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Effect of Clinical Rotation Timing on Learning Quality of Dental Students

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A B S T R A C T

Objective: Dental educational curricula are under constant modification and improvement. However, designing a comprehensive, efficient, and flexible curriculum is still challenging for the authorities. An efficient curriculum should obviate the educational needs of students and promote their knowledge and expertise for future practice. Time planning of clinical rotations is highly important for optimization of the learning process. This study aimed to compare the efficacy of two different timing models of clinical rotations, namely four versus two rotations in each semester.

Materials and Methods: A total of 74 dental students and 54 faculty members of Tehran University of Medical Science that experienced both rotation models for two consecutive years (2018 and 2019) participated in this study. A questionnaire was designed to assess different aspects of the two timing-models.

Results: A one-sample *t*-test indicated that students' and faculty members' mean perception were significantly better regarding the two-rotation program.

Conclusion: This study indicated that changing the time planning of educational rotations can affect different aspects of education.

Keywords: Education, Dental; Curriculum; Time Management

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INTRODUCTION

The undergraduate dental curricula dominantly aim to promote public oral health [1]. The significance of undergraduate dental education in preparing the dental students to retain their skills and knowledge throughout their professional life has been well recognized [2]. To achieve this goal, under-graduate dental education should be efficient enough to ensure that the new graduates fulfill the competence to independently provide dental care, and are committed to continue learning and enhance their knowledge and professional skills. Modifications are often made in the educational content of the curriculum. Dental curriculum provides a comprehensive plan for education, and include designing of educational programs, assessment of students' performance, and defining their activities in each educational discipline. The undergraduate dental (curricu-lum) in Tehran University of Medical Sciences is a six-year educational program, comprise of a two-year period of basic science and four-year period of

clinical dental education. In clinical courses, dental students receive hands-on clinical instructions in different departments [3]. There are two main models for dental clinical education namely the comprehensive care model and departmental model. The latter model mainly focuses on the educational needs of students while the former focuses mainly on patient needs [4-6].

The departmental model is implemented for dental education at the dental school of Tehran University of Medical Sciences. In this model, dental students attend two different departments each month for 16 consecutive sessions. The timetable of this educational model includes four rotations in each semester. According to previous investigations regarding self-reported problems of dental students, lack of efficiency and the resultant unproductive time in the clinical environment were among the shortcomings of this model. They also had some concerns with regard to scheduling patient attendance, in-time receipt of restorations from the laboratory, and fulfilling the requirements, that would leave insufficient time for actual learning [7].

The four-rotation model, used to be implemented before, had shortcomings that would negatively affect the efficacy of education and learning. The number of patients and the variability of the clinical procedures were not sufficient during the 16 consecutive day presence of students in the endodontics, restorative dentistry, pediatric dentistry, and oral and maxillofacial surgery departments. In the prosthodontics department, the prerequisites of prosthodontic treatment would require a longer time to prepare the patient for prosthetic treatment; thus, the prosthetic treatment of patients would not be accomplished within a one-month period. Moreover, the patient flow would decrease at some periods of time such as the final days before the Persian new year and during the back to school season. This would adversely affect the quality of education of students.

It appears that the timetable of presence and attendance of students in different departments is a fundamental factor affecting the learning efficiency. An effective educational program should create motivation for the instructors and mentors and at the same time, obviate the students' educational needs. Thus, this study aimed to compare the efficacy of the four-rotation model (one-month presence of students in each department for 16 consecutive sessions) with the two-rotation model (presence of students two days a week for two months) by assessing the attitude of students and the faculty members in this respect.

MATERIALS AND METHODS

This interventional comparative study evaluated the efficiency of two different time planning in dental education. For this purpose, two educational programs with different timetables were designed for each educational semester including a two-rotation and a four-rotation program in each semester. Ethical approval for this study was granted by the ethical committee of our University (IR.TUMS.DENTISTRY.REC.1399.236)

This study was designed and implemented in two phases. In the first scheduled rotational program, each semester included four rotations. Students attended each department for four sessions per week. In this program, each rotation lasted for about one month. The second program included two rotations in each semester. The students attended four clinical departments in each rotation. They attended each department two sessions a week.

In the first phase of the study, students who had experienced both two-rotation and four-rotation programs within 2 educational years were evaluated. A pilot questionnaire was administered among 35 dental students and they were asked about the clinical education environment, number of mentors per student, adequacy of the time period allocated to clinical treatments, and the effectiveness of demonstrations offered for clinical procedures. Also, the students were requested to report the strengths and weaknesses of the two programs. Moreover, they tested the content and face validity of the questionnaire. The final questionnaire was designed according to the feedbacks of students.

The questionnaire mainly focused on time efficiency, proportionate patient distribution, optimal patient cooperation, coordination with dental laboratory, students' stress level in the process of education, the quality of demonstrations, and the overall quality of instruction. In the second phase of the study, the final questionnaire was designed in Google form, and administered among 75 dental students who had experienced both models. The results were received from Google in the form of an Excel file. Also, a Google form questionnaire was designed for the faculty members, and administered among 64 faculty members of the prosthodontics, restorative dentistry, endodontics, pediatric dentistry, and oral and maxillofacial surgery departments. In this assessment, 14 questions were asked from both students and faculty members. Of 16 questions designed for the faculty members, one question was exclusive to the prosthodontics department faculty members, which was responded by 24 faculty members of this department. Three questions were exclusive to the pediatric dentistry, oral and maxillofacial surgery, endodontics, and restorative dentistry departments, which were answered by the respective faculty members (n=40). The answers were assessed on a 5-point Likert-type scale ranging from -2 (strongly disagree) to 2 (strongly agree). One sample T-test was used for analyzing the results using Statistical Package for the Social Sciences (SPSS) version 22.0 (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0).

RESULTS

Table 1 presents the descriptive results regarding the responses of students and faculty members to the questions. A one-sample t-test indicated that students' and faculty members perception were statistically significantly better toward two-rotation program in all questions ($P<0.001$). This statically significant result suggests a strong impact of clinical timing rotation on different aspect of education. The maximum rate of agreement of students with the two-rotation program was related to in-time delivery of restorations by the laboratory while the maximum percentage of disagreement of students with the two-rotation program was regarding benefitting from the knowledge of different professors.

Similar to students, the faculty members had maximum percentage of agreement with the statement regarding in-time delivery of restorations by the laboratory in the two-rotation program. In total, 53% of the faculty members and 60% of the students preferred the two-rotation program due to higher quality of instruction.

DISCUSSION

Instructional design is a dynamic and flexible process. Factors that need to be taken into account in designing educational programs include the educational aims and content, learning activities, assessment methods, learning sources and tools, time planning, learning environment, grouping of learners, and teaching strategies. Instructional design is performed aiming to enhance learning and create a successful educational environment [6]. Assessment of the educational needs and opinions of students in this respect can inform the educational authorities regarding the quality of educational program, and provide reliable documentation to improve educational planning. In this study, modification of educational program was addressed with respect to time factor, and two educational models namely the two-rotation and four-rotation programs in each semester were compared from the perspectives of dental students and faculty members. In general, both students and faculty members were significantly more satisfied with the two-rotation program. The results revealed that over half of dental students favored the two-rotation program due to adequate time allocated for completion of requirement, preserving the coherence of the trained topics in two consecutive semesters, decreased time waste, more proportionate patient distribution, adequate time interval between two clinical sessions to review the theoretical topics, adequate time to receive the restorations from the lab, better simulation of actual clinical dental practice, and the overall quality of education.

Table 1. Frequency of responses to different questions

	Question	Students				Faculty members			
		Agree	NO*	Disagree	P	Agree	NO	Disagree	P
1	The allocated time period to fulfill the clinical requirements is suitable in the two-rotation programs	66.67	8	25.33	<001	85.94	6.25	7.81	<001
2	In the two-rotation program, shorter time intervals between the courses of the same educational group offered in two consecutive semesters resulted in better coherence of the offered educational contents	52.00	25.33	22.67	<001	70.31	21.88	7.81	<001
3	The two-rotation program has less time-waste than the four-rotation program	54.67	17.33	28	<001	62.5	21.88	15.63	<001
4	Patient distribution is more uniform in the two-rotation program	69.33	8	22.67	<001	55	17.5	27.5	<001
5	Variability of the clinical procedures is higher in the two-rotation program (the likelihood of finding rare cases increases over a longer period of time)	38.67	25.33	36	<001	32.5	35	32.5	<001
6	The number of performed procedures (fulfilled requirements) increases in the two-rotation program	29.33	32	38.67	<001	42.5	22.50	35	<001
7	The two-rotation program is closer to actual clinical settings due to attendance of a higher number of departments	73.33	10.67	16	<001	-	-	-	
8	Patient cooperation and attendance is improved in the two-rotation program	30.67	22.67	46.67	<001	-	-	-	
9	The two-rotation program has lower level of stress for me since it allows in-time completion of requirements.	44.	16	40	<001	78.13	9.38	12.5	<001
10	The two-rotation program offers a fair ratio of the number of mentors to students	38.67	30.67	30.67	<001	51.56	28.13	20.31	<001
11	The two-rotation program allows easier timing coordination between students and mentors	36	33.33	30.67	<001	70.31	18.75	10.94	<001
12	The two-rotation program allows benefitting from the knowledge of different mentors	21.33	29.33	49.33	<001	-	-	-	
13	The two-rotation program has more appropriate demonstrations related to clinical procedures	13.33	56	30.67	<001	35.94	48.44	15.63	<001
14	The two-rotation program provides more time to review the theoretical topics due to the adequate time interval between the clinical sessions	53.33	9.33	37.33	<001	45.31	28.13	26.56	<001

15	The two-rotation program allocates adequate time for in-time preparation and delivery of prosthetic restorations by the lab	77.33	8	14.67	<001	91.67	0.00	8.33	<001
16	The two-rotation program results in lower stress level of students, and learning takes place in a less stressful environment	46.67	14.67	38.67	<001	76.56	17.19	6.25	<001
17	The two-rotation program has generally improved quality of clinical instruction	60	10.67	29.33	<001	53.13	32.81	14.06	<001
18	In the two-rotation program, the time interval between the two sessions is too long, if procedure is not completed within the first session	-	-	-		29.69	12.5	20.31	
19	In the two-rotation program, greater time is allocated to each student	-	-	-		56.25	20.31	23.44	

*NO: no opinion

In the four-rotation model, dental students attend a certain department in several consecutive days, which decreases the possibility of performing different procedures according to the requirement due to time limitation. For instance, in the prosthodontics department, some patients who are candidates for a full coverage crown also require pre-prosthetic crown lengthening surgery; however, conduction of crown lengthening surgery and subsequent prosthetic treatment is not possible within one month. Also, patients requiring partial removable dentures may also need scaling and restoration of abutments, which should be performed prior to their prosthetic treatment. However, conduction of all these procedures would be challenging considering the time frame of four-rotation program. Over half of dental students and faculty members discussed that decreased time interval between the offered courses related to one department would result in greater coherence of the topics and would improve the quality of education. Moreover, dental students reported more proportionate patient distribution among students in the two-rotation program. Small increase in the variations of dental procedures would probably be due to the fact that the likelihood of finding rare cases increases in a longer time period. However, only 29% of students reported a higher number of treatment procedures in the restorative dentistry, endodontics, oral and maxillofacial surgery, and pediatric dentistry departments in the two-rotation program. This finding may be due to the fact that the duration of semester remained unchanged and only the timing of student attendance in the departments was modified in this program. Due to increased duration of attendance in a certain department, the students had adequate time to find patients based on their requirement and fulfill their requirement in the allocated time period, which decreased the stress level of students. Presence of students in the prosthodontics department in several consecutive days would be of no benefit since each indirect restoration requires several days to be fabricated by the laboratory, and in the meantime, students have no clinical work to do in the department. This waiting time was minimized in the two-rotation program. Aside from the aforementioned advantages of the two-rotation program, dental students complained that due to their presence on some certain days in a certain department, they only had the chance to work with some certain professors in each rotation, and could not benefit from working with other professors whose work schedule was on some other days. Moreover, about one third of faculty members believed that

the time interval between the two sessions was too long this is an important point when a treatment could not be completed within the first session.

CONCLUSION

Based on our observations and above-mentioned findings, it appears that the learning quality of dental students can be significantly improved by changing the timing of their presence in different departments. Also, a more dynamic educational environment can be created as such, in which, students can pursue their educational activities with lower level of stress and fewer concerns.

CONFLICT OF INTEREST STATEMENT

None declared.

REFERENCES

1. DePaola DP. The revitalization of U.S. dental education. J Dent Educ. 2008 Feb;72(2 Suppl):28-42.
2. Field MJ. Dental education at the crossroads: challenges and change. Washington, DC: National Academies Press, 1995.
3. Dabaghi-Tabriz F, Ghaffari R, Hanaee J, Barzegar M, Bilan N, Dehghani, et al. Comparison of General Dentistry Curriculum in Iran with Eight of the World's Top Dental Faculties. Maedica (Bucur). 2019 Jun;14(2):104-115.
4. Dehghan M, Harrison J, Langham S, Scarbecz M, Amini M. Comparing comprehensive care and departmental clinical education models: students' perceptions at the University of Tennessee College of Dentistry. J Dent Educ. 2015 Feb;79(2):133-9.
5. Nadershahi NA, Salmon ES, Fathi N, Schmedders K, Hargis J. Review of outcomes from a change in faculty clinic management in a U.S. dental school. J Dent Educ. 2010 Sep;74(9):961-9.
6. Evangelidis-Sakellson V. Student productivity under requirement and comprehensive care systems. J Dent Educ. 1999 May;63(5):407-13.
7. Henzi D, Davis E, Jasinevicius R, Hendricson W. In the students' own words: what are the strengths and weaknesses of the dental school curriculum? J Dent Educ. 2007 May;71(5):632-45.