the community as a whole. The World Health Organization (WHO) defined the rational use of drugs as patients receiving medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time and at the lowest cost to them and their community [1, 2].

Evidence suggests that newly licensed physicians are not adequately trained to prescribe medications safely [3, 4], partly due to lack of adequate pharmacological training during the medical education course [5]. The rational use of drugs, especially antibiotics, has been recognized as a serious problem worldwide [5, 6]. To the author knowledge, at the time of this study, only a few studies have been performed in Bulgaria measuring the prescribing competency of medical students in their last year of education [7]. This study was aimed at obtaining preliminary information about the antibiotic prescribing performance of Bulgarian medical students in their 10th semester of education at the Medical University of Sofia, Bulgaria.

MATERIALS & METHODS

This study was performed at the Department of Clinical Pharmacology and Therapeutics, Medical University of Sofia. Approval from the Local Ethics Committee of UMHAT "TsaritsaYoanna-ISUL", Sofia was obtained before conducting the study. The study population included Bulgarian medical students in their 10th semester of education from 1 educational cycle in 2018 (a total of three cycles per year). The participation in this study was completely voluntary with the randomized distribution of two different patient cases sets.

The study was divided into two parts:
1. Self-assessment of acquired prescribing competencies;
2. Solving three simulated patient cases by writing drug prescriptions.

The first part of the study contained 5 multiple choice self-assessment questions concerning the skills of the medical students to prescribe drugs rationally, especially antibiotics.

The second part of the study contained 3 simulated patient cases, two of which required an antibiotic to be prescribed (either a single drug or a drug combination) and one case represented a clinical case where no antibiotics were to be prescribed. The prescribing competencies of the medical students were assessed by two specialists in clinical pharmacology and therapeutics, taking into account the

following criteria:

· Appropriateness of drugs chosen;

· Appropriateness of doses and dosing regimens;

· Conformity of written prescriptions with the accepted prescribing rules in Bulgaria.

According to these 3 criteria, the prescribing competencies of the students were rated as:

· Good (all criteria satisfied);

· Satisfactory (minor omissions in one or more criteria);

· Unsatisfactory (major errors in one or more criteria).

The average rating results the two assessing physicians came to was finally taken into consideration. Additionally, one of the important WHO/INRUD prescribing indicators [8], namely the percentage of drugs prescribed by generic name (optimal level: 100%) was also assessed.

RESULTS

The results of the self-assessment questionnaire concerning appropriate knowledge about drugs as well as the ability of medical students in their 10th semester of education to prescribe drugs rationally, especially antibacterial drugs, are presented in table 1.

Table 1. Questionnaire about the self-assessed confidence of medical students concerning rational drug prescribing

Self-assessment rating:	Good:	Satisfactory:	Unsatisfactory:
Question 1: How would you rate yourtheoretical knowledge about rational drug prescribing?	13 (27%)	34 (71%)	1 (2%)
Question 2: How would you rate yourpractical skills of rational drug prescribing?	12 (25%)	33 (69%)	3 (6%)
Question 3: How would you rate yourtheoretical knowledge andpractical skills of rational antibiotic prescribing?	9 (19%)	31 (66%)	7 (15%)
Question 4: Do you feel confident to prescribe drugs to real patients?	15 (31%)	29 (61%)	4 (8%)
Overall self-assessment rating:	**25,50%**	**66,75%**	**7,75%**

75% of the medical students participating in the questionnaire referred to the speciality of clinical pharmacology and therapeutics as to the discipline with the most contribution to their knowledge about rational drug prescribing followed by internal diseases (15,63%) and basic pharmacology (9,37%).

The appropriateness of drug prescriptions was assessed by two clinical pharmacologists. The results obtained are presented in table 2.

Table 2. Assessment rating by clinical pharmacologists (CP) concerning the practical skills of medical students to prescribe antibiotics rationally in three simulated patient cases

Assessment rating:	1st CP:	2nd CP:	Average value:
Good:	73 (51.77%)	69 (48,94%)	**50.35%**
Satisfactory:	29 (20.57%)	32(22.70%)	**21.64%**
Unsatisfactory:	39 (27.66%)	40 (28.36%)	**28.01%**
Total:	**141**	**141**	**100%**

The comparison of the student's self-assessment and the assessment by the investigators are presented in table 3.

Table 3. Comparison between the student's self-rating and their practical skills in rational antibiotic prescribing

Assessment rating:	Good:	Satisfactory:	Unsatisfactory:
Students self-rating	**19,15%**	**65,96%**	**14,89%**
Assessment by CP	**50.35%**	**21.64%**	**28.01%**

The percentage of drug prescriptions as generic drug names amounted 78.23% (97 out of 124 prescriptions).

DISCUSSION

Prescribing drugs represents a key clinical activity in the working life of all physicians. The necessary prescribing competencies of medical students representing a combination of knowledge, judgment and skills are supposed to have been achieved at graduation. Surveys all over the world have revealed a widespread lack of confidence in writing prescriptions among medical students [3] and newly licensed physicians [4, 5].

The overuse and misuse of antibiotics threaten the health of populations worldwide. Irrational prescribing of antibiotics can lead to adverse reactions and unnecessary hospital admissions for individuals [9] and on a population level there is a risk of emergence of antibiotic-resistant strains of bacteria [10, 11, 12].

This study showed a slight discrepancy between the self-assessed confidence of the medical students concerning their theoretical knowledge and practical skills to prescribe antibiotics and the assessment by clinical pharmacologists: 85% of the medical students felt more or less confident (the sum of "good" and "satisfactory" ratings) about rational antibiotic prescribing and about 15% believed to be untrained. In fact, almost 72% of the medical students showed an acceptable level (the sum of 50.35% "good" and 21.64% "satisfactory" results) of practical skills in rational antibiotic prescribing, whereas 28% failed to reach an acceptable level. These results are comparable to the results of other studies [7, 13].

WHO highly recommends prescribing medications by generic name as a safety precaution for patients because it identifies drugs clearly and enables a better communication among healthcare providers [14]. More than 78% of all drugs in this study were prescribed by generic names which is relatively high but still below the desired optimal level of 100%.

The results of this study clearly show the need to optimize and harmonize the training in clinical pharmacology and therapeutics in Bulgaria and in Europe to ensure a uniformly high standard of prescribing competency of medical graduates [15].

CONCLUSION

Medical students from the Medical University of Sofia in their 5th year of education showed an acceptable level of competence to choose and prescribe antibiotics rationally. The factors leading to irrational drug prescribing should be thoroughly analyzed to enable additional improvement of their prescribing skills.

LIMITATIONS OF THE STUDY

A limitation of the study was that it was a pilot study, including medical students from one teaching cycle (out of a total of three cycles per year) in 2018 with 48 out of 99 (48.5%) participating students. Besides, the study was not designed to reveal the reasons leading to irrational prescribing of antibiotics.

ACKNOWLEDGEMENTS

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