

Effect of a workshop in rational pharmacotherapy for interns during family medicine clerkship in Samsun- Turkey

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ABSTRACT

Objective: We aimed to investigate the effect of rational pharmacotherapy workshop for interns on the rationality, cost and number of drugs prescribed.

Methods: The participants were asked to prescribe a medication for acute noninflammatory osteoarthritis (ANOA), acute bacterial rhinosinusitis (ARS), acute otitis media (AOM), acute uncomplicated cystitis (AC), and acute bacterial tonsillopharyngitis (ABT) before and after workshop. Total 3000 prescriptions were scored regarding rationality of the drug choice (0-10), format (0-5), instructions (0-4), legibility (0-1) and total (0-20 points). The mean number of drug(s) and total costs per prescription were calculated. Paired samples t-test was used to compare the pre- and post score means.

Results: Total pre- and post-prescribing scores (0-20) were significantly different ($p=0.00$ for each): ANOA (13.59 ± 0.27 , 18.33 ± 0.18), ARS (13.26 ± 0.18 , 15.15 ± 0.17), AOM (12.58 ± 0.26 , 14.66 ± 0.27), AC (13.53 ± 0.17 , 15.76 ± 0.20), ABT (13.54 ± 0.24 , 15.49 ± 0.28). Mean number of drugs per prescription for the indications in the pre-test and post-test were: ANOA (1.24 ± 0.29 , 1.02 ± 0.01 , $p=0.00$), ARS (2.08 ± 0.04 , 2.00 ± 0.04 , $p=0.16$), AOM (1.66 ± 0.04 and 1.69 ± 0.03 , $p=0.54$), AC (1.55 ± 0.04 , 1.39 ± 0.03 , $p=0.00$) and ABT (2.10 ± 0.05 , 1.81 ± 0.05 , $p=0.00$). Mean costs per prescription in Turkish Liras: ANOA (6.31 ± 0.29 , 4.60 ± 0.05 , $p=0.00$), ARS (13.80 ± 0.38 , 4.63 ± 0.04 , $p=0.00$), AOM (10.18 ± 0.28 , 4.41 ± 0.07 , $p=0.00$), AC (11.33 ± 0.21 , 10.68 ± 0.18 , $p=0.01$) and ABT (12.03 ± 0.34 and 10.41 ± 0.35 , $p=0.00$).

Conclusion: Training produced a significant improvement in rational prescribing.

KEY WORDS: Rational drug therapy, Family medicine, Undergraduate medical education.

doi: <http://dx.doi.org/10.12669/pjms.302.4285>

How to cite this:

Dikici MF, Yaris F, Igde FA, Yazar F, Altuntas O, Gurz AA. Effect of a workshop in rational pharmacotherapy for interns during family medicine clerkship in Samsun- Turkey. *Pak J Med Sci* 2014;30(2):305-309. doi: <http://dx.doi.org/10.12669/pjms.302.4285>

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- * Received for Publication: August 26, 2013
- * Accepted for Publication: December 2, 2013

INTRODUCTION

The principles of clinical pharmacology are the basis of good patient-centered prescribing. Many would argue that teaching medical students to prescribe medicines is currently the greatest challenge in modern undergraduate education.¹ Some studies suggest that the scope of interns' prescribing practice is limited.² The opportunities for students to 'pre-prescribe' under supervision, to gain experience from junior doctors or to undertake simulated prescribing exercises should be considered vital developments that might help to move beyond the current 'in at the deep end' experience.¹

Training is an important intervention for rational pharmacotherapy (RP).³⁻⁶ In Turkey^{3,7-9} and other

countries, there are many curriculums¹⁰⁻¹² and technical programs¹³ to improve the prescribing skills. We aimed to investigate the effect of our workshop for interns in rational pharmacotherapy on the rationality, cost and number of drugs prescribed in this study.

METHODS

Approval of ethics committee: Ondokuzmayis University Medical School Ethics Committee approved the Clinical Skills Project 2005- T449 and the study was a part of curriculum.

Study design: One-day rational pharmacotherapy workshops have been organized for the interns during their one-month family medicine clerkship in the Department of Family Medicine at Ondokuzmayis University in Samsun, Turkey. In this study, we evaluated all prescriptions written by the interns on the first day and last day of the clerkship between July 2009 and November 2012. We excluded the prescriptions of the 40 students who did not complete their prescription task.

On the first day of the clerkship, before being introduced to RP, the participants were asked to prescribe a medication for an ANOA, ARS, AOM, AC and ABT case (Addendum 1).

Workshop: The prescriptions were analyzed, and the following day, feedback was given and workshop started. A small presentation was used to correct their mistakes. The presentation was based on the WHO's Good Prescribing Guide.¹⁴ After reading and discussion, the correct prescription of rational drugs was taught according to the Primary Care Guidelines of the Ministry of Health.¹⁵ The prices of the drugs were found via updated internet resources.

During the teaching session, the interns worked through the cases collaboratively in small groups and answered the questions posed by the medication prescribing framework. The session focuses on pharmacotherapeutic alternatives, clinical evidence.

Table-I: Scores Regarding Rationality of the Drug Choice*

Indication	Pre-test score (0-10)	Post-test score (0-10)	P value
ANOA	5.05 ± 0.22	9.36 ± 0.13	0.00
ARS	4.69 ± 0.13	6.28 ± 0.15	0.00
AOM	4.68 ± 0.16	6.28 ± 0.18	0.00
AC	5.11 ± 0.13	6.98 ± 0.16	0.00
ABT	5.08 ± 0.19	6.78 ± 0.23	0.00

* N= 300 interns, 3000 prescriptions.

The learning experience is not only guided and structured, but also interactive and flexible, encouraging discussion and debate. Potential drug information resources were also introduced and utilized during the sessions. Pub-med and Cochrane Databases were used as additional resources. Through these steps, interns had an opportunity to identify all pharmacotherapeutic possibilities available to treat the patient, then use a rational and systematic approach to decision making that combines best practices with patient-centered care.

After completing the training in the second day, the interns continued their clerkship with the family doctors in the primary care centers and family medicine residents in the Department of Family Medicine. At the end of the clerkship, the students were asked again to prescribe for the same cases, and a prescription analysis was performed.

The authors, who have been trained in the WHO/ Groningen model of problem-based RP teaching, participated in the teaching/facilitating activities. The sessions were guided by the same family medicine teachers for all groups. The teacher's role was to focus on the diagnostic knowledge and skills required for the case scenario, provide role modeling and coaching for the use of the framework, identify common issues from daily practice, and share real-life experiences.

All interns who took the workshop and completed prescriptions were involved in our study. Prescriptions were evaluated and scored by another staff of the department to guarantee blinding. The participant's therapeutic competence was also tested at the pre- and post-test phases to evaluate the effectiveness of the workshop. We approached scoring of the prescription part of the study in the same manner as Akici et al.³ Scores:

- A: Rationality of the Drug Choice (0-10 points): Regarding efficacy (0-2.5), safety (0-2.5), suitability (0-2.5), and cost (0-2.5).
- B: Format of the Prescription (0-5 points): Presence of date (0-1), physician's name (0-1) signature (0-1), patient's name (0-1), diagnosis (0-1).

Table-II: Scores Regarding Format of the Prescription.

Indication	Pre-test score (0-5)	Post-test score (0-5)	P value
ANOA	4.48 ± 0.06	4.60 ± 0.05	0.09
ARS	4.47 ± 0.06	4.61 ± 0.05	0.02
AOM	4.15 ± 0.09	4.36 ± 0.08	0.04
AC	4.45 ± 0.06	4.58 ± 0.06	0.08
ABT	4.60 ± 0.06	4.48 ± 0.06	0.76

Table-III: Scores Regarding Instructions.

Indication	Pre-test score (0-4)	Post-test score (0-4)	P value
ANOVA	3.05 ± 0.05	3.41 ± 0.04	0.00
ARS	3.09 ± 0.05	3.31 ± 0.04	0.00
AOM	2.80 ± 0.06	3.10 ± 0.06	0.00
AC	2.99 ± 0.05	3.42 ± 0.10	0.00
ABT	3.02 ± 0.05	3.27 ± 0.05	0.00

C: Instructions (0-4 points): Drug use (PO, IM etc) (0-1), dose (0-1), warnings (0-1), total amount to be delivered (0-1).

D: Legibility (0-1 point)

The mean number of drug(s) and total costs per prescription were also calculated. We used the paired samples t-test to compare the pre- and post-score mean in five indications for each student. A value of $p < 0.05$ was accepted as being statistically significant.

RESULTS

Total 300 interns completed 3000 pre and post-prescriptions. Total pre- and post-prescribing scores (0-20) were significantly different ($p=0.00$) for each indication: ANOVA (13.59 ± 0.27 and 18.33 ± 0.18), ARS (13.26 ± 0.18 and 15.15 ± 0.17), AOM (12.58 ± 0.26 and 14.66 ± 0.27), AC (13.53 ± 0.17 and 15.76 ± 0.20), and ABT (13.54 ± 0.24 and 15.49 ± 0.28). All data are presented (rationality, format, instructions, legibility) in Tables I-IV.

Mean number of drugs per prescription for the indications in the pre-test and in the post-test were: ANOVA (1.24 ± 0.29 and 1.02 ± 0.01 , $p=0.00$), ARS (2.08 ± 0.04 and 2.00 ± 0.04 , $p=0.16$), AOM (1.66 ± 0.04 and 1.69 ± 0.03 , $p=0.54$), AC (1.55 ± 0.04 and 1.39 ± 0.03 , $p=0.00$) and ABT (2.10 ± 0.05 and 1.81 ± 0.05 , $p=0.00$).

Mean cost of the prescriptions in Turkish Liras (TL) (1 USD=1.78 TL) for the indications in the pre-test and in the post-test were: ANOVA (6.31 ± 0.29 TL and 4.60 ± 0.05 TL, $p=0.00$), ARS (13.80 ± 0.38 TL and 4.63 ± 0.04 TL, $p=0.00$), AOM (10.18 ± 0.28 TL and 4.41 ± 0.07 TL, $p=0.00$), AC (11.33 ± 0.21 TL and 10.68 ± 0.18 TL, $p=0.01$) and ABT (12.03 ± 0.34 TL and 10.41 ± 0.35 TL, $p=0.00$).

DISCUSSION

Small-group teaching and learning has achieved an admirable position in medical education.¹⁶ The successful delivery of learning in clinical pharmacology will involve a variety of learning styles, including lectures and problem-based

Table-IV: Scores Regarding Legibility.

Indication	Pre-test score (0-1)	Post-test score (0-1)	P value
ANOVA	0.96 ± 0.01	0.99 ± 0.01	0.05
ARS	0.97 ± 0.01	0.98 ± 0.01	0.26
AOM	0.91 ± 0.02	0.94 ± 0.01	0.14
AC	0.96 ± 0.01	0.97 ± 0.01	0.25
ABT	0.96 ± 0.01	0.96 ± 0.01	0.79

tutorials, but the content should be centered on inquisitive rather than passive learning.^{2,17} In our study, we used presentation, readings, discussion, and research groups in small batches.

Developing a personal formulary and using an existing formulary both increase the competence of medical students in rational prescribing.¹⁸ In another study, it was found that interns base their prescribing on their teachers' choices.¹⁹ After taking workshop, our students were asked to write their own prescriptions.

There are some studies that indicate the students perceive RP training to be useful.^{20,21} In our study, we evaluated the prescription scores before and after the training, which is more objective measurement than the students' perceptions.

Students are overwhelmed by the large number of drugs. A limited formulary offers a learning target that is realistic. The list should comprise drugs that are commonly used in treating common illnesses.¹ In our case, our interns may prepare their own formulary.

Several reports show that training workshops on RP improve the skills of the trainees.^{2,4,22-24} Postgraduate workshops were also found effective.^{17,25} The results of a study show that even a short training workshop can significantly improve the ability of students to solve written patient problems.²⁶ In our study, at the pre-test, the interns exhibited a common irrational prescribing habit in that the rules of prescribing were not followed, e.g., bad handwriting, no information about the drug (e.g., after meal, before meal, how many times), etc. and it all improved after the workshop.

Several strategies for regulating prescribing practices have been proposed, such as formulary replacement, health care provider education, and feedback activities.²⁷ In our study, we used all three strategies for better prescribing. Prescription analysis reveals better results for Rational Pharmacotherapy Educated (+) interns regarding the number of drugs/prescription and treatment costs²⁸ similar to our study.

Use of the prescribing guidelines also had an impact on the number of drugs/prescription and treatment costs.²⁹⁻³² The problem of prescribing irrational antibiotics was found to be related to doctors not knowing of the evidence from clinical trials.³³ Our students reviewed the guidelines and evidence on the drugs and number of drugs per prescription decreased after the workshop.

Legibility and handwriting is important in writing a prescription.^{34,35} In our study, legibility did not improve after the training workshop. However, number of inappropriate drugs and costs decreased after the interventions³⁶⁻³⁹ Mean number of drugs also decreased in our study.

CONCLUSION

Training produced a significant improvement in prescribing skills. However, we could not evaluate long term effects and this may be a limitation for our study. Training on rational pharmacotherapy should be considered in undergraduate medical education.

ACKNOWLEDGEMENT

The authors thank Janice O. Vantrese for the grammatical review.

Note: The study is original and has not been published or is not currently under consideration by another journal.

Conflict of interest: All the authors have read and agreed to its content. There is no conflict of interest.

REFERENCES

1. Maxwell SR. How should teaching of undergraduates in clinical pharmacology and therapeutics be delivered and assessed? *Br J Clin Pharmacol.* 2012;73(6):893-839.
2. Pearson SA, Rolfe I, Smith T, O'Connell D. Intern prescribing decisions: Few and far between. *Educ Health (Abingdon)* 2002;15(3):315-325.
3. Akici A, Kalaça S, Ugurlu MU, Karaalp A, Cali S, Oktay S. Impact of a short postgraduate course in rational pharmacotherapy for general practitioners. *Br J Clin Pharmacol.* 2004;57(3):310-321.
4. Stewart M, Purdy J, Kennedy N, Burns A. An interprofessional approach to improving paediatric medication safety. *BMC Med Educ.* 2010;10:19. doi: 10.1186/1472-6920-10-19.
5. Esmaily HM, Savage C, Vahidi R, Amini A, Zarrintan MH, Wahlstrom R. Identifying outcome-based indicators and developing a curriculum for a continuing medical education programme on rational prescribing using a modified Delphi process. *BMC Med Educ.* 2008;8:33.
6. Ioannidis G, Papaioannou A, Thabane L, Gafni A, Hodsman A, Kvern B, et al. The utilization of appropriate osteoporosis medications improves following a multifaceted educational intervention: the Canadian quality circle project (CQC). *BMC Med Educ.* 2009;9:54.
7. Akici A, Gören MZ, Aypak C, Terzioğlu B, Oktay S. Prescription audit adjunct to rational pharmacotherapy education improves prescribing skills of medical students. *Eur J Clin Pharmacol.* 2005;61(9):643-650.
8. Ocek Z, Sahin H, Baksi G, Apaydin S. Development of a rational antibiotic usage course for dentists. *Eur J Dent Educ.* 2008;12(1):41-47.
9. Sahin H, Akcicek F. A de novo model of rational pharmacotherapy training: The interns' perspective. *Eur J Intern Med.* 2004;15(3):201-204.
10. Esmaily HM, Silver I, Shiva S, Gargani A, Maleki-Dizaji N, Al-Maniri A, et al. Can rational prescribing be improved by an outcome-based educational approach? A randomized trial completed in Iran. *J Contin Educ Health Prof.* 2010;30(1):11-18.
11. Hassan NA, Abdulla AA, Bakathir HA, Al-Amoodi AA, Aklan AM, de Vries TP. The impact of problem-based pharmacotherapy training on the competence of rational prescribing of Yemen undergraduate students. *Eur J Clin Pharmacol.* 2000;55(11-12):873-876.
12. Oshikoya KA, Senbanjo IO, Amole OO. Interns' knowledge of clinical pharmacology and therapeutics after undergraduate and on-going internship training in Nigeria: A pilot study. *BMC Med Educ.* 2009;9:50.
13. Meade O, Bowskill D, Lynn JS. Pharmacology podcasts: a qualitative study of non-medical prescribing students' use, perceptions and impact on learning. *BMC Med Educ.* 2011;11:2.
14. de Vries TP, Henning RH, Hogerzeil HV, Fresle DA. World Health Organization: Guide to good prescribing. Geneva: WHO; 1994.
15. Yaris E, Arisoy ES, Yaris F, Beyazova U, Tuncok Y, Toklu HZ, et al. Editors. Turkish Republic Ministry of Health Primary Care National Diagnosis and Treatment Guidelines. 2012, MoH Publications, Ankara. (In Turkish).
16. Meo SA. Basic steps in establishing effective small group teaching sessions in medical schools. *Pak J Med Sci.* 2013;29(4):1071-1076.
17. Richir MC, Tichelaar J, Geijteman EC, de Vries TP. Teaching clinical pharmacology and therapeutics with an emphasis on the therapeutic reasoning of undergraduate medical students. *Eur J Clin Pharmacol.* 2008;64(2):217-224.
18. de Vries TP, Daniels JM, Mulder CW, Groot OA, Wewerinke L, Barnes KI, et al. Should medical students learn to develop a personal formulary? An international, multicentre, randomised controlled study. *Eur J Clin Pharmacol.* 2008;64(6):641-646.
19. Tichelaar J, Richir MC, Avis HJ, Scholten HJ, Antonini NF, De Vries TP. Do medical students copy the drug treatment choices of their teachers or do they think for themselves? *Eur J Clin Pharmacol.* 2010;66(4):407-412.
20. Patricio KP, Alves NA, Arenales NG, Queluz TT. Teaching the Rational Use of Medicines to medical students: a qualitative research. *BMC Med Educ.* 2012;12:56.
21. Shankar PR, Jha N, Bajracharya O, Gurung SB, Singh KK. Feedback on and knowledge, attitude, and skills at the end of pharmacology practical sessions. *J Educ Eval Health Prof.* 2011;8:12.
22. Karaalp A, Akici A, Kocabaşoğlu YE, Oktay S. What do graduates think about a two-week rational pharmacotherapy course in the fifth year of medical education? *Med Teach.* 2003;25(5):515-521.
23. Toklu HZ. Problem Based Pharmacotherapy Teaching For Pharmacy Students and Pharmacists. *Curr Drug Deliv.* 2013;10(1):67-70.

24. Jackson SH, Mangoni AA, Batty GM. Optimization of drug prescribing. *Br J Clin Pharmacol.* 2004;57(3):231-236.
25. Gokcekus L, Toklu HZ, Demirdamar R, Gumusel B. Dispensing practice in the community pharmacies in the Turkish Republic of Northern Cyprus. *Int J Clin Pharm.* 2012;34(2):312-324.
26. de Vries TP, Henning RH, Hogerzeil HV, Bapna JS, Bero L, Kafle KK, et al. Impact of a short course in pharmacotherapy for undergraduate medical students: an international randomised controlled study. *Lancet.* 1995;346(8988):1454-4157.
27. Bantar C, Sartori B, Vesco E, Heft C, Saúl M, Salamone F, et al. A hospitalwide intervention program to optimize the quality of antibiotic use: impact on prescribing practice, antibiotic consumption, cost savings, and bacterial resistance. *Clin Infect Dis.* 2003;37(2):180-186.
28. Rasmussen HM, Søndergaard J, Kampmann JP, Andersen M. General practitioners prefer prescribing indicators based on detailed information on individual patients: a Delphi study. *Eur J Clin Pharmacol.* 2005;61(3):237-241.
29. Akici A, Kalaça S, Gören MZ, Akkan AG, Karaalp A, Demir D, et al. Comparison of rational pharmacotherapy decision-making competence of general practitioners with intern doctors. *Eur J Clin Pharmacol.* 2004;60(2):75-82.
30. Le Grand A, Hogerzeil HV, Haaijer-Ruskamp FM. Intervention research in rational use of drugs: a review. *Health Policy Plan.* 1999;14(2):89-102.
31. Cohen S, Taitz J, Jaffé A. Paediatric prescribing of asthma drugs in the UK: Are we sticking to the guideline? *Arch Dis Child.* 2007;92(10):847-849.
32. Fretheim A, Oxman AD, Treweek S, Bjørndal A. Rational Prescribing in Primary Care (RaPP-trial). A randomised trial of a tailored intervention to improve prescribing of antihypertensive and cholesterol-lowering drugs in general practice *BMC Health Serv Res.* 2003;3(1):5.
33. Butler CC, Rollnick S, Pill R, Maggs-Rapport F, Stott N. Understanding the culture of prescribing: Qualitative study of general practitioners' and patients' perceptions of antibiotics for sore throats. *BMJ.* 1998;317(7159):637-642.
34. Hugman B, Edwards IR. The challenge of effectively communicating patient safety information.. *Expert Opin Drug Saf.* 2006;5(4):495-499.
35. Benjamin DM. Reducing medication errors and increasing patient safety: Case studies in clinical pharmacology. *J Clin Pharmacol.* 2003;43(7):768-783.
36. Awad A, Al-Saffar N. Evaluation of drug use practices at primary healthcare centers of Kuwait. *Eur J Clin Pharmacol.* 2010;66(12):1247-1255.
37. Irshaid YM, Al-Homrany MA, Hamdi AA, Adjepon-Yamoah KK, Mahfouz AA. A pharmacoepidemiological study of prescription pattern in outpatient clinics in Southwestern Saudi Arabia. *Saudi Med J.* 2004;25(12):1864-1870.
38. Niquille A, Ruggli M, Buchmann M, Jordan D, Bugnon O. The nine-year sustained cost-containment impact of Swiss pilot physicians-pharmacists quality circles. *Ann Pharmacother.* 2010;44(4):650-657.

Addendum 1: Case vignettes used during teaching.

Mrs. ND; 57 years old, was diagnosed with AOA in both the knees.

Mr. MB; 22 years old, was diagnosed with ARS.

AK; four years old, was diagnosed with AOM in his right ear.

Mrs. AA; 37 years old, was diagnosed with AC.

Mrs. AB, 24 years old, was diagnosed with ABT.