

How can we motivate medical sciences students to learn health system management? A report of the first national Olympiad on managerial reasoning and decision-making

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BACKGROUND: Although health system management is one of the main roles of health care providers, medical sciences students are not properly trained for it. The first national scientific Olympiad for managerial reasoning and problem solving was designed to motivate students for acquiring managerial knowledge and skills, improve their reasoning and problem solving capabilities and propagate team working in students in an excitingly competitive and friendly atmosphere. This paper aims to report our experiences in designing and administering this scientific Olympiad. **METHODS:** A model for the Olympiad was designed in three phases: building up a framework for designing the exam questions and determining the topics, setting the exam questions and administering it, and finally judging. In summer 2009, the first national Olympiad for the students of medical sciences on reasoning and decision making in health system management was held in Isfahan University of Medical Sciences. **RESULTS:** After 19 months, a framework for the exam questions was built up and the themes of the Olympiad were decided to be health policy and health economics. The exam was run in two phases of individual and group competition. 106 students participated in the event. 88.5% of participants uttered the skills needed for this exam were not taught at the university and 61.6% believed the skills were useful for their professional future and 65.4% tended to encourage their friends to participate in the next Olympiads. **CONCLUSIONS:** Based on participants' feedbacks, it seems that holding a national festival like an Olympiad can motivate medical sciences students to go beyond routine studying and probably can fill some educational gaps in health system education. Of course, this Olympiad was the first experience in this field and further studies and amendments is necessary to improve it in future.

KEYWORDS: Science Olympiad, Reasoning, Decision Making, Health System Management, Health Policy, Health Economics

BACKGROUND

Many of the physicians and other health care providers are involved in health care leadership and management,^[1-3] but too few of them are educationally prepared to assume the challenges of these roles and very little attention is paid to this important issue in medical schools.^[4,5] there is a general belief that students are not well trained for managing the future health system and they do not acquire the essential trainings.^[6] Different studies have been conducted in order to identify the necessary extracurricular capabilities for health care providers. In a study which analyzed the nine major reports about the required capabilities of physicians, the ability for quality measurement and im-

provement, medical management, teamwork and collaboration, information management and having health care system overview were among the aforementioned capabilities.^[7] In addition, the American College of Preventive Medicine has defined four chief competencies as the medical management skills of physicians as: 1) delivery of health care, 2) financial management, 3) organizational management and 4) legal and ethical considerations,^[2] and also there are some other studies in this field.^[6,8] Certainly, these capabilities are not limited to managers and physicians. For instance, being communicator, collaborator, manager and advocate have been recognized as the essential capabilities of physiotherapists in Canada.^[9] Some

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other studies have also mentioned the required skills for pharmacists, nurses, etc.^[10-13] With regard to the important role of all the health care providers in a responsive health system,^[14] the need for change in training programs toward preparing them for future responsibilities is absolutely necessary.^[15] Although there is some direct or indirect managerial training in the educational program of some majors, there are many differences and gaps between the required capabilities and what is educated, moreover, coordinating between these two is difficult.^[16] There are some studies which have approached to this task through different methods like simulating the situations^[17-18] and working directly under supervision of faculty members in real business projects.^[19] Being aware of the structure and economics of health system is so important that some studies has suggested Health Policy and Health Economics to be taught in pre-clinical and clinical years of medical education.^[20]

By considering the aforementioned factors, the first scientific Olympiad for the students of medical sciences was designed with the aim of motivating students in different majors of medical sciences to acquire managerial skills and expanding the atmosphere of team working in a motivating and interesting environment. The scientific Olympiad in its current form was introduced first in 1959 in Math in Romania. Eight years after that, the second scientific Olympiad in Physics was held.^[21,22] In our country, no scientific Olympiad had been ever designed and held for students of medical sciences. In 2010, the first national scientific Olympiad for students of medical sciences was designed and held in three areas of clinical reasoning, scientific thinking and health system management at Isfahan University of Medical Sciences. In this article, we present the designing and administering methods of the first scientific Olympiad for medical sciences students in the area of reasoning and decision making in health system management in order to share the acquired experiences with others.

METHODS

Designing the Olympiad model carried out in three phases, consisted of:

- 1- Compiling the framework for designing the exam questions and defining the topics
- 2- Designing the questions
- 3- Administering and judging the exam

1. Compiling the framework for designing the exam questions and defining the topics

Designing the exam framework was done in two stages. In the first stage, through a comprehensive systematic review and a series of interviews with the experts, the initial framework was compiled and in order to disseminating the key points, all the gathered materials and primary ideas were published as a book.^[23] At the second stage, the designing board of the exam including a team of six experts in various relevant specialties was formed.

Taking advantage of virtual team working techniques and by attendance in several sessions, some different models were designed and analyzed from different aspects and the final model was prepared after accurate examinations and modifications. At the end, by virtue of the importance level of the topic in the country, the possibility of using the results by beneficiary organizations, and the feasibility of holding the exam and designing it properly, two topics were selected for the first year Olympiad. Accordingly, some primary questions were designed and in accompany with the framework were uploaded on the Olympiad website for the notice of the applicants. Conducting this stage took almost 19 months.

2. Question designing process

In order to make use of the capabilities of all experienced university teachers of the country, all universities were asked to introduce two professors for the membership of the Olympiad scientific committee. After briefing about the Olympiad, they were asked to design and send some proper questions. Using some of these questions, the question-designing board designed the final version of the questions under completely protected conditions at the Center for Medical Training Assessment of the Ministry of Health.

3. Holding and judging the exam

The first national managerial reasoning and decision making Olympiad was held in the summer 2009, in two phases of individual and team competitions.

Judging the individual stage: Judging was handled in a completely blind and protected manner. The judging of the exams at the individual stage was mainly based on the expert panel views. At the end, the mean scores of all participants in each three membered groups were estimated and the six groups who had taken the highest scores were admitted to the group stage of the Olympiad.

Judging the group stage: This section was also judged completely in blind and protected manner and the mean score of all five referees were set as the final score for each group.

Opinion Survey: At the end of the festival, a questionnaire containing 39 questions about different sections of the Olympiad was filled out by students, among which, 13 questions were related to the scientific issues of the exam. These questions, which were in form of 5-point Likert scale and had been arranged from "absolutely agree" to "absolutely disagree", are presented in table 3.

RESULTS

1. Compiling the exam questions framework and defining the subjects:

While searching and examining the available resources, we could not find any document about holding any scientific Olympiads for medical students or any reliable paper for assessment of the managerial reasoning and decision-making skills especially in the Health System Management settings. We only could find and use some evidences about the methods of clinical reasoning skills assessment.

The individual stage exams: The individual stage exams were held in four sections in the first two days. The first exam focused on assessing the students' ability of managerial reasoning. In this exam which was in English, an article that its discussion section was omitted, alongside 16 related paper abstracts with different approaches to the main idea were given to the students and they were asked to develop a discussion for the first article considering the results of it and the sixteen paper abstracts. The specified time for this exam was limited to 3 hours.

The second exam was designed using the common as

assessment techniques of clinical reasoning and problem solving skills like "clinical reasoning problem (CRP) which is altered to managerial reasoning problem (MRP), script concordance (SC), extended matching and key features (KF)". It was evaluated through 40 Persian questions that each question itself contained multiple sections (totally, 160 answerable sections) in 90 minutes.

The third part of the exam which was dedicated to examining the decision making ability of the participants on the basis of different viewpoints was held in English. Initially, a 14-minute film around one of the intended areas was shown and one paper and an article abstract which had discussed that issue with different views were given to the participants and they were asked to imagine themselves in each of the four following positions and each time, express the commonest challenges and the best suggestions about the intended area from the same perspective in three hours:

1. Health equity activist
2. Pharmaceutical industry representative
3. Academic biomedical researcher
4. Minister of health

In the last section of the individual part which was about assessing the students' ability of decision making in face of having various options, two questions were presented in a design like PMP (patient management problem) tests. One of the questions consisted of 10 parts and the other one was of 15 parts, while having 4 to 5 alternatives in each part which had to be ranked according to their priority. All the exams in the individual phase were open-book. All the individual exams and their goals are summarized in table 1.

The exams of the group stage: The group stage was held in three turns. This stage was open-sourced and all the six groups of three members had access to

Table.1. Individual stage exams and the aim of designing each one.

Holding time	Aim of exam	Type of exam
1 st day morning	Assessing the students' managerial deduction potency	Compiling an article discussion using the results of 1 paper and 16 abstracts of different articles
1 st day evening	Assessing the students' reasoning and problem solving skills	MRP (Managerial Reasoning Problem), SC (Script Concordance), extended matching, KF (Key Features) tests
2 nd day morning	Assessing the students' decision making capabilities when there are different comments and views	Providing different comments and views around one subject and asking students to compile major challenges and the best options for that subject on behalf of different stakeholders
2 nd day evening	Assessing the students' decision making capabilities when there are multiple and different choices	An exam like PMP (patient management problem) exam

internet. In addition, as the exam subject for the group stage had been released on the Olympiad website,

there was more possibility for the participants for further studies in this area and provide the relevant re-

sources. At the first stage of the exam, the establishment of an integrated system of family physician and the facilitation of the geographical access of the patients to family physician were mentioned as the present need of the society. The students were asked to achieve some option lists (the more, the better) to attain such requests within five health system control knobs (finance, organization, behavior, regulation and payment method). In the second section, the students were asked to do the scientific stages of options appraisal for all of their options and at the end, choose one option as their best final choice. The variety of the applied methodologies at the assessment stage of the alternatives and the rationality of the way of choosing the final option had points. At the last part, the students had to explain their operational plan for the establishment of their selected plan.

At the end of the third day, the students presented the results of their 3-day activity in two sections of poster and oral presentation.

The topics of this Olympiad were defined as “health policy” and “health economics” and “the current problems around administration of the family physician system in Iran” was introduced as the subject of the team-stage project.

2. Designing the Questions:

Totally, 194 questions in the individual section and 3 expository questions in the group section were designed and asked.

In the group stage, in addition to assessing the previous aims, evaluation of the participants’ team working skills was also taken into account. It was done by observing their activities via scoring a designed checklist. Posters and oral presentations were evaluated by a prepared checklist too. The final scoring of the team working process was conducted according to table 2.

3. Holding the exam:

106 students in different majors of medical sciences from all over the country participated in this exam, among whom 71 individuals (66.98 %) were girls. The

majority of the participants were medical students (33 students) and the rest were BSc students of Nursing (26 students), Health System Management (20 individuals) and all other majors (27 individuals). The top three students at the individual stage were medical student and among the 18 students admitted to the team stage eight individuals were medical students, eight were Health System Management students and two were students of dentistry. The mean of the final score of the female students was 335.3 ± 73.9 out of 1000 and the mean scores of the male students was 363.0 ± 84.2 which did not have any statistically significant difference ($p = 0.143$). The mean score for the ability of reasoning and problem solving ($p = 0.007$) and for assessing the power of participants’ decision-making in case of having multiple options ($p = 0.044$) were significantly more in men than in women.

There were no significant differences between men and women with regard to the other parts of the exam ($p > 0.05$). Comparing students of different majors, the final scores mean of the students of medicine and management was more than the mean of the final score of the nursing students ($p = 0.007$) and ($p = 0.002$). No statistically significant difference was observed among the means of final scores among other majors ($p > 0.05$). The mean scores obtained from the tests for assessing the ability of managerial reasoning, decision making based on the different viewpoints and in the situation of existing multiple options by the students of management was more than other students but this difference was not statistically significant ($p > 0.05$). The mean scores of the ability of reasoning and problem solving assessment tests obtained by the students of management ($p = 0.008$) and medicine ($p = 0.024$) were better than the other students. The correlation between the students’ final scores and their grade-point average (GPA) was statistically significant ($p = 0.024$) but the Pearson correlation was estimated as 0.2. In no major, there was any statistical correlation between the participants’ GPA and their final scores.

Opinion Survey: The findings of the conducted survey of students are summarized in table 3.

Table 2. Coefficients of each part of the group exam

1 st day evening exam	2 nd day exam	3 rd day morning exam	Oral presentation	Poster presentation	Team working
20%	35%	20%	10%	5%	10%

Table.3. Summary of the findings of the conducted survey on students

The survey phrase	Strongly agree and agree (percent)	No idea (percent)	Strongly disagree and disagree (percent)
This exam was different from all the routine exams at the university	98	2	0
This exam assessed reasoning and problem solving	52	0	48
Taking book to the exam session was helpful	37	29.9	33.1
The skills needed for this exam have not been taught at the university	88.5	9.6	1.9
My score was in proportion with my problem solving skills in the examined area	36.5	23.1	40.4
The time for the individual stage exams was adequate	80.8	1.9	17.3
The skills that were assessed are useful for my professional future	61.6	11.5	26.9
The problem solving skills are learnable	84.6	11.5	3.9
The success rate in this exam was not tied with my knowledge and information level	57.7	11.5	30.8
This exam assessed creativity	51.9	7.7	40.4
I will encourage my friends to participate in this Olympiad in next years	65.4	11.5	23.1

DISCUSSION

Because there is not any Health Economics and Health Policy related issues in the official curriculums of the undergraduate students, there was no difference between the formal exposures of the students of different majors with these themes. The partial superiority of the management students might be because that they were more interest in studying this field alongside their more exposure with managerial sciences. The superiority of the medical students is also interpreted with regard to their longer and more real exposure with the health system problems and consequently, their sense of need to study more in this field and probably their partially higher aptitude.

With regard to this point that the questions had not been textually extracted from the textbooks and it was tried to reduce the effect of background knowledge in answering the questions, the higher averages of second and forth tests scores of the boys than the girls could be an indicator of their higher ability in decision making and problem solving. The significant superiority of the students of management and medicine in the second exam, which was devoted to assessing the skills of decision making and problem solving, can be attributed to a further training of these skills in different forms to these students and also a higher exposure of them with situations that require decision making and problem solving. One of the tactics that was used to reduce the effect of the background knowledge and the memory effect in answering the questions was the permission to take every manuscript or book to the exam sessions. However, only 37 percent believed that

taking books to this exam was helpful which can be attributed to this fact that the students were unfamiliar with a quick and proper use of this technique at the limited time of the exam.

Considering the absence of standard framework for assessing the skills of reasoning and problem solving in health system management and by virtue of the fix reasoning and problem solving principles, the available formats and frameworks for assessing the clinical reasoning skills were employed to design a part of the questions. Therefore, the reliability of these questions in the assessment of managerial reasoning was an ambiguous point in this study.

Since one of the most important aims of designing and running this Olympiad is the improvement of managerial knowledge of the future health care providers through motivating them for increasing their managerial studies, the authors suggest that annual selected topics wouldn't be among the Management students' formal curriculums syllabuses. It helps to form an almost equal situation for all majors' participants and subsequently results in increasing all the students' motivation for study the subjects and taking part in the Olympiad.

CONCLUSIONS

Considering the significance of medical students' awareness of health system management and the importance of improving reasoning and decision making skills in them, holding such examinations could facilitate the achievement of these objectives.

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REFERENCES

- Naylor CD. Leadership in academic medicine: reflections from administrative exile. *Clin Med* 2006; 6(5): 488-92.
- Kumpusalo E, Virjo I, Mattila K, Halila H. Managerial skills of principal physicians assessed by their colleagues. A lesson from Finland. *J Health Organ Manag* 2003; 17(6): 457-62.
- Jennings BM, Scalzi CC, Rodgers JD, III, Keane A. Differentiating nursing leadership and management competencies. *Nurs Outlook* 2007; 55(4): 169-75.
- Lawson JS. Difficulties in the transition from clinician to manager. *Physician Exec* 1994; 20(7): 19-21.
- McCall MW, Jr., Clair JA. In transit from physician to manager--Part I. *Physician Exec* 1992; 18(2): 3-9.
- Rabinowitz HK, Babbott D, Bastacky S, Pascoe JM, Patel KK, Pye KL, et al. Innovative approaches to educating medical students for practice in a changing health care environment: the National UME-21 Project. *Acad Med* 2001; 76(6): 587-97.
- Halpern R, Lee MY, Boulter PR, Phillips RR. A synthesis of nine major reports on physicians' competencies for the emerging practice environment. *Acad Med* 2001; 76(6): 606-15.
- Rice JA, Hogue M, Nye J, Gustavson P. Versatility and physician leader effectiveness; a white paper to enhance performance. governance and leadership services; 2009 [Online]. Available from: URL: <http://www.ihstrategies.com/documents/VersatilityPhysicianLeaderEffectiveness.pdf>
- National physiotherapy advisory Group. Accreditation Council for Canadian Physiotherapy Academic Programs. Essential Competency Profile for Physiotherapists in Canada. [Online]. 2009 Oct. [Cited 2011 Apr 15]; Available from: URL: <http://www.manitobaphysio.com/documents/ECProfile2009English.pdf>
- Shirey MR. Competencies and tips for effective leadership: from novice to expert. *J Nurs Adm* 2007; 37(4): 167-70.
- Scott ES, Cleary BL. Professional polarities in nursing. *Nurs Outlook* 2007; 55(5): 250-6.
- Filerman GL, Komaridis KL. The pharmacy leadership competency gap: diagnosis and prescription. *J Health Adm Educ* 2007; 24(2): 117-34.
- Pollard SR, Clark JS. Survey of health-system pharmacy leadership pathways. *Am J Health Syst Pharm* 2009; 66(10): 947-52.
- Aluise JJ, Schmitz CC, Bland CJ, McArtor RE. Administrative skills for academy physicians. *J Health Educ Train* 1989; 4(3): 7-13.
- Mahoney JF, Cox M, Gwyther RE, O'Dell DV, Paulman PM, Kowlowitz V. Evidence-based and population-based medicine: national implementation under the UME-21 project. *Fam Med* 2004; 36 Suppl: S31-S35.
- Cockerill T, Hunt J, Schroder H. Managerial competencies: fact or fiction? *Business Strategy Review* 1995; 6(3): 1-12.
- Rubino L, Freshman B. An experiential learning simulation exercise for healthcare management students. *J Health Adm Educ* 2001; 19(2): 155-72.
- Marks A, McIntosh J. Achieving meaningful learning in health information management students: the importance of professional experience. *HIM J* 2006; 35(2): 14-22.
- Carter T. Health insurance and corporate social responsibility. *J Hosp Mark Public Relations* 2009; 19(1): 64-86.
- Cox M, Pacala JT, Vercellotti GM, Shea JA. Health care economics, financing, organization, and delivery. *Fam Med* 2004; 36(Suppl): S20-S30.
- Gorzowski W. International Physics Olympiads (Ipho): Their History, Structure And Future. *AAPPS Bulletin* 2007; 17(3): 2-11.
- Chakrabarti B. International Mathematics Olympiad: the first science olympiad is now fifty years old. *Current Science* 2009; 96(12): 1573.
- Adibi P, Hadadgar A, Hadizadeh F, Haghjoo Sh, Monajemi A. Medical science olympiad: concepts, disciplines and methods in university context. Isfahan: Isfahan University of Medical Sciences; 2009.

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