Assessing Professionalism in Early Medical Education: Experience with Peer Evaluation and Self-evaluation in the Gross Anatomy Course

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Abstract

Introduction: As today’s healthcare model moves toward more streamlined and corporate industrialism, it is our responsibility, as doctors, to ensure the integrity of medicine’s foundation in professionalism. The erosion of professional values not only creates a climate of animosity, but reverberates negatively to impact the development of students, who model their behaviour after those they most respect. This hazard has spurred an evaluation of medical school curricula, with a new emphasis on professionalism in the philosophy of medical education. Courses such as Gross Anatomy that, in the past, offered “pure content,” are now being used to teach and evaluate professionalism. The goal of this study was to determine if peer evaluation and self-evaluation used in conjunction and implemented early in the medical curriculum, can serve as useful tools to assess and provide feedback regarding professional behaviour in first-year medical students.

Materials and Methods: From 1999 to 2003, students at Mayo Clinic College of Medicine evaluated themselves and their peers during the Gross and Developmental Anatomy Course. Numerical evaluations and written comments were statistically analysed within established categories of professionalism and correlated with academic performance, gender, and peer rating and self-rating.

Results: The majority of written comments pertained to inter-professional respect, responsibility, and excellence. Students who gave higher peer evaluation and self-evaluation scores provided more positive comments, and students performing well in the course provided more positive comments about their peers and themselves than did those struggling academically. Students consistently rated their peers higher than themselves, and male students rated themselves higher than did female students.

Conclusions: Implementing peer evaluation and self-evaluation early in the medical curriculum is a valuable exercise in teaching first-year medical students assessment skills when evaluating their behaviour, as well as the behaviour of their colleagues.

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Introduction

The professional role of physicians implies a commitment to upholding social order by providing strong leadership, good moral judgement, and the ethical practice of medicine. However, in the latter part of the 20th century, increasing pressure from political, legal, and market forces has effected significant change in healthcare delivery in nearly every industrialised country. Whereas economic drive has funded exponential scientific growth and advancement, these successes have, unfortunately, been accompanied by a compromise of philanthropic values and a growing negative sentiment among physicians. Additionally, it is well-documented that despite an expected increase in medical students’ ethical reasoning skills over the course of their training, most experience a static or negative progression. This may be attributed to the fact that medicine is increasingly shrouded by required competencies such as “system-based care”, “evidence-based medical practice”, “outcome-based standards of care”, “population medicine”, “quality management”, and “information access practice”. While such guidelines provide structure to corporate endeavours, an abundance of bureaucracy diminishes the humanness of medical practice which is its professionalism – our contractual obligation to

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society. This fundamental compromise undermines professional esteem, and ultimately reverberates to affect medical students.

As such, it is evident that a well-trained and effective physician must be as competent in professionalism and ethical reasoning as he or she is in academics. To this end, medical schools throughout the United States have actively re-examined their curricula, finding that though medical students model their professional behaviour after those they most respect, traditional methods of instilling professional values, such as observation and enculturation, are no longer sufficient. Because professionalism has not historically been emphasized in medical education, accepted methods for teaching and assessment have not been agreed upon. Therefore, medical educators have begun to implement innovative solutions to achieve these ends. Currently, almost 90% of US medical schools provide formal activities designed to teach medical professionalism.

Several authors have attempted to deconstruct professionalism’s score attributes, to determine which aspects are essential to professionalism education. Others have focused on determining “success” in teaching professionalism. Some schools initiate professionalism training from the very beginning of the medical school curriculum, and thus courses such as Gross Anatomy, which were traditionally thought of as “pure science,” are now being utilised to teach professionalism as well.

Organisations such as the General Medical Council (GMC) and the American Board of Internal Medicine’s (ABIM) “Project Professionalism” have suggested that an important component of the development of medical students’ professionalism is self-assessment. In addition, several educators have suggested that peer evaluation may be a useful adjunct. Both formats help students develop the ability to make judgements, a necessary skill for study and professional life. By judging the work or behaviour of others, students gain insight into their own performance, an important element of professional competence.

The goal of this study was to determine if peer evaluation and self-evaluation used in conjunction with and implemented early in the medical curriculum, can serve as useful tools to assess and provide feedback regarding professional behaviour in first-year medical students.

Materials and Methods

From 1999 to 2003, five consecutive classes at the Mayo Clinic College of Medicine (n = 213 students) were asked to evaluate professionalism in themselves and their colleagues during the first-year Gross and Developmental Anatomy Course. Students were randomly divided into dissection groups (3 to 4 students/group), with whom they worked intimately for the duration of the class. Students were then asked to complete an online questionnaire (Appendix 1) at the midpoint and conclusion of the course, rating themselves and their group members on a 5-point Likert scale. Students were also asked to provide written comments on positive and negative interactions regarding professional values. Remarks for each student were compiled and returned to that individual in an anonymous fashion, to provide candid, non-punitive feedback and encourage self-reflection. Results of the peer evaluation and self-evaluation had no impact on the student’s final grade.

With identifying information removed, each submission was evaluated and coded as positive or negative. Data were recorded according to predetermined aspects of professionalism: Excellence, Compassion, Confidentiality, Integrity, Inter-professional Respect, Responsibility, Self-policing, Accountability, and Miscellaneous. In addition, each comment was classified according to 3 subcategories: peer-provided positive comments, self-provided positive comments, or negative comments. Positive comments included those praising students’ professionalism; negative comments reflected areas of perceived need for improvement. Results were also analysed to assess interclass differences within the 5-year sample.

Descriptive statistics were analysed as either mean (with standard deviation), or as median and interquartile percentiles as appropriate. The associations between the number of positive comments and the numerical rating were estimated using Spearman’s rank correlation coefficient.

Linear regression was used to assess associations between the dependent factor of academic performance (final course percentage) and peer evaluation, self-evaluation, and the net number of positive comments received by each student and his/her peers. The estimated impact of the predictors from these models with course performance was reported, along with the Pearson correlation coefficient.

The number of positive comments and the final grade received were compared between grading systems (percentage and pass/fail) and between genders, using a two-sample t-test, assuming unequal variances. A similar analysis was done comparing peer evaluation and self-evaluation between genders. The change in positive comments and the numerical rating received were compared at the midpoint and course conclusion using a paired t-test. Similarly, students’ self-rating was compared to the rating received from their peers.

The alpha-level was set at 0.05 for statistical significance.

Results

From the 213 students polled [100 (46.9%) females, 113
(53.1%) males], 1650 evaluations were submitted (participation = 100% of students): 1234 peer evaluations and 426 self-evaluations. Three thousand one hundred and sixty-five written comments related to professional values (2810 positive comments and 355 negative comments) were recorded and categorised, as described above.

Comments on Professionalism

With respect to positive comments (n = 2810), the mean (± sd) was 11.7 (± 3.1) net positive comments per student, with a median of 12 and interquartile range of 10 to 14. The distribution of positive comments in peer evaluation and self-evaluation is indicated in Figure 1. Students received the most praise from their colleagues in the areas of Inter-professional Respect (40.2%), Excellence (21.6%), and Responsibility (16.9%). In self-evaluation, students commented positively in Self-policing (35.7%), Inter-professional Respect (31.4%), and Accountability (13.1%). The number of peer-provided positive comments showed a positive correlation with peer rating (Spearman, r = 0.52, P <0.001). A similar positive, though weaker correlation, was seen between positive self-provided comments and self-rating (Spearman, r = 0.12, P = 0.025), and were rated higher than females on peer-provided numerical rating [mean (± sd) of 4.4 (± 0.5) and 4.2 (± 0.5) respectively, P = 0.02]. As indicated in Figure 2, males also rated themselves more highly than did females [mean (± sd) 3.7

Peer Evaluation versus Self-evaluation

Students received significantly more positive comments from their peers than from themselves (Table 1). Students were also ranked higher by their peers than by themselves, with a mean (± sd) of 4.3 (± 0.5) and 3.6 (± 0.8) respectively, P <0.001.

Academic Performance

Linear regression indicated a slight positive correlation between the final grade and the total number of positive comments received (r = 0.22, P <0.001). Each positive comment correlated with an increase of approximately 0.5 points of the final grade. A similar association was seen between the final grade and the numerical rating scale. Peer rating also correlated with the final grade, (r = 0.26, P <0.001), with an associated 3.3-point increase in the final grade per peer-rating point. Self-rating showed a weaker positive correlation, (r = 0.14, P = 0.04), with each point in self-rating associated with an increase of approximately 1.0 final grade point.

Gender Differences

Males received significantly more positive comments than females on peer evaluations [mean (± sd) of9.1 (± 2.5) and 8.4 (± 2.0) respectively, P = 0.025], and were rated higher than females on peer-provided numerical rating [mean (± sd) 4.4 (± 0.5) and 4.2 (± 0.5) respectively, P = 0.02]. As indicated in Figure 2, males also rated themselves more highly than did females [mean (± sd) 3.7.
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(± 0.8) and 3.5 (± 0.9) respectively, \( P = 0.04 \). However, there was no significant gender difference in the number of negative comments [mean (± sd) of 1.8 (± 1.5) and 1.9 (± 1.6), males and females respectively, \( P = 0.85 \)].

**Midpoint and End-of-course Evaluations**

Students made more positive and negative comments (both peer- and self-provided) at the midpoint of the course than at the conclusion (Table 1). For both males and females, the mean (± sd) decrease in number of comments was as follows: positive self \( [0.4 (± 1.2), P <0.001] \), positive peer \( [0.1 (± 1.6), P = 0.22] \) and negative peer \( [0.8 (± 1.1), P <0.001] \).

Numerical ratings increased from the midpoint to the conclusion of the course, in both self-rating [mean of 3.5 and 3.6 respectively, for a mean (± sd) increase of 0.1 (± 1.0), \( P=0.05 \)] and peer ratings [mean of 4.2 (± 0.6) and 4.4 (± 0.5) respectively, for a mean (± sd) increase of 0.2 (± 0.6), \( P <0.001 \)].

**Grading System**

Despite the fact that the medical school switched from numerical grading to a pass/fail system, no significant difference was observed with respect to the number of positive comments (sum of peer and self comments; \( P = 0.42 \)) or distribution of final grade percentage points \( (P = 0.99) \).

**Discussion**

Our results confirm those of Rudy et al\(^{11}\) in that peer-provided positive comments correlated with higher peer evaluation scores, but not with self-evaluation scores. Additionally, we reproduce findings that students with higher grades underestimated their own performance, while those doing poorly tended to overestimate it.\(^{32}\) These data suggest that, similar to previously drawn conclusions, peer assessment skills may not transfer to self-assessment skills.\(^{23,31}\) Despite students’ willingness to evaluate their peers in an objective fashion, their self-evaluation is much more critical. This may reflect students’ reluctance to praise themselves, while being more comfortable commending their peers. It may also reflect a fear of an inflated self-rating, resulting in social isolation or a lower final grade (particularly in the face of a lower peer evaluation). It is also possible that lack of experience using this type of evaluation and unrealistic expectations of their own abilities as first-year students\(^{31}\) may contribute to this observed difference.

The gender differences we demonstrate in peer evaluation and self-evaluation are consistent with those previously reported. Rees\(^{33}\) reported that 73.3% of first-year male medical students overestimated their performance in professional development portfolios, while 72.7% of female students underestimated themselves. In a study of accuracy of third-year medical students’ self-assessment, Lind et al\(^{34}\) indicated that male students overestimated their performance on a surgery clerkship, while female students underestimated their abilities on the same rotation, despite the fact that female students were statistically outperforming male students. In our study, males may have received more positive peer-provided comments because they contributed more actively to group dissection. They may also have been more dominating in their groups. Nevertheless, these results indicate that gender equality in professional perception remains a goal to be actively pursued.

With respect to midpoint and end-of-course evaluations, the number of both positive and negative comments significantly decreased toward the end of the course. This may suggest that students had less interest in commenting on personal and peer behaviour toward the end of the...
course. However, this may also indicate a decrease in unprofessional behaviour, as supported by the fact that the numerical rankings of professionalism increased toward the conclusion of the course.

The distribution of final grade percentages suggests that the grading system does not influence professionalism or students’ motivation to achieve high marks in a course.

The highlights of our findings can be summarised as follows:

• First-year medical students recognised professional values and commented on them during peer evaluation and self-evaluation.
• Peer assessment skills may not translate to self-assessment skills (the latter being more critical).
• Males often tended to overestimate their performance while females tended to underestimate theirs.
• Students performing better academically were more likely to provide positive comments about themselves and about their peers.
• Grading system does not appear to influence students’ level of professionalism or motivation to achieve.

Conclusions

Professionalism is fundamental to medical practice and must be emphasized during medical education. However, despite the fact that medical students understand and are willing to provide peer assessment and self-assessment of professional behaviour, our results correlate with previously reported data to indicate that, at this point in their training, students lack the necessary insight to make accurate evaluations. We submit that, rather than using peer evaluation and self-evaluation as a precise estimation of professionalism, such assessment may instead be applied as a training tool to help students learn to realistically appraise their own and colleagues’ professional behaviour. When introduced early in the curriculum, such assessment may ultimately improve the accuracy of peer evaluation and self-evaluation conducted later in medical school.

Further studies are warranted to elucidate how students internalise the professional behaviours they will take with them into their future careers.

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Appendix 1. Students’ peer and self-evaluation questionnaires available on the Gross and Developmental Anatomy Course website. The window for open-ended questions did not constrain the length of typed-in text. The same questionnaire was used at the midpoint and conclusion of the course.

<table>
<thead>
<tr>
<th>Student Peer Evaluation</th>
<th>Student Self-evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Please rate each person in your dissection team using the scale below:</td>
<td>1. Please rate your contribution to your assigned dissection team using the scale below:</td>
</tr>
<tr>
<td>(1) Would have learned more if not in group</td>
<td>(1) I made little or no contribution</td>
</tr>
<tr>
<td>(2) Average contribution</td>
<td>(2) Average contribution</td>
</tr>
<tr>
<td>(3) Neither helped nor hurt my learning</td>
<td>(3) Neither helped nor hurt others learning</td>
</tr>
<tr>
<td>(4) Contributed more than average</td>
<td>(4) Contributed more than average</td>
</tr>
<tr>
<td>(5) Truly outstanding at helping me learn</td>
<td>(5) Truly outstanding at helping others learning</td>
</tr>
<tr>
<td>2. Identify an incident(s) that this team member was most helpful:</td>
<td>2. Identify an incident(s) in which you were effectively interacting with your team members:</td>
</tr>
<tr>
<td>3. Identify an incident(s) that this team member could have handled differently:</td>
<td>3. Identify an incident(s) that you could have handled better or you could have been more effective in interacting with members of your team:</td>
</tr>
</tbody>
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REFERENCES


