Rational drug therapy education in clinical phase carried out by task-based learning

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Abstract:
Objectives: Irrational drug use results in drug interactions, treatment noncompliance, and drug resistance. Rational pharmacotherapy education is being implemented in many faculties of medicine. Our aim is to introduce rational pharmacotherapy education by clinicians and to evaluate task-based rational drug therapy education in the clinical context.

Methods: The Kirkpatrick's evaluation model was used for the evaluation of the program. The participants evaluated the program in terms of constituents of the program, utilization, and contribution to learning. Voluntary participants responded to the evaluation forms after the educational program. Data are evaluated using both quantitative and qualitative tools. SPSS (version 21) used for quantitative data for determining mean and standard deviation values. Descriptive qualitative analysis approach is used for the analysis of open-ended questions.

Results: It was revealed that the program and its components have been favorable. A total 95.9% of the students consider the education to be beneficial. Simulated patients practice and personal drug choice/problem-based learning sessions were appreciated by the students in particular. 93.9% of the students stated that all students of medicine should undergo this educational program. Among the five presentations contained in the program, “The Principles of Prescribing” received the highest points (9 ± 1.00) from participating students in general evaluation of the educational program.

Conclusion: This study was carried out to improve task-based rational drug therapy education. According to feedback from the students concerning content, method, resource, assessment, and program design; some important changes, especially in number of facilitators and indications, are made in rational pharmacotherapy education in clinical task-based learning program.

Key words: Education, personal drug, pharmacotherapy, rational drug use, task-based learning

Rational drug use was first described in 1985 in a meeting in Nairobi-Kenya as providing medicine that is suitable for clinical symptoms and individual properties to people in appropriate time dosage and minimum expenses.[1] According to the estimates by the World Health Organization (WHO), more than 50% of drugs are being prescribed or provided inappropriately.[2] As a result of nonrational drug use, serious problems including drug interactions, treatment in compliance, and resistance occur.[3]

To this end, the WHO has published a list of corrective actions to encourage rational drug use.[4] One of these articles is defined as “Providing problem-based pharmacotherapy training in curriculum before graduation.” Problem-based pharmacotherapy education was first put into curriculum in faculties of medicine in Turkey in 1992.[5] This education method was developed by the joint efforts of the WHO and Groningen University Faculty of Medicine Department of Clinical Pharmacology. In this model, which is known as Groningen Model, students make the personal drug (P-drug) list of medicines for an indication under the guidance of a facilitator and reliable sources of information.[6] Drugs are selected considering effectiveness, safety, suitability, and cost. Effectiveness refers to the ability to treat the disease; safety refers to possible side effects, suitability refers to contraindications, dosage form and interactions, cost refers to total cost of treatment. Students initially give a percentage to each criterion such as effectiveness 30%, safety 40%. Then, they list the drugs used for the indication, and according to research conducted in the light of...
It is imperative to use problem-based rational pharmacotherapy education repeatedly throughout medical education to form a habit out of this process. This method can be utilized in various period of education in many faculties of medicine.[8-13] Rather than teaching knowledge, the aim of pregraduate education is “to train doctors that can meet the needs of the society, and provide individuals who wish to pursue postgraduate education with the sufficient infrastructure.” The new education program, which is a student-centered program where problem-based learning (PBL) is the main element, has been applied to its newly enrolled students since 2003–2004 in parallel with the developments in the education of medicine in both the world and Turkey. After 1 year of elective English Prep course, the first 3 years of the 6-year new program is composed of PBL sessions, presentations, professional and clinical skills training, applications, and other education programs. Years 4–6 of the 6-year course comprise the clinical component. In years 4 and 5, task-based learning (TBL) approach is being used. TBL offers a practical approach to integration and PBL in the later years of the medical course. In TBL, the focus for learning is a set of tasks addressed by a doctor in clinical practice. The learning is built round the tasks and learning results as the student tries to understand not only the tasks themselves but also the concepts and mechanisms underlying the tasks.[14] The emphasis on self-directed learning and evaluation of medical literature recognizes that the biosciences and the practice of evidence-based healthcare underpin clinical training.

Rational drug education in Ondokuz Mayıs University was practiced in 4th year block of endocrine-urogenital system as a 1-week task between the years 2010 and 2012. Block of endocrine-urogenital system consists of 8 weeks and 7 tasks such as dry mouth and obesity, goiter, hematuria, voiding disorders, sexual dysfunction, hypertension, kidney failure, and edema. Rational Drug Education was practiced in rational pharmacotherapy task as 1-week program. On the 1st day of the 5-day task program, the program was described in general terms. Second, students practiced prescribing for five different indications. After that, they attended two presentations about “Principles of Prescribing” and “Evidence-Based Medicine.” On the 2nd day, the 1st day tasks were evaluated by the participants. Next, participants attended the presentation about “rational drug choice” and “MAUA.” On the 3rd day, participants selected the appropriate P-drug for essential hypertension. On the 4th day, written prescription on previous days was evaluated. After the evaluation, a presentation was made about “patient-doctor relationship.” Finally, case discussion and evaluation of the task were performed. On the last day, OSCE was applied. There were four blocks and a total 156 students in the 4th year of faculty. These students were divided into four blocks, so there were approximately 40 students in every block. 40 students who took endocrine-urogenital system block were subdivided into three groups so that every task group contains 13 students. Each group practiced rational drug therapy education. Therefore, education was repeated 12 times a year and executed by four facilitators who work in the fields of family medicine and pharmacology.

This study is aimed at the evaluation of task-based rational drug therapy education in clinical tasks of Faculty of Medicine in Ondokuz Mayis University.

Methods

This study is based on anonymous evaluation forms filled by students following the education program to improve rational pharmacotherapy education. The students have been informed that the data provided could be used in a study, and written approval was obtained. Students were given information about filling of the evaluation forms will not bring any liability or damage. The Kirkpatrick’s evaluation model was used for the evaluation of the program. Data were obtained through two basic questions:

1. Were the participants pleased with the program?
   • What are the opinions of the Students about the constituents of the program?

2. Did the participants learn?
   • Did the program contribute to the learning process?
   • What are the opinions of the students concerning the success and usefulness of the program?

Voluntary participants filled three types of evaluation forms up after the educational program. These forms were evaluation form for lecture presentation, evaluation form for practice, and end of task form.

Evaluation form for lecture presentation and practice consist of:
1. A five-point Likert scale
2. Three open-ended questions (the participants should be able to openly state their opinions):
   • What is the most important thing you learned from this presentation/practice?
   • Please write, if there is unclear or misunderstood points about the presentation/practice?
   • Do you have any suggestions or anything to add?
3. The general evaluation point for the presentation/practice.

End of task form was used as the survey form which was consisted of open- and close-ended questions which require the evaluation of educational components. Besides, we were utilize evaluation forms used in every class after each block in the faculty, OSCE results, block test results, and progress test results.

Data collection tools used includes both quantitative and qualitative data. SPSS (version 21, SPSS Inc., Chicago, IL, USA) was used for quantitative data for determining mean and standard deviation values, and descriptive statistical analysis was performed. Descriptive analysis approach was used in the analysis of qualitative data derived from open-ended questions. Students’ opinions were transferred to computer data in text form. After the text was read for a few times, a code list was formed using research question and literature. Thematic code list was produced as a result of rearranging and recategorizing
of the codes in accordance with new readings. The written text was coded in accordance with this list and the findings which can answer the research questions were achieved. Direct citations were placed in findings section and they were chosen based on frequency, suitability, and contrast.\[^{15,16}\]

**Results**

A total of 400 students participated, 230 of which were females, and were all given the task between the years 2010 and 2012. The percent response to the survey questions was 85.6%. Because of the participation of this research depends on voluntary approval not all of the students who practiced rational drug therapy education filled all three forms. In addition, some of the students were filled some of the questions in each form and left the others blank. Hence, “n” values are variable for different forms and also different questions. Both qualitative and quantitative findings were presented in accordance with the research questions and specified codes.

**Research Question I: Were the Participants Pleased with the Educational Program? What are the Opinions of the Students about the Constituents of the Program?**

The opinions of the students about the constituents of the program

Students were generally pleased with the components of the program. The lowest percentage the participants gave was on the duration of the program [Table 1].

**Code 1: Educational contents and methods**

Presentation, problem-based practice, and discussion were the most frequently used methods in the education. Students’ evaluations on the utilization of the practice were given in Table 2.

Many opinions were expressed (n = 104) as to why the program was appreciated, and these opinions were made visible under seven heads. These were:

i. Gives the opportunity to practice/research/learn on your own (n = 29)
ii. Has importance in professional life (n = 29)
iii. Provides learning (n = 20)
iv. Paves the way for discussion (n = 12)
v. Gives the information of abstract information/method (n = 6)
vi. Provides the grounds for successful teamwork (n = 10)
vii. Provides good guidance (n = 1).

The students answered (n = 157) the phrase “it had a good of this educational program” by thinking the educational methods and application duration. Considering the preferences of the students, it was understood that they liked the applications in the program. Especially, P-drug selection/PBL session has been appreciated by the students (n = 36). Other appreciated applications include (i) prescribing (n = 29), (ii) case discussion (n = 29), (iii) evidence-based medicine lecture (n = 17), (iv) educators (n = 17), (v) the overall task (n = 15), (vi) hypertension case (n = 7), (vii) simulated patient (n = 26), and (viii) teamwork (n = 2). The reasons why the technique of simulated patient is favored is that it is similar to real-life learning. It has great importance in professional life, and it aids learning process. The participants (n = 15) demanded more frequent simulated patients and stated that: “I wish I had the chance to encounter not one but several simulated patients. I believe it is a useful experience. In my opinion, the more patients you see, the more experience you get,” “If only doctor-patient relationship was taught adequately and in detail so that we could have enough number of patient practices.” Some students (n = 2) expressed their desire to have experiences beyond simulated patients and stated: “I would

| Source of education | Number of educators | Level of active student attendance |
|---------------------|---------------------|-----------------------------------|
| Number of educators | 205 (83.3)          | 23 (9.3)                          |
| Examination         | 205 (83.3)          | 23 (9.3)                          |
| Sources of education| 221 (89.8)          | 17 (6.9)                          |
| Examination         | 205 (83.3)          | 23 (9.3)                          |
| Educational setting | 223 (90.7)          | 15 (6.1)                          |
| Tools               | 236 (95.9)          | 4 (1.6)                           |
| Total               | 238 (96.7)          | 238 (96.7)                        |

**Table 1: Students’ opinions on the components of education in rational drug therapy (n=238)**

| Evaluation of educational components | Positive, n (%) | Should be developed, n (%) | Total, n (%) |
|--------------------------------------|-----------------|---------------------------|--------------|
| Duration of education                | 181 (73.6)      | 17 (6.9)                  | 238 (96.7)   |
| Number of educators                  | 205 (83.3)      | 29 (11.8)                 | 234 (95.1)   |
| Contents of the education            | 212 (86.2)      | 20 (8.1)                  | 232 (94.3)   |
| Methods of education                 | 210 (85.4)      | 24 (9.8)                  | 234 (95.1)   |
| Quality of educators                 | 217 (88.2)      | 17 (6.9)                  | 234 (95.1)   |
| Level of active student attendance   | 217 (88.2)      | 11 (4.5)                  | 228 (92.7)   |

**Table 2: Students’ evaluation on educational practices in task-based learning (n=238)**

| Evaluation of educational practices, median | 4.41±0.72 (5) |
|--------------------------------------------|---------------|
| The target, contents, utilization, duties, and responsibilities were clearly explained | 4.58±0.66 (5) |
| The use and importance of the practices in professional life were explained | 4.24±0.92 (4) |
| Case/cases were arranged to teach the subject (the number and diversity of the cases were sufficient. the properties of the cases were diagnostic, and cases were common and easy to learn) | 4.21±0.97 (4) |
| Facilitator used different methods (discussion, problem-solving, learning by doing, etc.,) and arranged the practices to ensure everyone’s participation and allow them to learn by doing | 4.40±0.72 (4) |
| Education targets were reached | 4.34±0.85 (4) |
| Facilitator guided the group members throughout the practice in order for them to express their opinions and directed them to reach the evidence | 4.28±0.87 (4) |
| Facilitator constructed the educational environment in a manner which allowed all group members to contribute and learn from each other | 4.19±0.94 (4) |
| The session continued with a discussion which provided an opportunity to evaluate and think with a wider perspective and was completed with a summary | 4.28±0.87 (4) |

SD=Standard deviation
prefer real patients. With simulated patients, I feel like I’m acting in a play.”

The practice most disliked by students was writing prescriptions for different indications which took place on the 1st day. According to the students (n = 17), this practice made them feel: “Stressful, anxious, panicky, unnerving, unnecessary, humiliated, unable to satisfy high expectations, embarrassed.”

The education program consisted of a total of five presentations. The presentation on “The Principles of Prescribing” received the highest points (9 ± 1.00) from attending students in general evaluation. Table 3 shows the evaluation of presentation by students. The presentation on the principles of prescribing was appreciated because it provided a proper learning opportunity. The presentation on evidence-based medicine was well received due to its importance in professional life. Another reason why this education program was appreciated was that it takes place at school and does not require extra studying. The students remarked the necessity of more cases, drugs, and indications. The students (n = 14) criticized some presentations based on contents contribution and manner of presentation, i.e. the presentation on rational drug use selection was chosen as the least appreciated lesson. The participants defined this lesson with the words “monotonous, boring, detailed, no contribution.” While the participants made negative comments on sequencing and number of sessions of case discussion using simulated patient, a student stated that the presentation on patient-doctor relationship was unnecessary because this subject had been addressed constantly due to the curriculum.

The students have indicated that there is no subject they could not fully understand; however, they also complained that the educational program is exclusively on hypertension case/indication and that they did not know what to do in the case of another indication (n = 5). The students expressed that they have understood the manner, in which the method works, yet they also pointed out that their self-sufficiency for other cases is inadequate.

Table 3: Evaluation of presentations made by educators in task-based learning by students

| Evaluation of presentations in task, mean±SD | Evidence-based medicine (n=242) | Principles of prescribing (n=239) | Doctor-patient relationship (n=238) | Multi-attribute utility analysis (n=78) | Rational drug choice (n=242) |
|--------------------------------------------|---------------------------------|----------------------------------|-----------------------------------|----------------------------------|-----------------------------|
| The educator focused the attention of the participants with an effective introduction | 4.36±0.74 | 4.48±0.62 | 4.31±0.77 | 4.18±0.80 | 4.17±0.80 |
| The educator explained purpose, objective, and the content of the presentation clearly | 4.40±0.71 | 4.56±0.61 | 4.35±0.75 | 4.38±0.76 | 4.28±0.77 |
| The educator stated the importance of the subject in professional life | 4.45±0.73 | 4.64±0.56 | 4.47±0.64 | 4.27±0.74 | 4.33±0.76 |
| The content was based on 3-5 main ideas | 4.14±0.88 | 4.15±0.92 | 4.17±0.87 | 4.09±0.89 | 3.90±0.99 |
| The educator presented/discussed the content in a systematic and organized manner | 4.29±0.79 | 4.40±0.70 | 4.23±0.92 | 4.31±0.77 | 4.20±0.83 |
| The educator supported the presentation with clear examples, explanation of difficult concepts and summaries of important points | 4.35±0.78 | 4.40±0.70 | 4.31±0.83 | 4.21±0.11 | 4.10±0.88 |
| The educator adjusted the pace of the presentation in accordance with the participants | 4.23±0.82 | 4.31±0.79 | 4.19±0.88 | 4.05±0.98 | 3.98±1.02 |
| The information which was given with visual and auditory means was clear and understandable | 4.37±0.79 | 4.26±0.80 | 4.25±0.86 | 4.09±0.83 | 4.00±0.92 |
| The educator utilized audiovisual aids and instructional technology effectively | 4.36±0.82 | 4.24±0.82 | 4.21±0.87 | 4.21±0.64 | 4.12±0.84 |
| The educator summarized the main ideas/main messages without adding new information | 4.20±0.87 | 4.16±0.88 | 4.14±0.88 | 3.96±0.97 | 4.32±0.80 |
| The educator made a conclusion that allowed an opportunity to think and evaluate from a wide perspective | 4.28±0.76 | 4.19±0.79 | 4.22±0.82 | 4.16±0.83 | 4.12±0.84 |
| The educator was enthusiastic to communicate and transfer the contents of the presentation | 4.49±0.72 | 4.45±0.67 | 4.46±0.72 | 4.27±0.85 | 4.32±0.80 |
| The educator used his/her posture, mimics, and eye contact appropriately | 4.41±0.76 | 4.38±0.73 | 4.46±0.69 | 4.22±0.83 | 4.22±0.89 |
| The educator gave place to discussion and active participation (asked questions, listened to asked questions, and answered appropriately) | 4.37±0.80 | 4.44±0.75 | 4.39±0.80 | 4.28±0.72 | 4.35±0.85 |
| General evaluation (out of 10) | 8.89±1.18 | 9±1.00 | 8.72±1.19 | 8.43±1.59 | 8.54±1.33 |

SD=Standard deviation
"The guidance of presentations and facilitators: It is not possible to move in the dark without someone holding the light."

Among the reasons why the facilitators were appreciated were because they were nice, they guided well, they were funny, and instructional (n = 17).

Some of the students commented that “PBL rooms were not efficient areas. Everybody did not participate equally.” In addition, they commented that “had to fight with books…” and that “other students always left the final decision to me.” This openly states that equal participation was not realized and the PBL was arduous (n = 6).

Another point the students commented on was the differences between the facilitators. They stated such differences on the preparation of learning environment and guidance (n = 10). “Our facilitator did not help us much. Our friends in other groups were having fun while we were getting bored. It could have been more productive.” “The facilitator could not prepare a friendly environment, failed to create group dynamics, and was deficient in guidance.”

The students stated that teamwork (n = 5) benefits learning with the words “It is good to have teamwork because it is more educative.” “We have learned that there may be situations where we might need to ask for consultations from each other in the future.” They also suggested that “If only there were fewer students…We were very crowded which is why it takes longer and impairs the quality.”

“I wish we had more facilitator from the clinics. We would benefit from their clinical experiences. We could have written prescriptions to real patients under our instructors’ supervision which would have been a reinforcing process.” These statements are important in that they provide a suggestion that the program should be more multidisciplinary (n = 3).

Code 3: Duration of education
The students’ suggestions (n = 66) on time and duration of the education are 3-fold: The educational program should be repeated during each internship; it should start at the beginning of the term and last longer and till final. It should be included in the 1st year of the curriculum. The majority of the comments (n = 56) were about the program being repeated during each internship.

“I wish we had this program in each internship.”

“It would have been more useful if we had this program early in the year.”

“I wish this had been done in earlier years. The pharmacology we have learned in 3 years was nothing but a few drug names which we memorized and then forgot a few days later. I have started to view pharmacology from a different perspective).”

Other students (n = 10) think that the duration of the educational program and the presentations were too long. They stated that the presentations could be shortened which would reveal more time to discuss on cases.

“There should have been fewer presentations and more indications. It is easier to learn during sessions.”

“There should have been more indications. Having certain drugs and sample prescriptions before accepting patients could guide us.”

Code 4: Environment and sources of the education
Opinions were generally positive about the environment of education. Having the education program in PBL rooms and away from hospital context emerges as one of the points of criticism (n = 3).

Two students who stated that there should have been more educational tools and sources indicated that “we need more sources; the pharmacology textbook is actually sufficient in terms of content but we don’t have enough data for MAUA.”

Code 5: Examination and program evaluation
Program was well received because it clarifies and checks learning (n = 128).

“It was one of the rare examinations which I believe will genuinely aid me in my professional life. I wish all the exams were like this.”

Students’ points of criticism on the examination are revealed in the comments (n = 17): “The things I perfectly learn and hope to utilize in professional life are suddenly lost to me during exam.” “We will be able to do these kinds of things as we gain experience as a doctor anyway.” “This exam is not for me.” “I get too excited but I’d better get used to these things” which indicate “exam anxiety, fear of failure, and their personal mistakes.” There have also been a few criticisms which state that the exam is insufficient for permanent learning and that it is too detailed.

Another point of criticism from the students (n = 4) was on the evaluation of the educational program. The statement “the bad part was that we had to feedback every day. I think it’s a waste of time. We fill a feedback form for each educational activity anyway” reveals that the feedback procedure places additional burden on the student. The students expressed that the feedback forms were unnecessary and tiresome for short-term education.

The words that were chosen by the students (n = 141) to define the educational program include “good, nice, beneficial, necessary, positive, educational, applicable, effective, perfect, fun, successful, a little too late education,” and “efficient.”

Research Question II: Did the Participants Learn? Did the Program Contribute the Learning Process? What are the Opinions of the Students Concerning the Success and Usefulness of the Program?

Code 6: Program success and utility
95.9% of the students considered the education to be beneficial. The educational utility was stated under these categories:

i. Drug choice and prescription (n = 56)
ii. Professional utility (n = 23)
iii. Making a P-drug list (n = 4)
iv. Learning the regulations (n = 1)
v. Learning how to approach a patient (n = 9)
vi. Learning evidence-based medicine (n = 3)
vii. Learning drug costs and economy (n = 5)
viii. Learning pharmacology (n = 5)
ix. Learning hypertension treatment (n = 4).

Code 7: The status of educational attainment
Students’ opinions (n = 27) on their state of accessing educational attainment are as follows:

“It’s been very good for me. None of the other lessons in these 4 days could teach me more.”

“This is the only task that I’ve had full attendance.”

Students’ opinions about educational attainment were given in Table 4.

Code 8: Continuity of the educational program
Students’ opinions (n = 128) on their state of continuity of the educational program care as follows:

“…to use during the professional life against pharmaceutical representatives…”

“I have learned to provide better treatment with safer drugs and less cost. I will follow these principles and hope to use potential at hand better.”

“I have learned a lot on prescribing, most important of which is that I know nothing on prescribing.”

“This educational program is about learning; it has taught us to have confidence.”

The statements above about continuity of the educational program are only a few among many. Quantitative data on the continuity of the educational program is shown separately in Table 5.

Students stated that there was no incomplete or incoherent issue but because of this program only includes one indication (hypertension), they did not know what to do if another indication come across.

Between the years 2010 and 2012, OSCE average of the students who were given the rational drug pharmacotherapy education was 94.8 ± 8.6.

Discussion

“Prescribing” is a difficult process for students of medicine and is an error-prone process for all doctors. It requires correct diagnosis as well as adequate knowledge of pharmacology. However, educational problems, increasing number of drugs, and indications as well as patients with diverse characteristics make this process more difficult. To overcome this problem, different approaches in education have been used. Knowledge and skills a doctor should have, to write a prescription was published by “safe prescribing working group” in 2007. The most frequently used method in the world is “problem-based rational drug education.” In this method, the students make

| Table 4: Students’ opinions on their state of accessing educational attainment |
|-----------------------------------------------|
| State of educational attainment               |
| Yes, n (%)                                     |
| No, n (%)                                      |
| Total, n (%)                                   |
| I have learned the rules of writing a prescription | 242 (98.4) | - | 246 (100) |
| 241 (98.0) | 2 (0.8) | 243 (98.8) |
| I have learned how to evaluate the rationality of my prescription | 243 (98.8) | 3 (1.2) | 243 (98.8) |
| 220 (89.4) | 22 (8.9) | 242 (98.4) |
| I can explain treatment plans to patients easily | 237 (96.3) | 5 (2.0) | 242 (98.4) |
| 241 (98.0) | - | 241 (98.0) |
| I believe it is necessary to give clear and exact information to patients regarding treatment | 216 (87.8) | 18 (7.39) | 234 (95.1) |
| With the knowledge and skills, I have gained from this educational program I can analyze, compare and evaluate different prescriptions | 233 (94.7) | 2 (0.8) | 235 (95.5) |
| The rational prescription method I have learned will assist me in making evaluations on rational drug use | |
| I believe it is important to take the patient’s opinion before planning the treatment | 228 (92.7) | 11 (4.5) | 239 (97.2) |

| Table 5: Students’ opinions on continuity of the educational program on rational drug therapy using task-based learning (n=246) |
|---------------------------------------------------------------|
| Continuity of the educational program                         |
|                                                                 |
| Yes               | No               | Total             |
| All students of medicine should have this educational program | 231 (93.9) | - | 231 (93.9) |
| Prescribing skills should be developed using this educational method in all internships | 210 (85.4) | 6 (2.4) | 216 (87.8) |
| I do not think I will be able to use the attainments I have gained from this educational program until my senior year | 106 (43.1) | 123 (50.09) | 229 (93.1) |
| I will use what I have attained from this program during internships and while preparing treatment plans | 199 (80.9) | 21 (8.5) | 220 (89.4) |

P-drug choice based on effectiveness, suitability, safety, and cost. They are expected to choose drugs, prescribe, and monitor patients.

In recent years, rational pharmacotherapy education has been implemented in numerous medical faculties. However,
there are differences concerning the duration, form, and the location of the education. The process is heavily influenced by Groningen model.[21] It is important to note that the education-implemented for only 1 week during 4th year in our faculty is implemented in all clinical branches later. In this study, we evaluated the rational pharmacotherapy education in the faculty.

The feedback from the students revealed that the program and its components have been favorable. This result largely depends on the method of education. Students believe that problem-based/task-based education, in which they interacted with the other students and facilitator is more effective than presentations. "Active learning" which has been implemented in the faculty for many years has great contribution in this result. Students have been carrying out other educational programs based on scenarios in small groups. The educational environment is designed to be used by small groups as well. The reasons for favoring the educational program are relevant to the principles of adult learning. Consequently, the results of the program are valuable in terms of revealing the effect of adult education.

The activity that required writing a prescription for 5 indications which took place on the 1st day of education is the activity with negative feedback. Students had difficulty in writing a prescription and put forth shortcomings in educational system as the reason for it. It is true that educational system puts greater emphasis on diagnosis education rather than drug choice and prescription. Especially in systems which rely heavily on pharmacological knowledge. Medical students are known to be poor in prescribing.[22] Prescribing is, therefore, an essential skill for doctors in most medical specialties.[23] As a result rational pharmacotherapy education has great value over its contribution on the process of prescribing. Although “writing prescriptions for five indications” caused difficulties for students initially, its contribution on defining the necessity is great.

Another unfavorable factor is inadequate time of education. Students emphasize on the importance of the choice of drugs for more indications. Indeed “rational pharmacotherapy education” is important since it provides suitable environment to develop attitude. Students, especially those in clinical branches state that it is important to make the drug choice while studying the relevant disease. This requires the necessity to make changes to educational programs and add modules.

On the examination of 2-year evaluation results of the application, it is revealed that the program is appreciated by the students and it’s considered useful; on the other hand, in terms of the outcome, content, method, resource, assessment and program design, necessities of minor and major changes have been detected. Within the scope of the development and improvement of the program, some important changes were done.

Moreover, it is necessary to ensure that the facilitator taking part in clinical branches learn and be able to apply the model. Such a practice does not exist in most medical faculties. To overcome this problem “rational pharmacotherapy education” program was carried out in our faculty for 44 lecturers from clinical branches, they received education for being facilitator during 10 days. The most widely prescribed diseases have been considered for the selection of the Departments of the Facilitators. After that, revisions were made on educational program. In the 4th year in our faculty, there are 4 blocks: Respiratory-Circulatory, Gastrointestinal System-Hematopoietic-Masses, Pediatrics, and Endocrine-Urogenital. The learning targets of these blocks have been revised and the suitable time for rational drug choice has been planned. For each block, indications for rational drug therapy education determined based on mostly prescribing disease. The chosen indications were asthma, pneumonia and angina pectoris for respiratory-circulatory block, peptic ulcer, and parasitosis for Gastrointestinal System-Hematopoietic-Masses block, tonsillitis, anemia and otitis for Pediatrics and hypertension, cystitis and diabetes for Endocrine-Urogenital block. Since the students will have to carry out this program during 4th year, they need to learn this model at the beginning of the year. For this purpose, all the 4th grade students take the courses at the beginning of the year then they disperse to the blocks.

In TBL program, students are evaluated by OSCE through simulated patients during clinical period. In this type of examination, the rater has a standard checklist which includes the steps students should follow and how many points each step has. This method provides to avoid the risk of influencing the result from the personal opinion of the evaluators.

Clinical examinations in TBL program were planned as stations. Every station is prepared in another room with a simulated patient. 1st station is taking medical history, 2nd station is physical examination, 3rd station is explication of the results of laboratory, and 4th station is: The ability to write prescriptions for simulated patients. Students pass from one station to another and perform the tasks expected from them. Thus, raters evaluate the performance of the student using standard checklist as mention above.

Conclusion

Students who received “Rational Pharmacotherapy Education” stated that the education is useful and will have high impact on their professional lives. They also pointed out that anxiety of explaining and prescribing for the treatment decreased and that all medical students should receive this education. However, the success of the program relies on numerous factors. These include education environments, which are suitable for PBL, digital and published new resources, devoted educators, and directors who provide the necessary means. Our aim was to make this education applicable to other subjects and increasing the number of indications such as diabetes, otitis, asthma, and also to increase the number of facilitators. Therefore, in light of the feedback from students, a project was designed. Within the scope of the project, rational drug therapy education was given to lecturers from different departments in the faculty, and the number of facilitators was increased. Besides required textbooks purchased and given to relevant departments. After these improvements, “Rational Drug Therapy Education” disseminated to other blocks, and number of indications was increased.
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Conflicts of Interest
There are no conflicts of interest.

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