

# Grand Rounds for Dental Students: An Exploration

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*Abstract:* Grand Rounds are widely used in medicine for educating students comprehensively about clinical issues. The aim of this study was to explore the value of Grand Rounds for introducing first- (D1) and second-year (D2) dental students to an interdisciplinary approach to dental care. The objectives were to explore how interested students were in various topics, which topics they would like to see addressed in future sessions, which aspects they liked/disliked, how they evaluated the program components, and how they evaluated the outcomes. Data were collected from D1s at the end of the Year 1 fall term and from D1s and D2s at the beginning and end of the Year 1 winter term and at the end of Year 2. Response rates for most of the groups ranged from 88% to 100%, but response rates for surveys at the end of the study period fell to 40% and 32%. The results showed that the students were most interested in clinical topics that were presented in an interdisciplinary way. Their suggested topics ranged from specialty-specific issues to treatment-related topics such as implants and cosmetic dentistry. The open-ended responses showed that students liked learning differing perspectives on these topics, but disliked the course-related assignments and the preparation work in small groups. The closed-ended responses showed that the students appreciated the in-class presentations by experts and evaluated the course as helpful in informing them about the complexity of issues and the importance of the interplay between basic and clinical sciences. Educating future dentists in a way in which they embrace interdisciplinary approaches is challenging. Using the Grand Rounds concept could be one approach to increasing students' awareness of the importance of interdisciplinary work.

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The Commission on Dental Accreditation (CODA) lists a set of core principles in its Accreditation Standards for Dental Education Programs that it describes as promoting innovation and continuous improvement of educational programs.<sup>1</sup> According to CODA, applying these principles throughout dental education is essential for achieving a quality education. These principles emphasize the importance of educating students about comprehensive and evidence-based care, increasing their critical thinking skills, ensuring their appreciation of scientific discoveries, integrating their knowledge, and increasing their willingness and ability to function in an interdisciplinary team with other health care professionals. A central question for dental educators is how these goals can be achieved. This study proposes that using Grand Rounds might

be one approach to creating an educational environment conducive to implementing these CODA principles.

Grand Rounds are a time-honored approach in medical education<sup>2</sup> and even in continuing medical education.<sup>3</sup> They are known for bringing professionals from similar fields together<sup>4</sup> and for providing opportunities to discuss differing perceptions<sup>5</sup> and values.<sup>6</sup> While Grand Rounds were originally mostly case-based, they can also consist of a series of lectures on one topic.<sup>7</sup> One study found that offering insights into clinical cases or issues from various perspectives increased attending hospital staff members', residents', and students' awareness concerning the complexity of these cases or issues.<sup>8</sup> Other benefits of the Grand Rounds approach are described in the literature. First, Grand Rounds are

a useful tool to share information<sup>9,10</sup> (and especially new information<sup>11</sup>) and thus increase participants' knowledge.<sup>12</sup> Second, by having several speakers address topics from their own perspectives, more in-depth appreciation of a topic can be developed that takes the complexity of issues into consideration.<sup>13</sup> A third benefit is that the communication among participants can be improved.<sup>14</sup> For example, Allen et al. reported that many specialists felt isolated from each other and the Grand Rounds provided them with opportunities to communicate and connect with one another.<sup>4</sup>

Based on these research findings, a decision was made to introduce a Grand Rounds course for first- and second-year dental students at the University of Michigan School of Dentistry. The purpose of this course was to use the Grand Rounds concept for educating these students in a comprehensive and interdisciplinary way. The aim of this study was to explore the value of Grand Rounds for introducing first- and second-year dental students to an interdisciplinary approach to dental care. The objectives were to explore how interested the students were in learning about the 16 topics presented in the first two years, which additional topics students wanted to see addressed in future Grand Rounds, which aspects of this approach they liked and disliked, how they evaluated the Grand Rounds course components, and how they evaluated the outcomes.

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## Methods

This study was determined to be exempt from Institutional Review Board oversight by the Institutional Review Board for the Behavioral and Health Sciences at the University of Michigan. During the fall term of the initial year in which Grand Rounds were introduced (2010), only D1 students participated in this program, and those students were surveyed at the end of that term. During the winter term (2011), D1 and D2 students jointly took the course, so both D1 and D2 students were surveyed at the beginning and end of the winter term. Finally, both D1 and D2 students were surveyed at the end of the Year 2 winter term (2012); this survey asked them to evaluate their Year 2 fall and winter term experiences in the Grand Rounds course.

The paper and pencil surveys were distributed to the students at the end of regularly scheduled classes. The students were informed about the purpose of the research and were asked to volunteer to respond

to the survey and return the surveys anonymously to the instructors.

## Key Features of Grand Rounds Courses

During the fall term of Year 1, only D1 students participated. This decision was based on the assumption that starting right at the beginning of students' dental education with interventions aimed at showcasing the value of interdisciplinary education would be beneficial. However, a decision was made to include both D1 and D2 students in this course starting in the winter term of Year 1 to also provide D2 students with opportunities to participate in this course and benefit from its presentations. During each term, four topics were addressed. Table 1 provides an overview of the four topics in each term of the first two years. Starting in the winter term of Year 1, one of these four topics in each term was presented as a so-called "Mega Round." This term indicates that these Grand Rounds presentations were open to all dental school students, residents, and faculty members. In addition, they were offered as Continuing Dental Education courses designed to enhance collegiality between alumni and students while pursuing the original goals of the course. These Mega Rounds were an attempt to initiate joint discovery and discussion among students, faculty, and alumni.

At the beginning of each year, the D1 and D2 students were assigned to groups with six or seven group members and one faculty mentor. Faculty mentors were a resource for the groups to help them focus their preparation of the topics, offer suggestions concerning the literature considered for submission, discuss the value of the selected references, and help provide context for students as they planned the focus of their literature searches and assessments. The student groups were asked to meet with their faculty mentors at least once early in the preparation phase for a topic and at least once after the class presentations by the experts. Each topic was covered in a three- to four-week period. In weeks 1 and 2, the students prepared themselves for the topics by conducting literature searches, finding relevant references, and writing up descriptions of these articles. These sessions were unscheduled and allowed the student groups to meet at their convenience. In week 3, a two-hour presentation about the topic was offered. In most of these class sessions, an interdisciplinary team of experts provided mini-presentations, which were followed by discussion that included a question

and answer period (Table 1). The first presentation in the fall term of Year 1 had a pro vs. contra format with two content experts providing arguments for and against using amalgams. The second topic in the winter term of Year 1 included an interview of a patient with pemphigus vulgaris followed by mini-

presentations and a question and answer session. The fourth and final two-hour class session for each topic in the week after the presentations allowed the students to ask more detailed questions.

All class assignments were group assignments. The groups had to perform literature searches for

**Table 1. Overview of topics in Grand Rounds course and how they were covered**

Topic	Students	Instructor Disciplines	Presentation Type
Amalgam: yes or no?	D1	Dental specialist in computerized dentistry and dental specialist in restorative dentistry	Pro vs. contra
The role of genetics in dentistry	D1	Basic scientist* (tissue engineering), dental specialist (head and neck cancer), and dental specialist in biomedical science	Mini-presentations and discussion
Cleft lip/palate	D1	Speech pathologist*, pediatric oral surgeon, and basic scientist* (developmental biology)	Mini-presentations and discussion
Minimally invasive dentistry	D1	Basic scientist* (biochemistry), endodontist, and dental specialist in restorative dentistry	Mini-presentations and discussion
Student evaluations	D1 and D2	Educational psychologist* and specialized dentist (dental education)	Mini-presentations and discussion
Pemphigus vulgaris	D1 and D2	Oral medicine specialist, basic scientist* (biological science), and oral pathologist	Patient interview and discussion
Facial pain	D1 and D2	TMD specialist, orofacial pain specialist, pain specialist*, and neurologist*	Mini-presentations and discussion
Mega Round: Oral cancer	D1-D4; plus faculty and practitioners	Oral pathologist, oral surgeon, and oral cancer researcher	Mini-presentations and discussion
The severely compromised tooth	D1 and D2	Two endodontists and dental specialist (restorative dentistry)	Mini-presentations and discussion
Access to care and mid-level providers	D1 and D2	Oral pathologist and prosthodontist	Mini-presentations and discussion
Mega Round: Digital dentistry	D1-D4; plus faculty and practitioners	Dental specialist (computerized dentistry), bioengineer*, and dental specialist	Mini-presentations and discussion
Oral health and cardiovascular disease	D1 and D2	Periodontist and oral biologist	Mini-presentations and discussion
Dentine hypersensitivity	D1 and D2	Endodontist, dentist, periodontist, and psychologist*	Mini-presentations and discussion
Drug abuse	D1 and D2	Pharmacologist*, addiction specialist*, dentist/oral medicine specialist, and oral medicine specialist	Mini-presentations and discussion
Occlusion	D1 and D2	Neuroscientist*	Mini-presentations and discussion
Mega Round: Personalized medicine	D1-D4; plus faculty and practitioners	Two MD/medical specialists* and dental specialist (periodontist)	Mini-presentations and discussion

\*Instructors from disciplines outside dentistry

information on the topic presented in each Ground Round presentation and had to submit four references per speaker for a given topic, resulting in a total of eight references for two speakers and 12 references for three speakers. The groups also had to provide written explanations why specific references were selected for the topics. In addition, each group had to submit at least three questions for each speaker after the presentations, which were used by the class moderators to facilitate the question and answer period.

In addition, the groups had to write an assessment report for each presented topic that discussed a) whether the topic had been sufficiently explored in the class presentations or if specific areas or issues had not been covered, b) whether evidence-based decision(s) can be made concerning the topic, c) which assumptions the students had prior to the presentation that were reconsidered after the presentation, and d) how patient treatment protocols would be influenced by the presented topic. The groups had to be prepared to present their assessments during the scheduled review and assessment class sessions.

## Surveys and Statistical Analysis

The surveys consisted of four sets of questions. The first questions asked the students how interested they were in the Grand Rounds course in general and how interested they were in each of the topics that had been presented during the term. In the beginning survey, the students indicated how interested they were in taking the course and in the upcoming topics. The second set of questions asked how helpful various aspects of the course had been for the students in learning about dentistry. Answers were given on five-point scales from 1=not at all to 5=very much. The third set of questions asked how much the course enhanced their interest in learning more about the topics, how much they would recommend the Grand Rounds course to other dental schools, when the course should be given, and how much they looked forward to the next Grand Rounds topic. The final part consisted of four open-ended questions that asked which topics the students would like to be discussed in future Grand Rounds classes, what they liked and did not like about the class, and any additional thoughts they had.

The data were entered into SPSS (Version 20). Descriptive statistics such as means, standard deviations, frequency distributions, and percentages were computed to provide an overview of the responses.

Inferential statistics were used when comparing the answers from different groups of students. A  $p$  level of  $\leq 0.05$  was assumed to indicate significance.

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## Results

In the initial group of D1 students, who took the course during fall term, 98 participated in the survey at the end of that term, for a response rate of 92%. At the beginning of the winter term, those responding to the survey were 98 D1 students (response rate: 92%) and 92 D2 students (response rate: 88%). At the end of that winter term, 109 D1 students (response rate: 100%) and 95 D2 students (response rate: 92%) responded to that survey.

In the survey at the end of the Year 2 winter term, 42 D1 students (response rate: 40%) and 34 D2 students (response rate: 32%) responded. To determine whether this sample size was large enough to allow to test whether D1s' and D2s' responses differed significantly, a power analysis was conducted with the program package G\*Power 3.1.2 ([www.psych.uni-duesseldorf.de/abteilungen/aap/gpower3](http://www.psych.uni-duesseldorf.de/abteilungen/aap/gpower3)) to compute the needed sample size when using a  $t$ -test for independent samples to test whether the average responses of two independent samples differ. Assuming a one-sided hypothesis ("average D1 responses are more positive than average D2 responses"), an alpha of 0.05, the power of 0.80, and a large effect size of 0.65, we found that 30 respondents in each of the two groups would be needed. Given that 42 D1s and 34 D2s responded, we had the needed sample size to test for such large effects.

Table 2 provides an overview of the number of respondents in each term, the response rates, and the timing of the survey. In addition, this table provides information about the students' average interest in each of the 16 topics. The lowest level of interest was expressed for an educational topic: the value of student course evaluations (on a scale from 1=not at all interested to 5=very interested: D1s=1.43 vs. D2s=1.62; not significant). The most positively evaluated topics were treating patients with cleft lip and/or palate (Mean=4.43) and a Mega Grand Rounds course on oral cancer (D1s=4.39; D2s=3.87;  $p < 0.001$ ). Table 2 also shows changes from the beginning to the end of the winter term of Year 1. While the D1s were more interested in the educational topic of student course evaluations at the beginning of that term in Year 1 than the D2s, by the end of the term, the two groups did not differ from

**Table 2. Average level of responding D1 and D2 students' interest in specified topics at beginning and end of term**

Topic	D1		D2	
	Beginning of Term	End of Term	Beginning of Term	End of Term
Fall 2010: number of respondents (response rate)	Not collected	N=98 (92%)	Not collected	Not collected
Amalgam: yes or no?		3.98		
The role of genetics in dentistry		3.13		
Cleft lip/palate		4.43		
Minimally invasive dentistry/sealants		3.55		
Winter 2011: number of respondents (response rate)	N=98 (92%)	N=109 (100%)	N=92 (88%)	N=95 (92%)
Student evaluations	2.22	1.43	1.92*	1.62
Pemphigus vulgaris	3.49	4.22	2.90**	3.48**
Facial pain	4.23	3.50	3.42**	2.77**
Mega Round: Oral cancer	4.41	4.39	3.82**	3.87**
Fall 2011: number of respondents (response rate)	Not collected	N=42 (40%)	Not collected	N=34 (32%)
The severely compromised tooth		3.40		3.18
Access to care and mid-level providers		3.71		2.79**
Oral health and cardiovascular disease		3.52		3.06*
Mega Round: Digital dentistry		3.80		3.26*
Winter 2012: number of respondents (response rate)	Not collected	N=42 (40%)	Not collected	N=34 (32%)
Dentine hypersensitivity		3.39		2.85*
Drug abuse		3.83		3.71
Occlusion		3.12		3.12
Mega Round: Personalized medicine		3.56		3.19

Note: Numbers are mean of responses on scale from 1=not at all interesting to 5=very interesting. The significances refer to significant differences between the D1 students' and D2 students' average responses.

\*p≤0.05, \*\*p≤0.001

each other, and both had relatively low evaluations. In addition, the D1s were more interested in all three topics at the beginning of the winter term of Year 1 than the D2s, and they were still more interested at the end of that term. In Year 2, the topic of access to care and midlevel providers was evaluated as more interesting by the D1s than by the D2s. The D1s also evaluated the Mega Round on digital dentistry and the topic of oral health and cardiovascular disease as more interesting than did the D2s. In the winter term of Year 2, the D1s rated the topic of dentin hypersensitivity as more interesting than did the D2s. However, the two groups did not differ in their interest in the other topics.

In the Grand Rounds courses, each of the 16 sessions was presented by groups of interdisciplinary instructors, addressing a wide range of topics (Table 1). For example, for the cleft lip and/or palate topic, a basic scientist talked about the genetic background, a

pediatric oral surgeon about his surgical cases and the outcomes of the surgeries, and a speech pathologist about these patients' challenges with speaking and the treatment she provides for these patients.

When the students were asked to indicate other topics in which they would be interested for future Grand Rounds, 566 of the 568 students responded (Table 3). The answers fell into five groups. Responses related to practice management and behavioral science issues were most frequent (N=210), with 38 students mentioning this topic in general, 29 students wanting to learn more about patient interactions, and 26 wanting more information about business-related issues. The second most frequently mentioned group of topics referred to specific treatment-related topics: 41 students wanted to learn more about implants, 36 students about "real-world" clinical topics, 29 students about cosmetic dentistry, 20 about dental treatment controversies,

**Table 3. Number of students suggesting other topics for Grand Rounds, by category**

Category/Topic	D1 Students	D2 Students	All Students	Category/Topic	D1 Students	D2 Students	All Students
<b>Specialty-related topics</b>				<b>Practice management/behavioral science</b>			
Orthodontics	21	3	24	General issues	21	17	38
Specialty in general	12	2	14	Patient interactions	12	17	29
Endodontics	8	2	10	Business skills	19	7	26
Periodontics	7	2	9	Ethical issues	12	6	18
Oral surgery	3	5	8	Health care issues	11	6	17
Prosthodontics	4	4	8	Private practice	13	1	14
Dental public health	5	2	7	Mid-level care	11	3	14
Special needs dentistry	3	3	6	Insurance issues	8	4	12
Geriatric dentistry	1	0	1	Medicaid	6	6	12
Pediatric dentistry	1	0	1	Advertising	5	6	11
Total	65	23	88	Malpractice	3	4	7
<b>Oral health issues</b>				<b>Dental education issues</b>			
Specific diseases	12	13	25	Politics of dentistry	3	2	5
Oral cancer	9	7	16	Pro bono care	2	2	4
TMD/oral pain	7	8	15	Making a living/profit	2	0	2
Dental issues	5	3	8	Dental fears	1	0	1
Cleft lip/palate	3	3	6	Total	129	81	210
Caries	0	1	1	<b>Dental education issues</b>			
Total	36	35	71	More pro vs. con	18	2	20
<b>Treatment-related topics</b>				<b>Other topics</b>			
Implants	28	13	41	Outreach/aid	5	3	8
Real-world clinical topics	22	14	36	No evaluations	2	6	8
Cosmetic dentistry	21	8	29	Cost of dental education	3	3	6
Treatment controversies	13	7	20	How to do Grand Rounds	3	0	3
Advances in treatment	13	6	19	How to get patients to come to dental school clinics	2	1	3
Amalgam/composite	6	4	10	New curriculum	1	1	2
Extractions	2	6	8	How effective other schools are at clinical preparation	2	0	2
Diagnostic testing	7	0	7	Dental education	1	1	2
Oral hygiene	4	1	5	Visit other dental schools	1	0	1
Anesthesia	2	3	5	Total	38	17	55
Digital radiology	2	0	2	<b>Other topics</b>			
Dentures	1	1	2	Research	6	3	9
Lasers for soft and hard tissues	0	1	1	Genetics	3	0	3
Total	121	64	185	Dental materials	1	3	4
				Stem cells	1	0	1
				Total	11	6	17

and 19 about advances in dental treatments. The third group of topics consisted of responses from 88 students who were interested in specialty-related topics, such as in learning more about orthodontics (N=24), specialty-related general topics (N=14), endodontics (N=10), periodontics (N=9), oral surgery (N=8), and

prosthodontics (N=8). The fourth group of topics, mentioned by 71 students, can be described as oral health-related issues. The most common topics were specific diseases (N=25), followed by oral cancer (N=16) and temporomandibular disorders and oral pain issues (N=15). Finally, 55 students mentioned

dental education-related topics, with more pro versus con style presentations and discussions being most frequently named (N=20).

When the students were asked to indicate what they liked/disliked about the Grand Rounds course (Table 4), 566 of the 568 students gave one positive response. Most students mentioned more than one

negative aspect of the course, resulting in a total of 955 negative responses. The positive responses fell into three groups with pedagogy-related responses being mentioned most frequently (N=364). Several of these positive open-ended responses showed that students appreciated the interdisciplinary nature of the presentations. For example, 56 students said they

**Table 4. Number of students who liked/disliked parts of the Grand Rounds courses, by category**

Liked/Disliked: Category	D1 Students	D2 Students	All Students	Liked/Disliked: Category	D1 Students	D2 Students	All Students
<b>Liked: Pedagogy</b>				<b>Disliked: Course-related</b>			
Presentations/presenters	43	42	85	Assignments in general	71	43	114
Differing perspectives	32	24	56	Homework: literature searches	43	30	73
Learning from experts	37	16	53	Class time (am/length)	24	40	64
Discussions/Q&A	32	13	45	Assessment assignments	26	27	53
Working with faculty	21	13	34	Seemed like busy work	20	22	42
Pro vs. con	11	9	20	Grading	20	17	37
Working in groups	9	5	14	Forced participation	12	18	30
Debate in presentations	9	3	12	Working with mentors	16	12	28
Interactive	6	5	11	Presentations over time limit	8	15	23
Being with other dental students	7	2	9	Too much work	8	13	21
Practicality	4	3	7	Adding D1s and D2s together	10	9	19
Critical thinking	4	3	7	Time commitment	13	1	14
Complexity of issues	5	1	6	Total	271	247	518
Q&A sessions	3	2	5	<b>Disliked: Pedagogy</b>			
Total	223	141	364	Working in groups	57	43	100
<b>Liked: Content</b>				Presentation style	14	33	47
Many different/interesting topics	100	44	144	Working/coordinating with D2s	28	7	35
Cleft lip/palate	3	0	3	Discussion length/size	20	14	34
Business part of dentistry	0	1	1	Follow-up questions	19	8	27
Total	103	45	148	Meeting with mentor	16	7	23
<b>Liked: Course-related</b>				Preparation work	14	6	20
Like the course	19	6	25	Total	168	118	286
Homework: searching for articles	4	4	8	<b>Disliked: Content</b>			
Time of the class	3	5	8	Boring topics	30	25	55
Atmosphere of class	0	5	5	Topic overkill	17	21	38
Assessment	2	1	3	Topics too complex	11	6	17
No exams	3	0	3	Teacher evaluation topic	14	3	17
Progression of course	1	0	1	Didn't have enough background on topics	4	3	7
Brings dental community together	1	0	1	Never a right answer	1	1	2
Total	33	21	54	Total	77	59	136
Total like responses	359	207	566	No complaints	5	10	15
				Total dislike responses	521	434	955

liked the differing perspectives presented, 20 liked the pro and con in the sessions, 12 liked the debates in class between interdisciplinary instructors, and six liked the complexity of the issues. Overall, 85 students commented that they liked the presentations and presenters, 53 students liked that they could learn from experts, 45 students liked the discussion in question and answer format, and 34 students liked working with faculty members as mentors. The second most commonly liked group of issues dealt with the content of the presentations, with 144 students indicating they liked the many different and interesting topics. Finally, there were some general responses about liking the course (N=25) as well as the homework/searching for articles and the time of the class.

The open-ended answers concerning what the students disliked about the Grand Rounds course

were mostly concerned with course-related issues such as the assignments (N=114), the homework (N=73), the length and timing of the class (N=64), and the assessment assignments that followed the presentations (N=53). The pedagogy used in the course also drew 286 negative responses, with 100 students disliking that they had to work in groups and 35 students disliking that they had to work and coordinate between D1s and D2s. The last group of negative responses was related to the content of the class: 55 students thought some of the topics were boring, and 38 students thought some topics were discussed in too much depth.

Table 5 provides an overview of the course-related answers to the closed-ended questions. When asked how important it was to have the Grand Rounds course right at the beginning of their dental education, the D1s gave on average a neutral answer on a scale

**Table 5. Comparison of D1 and D2 students' responses concerning specific aspects of the Grand Rounds course**

Question	D1 Students	D2 Students	All Students
How important is it to have the Grand Rounds course right at the beginning of your dental education?	3.17	2.28**	2.84
How helpful was/were:			
• the literature assignment in preparing you for the topic?	2.83	2.27**	2.62
• working as a group on preparing each topic?	3.25	2.27**	2.88
• the in-class presentations by topic experts?	4.06	3.43**	3.81
• reviewing and discussing the topic after the presentation?	3.26	2.65**	3.03
• attending the follow-up class session?	3.05	2.36**	2.79
• having a faculty member work with you?	3.16	2.82*	3.03
• having the same group members for all groups in all classes?	3.58	3.77	3.65
Outcomes of course: how helpful was this course in informing you about:			
• what dentistry is all about?	3.43	2.76*	3.13
• recent advances in dentistry?	3.67	3.06*	3.39
• the complexity of issues discussed?	3.87	3.00**	3.54
• the interplay of basic, behavioral, and clinical sciences?	3.61	2.86**	3.33
• the importance of interdisciplinary collaborations?	3.67	3.06*	3.39
How much did this course enhance your interest in learning more about these topics?	3.50	2.61**	3.16
How helpful was this course in challenging you to engage in critical thinking?	3.39	2.51**	3.07
General evaluation of course			
• How much did you enjoy this course?	3.29	2.17**	2.89
• How much would you recommend to other dental school programs to have a Grand Rounds course?	3.34	2.16**	2.89
• How much do you look forward to the next Grand Rounds topics?	2.99	2.04**	2.62

Note: Responses were on a scale from 1=not at all to 5=very. Significances refer to significant differences between the D1 students' and D2 students' average responses.

\*p≤0.01, \*\*p≤0.001



from 1=not at all important to 5=very important, while the D2s were on average significantly more negative in their responses. This trend of having D1s provide more positive evaluations than D2s was also found for all but one question concerning how helpful the various parts of the course were. In comparison to the D2s, the D1s rated the in-class presentations of experts more positively and were more positive about working in groups when preparing the topics and about reviewing and discussing the topic after the presentation. On average, both the D1s and D2s considered it as helpful to have the same group members for all groups in all the classes.

A significantly more negative response from the D2s compared to the D1s was also received for each single question concerning course outcomes and their general evaluation of the Grand Rounds format. When asked how helpful this course was in informing students about what dentistry is all about, recent advances in dentistry, the complexity of the issues discussed, the interplay of basic and clinical sciences, and the importance of interdisciplinary collaborations, the D1s responded significantly more positively than the D2s. In addition, the D1s were much more likely to indicate that this course enhanced their interest in learning more about these topics and was helpful in challenging them to engage in critical thinking compared to the D2s. The D1s also said they enjoyed the class more, would be more likely to recommend the class to other dental schools, and were more likely to look forward to the next Grand Rounds topics.

Finally, when the students were asked at the beginning and end of the winter term of Year 1 how interested they were in the course and how helpful various aspects of the course had been, the data showed that the answers were significantly more positive at the end of the course for several of the questions addressing the interdisciplinary nature of this course (Table 6). For example, at the end of the course, the students evaluated the in-class presentations by topic experts as more helpful than at the beginning (3.69 vs. 3.90;  $p=0.037$ ). In addition, they were more positive in their responses concerning how helpful the course will be versus was in making them more interested in learning more about dentistry (2.94 vs. 3.24;  $p=0.012$ ), informing them about the complexity of the issues discussed (3.28 vs. 3.63;  $p=0.001$ ), informing them about the importance of the interplay between basic and clinical sciences (3.03 vs. 3.50;  $p<0.001$ ), and enhancing their interest in learn-

ing more about the topics (2.87 vs. 3.24;  $p=0.001$ ). At the end of the course, the students also indicated that they enjoyed it more than they had expected at the beginning of the term and that they would recommend it more to other schools than before.

When we compared the before and after responses concerning the students' interest in the four topics discussed during the winter term of Year 1, the findings were not consistent. While the topics of student course evaluations and facial pain were evaluated as less interesting at the end of the term, the topic of pemphigus vulgaris was evaluated as more interesting at the end of the term compared to the beginning.

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## Discussion

Dental education faces the challenge of preparing future dentists in a way that they will be able to (according to the CODA principles) provide comprehensive and evidence-based care, apply critical thinking skills, appreciate scientific discoveries, remain lifelong learners who integrate new knowledge into their professional activities, and function in interdisciplinary teams with other health care professionals.<sup>1</sup> The question is whether traditional approaches in dental education offer the best venues to achieve these outcomes. This study explored whether using a Grand Rounds format might be one approach to creating an educational environment conducive to implementing these CODA principles. Specifically, we explored how interested D1 and D2 students were in the content of this course and which other topics they would like to see addressed. In addition, we evaluated how these two student cohorts responded to being engaged in interdisciplinary presentations and how they assessed the outcomes of this approach.

Concerning how interested the students were in various presented topics as well as in possible future topics, the data clearly showed that the only educational topic presented was rated as being of very low interest to both D1s and D2s. In addition, when asked which future topics would be of interest, relatively few students volunteered topic suggestions related to dental education issues. It is also interesting that, in Year 1, the D1 students were significantly more positive in their responses both at the beginning and the end of the winter term compared to the D2s. One might interpret these findings as support for the argument that Grand Rounds should be presented to

**Table 6. Comparison of beginning and end of winter term responses, by mean for all student respondents**

Question	Beginning of Winter Term	End of Winter Term	p-value
How important is it to have the Grand Rounds course right at the beginning of your dental education?	2.63	2.89	0.032
How helpful will be/was:			
• the literature assignment in preparing you for the topic?	2.54	2.68	0.199
• working as a group on preparing each topic?	2.67	2.89	0.086
• the in-class presentation by topic experts?	3.69	3.90	0.037
• reviewing and discussing the topic after the presentation?	2.87	3.11	0.042
• attending the follow-up class assessment session?	2.60	2.80	0.083
• having a faculty member as your group's advisor?	3.13	2.99	0.300
• having the same group members for all groups in all classes?	3.62	3.76	0.261
Outcomes of course—how helpful will be/was this course in:			
• making you interested to learn more about dentistry?	2.94	3.24	0.012
• informing you about the complexity of the issues discussed?	3.28	3.63	0.001
• informing you about the importance of the interplay between basic and clinical sciences?	3.03	3.50	<0.001
• enhancing your interest in learning more about these topics?	2.87	3.24	0.001
• challenging you to engage in critical thinking?	2.89	3.07	0.119
General course evaluation			
• How much will/did you enjoy this course?	2.63	2.89	0.020
• How much would you recommend to other dental schools to have a Grand Rounds course?	2.62	2.91	0.022
• How much do/did you look forward to the Grand Rounds topics?	2.56	2.55	0.924
How interesting is/was the topic on:			
• student course evaluations?	2.08	1.55	<0.001
• pemphigus vulgaris?	3.21	3.90	<0.001
• facial pain?	3.84	3.18	<0.001
• oral cancer?	4.12	4.15	0.770
I prefer to work:			
• individually	35%	24%	0.008
• in a group	50%	65%	
• no preference	15%	12%	

Note: Responses were on a scale from 1=not at all to 5=very. Percentages on final question may not total 100% due to rounding.

dental students from the beginning of their education on. Introducing them to the complexity of issues by offering interdisciplinary presentations right from the start could make them more aware of the value of engaging in interdisciplinary education and work. Future research should continue to focus on evaluating the best timing of Grand Rounds courses.

The majority of students' responses to the open-ended questions about desired future topics focused on treatment-related issues, specialty-related issues, and oral health issues in general. It is interesting that the most positively rated topic (cleft lip/

palate) consisted of presentations by three experts: a developmental biologist describing the newest genetic research concerning this matter, a speech pathologist who provided information about the issues that pediatric patients with cleft lip and/or palate face and what can be done about it, and a pediatric oral surgeon who described the surgical treatment he provides for these patients. As we look back at this session, it becomes quite obvious that the students' positive evaluations were related to factors discussed in the literature as supporting the effectiveness of the Grand Rounds approach: presentations in this

session had clear clinical relevance,<sup>2</sup> they included an interdisciplinary group of speakers,<sup>6</sup> discussion of patient treatment issues kept the audience's attention,<sup>15</sup> and the speakers' enthusiasm and passion for their work translated into an increased interest of the audience in this topic.

However, in addition to these treatment-related topics, quite a number of students suggested addressing practice management and behavioral science-related topics in the future. Two presented topics fell into this general category. While the D1s evaluated the first topic (access to care and mid-level providers) as being interesting, the D2s were on average neutral to negative concerning this presentation. It would have been interesting to collect additional data at the end of this session concerning the students' attitudes towards this controversial topic because it might have provided insights into the differences between the D1 and D2 students. On the second treatment-related topic (drug seeking/drug abuse of patients), both the D1s and D2s rated this presentation positively.

In summary, it seems that treatment-related and practice-relevant topics engaged students' interest more strongly than educational topics. Including not only experts from various dental specialties but also from other health professions is important if the purpose of this course is to increase students' awareness concerning the significance of working in interdisciplinary teams.

In addition to considering which content and presenters were most engaging to students, the findings of this study also inform about how Grand Rounds should be done. The distinctive ability of the Grand Rounds approach to create a more in-depth appreciation of a topic by having several speakers address different aspects of a subject<sup>13</sup> was appreciated by the students and reflected in their closed- and open-ended responses. Especially the D1s evaluated the in-class presentations by topic experts very positively, and quite substantial numbers of students noted that they liked the many differing/interesting topics, presentations/presenters, and various perspectives.

However, one major finding of this study was that the D1s were significantly more positive about this approach than the D2s. Compared to the D2s, the D1s found this course more helpful in informing them about the complexity of the issues involved; the interplay of basic, behavioral, and clinical sciences; the importance of interdisciplinary collaborations; and in engaging them in critical thinking. In addition, the D1s enjoyed this class significantly more and

would recommend it more to other dental schools than the D2s. This finding is crucial because it points to the importance of engaging incoming dental students in this type of educational intervention early on and thus hopefully creating a mindset that supports the objectives of dental education described in the CODA standards.

Finally, one positive outcome was that the evaluations at the end of the term concerning how helpful the course was were more positive than the students' expectations at the beginning of the term. These comparisons of the responses over time also provide evidence for the value of these Grand Rounds sessions for increasing students' appreciation for interdisciplinary issues. For example, the comparisons of responses at the beginning and end of the winter term showed that this course was seen as significantly more helpful at the end of the term for informing students about the complexity of the issues discussed. This finding is clearly encouraging.

This study had several limitations. First, the response rate in Year 2 was rather small. This response rate raised two questions: first, whether the sample size was large enough to allow testing of whether the average responses of D1s and D2s differed; and second, whether the responding students were representative of the population. In order to determine whether this sample size was large enough to test whether the two groups' responses differed significantly, a power analysis was conducted (as described above), which showed that 30 respondents in each of the groups would be needed to test whether a large effect can be found. Given that 42 D1s and 34 D2s responded, the sample size was sufficient to test for large effects. However, the fact that only large significant effects could be found due to the smaller sample size in Year 2 is a limitation of this research.

Regarding the question of whether the responding students differed in a systematic way from the nonresponding students, one general consideration is whether voluntary participation in course evaluations is useful or whether course evaluations should be required from all students. Concerning this particular study, it is important to know that the evaluations were conducted at the end of a regularly scheduled class session. One might therefore argue that organizational issues such as lack of time might have prevented some students from responding. However, the question whether the responding students were either more interested or more critical of the Grand Rounds course than the nonresponding students

cannot be answered. In any case, we see no reason to assume that the D1 and D2 students' motivations for responding in Year 2 were different and therefore suggest that the results concerning the differences between these two cohorts can be useful information. For example, they can be interpreted as pilot data for future research concerning the best possible timing of Grand Rounds in dental curricula.

A second limitation is that data were collected from the course participants at the end of the fall and winter terms of Year 1 and at the end of the winter term of Year 2. One might argue that having immediate feedback after each class session in addition to these long-term course evaluation data could be helpful in understanding the unique responses to each topic. Future research should therefore attempt to collect data at the end of the presentations as well as at the end of the course. Third, while research concerning the effectiveness of medical Grand Rounds tended to not merely analyze the participants' satisfaction with this approach, but also whether knowledge gain was achieved,<sup>16,17</sup> this study did not assess individual students' knowledge gain at the end of the terms and instead only required group assignments for determining the students' grades. Future research should address this issue. A final limitation is that no data were collected from the faculty mentors assigned to work with the groups and the faculty presenters. Having information about their perspectives could have been potentially informative.

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## Conclusion

Several lessons were learned from this study about a Grand Rounds course for dental students regarding who should teach what, how, and when. Concerning the question of *who* should be engaged, it seems important to have clinical experts from diverse health professions provide insights into the way that patients with specific diagnoses should be cared for in an interdisciplinary way. Concerning *what* students wanted to be educated about, it can be concluded that educational topics should not be addressed, but instead the focus should be on clinical issues. These dental students wanted to learn about providing the best possible care for their patients, but were not interested in learning how to best be educated to do so. Overall, the students liked the approach of learning about many differing topics and from experts with various perspectives on each topic. When considering

*how* to teach Grand Rounds, it seems important that organizational challenges should be avoided, such as the need to coordinate group meetings with D1s and D2s or having too many separate assignments. While the majority of these students preferred to work in groups compared to working individually, about half of them provided answers to the open-ended questions related to negative aspects of working in groups. Addressing group-related concerns is therefore important. In addition, a majority of the students did not like having to do literature searches and the assessment assignments in general. Alternative ways of preparing for the presentations and discussion of the presentations should be explored. Finally, considerations of *when* to integrate Grand Rounds courses into the curriculum should take into account the socialization process of our students. Introducing them right from the start of their dental education to educational interventions that stress the importance of interdisciplinary work might be crucial.

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