Assessing Early Performance in the Patient-Doctor Relationship in Dental Education

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Abstract: In addition to current admissions criteria, the assessment of qualities related to humanistic medicine may help predict clinical and academic performance in dental education. The objective of this feasibility study was to develop and assess the reliability of a coding scheme to quantify and rate qualitative formative narratives describing individual student performance in a medical interview course that utilizes principles of humanistic medicine. A mixed method, using focus groups and individual interviews, was used to develop a coding strategy. Three coders retrospectively rated 209 formative narratives evaluating first-year students at the Harvard School of Dental Medicine to determine high and low performance in this course. Interrater reliability was tested. The focus groups yielded the use of superlatives to identify high performance, with their absence indicating low performance. This study found a high level of calibration among independent coders (Cronbach's alpha 0.75). Twenty-four (11.5 percent) of the narrative evaluations were coded as "high performers" and seven (3.3 percent) as "low performers." The results demonstrate the feasibility of quantifying narrative evaluations to determine high and low performance in a patient-centered course for dental students. It may be that humanistic qualities taught in a patient-centered medical interview course are more significant competencies than previously thought.

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Because dental education requires a significant investment from both students and academic institutions, it is important to predict which students will succeed and which students may have problems in successfully completing the curriculum. The relationship between admission criteria and later academic and clinical performance has often been found to be weak.[1-3] Two Canadian studies suggested that a combination of scores from the Canadian Dental Aptitude Test, some measures of personality (conscientiousness, neuroticism, openness to experience, agreeableness), and a well-designed structured interview provide the best prediction of both academic and clinical performance.[4,5] For international students, the cultural norm of Long-Term View (deferred gratification versus quick results/rewards) appears to show some predictability.[6] The University of Texas Health Science Center at San Antonio, in trying to address this issue, created a dental early admissions program (seven-year combined college/dental school) for students who are highly motivated and willing to make an early commitment during the first year of their college education. However, the early admissions program resulted in these students' scoring significantly lower on the National Board Dental Examination Parts I and II than students admitted under the traditional admissions program.[7] For all dental schools, early identification of students who will excel and those who will be at risk for academic failure may provide opportunities for efficacious expenditure of resources.

Dental students at the Harvard School of Dental Medicine (HSDM) are required to complete the first two years of the medical curriculum at the Harvard

Medical School (HMS) while also taking parallel dental classes.[8] In 1987, HMS embarked on an effort to overhaul not only the curriculum but, more importantly, the manner in which students would be taught based on new insights into how students learn best.[9] As a result, the New Pathway Program curriculum was developed with problem-based learning (PBL) as its primary teaching tool. The patient-centered course Patient-Doctor I (PDI) taught in the first-year curriculum naturally became part of the New Pathway Program as it educates students on how to connect with the patient and see the patient as a person and not just a sign or symptom of disease. As Lowen states, "The medical encounter begins when two people enter into a relationship with hopes for understanding, help, and healing. One of the major functions of the medical encounter is the development of a relationship between the clinician and patient which enables them both to realize these hopes."[10]

What has become known as "humanistic medicine" is a combination of clinical expertise and human values such as compassion, caring, sincerity, understanding, integrity, and a positive disposition. Humanistic medicine is said to place "a high value on strengthening providers' relationships with patients, while emphasizing empowerment, respect, and effective communication."[11] In addition to learning to conduct a standardized medical interview, the PDI course requires students to demonstrate the capacity to employ humanistic values. Long-term results indicate that humanistic medicine can be taught and learned.[12] Similarly, narrative medicine emphasizes that storytelling and active listening value the humanity of patient and provider in what enables the "physician to practice medicine with empathy, reflection, professionalism, and trustworthiness."[13,14] Narrative medicine is a way to ensure that the patient as a person does not get lost among lab work, dental charting, and insurance regulations. The PDI course is structured so that faculty members make weekly assessments of the student's capacity to conduct a medical interview as well as connect with the patient as a person and express empathy, empowerment, and respect as well as self-reflection—humanistic qualities taught in the course.

At HSDM, first-year students are immersed in humanistic medicine by interviewing hospital patients on a weekly basis. These cases include admissions as well as patients in the Emergency Room. As such, although not dental patients, they provide the students with a rich context to learn and demonstrate their medical interview and humanistic skills. Just as in a medical primary care setting, where there are significant time pressures to engage the patient and collect the necessary medical data, so too is the dentist pressured to obtain relevant information from patients who are often medically complex. These hospital venues allow the students to practice their skills without disrupting practice flow and production. This experience creates a rich context for patient-centered (humanistic) discussion of disease and illness and student self-reflection through the structure of the course.[15] Students read relevant literature, meet with their instructors in small groups for thirty minutes to discuss the literature and/or role play, and then meet patients whom they interview regarding past medical/dental history, social and family history, chief complaint and history of present illness, and review of systems, for a total of two hours per week during the entire first academic year. Instructors observe the students' interviews and provide immediate feedback. They also provide guidance on the students' written summary of the case experience, which includes a self-reflection on how the student perceives his or her own interview performance. Lastly, the students are expected to present an oral summary of the interview. Students learn to take a medical history while developing their communication skills and establishing professional rapport with patients. Understanding the patient's experience of illness and various aspects of the patient-doctor relationship are important themes of the course.

In 1994, HSDM followed the HMS lead and incorporated PBL into its clinical dental courses after successfully integrating PBL into the basic science courses. At matriculation, the dental students are assigned to a senior tutor. Each senior tutor is a clinical dentist with a faculty appointment at HSDM and is responsible for one quarter of the dental class through the four-year curriculum. During the clinical years, the senior tutor meets frequently with each student individually to discuss the student's treatment plan proposals, oversee progress made with the student's implementation of treatment plans, and provide support by functioning as a general resource to the student. Consequently, the senior tutors became intimately aware of their assigned students' skills, behavior, and attitudes. They note that those students who are outstanding in their first-year PDI course also seem to excel in their overall clinical performance in the third and fourth years. Conversely, the low achievers in PDI consistently appear to need remedial support in their third and fourth years.

A pilot study, supported by the faculty of Harvard School of Dental Medicine and Harvard Medical School and subsequently funded by the American Dental Association, was developed to observe the relationship between student performance in PDI and in the third and fourth clinical years. This report is the first phase of a two-year pilot study aimed at predicting dental students' performance through their humanistic qualities demonstrated in PDI, a patient-interviewing course. PDI course assessment of the students' humanistic capacity is represented in the year-end narrative evaluations. This study aimed to quantify those qualitative narrative assessments within the context of the humanistic objectives of the course.

We defined humanistic qualities as the values described in humanistic medicine and demonstrated by the students' performance in the PDI course; academic performance as the level to which the student has mastered the knowledge, attitude, and skills of course materials, lab exercises, research methodology, and other information; and clinical competence as the level to which the student has mastered performing the actual clinical and manual skills of direct dental patient care. Faculty members assessed humanistic qualities using a standardized form described below.

We proposed the development of an innovative rating system for qualitative assessments of patient-centered care skills in the first preclinical year to examine how these ratings predict academic and clinical performance in the later clinical years. This is important in at least two ways. First, it may be that humanistic qualities taught in PDI are more significant competencies than previously thought. Second, early identification of students who are at risk for needing specific remedial programs later in the curriculum could prompt early interventions. Ultimately, an early identification and intervention program may improve students' performance and satisfaction.

Methods

The first phase of the project was twofold. First, we developed a rating method to quantify and rate (code) existing qualitative formative narratives describing individual performance of first-year dental students in an applied patient-centered course. Second, we assessed the reliability of this coding scheme among three independent coders.

The study was reviewed by the Harvard Faculty of Medicine Committee on Human Studies and given an Exempt status based on 45 CFR 46.101(b)(1),(2)&(4). The STATISTICA version 9.1 (StatSoft, Tulsa, OK, USA) statistical analysis software suite was used for all quantitative data analyses. We intended to recruit a convenience sample of six to ten participants in a focus group, which is considered an optimal number of participants.[16] Given that our ultimate research questions regarding how patient-centered course narrative ratings predict academic and clinical performance in the later clinical years are new and innovative, it is hard to estimate an exact effect size. However, we had set a target sample size of 200. With n=200, even a small effect size can be detected with .80 power (0.1–0.3=small effect; 0.3–0.5=moderate effect; and >0.5=large effect).[17] Further, detecting a moderate effect (using a two-tail test for one correlation and α=0.05) would have a power approaching 1.0. Hence the target number of 200 was more than sufficient in size for both the univariate and multivariate analyses.

Procedures for Development of Coding Strategy

To ensure that the developed codes were empirically based, faculty members who taught the course and wrote the student evaluations were interviewed to help us better understand the precise words or phrases they used to describe high and low performers in the evaluations. Given our intent to quantify qualitative evaluations, focus groups were determined to be the best interview methodology. Focus groups are the preferred methodology in health research to gain insights into subjects' perspectives[18] and are increasingly used in dental studies seeking a depth of understanding not captured in quantitative approaches.[19,20] Established protocols from the behavioral sciences were utilized in developing and implementing the focus group interviews.[21,22]

Due to the exploratory nature of this pilot study, data were recorded through notetaking. These data were analyzed using Fielding and Lee's approach[23] of identifying keywords in context, which involved contextualizing words that were central to the evaluation of student performance.

Faculty members identified the words that they used in their written evaluations, which we set as key words to describe high, neutral, or low performance in the PDI course. Questions administered to each faculty participant to generate the evidence-based

key words were taken directly from the focus group interview guide: 1) If a student is not performing well in the course, what words do you use to communicate your concerns about his or her performance? 2) If a student does exceptionally well in the course, what words would you use to communicate your positive impressions of his or her performance? 3) From your perspective, what words or phrases in formative comments should we look for in identifying students who did not perform well in the PDI? and 4) What words or phrases in formative comments should we look for in identifying students who did exceptionally well in the PDI?

It is important to note that the faculty assessments are based upon a standardized form, which includes elements of humanistic medicine. After each student-patient interview, faculty members assess the medical interview (chief complaint, past medical history, history of present illness, etc.) and then the elements of humanistic medicine reflected in the six headings on the feedback form: builds a relationship; sets the stage; opens the discussion; gathers information; understands the patient's perspective; shares information; reaches agreement; provides closure; and manages the flow. Examples of identified key words within a sentence are shown in Table 1.

The research team attached thematic descriptors to a five-point numerical scale in which 1=high, 3=average, and 5=low performer. This empirically derived coding strategy was then tested using the PDI year-end formative narrative evaluations from the initial twenty narrative assessments selected as a convenience sample from the sample frame. Due to variation in the length and writing style of different faculty members, the analysis combined content analysis (counting the number of positive and negative descriptors) with the key words-in-context approach to code each narrative with a score ranging from 1 to 5. Each coder identified ideas in a line-by-line analysis, identifying key words in the context of what the faculty member was trying to express as constructive feedback. To evaluate if the assessments were skewed in either direction (positive or negative), these data were collected for inclusion in the analysis. To yield sufficient reliability, three independent coders were used. The quantitative analysis used a minimum Cronbach's alpha of 0.80 between each of their assessments before the case could be given a final code. The coders were themselves PDI course faculty members extensively trained in the coding strategy. They helped develop and then used the coding scheme to rate 209 narratives of student performance.

Procedures for Assessing Reliability and Rater Agreement

Three trained coders used the coding scheme to rate 209 narratives of student performance. As the anchor points 1 and 5 were essential for our study, if any of the coders rated the narrative as 1 or 5, those cases were discussed and resolved. There were a total of thirty-nine cases (18.7 percent) that had to be resolved and recoded. Twenty-six cases pertained to ratings anchored at 1 and thirteen anchored at 5. Prior to resolving these disagreements, the interrater correlations ranged from 0.68 to 0.74. After revisiting the thirty-nine cases, agreements of 0.82, 0.84, and 0.84 were achieved. Cronbach's alpha for assessing internal consistency of the ratings was 0.75, which is considered good. The widely accepted cut-off in the social sciences is 0.70.[24]

After the development of the coding scheme and calibration of the three coders, 209 student narrative evaluations were rated. While there are many ways to assess the rater agreement, we have chosen to follow the suggestion and guidelines by Uebersax.[25] We first assessed the rater bias by calculating mean and standard deviation for each coder as well as the

Table 1. Composite example of identified key words in sentence context

Examples of Positive Connotation	Examples of Negative Connotation
Student A was an outstanding addition to the PDI group and will be a star going forward.	Although Student X met the course objectives, he struggled with engaging the patient.
Student B was a pleasure to have in our PDI group and from the beginning exhibited an innate sense of empathy with her patients.	Student Y ended the course satisfactorily; however, she struggled with expressing empathy.
Student C was exceptional in all aspects of the patient-doctor relationship.	Hopefully, with more experience, Student Z's hard work will pay off.

mean and standard deviation of all ratings. Next, we calculated Pearson correlations between coders and the mean of all ratings. While the Pearson correlation is sufficiently descriptive, we also assessed the rater bias by conducting a one-way analysis of variance (ANOVA), in which CODER was an independent variable and RATINGS the dependent variable. Paired t-tests were used to assess any differences between CODERS. Finally we used latent trait analysis as described by Uebersax.[25] In this method, factor analysis is used in which each rater's loadings on the factor could be viewed as representing the actual (latent) trait that is being rated. A common factor model with one-factor solution without fixed commonalities using principal factor analysis (principal factors: MINRES) was conducted.

Results

Development of Coding Strategy

Due to scheduling difficulties, two focus groups (rather than one) were conducted with a convenience sample of seven faculty members from a potential pool of nineteen. Two additional participants who could not attend the focus groups due to scheduling conflicts were interviewed individually using an in-depth interview strategy. Therefore, the total number of participants was nine: nearly 50 percent of the dental faculty members teaching the course from which the study sample was selected.

The PDI faculty members interviewed for this study each reported that superlatives indicated high performance. Faculty members consistently reported that they had strong opinions of which students had difficulty with the humanistic medicine approach and therefore did not perform well in patient interviews. Faculty members also reported that while this was a pass/fail course with ample opportunity for remediation if needed, the only place they would be likely to document poor student performance in PDI was in the year-end formative comments. Each faculty member interviewed also reported being unlikely to overtly describe performance in negative terms; instead, they were more likely to use "encouraging" language that the research team characterized as conflict avoidant. The interviews with faculty members identified "non-superlative descriptions," which typically included qualifying statements, indicating low performers. The key words in Table 2 are from direct quotations taken from the faculty member being interviewed. Given that 50 percent of the faculty members were interviewed and no additional terms were identified, it appeared that we reached a point of saturation on positive and negative terms used to summarize student performance. We therefore considered the list complete and evidence-based as we proceeded with the coding.

With respect to the overall positive and negative ratings of ideas in the context of each evaluation, we found significantly fewer negative (mean=1.29; SD=1.26) than positive phrases (mean=3.19; SD=1.89) identified in the narratives by the coders ($t_{(208)=}6.2$; $p<0.001$), while the mean number of phrases correlated strongly with the mean ratings (0.73 negative phrases and -0.65 positive phrases). This finding suggests that both negative and positive dimensions were considered in the mean ratings.

Assessing Reliability and Rater Agreement

The means and standard deviations for each coder and the mean of all ratings as well as the correlations are reported in Table 3 and visually displayed in Figure 1. The one-way ANOVA was not significant ($F_{(2, 624)}=0.67$, $p=0.51$). The results from the paired t-tests assessing rater bias among coders are shown in Table 4, indicating a significant difference between Coder 1 and Coder 2 CI (0.03 to 0.19). The factor loadings of each rater were 0.91 for Coder 1, 0.92 for Coder 2, and 0.91 for Coder 3. These values reflect high levels of agreement and consistency.

Based on the ratings of the three coders, twenty-four (11.5 percent) of the 209 narratives describing student performance in the PDI were coded as "high achievers" and seven (3.3 percent) as "low achievers." The frequency distribution of mean ratings is shown in Figure 2.

Discussion

Almost 50 percent of the dental faculty members participated in the focus groups to identify the words used to describe high, neutral, or low performance for the coding strategy. Although we had hoped for more faculty members to be involved, this number of participants still satisfies the minimum rules as described by Van Thiel et al.[16] They note that a feasible and reliable measurement can be obtained

Table 2. Examples of key words or phrases in context codes, derived from direct quotations from faculty interviews

Key Words and/or Phrases in the Narrative Evaluations	
With POSITIVE connotations	With NEGATIVE connotations
• From the beginning she seemed to exhibit an innate sense . . . • I have no doubt she will be a fine [something positive] • [Name] was a leader in group discussion. • Outstanding • Delightful • It was a pleasure to have (name) . . . • [Name]'s contributions were valuable. • Exceptional • Superb • Responded well to feedback • Star • Mature • Leader • Excellent • It was a pleasure to work with [name]. • A natural . . . • Came in with . . . • Has innate people skills . . . • Openness to experience • Highly motivated self-learner • Goes the extra mile • Natural gifts	• Although . . . • However . . . • I would hope that . . . • With more training . . . • With more experience . . . • I am looking forward to [some area of improvement]. • Should continue working on . . . • Any mention of language or cultural issues affecting performance • It would be good if . . . • It might be to her benefit if . . . • Might benefit from . . . • [Name] had some difficulty with . . . • Had problem with [describe issue], but as the year progressed [something positive about performance]. • In the end, [name] was able to do the skills required to . . .

Table 3. Descriptive statistics and correlations of narrative evaluation ratings

			Pearson Correlations		
Source	Mean	Std. Dev.	Coder 1	Coder 2	Coder 3
Coder 1	2.70	0.95	–	–	–
Coder 2	2.81	1.01	0.84	–	–
Coder 3	2.77	0.95	0.82	0.84	–
Coder mean	2.76	0.92	0.94	0.95	0.94

using eight to ten interview cases in two to two and a half hours of testing time and that reliability improves considerably if assessment is constricted to basic interviewing skills. Our study used a mixed methodology, using focus groups to develop an empirically driven content analysis to quantify existing qualitative data.

The narrative evaluations were rated using a five-point scale. Harvard School of Dental Medicine's admissions rating uses a five-point scale to identify strengths and weaknesses of the applicants' records and interviews. Consequently, a five-point scale for the coding strategy allowed us to compare the data in future assessments.

Because the PDI is a pass/fail course in which all students are brought to the level of pass through remediation when needed, there are no data to assess a linear relationship between our ratings and student performance in this course. The three independent coders' ratings of PDI student performance shows twenty-four (11.5 percent) of the formative narratives were coded as high achievers (score of 1) and seven (3.3 percent) as low achievers (score of 5). This matches the skew of the bell-shaped curve for student

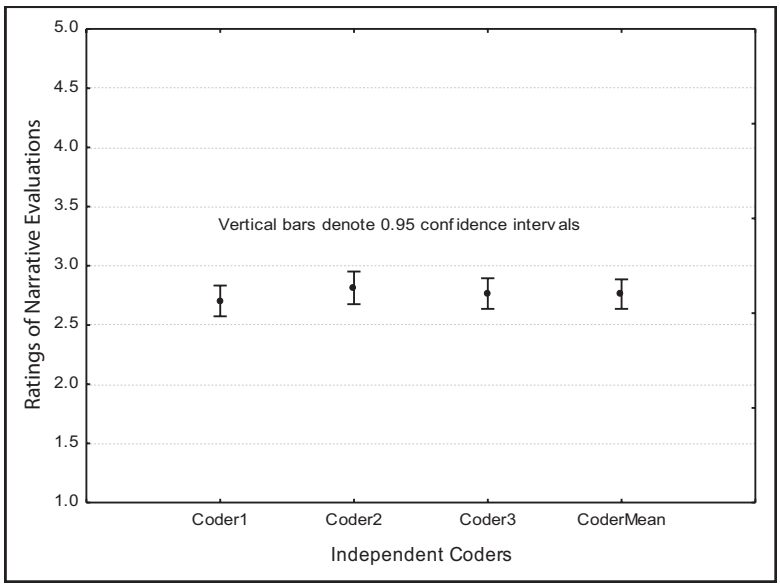

Figure 1. Correlation between narrative evaluation ratings and coders

Table 4. Results from the paired t-tests to assess rater bias among coders

	Mean	Std. Dev.	t	df	p-value	Confidence Interval
Coder 1	2.70	0.95				
Coder 2	2.81	1.01	-2.81	208.00	0.01	0.03 to 0.19
Coder 1	2.70	0.95				
Coder 3	2.77	0.95	-1.59	208.00	0.11	-0.15
Coder 3	2.77	0.95				
Coder 2	2.81	1.01	-1.23	208.00	0.22	-12.03

performance in the PDI in that there is a skew towards higher performance with very few students at the lowest level requiring remediation. This reflects the fact that on the rare occasion (at most one student per year) that a student cannot be remediated, he or she is counseled early on to seek a different professional career path. Those students have left the educational program, and their performance is not included in this study. Furthermore, while all the students are brought to the level of pass, the variability in their performance is reflected in the formative narrative evaluations. The goal of this report is to quantify these performance reports. As shown in Figure 2, meaningful variability was observed.

Narratives can provide essential information to assess clinical care. In a large study assessing case notes in an acute care setting, Hutchinson et al. documented the feasibility of using implicit (narrative) review in combination with explicit (objective, i.e., outcome data) review criteria to compare how different provider groups document medical information.[26] They developed codes for the narrative case notes in order to compare results with the objective outcome criteria. In our study, we used a similar multimodal approach by developing a standardized method to code the narrative assessments of students' performance in a patient-centered course. In the second phase of our ongoing study, these narrative ratings will be used to examine the relationship between individual student performance in a first-year patient-centered course and performance in later clinical years.

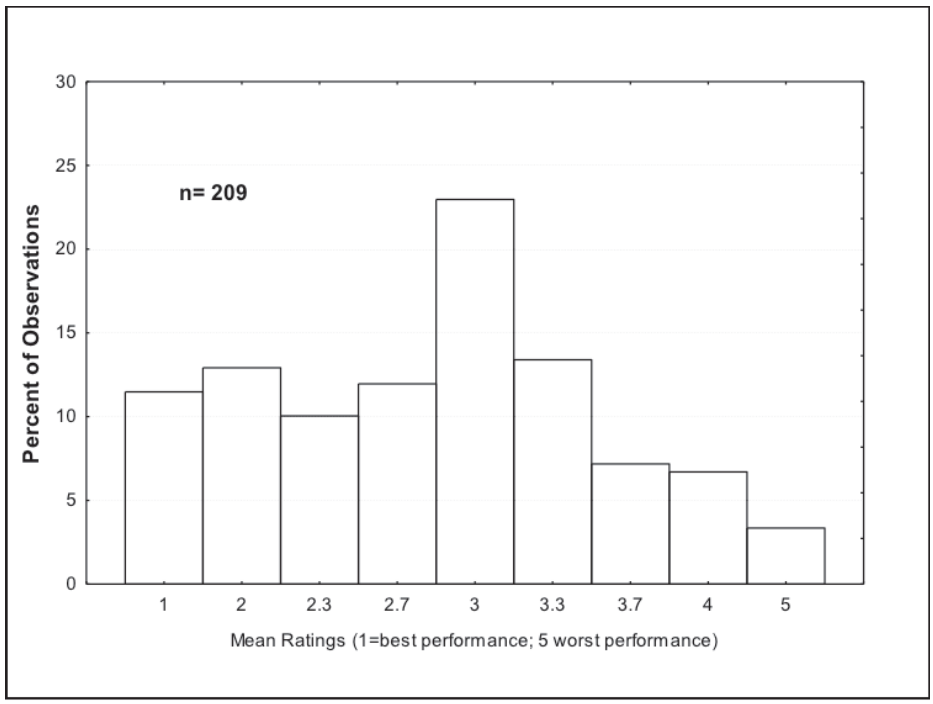

Figure 2. Frequency distribution of mean ratings of student performance in the PDI

Conclusions

The results reported here are from the first phase of a two-year pilot study aimed at predicting dental students' performance through their humanistic qualities demonstrated in a patient interviewing course. Our findings demonstrate the feasibility of retrospectively quantifying existing narrative evaluations to determine high and low performance in a patient-centered course for dental students. As higher education is a significant investment for both the student and the institution, the ability to quantify humanistic qualities during early assessment, as demonstrated here, may be key to predicting student performance. If humanistic qualities predict success in later academic and clinical performance, they could be considered in admissions criteria and early student assessment.

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