Problem-Based Learning to Encourage Active Learning and Teamwork Among First Year Medical Students

- Student Reports in 2019 -

Comparison of Entrance Selection Systems for Medical Schools in Japan and the United States

(Course name: What does a test measure?)

MIZUKI INAGE*, YUSEI TACHIBANA*, RIE KOIZUMI*

*Faculty of Medicine, Juntendo University, Chiba, Japan

Objective: To identify the characteristics of the motivation of medical students and their relationships with entrance selection systems in Japan and the U.S.

Methods and Materials: We had two types of participants: medical students and teachers at medical schools in Japan and the U.S. The students and teachers responded to a survey that included 11 and 3 questions, respectively.

Results: It was found that although students in Japan enter medical schools with high motivation—similar to students in the U.S.—, after some time, medical students in Japan are considerably less motivated than students in the U.S.

Conclusions: Based on the results, we conclude that the selection system of medical schools, including general education, is one of the reasons why motivation decreases drastically in Japan. We propose two potential changes to the selection system for medical schools in Japan.

Key words: undergraduate medical education, general education, admission systems, motivation, surveys

Introduction

The current decrease in the motivation of medical students in Japan has become one of the biggest concerns of medical schools. Statistical research conducted by professors at Fujita Health University in 2010\(^1\) reported a decline in the motivation of students after entering medical schools. In this research, 87 medical students answered questions on their motivation. A questionnaire was administered longitudinally twice: when the students were in year 1 and year 4 of their program to understand the changes in the motivation of students. Results show that the average number of missed classes progressively increased from year 1 to year 3 but decreased in year 4: 20.5, 25.1, 30.8, and 18.8 times, respectively. This number decreased in year 4, probably because fourth-year students have to take the computer-based testing (CBT) and the objective structured clinical examination (OSCE), causing them to study harder than in year 3. Moreover, answers to the question —“What is the focus of your life?”— showed a decrease in motivation. In year 1, 63.4% of students answered "study," whereas in year 4, only 27.3% of the students answered "study."

This problem may be attributed to the entrance selection system and general education. In Japan, to enter a medical school, high school students must have high scores on entrance exams. In some medical schools, applying high school students are...
required to submit reports of their activities during high school; however, these reports may not be important when selecting students, particularly at national universities. This conclusion can be assumed because only a limited number of universities (i.e., only 27 of 82 medical universities in Japan) include these reports as their scores for their examination. An interview examination is conducted as well, which may not be significant in selecting students. In comparison to Japan, to enter a medical school in the United States (U.S.), students are required to graduate from a university. After graduating, they are required to take the Medical College Admission Test (MCAT). The MCAT is used to evaluate problem-solving, critical thinking, written analysis, and knowledge skills of students. After passing this test, students are required to undergo an interview exam and provide recommendation letters. Furthermore, general education in Japan and the U.S. are significantly different. Although students in Japan are required to have general education of one year at a medical university, students in the U.S. are required to have a general education of four years before entering medical school. Thus, students in the U.S. are surer of their interest in medicine. Medical schools in America are pragmatic when selecting students interested in being a doctor.

**Current study**

We aim to identify the characteristics of the motivation of medical students and their relationships with entrance selection systems in Japan and the U.S. through a comparison of the data obtained using a survey. We intend to propose an improved system of selecting people intending to be doctors. This proposal to change the selection system can facilitate the progress of medical education and eventually medical care in Japan. We assume that students with high motivation for becoming doctors and goals or visions for the future have the will and passion to learn and work hard at the university, which would result in better doctors. Therefore, we are interested in determining the differences in the process of medical school entrance in Japan and the U.S. as well as its effects on the motivation of students to become doctors.

In this report, entrance selection systems are defined as the process of admission to a medical school, which includes not only tests and grades but also general college education received by students in the U.S. Students in the U.S. are required to attend college to apply to a medical school, and thus, we considered four years of the college experience as one of the components of entrance selection systems in the U.S.

![Figure 1](image)

**Figure 1** Question (Q) 1. What grade are you in medical school?
Method

1. Participants
The survey study included two types of participants: students and teachers at medical schools. First, the students in Japan (n = 104) were from recognized universities, including Juntendo University, whereas those from the U.S. (n = 22) were based in widely known universities, such as Stanford University, University of Hawai‘i, and University of Massachusetts Medical School. Figure-1 shows the percentage distribution of respondents that answered question 1: “What grade are you in medical school?” Second, we surveyed the teachers at medical schools, including doctors and professors teaching other subjects (n = 10 and 5 in Japan and the U.S., respectively). The teachers in both countries were surveyed to ensure that the current study includes perspectives of medical students and the teachers with whom they interact.

2. Survey
The students in Japan and the U.S. were asked 11 questions, whereas the teachers were asked 3 questions. The responses were used to analyze the effect of differences in medical school entrance on the motivation of students to become doctors. The surveys were administered through the internet or in person from August to September 2019.

3. Analysis
The survey included multiple-choice and short-answer questions. We compared the multiple-choice questions based on the percentages and sorted major responses from the short-answer questions.

Results and Discussion

1. Medical students in Japan and the U.S.
We asked students the following question: “Do you have any specific goals in becoming a doctor?” Figure-2 shows that 57% of the students in the U.S. had an idea of their future interests or their intentions of contributing to medicine, such as working in hospital administration, performing reproductive healthcare research, working in international humanitarian settings, or working as a surgeon managing a medical school. However, only 12% of the students in Japan had some idea of their prospects or interest. Moreover, only 37% had decided whether they intended to be a clinician or researcher, and only 32% had determined the specialty they wanted to work in.

The third question was as follows: “Why did you decide to become a doctor? (What motivated you to become a doctor?)” In both countries, some people aimed to become doctors because their families or the individuals themselves had experienced sickness.
or because they thought that medicine as a profession was worth pursuing. However, 37% of the students in the U.S. stated that they wanted to study medicine because of their interest in subjects, such as biology, anatomy, science, and genetics, whereas only 9% of the students in Japan provided such responses. Furthermore, when we asked question 4: “When did you decide to become a doctor? What was the cause? (When and based on which factors did you decide to become a doctor?)” Here, 50% of the students in the U.S. responded that they decided to become doctors during their college undergraduate studies, and 17% stated that they decided after graduating from college. The majority of the students in Japan had decided to become doctors before graduating from high school. The students in the U.S. stated that their studies in college were a contributing factor to their decision, whereas those in Japan stated that they decided to become doctors because of their grades or academic ability in high school, recommendations from their parents, or the need to select a major for their university entrance exams.

Question 5 was as follows: “What do you think is important in getting into medical school? (Which factors do you think are crucial for admission into a medical school?)” As shown in Figure-3, 31% of the students in Japan considered test scores on the entrance exam to be the most crucial factor for admission into a medical school, and 20% of the students in the U.S. considered grades in college to be important. These results show the importance of the four years of general education in college and the corresponding grades, whereas only 1% of the students in Japan stated that grades in high school were crucial. Furthermore, communication skills were another factor that was considered crucial in both countries by 20% and 12% of the students in Japan and the U.S., respectively. These results seem to be reflected in the interviews conducted after entrance examinations in both countries.

From the responses to these four questions (Questions 2–5), we found that having four years of general education and study, including subjects
unrelated to medicine, generally seems to have a strong influence on students in the U.S. The four-year general education provides students with specific goals and encourages them to think about their careers and work life. Furthermore, during undergraduate study, students have a considerable amount of time to plan for their future and discover their interests, which helps them make better career choices. With the proper understanding of the field, students can take more interest in their studies. In addition, the entrance selection systems affect the perspectives of students on admission to a medical school, which consequently affects their actions and preparation for university admissions. Furthermore, these systems seem to help members of entrance selection committees determine which students will continue to study hard in the relative freedom at university, as suggested by a reviewer.

For Questions 6 and 7, we asked the following questions: “What would you give to evaluate your class attitudes when you just entered medical school?” and “What would you give to evaluate your class attitudes now?” (How would you evaluate your attitude toward the curriculum when you had entered medical school versus now?). Figure-4 shows that the students in the U.S. have better attitudes toward their curriculum than the students in Japan—both from when they had entered the university and now. In Japan, 54% of the students had a “good” or “very good” attitude toward the curriculum when they entered the university, and this rate declined to 25% at the time they took the survey. In the U.S., 75% of the students had a “good” or “very good attitude” toward their curriculum, which decreased to 50%. Moreover, 5% and 11% of the students in Japan had “very bad” attitudes then (when they entered the university) and now, respectively, whereas the U.S. had no such students. Although the attitudes of students toward their studies deteriorated in both the countries over the time interval, a more significant decline was observed in Japan, where the rate decreased by half compared with the one-third decrease in the U.S.

Questions 8 and 9 were as follows: “What would you give to evaluate your motivation when you just entered medical school?” and “What would you give to evaluate your motivation now?” (How would you evaluate your motivation when you had entered medical school versus now?). As seen in Figure-5, the percentage of students in Japan, who evaluated their motivation as “very good” or “good,” decreased from 69% when they had entered the school to 39% now, whereas the rate for students in the U.S. increased slightly from 77% to 81%. Moreover, 10% of the students in Japan stated that

![Figure-4 Q6 & Q7. What would you give to evaluate your class attitudes when you just entered medical school and now?](image-url)
their motivation decreased to "very bad" now, whereas no such students were observed in the U.S.

Responses to Questions 6 to 9 suggest that although the attitudes of students toward their studies deteriorated from when they had entered medical school in both countries, in general, the motivation of students in the U.S. increased slightly, whereas that of the students in Japan decreased substantially. These results may indicate that after students in Japan are familiar with the school and feel less pressured or nervous, their attitudes toward the curriculum tend to deteriorate. However, the motivation of students in the U.S. slightly increases after they have been studying for some time. One probable reason for this motivational increase in American students is that a deeper knowledge of medical studies induces their curiosity and motivates them to study. Another reason (suggested by a reviewer) may be that students in the U.S. are able to study clinical aspects of medicine and learn from actual patients much sooner after entrance than their Japanese counterparts. However, these results were not observed in Japan.

Question 10 was as follows: "Did your motivation change from when you entered medical school until now? (Has your motivation changed compared with when you had entered medical school?)" (see Figure–6). The result was that half the students in both the countries state that their motivation changed. The students in Japan and the U.S. who answered "Yes" to the aforementioned question stated that their motivation changed negatively. However, the reasons for those changes in motivation were different. The students in Japan stated that they started being sluggish and felt exhausted because they were unhappy with general education and wanted to focus more on medicine, whereas the students in the U.S. stated that after studying for a while, they realized the difficulties of being on ward duties, cooperating with coworkers, memorizing all diseases and work cases, and competing for residency positions. Approximately 30% of the students (27%) in the U.S. stated that they were burnt out after entering medical school. These responses suggest that the motivation of students in the U.S. changes primarily because of demanding hard work and the difficulties of being a doctor, which is not generally observed among students in Japan.

The students in Japan were asked Question 11 as follows: "Do you think your motivation was different if you entered an American medical school? (Do you think your motivation would have been
different if you were in a medical school in the U.S.?" The students in the U.S. were asked the following: "Do you think your motivation was different if you entered a Japanese medical school? (Do you think your motivation would have been different if you were in a medical school in Japan?)" As seen in Figure-7, nearly 60% of the students in both the countries (59% and 62% in Japan and the U.S., respectively) answered "Yes". Further, the students in Japan and the U.S. had similar perspectives toward general education—nearly 70% and 85% of the students in Japan and the U.S. stated that the four years of general education in the U.S. has a positive effect when selecting future careers, respectively. The students in Japan and the U.S. stated that students with four years of general education before entering medical school have more time to think about their future career and are sure of their decision. The results suggest that studying various subjects and doing so with people having different future aspirations can enhance their knowledge, life experience, and communication skills and can increase their interest toward medicine or research, thereby helping them set specific goals for their future. Although 5% of the Japanese students said that four years is a considerably long duration for general education, most of the students in Japan and the U.S. recognize the benefits of general education before medical school.

Figure-6  Q10. Did your motivation change from when you entered medical school until now?

Figure-7 Q11. Do you think your motivation was different if you entered a Japanese/an American medical school?
2. Teachers in Japan and the U.S.

First, we asked the teachers the following question: “What would you give to evaluate the students’ class attitudes when they just entered medical school? (How would you evaluate the attitudes of students toward the curriculum when they had entered medical school?)” (Question 1 to the teachers but labeled as Question 12 overall). For this question, we asked teachers to evaluate the attitudes of students on a scale of 1 to 5, with 1 being the worst and 5 being the best. Figure-8 shows that all teachers in the U.S. answered “5”, which indicates that teachers thought the students showed a positive attitude toward the course of studies. However, teachers in Japan responded differently. Although 5 out of the 10 teachers (50%) answered “5”, some teachers rated student attitudes at “3” or “4” (20% and 30%, respectively). Thus, some teachers judged that some students had lower motivation even at the beginning of year 1, although the results may be affected by cultural differences, as suggested by a reviewer.

Second, teachers were asked the following question: “What would you give to evaluate the students’ class attitudes now? (How would you evaluate the attitudes of students toward the class now)” (Question 13; see Figure-8). A deterioration in attitudes toward the course of studies, which reflects a decrease in motivation, was noted in both countries. However, the teachers in Japan and the U.S. provided an average attitude score of 3.6 (SD =0.64) and 4.2 (SD = 0.70), respectively. Therefore, according to the teachers, the difference in motivation between the students in Japan and the U.S. is notable, with the students in the U.S. being more motivated.

Finally, we asked the teachers the following question: “What do you think are the advantages and disadvantages of general education?” (Question 14). Students in Japan are required to have a general education of one year after entering medical school, whereas those in the U.S. are required to have four years of general education before entering medical school. The responses to this question were similar for teachers in both the countries. As advantages, all teachers stated that general education provides a foundation of knowledge and enables students to be well balanced and...
explore alternative options and interests in medicine. The teachers mentioned no other disadvantages apart from general education being time-consuming. Therefore, teachers seem to perceive that general education has more advantages than disadvantages.

Conclusion

This report aimed to identify characteristics of the motivation of medical students and how this relates to the entrance selection systems in Japan and the U.S. The study compared the two countries using a survey to obtain the perspectives of both students and teachers. One of the major limitations, as pointed out by a reviewer, is related to the approach used to collect data in the survey, as the medical students and teachers queried may not be representative of the whole population. Further, the students’ different learning stages, as a majority of the student respondents in Japan were in year 1, whereas half of the students in the U.S were in year 3, taking ward rounds and observing living patients, might pose difficulties in interpreting the differences between the two groups and drawing rigorous conclusions regarding the causal effects of entrance selection systems on motivation.

Despite these limitations, the results seem to suggest the following: As for the characteristics of the motivation of medical students, we conclude that although students in Japan enter medical schools with high motivation — similar to students in the U.S. — as time passes, medical students in the U.S. remain considerably more motivated than students in Japan. Regarding relationships between motivation and the entrance selection systems, we conclude that the selection system of medical schools, including general education, may be one of the reasons why motivation decreases drastically in Japan.

Based on these results, we propose two potential changes to the selection system for medical schools in Japan. First, we could provide students with two options to enter medical schools: One alternative is for students who are sure they want to become doctors to enter medical schools as soon as possible, while the other is for students who want more time to evaluate whether becoming a doctor is the right choice for them or those who decide after entering other departments that medicine is what they really want to pursue. However, in such a two-streamed system, the majority of the students may not choose the second option because it requires more time to become a doctor. Thus, having two options may not change very much. We propose a second system, in which Japan could imitate the system in the U.S. Before entering medical school, all students must graduate from a university and pursue general education for a longer period to evaluate their interests in medicine. The requirements for entering medical school can be to pass a written exam and an interview. A written exam is crucial because understanding medicine requires learning ability, and a written exam is one of the easy approaches to measure that ability. The current test in Japan includes only a limited number of subjects; however, different subjects would need to be included in the exam because students learn different subjects at universities. Any test that appropriately measures the learning ability and achievements should be acceptable. An interview must be included as well to understand the determination of each student and to select students who can reliably contribute to the medical field in Japan. Moreover, the grades obtained during general education must be one of the criteria for evaluating whether a student works hard on their studies. Although these methods suggest a drastic reform, implementing the U.S. entrance selection system may help enhance the motivation of medical students in Japan.

Acknowledgment

We would like to express our great appreciation to an anonymous reviewer who provided invaluable advice on how to improve this article.

References

1) Nakashima A, Osada A, Ishihara S, et al: Surveys to assess the attitudes of medical students about learning. Medical Education, 2010; 41: 429-434.
2) 医系専門予備校メディカル・ラボ: 全国医学部最新受験情報2020年度用. 東京: 時事通信社, 2019.
3) Association of American Medical Colleges (AAMC): AAMC for students, applicants, and residents, 2019. https://students-residents.aamc.org/