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Nishan Sharma, Ying Cui, Jacqueline P. Leighton & Jonathan S. White

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Team-based assessment of medical students in a clinical clerkship is feasible and acceptable

NISHAN SHARMA, YING CUI, JACQUELINE P. LEIGHTON & JONATHAN S. WHITE

University of Alberta, Canada

Abstract

Background: This study describes the development, implementation and evaluation of a team-based, multi-source method of assessment in which students on a clinical clerkship were provided with feedback on their performance as observed by physicians, residents, nurses, peers, patients and administrators.

Methods: The instrument was developed by reviewing existing assessment items and by obtaining input from assessors and students. Numerical data and written comments provided to students were collected, internal consistency was estimated and interviews and focus groups were used to determine acceptability to assessors and students.

Results: A total of 1068 assessors completed 3501 forms for 127 students. Internal consistency estimates for each assessment form were acceptable (Cronbach's alpha 0.856–0.948). Each student received an average of 188 words of written feedback divided into an average of 26 'Areas of Excellence' and 5 'Areas for Improvement'. Interviews revealed that the majority of students and assessors interviewed found the method acceptable.

Conclusions: This study demonstrates that a team-based model of assessment based on the principles of multi-source feedback is a feasible and acceptable form of assessment for medical students learning in a clinical clerkship, and has some advantages over traditional preceptor-based assessment. Further studies will focus on the strengths and weaknesses of this novel assessment technique.

Introduction

Observation of performance in the clinical environment is essential for the assessment of medical students. In the model of education which has been traditional in North America, one student is assigned to one physician for a defined period of time, in a 'preceptor-based' arrangement. This physician is responsible for observing the student's day-to-day clinical performance and for making an assessment based on the behaviours observed. While this model has its merits, it relies upon repeated interactions over time between the student and preceptor, takes no account of behaviours observed by other members of the healthcare team, and may be vulnerable to 'impression management' by students (Evans et al. 2005). As medical school enrollment expands, it is also anticipated that maintaining a one-preceptor-to-one-student ratio may become difficult to sustain (Bunton et al. 2008; The Association of Faculties of Medicine of Canada 2010).

In response to the expansion of our undergraduate medical school class, we implemented a novel team-based model of assessment in our Year 3 clerkship in General Surgery, Anaesthesiology and Pain Medicine in the 2009–2010 academic year. In this model, students were assigned to work with a team comprising a number of physicians, residents and nurses. As students would be spending short periods of time with multiple members of the healthcare team, we employed the principles of multi-source feedback (MSF) to design a

Practice points

- Assessment of medical students in a clinical clerkship by all members of the surgical team is feasible and acceptable to both assessors and students.
- Team-based assessment may have some advantages over preceptor-based assessment, and may have an important role to play in the interprofessional education of medical students.

team-based assessment model which would incorporate observations from all team members working with students in the clinical environment.

MSF gives a broader understanding of an individual's performance and behaviour in all aspects of their work in the professional environment (Foy & Schlisselberg 2002). The technique has been shown to solicit valuable feedback from those best qualified to assess certain behaviours (Edwards & Ewen 1996), enhance communication and trust (Waldman & Bowen 1998), address complaints of assessor-bias (Lockyer & Clyman 2008) and improve self-evaluation skills (Fleenor et al. 2008). As MSF collects the opinions of numerous observers, it provides a means to understand how the subject is contributing and functioning in a team-based environment, a perspective which is difficult, if not impossible to gather from a traditional one-on-one assessment of an individual (Foy & Schlisselberg 2002).

Correspondence: N. Sharma, University of Calgary, GD01, TRW Building, 3280 Hospital Drive NW, Calgary, AB T2N 4Z6, Canada. Tel: 403 210 7019; fax: 403 210 9850; email: nishan.sharma@ucalgary.ca

Although MSF has been used in residency programmes and for physicians in practice (Risucci et al. 1989; Waldman & Bowen 1998; Davies & Archer 2005), there have been no major studies on the use of MSF in the assessment of undergraduate medical students. Schell and Lind (2003) reported on an internet-based tool for multiple faculty evaluating third-year medical student performance, suggesting that MSF is a more inclusive form of evaluation. Rees and Shepherd (2005) have also explored the use of a 360-degree assessment model to evaluate professionalism in medical students. However, no study in the literature to date has fully explored the feasibility and acceptability of using a multi-source assessment tool for assessment of clinical performance in an undergraduate clerkship.

We therefore set out to design and implement a team-based multi-source method of assessment in which feedback on observed clinical performance would be provided to students by physicians, residents, nurses, peers, patients and administrators. The aim of this study was to develop and evaluate this method of assessment in a clinical clerkship over a single academic year, focusing on the feasibility and acceptability of the method to students and assessors.

Methods

The setting for this study was a General Surgery, Anaesthesiology and Pain Medicine clerkship in Year 3 of medical school. In this clerkship, students are assigned to spend 3 weeks working on a surgical healthcare team based at a trauma hospital and 3 weeks on a second team based at a community hospital, with 2 days at each site dedicated to working with an anaesthesiologist. A total of 127 students completed the clerkship in this year, in six rotations at a total of four teaching hospitals. In addition to team-based assessment of clinical performance, students were assessed using a multiple choice examination, an objective structured clinical examination (OSCE) and a reflective written assignment.

The assessment instrument was developed after reviewing existing assessment items from four sources:

- The traditional preceptor-based assessment forms previously used in the clerkship.
- The Alberta Physician Achievement Review (2009) survey.
- The Royal College of Physicians and Surgeons of Canada's CanMEDS Competencies (Frank 2005).
- Published instruments used for the assessment of resident performance (Woolliscroft et al. 1994; Davies & Archer 2005; Hesketh et al. 2005)

The authors met several times to review and discuss items from these sources, and drew up an agreed list of statements describing the spectrum of desired performance of medical students in the clerkship; items on the final list were assigned to those assessor groups we considered most qualified to evaluate that aspect of a student's performance. Rather than developing a single assessment form for use by all assessors, we chose to develop one form for each group of assessors, based on the belief that different types of assessors observe different aspects of professional behaviours. For example, a medical student may be rated on procedural skills by a

supervising physician, on communication skills by a patient, on punctuality and order-writing by a nurse, and on team-working skills by a fellow student. There was considerable overlap of items; one item might appear on several different assessor forms if it was considered that multiple groups could use it in assessment.

Items were then reviewed by representatives from each group of assessors. We asked physicians, residents, administrators, patients and nurses to respond to the following questions, and items were added, omitted or modified accordingly:

- (1) In your role, do you observe medical students performing the task or behaviour described in these items?
- (2) In your role on the team, do you think you can assess how good medical students are at performing the task or behaviour described in these items?
- (3) Are there any other medical student tasks or behaviours that you observe and can assess that are not described in these items?

Groups of medical students who had completed the clerkship also reviewed the list of assessment items to ensure face validity, asking: Do you think this assessor group observes and can assess the medical student task or behaviour described in these items? Students were also asked their opinion on how many forms should be completed on a single student by each type of assessor over the 6-week clerkship. Experts on the use of MSF were also consulted before the final draft of the assessment forms was completed.

The final version of each assessment form was produced as a series of statements with a response required on a disagree/agree five-point Likert scale with space provided for written comments on 'Areas of Excellence' and 'Areas for Improvement'. Most forms had 6–12 items in total; the resident form had 26 items and the self-assessment form 24 (Table 1). Forms were designed to be machine-scannable (see example form in Figure 1).

Assessment forms were bound together in small booklets which also contained instructions for the students and assessors and a clerkship calendar in which students could record their daily activities. The decision to employ a paper-based method was made on practical grounds in the hope of avoiding the delays previously encountered using online assessment in this setting. Each student received a booklet and information on the new assessment method at the beginning of the clerkship. The booklet contained a total of 18 assessment forms: physician – surgeon (6), physician – anaesthesiologist (2), chief resident (2), operating room nurse (2) and patient (6). Assessment forms completed by ward nurse managers on behalf of a team of ward nurses (2), peers (anonymous, 4–6), administrators (1) and self-assessments (1) were collected by the administrative staff towards the end of the rotation; students were provided with samples of these forms.

Because of the complexity of the team-based setting, students were allowed to initiate the process of assessment, asking an assessor to complete a form after a period of interaction. Students were given advice on approaching patients for assessment, and were instructed to avoid very ill

Table 1. Numbers of forms, items, internal consistency values, assessors, forms completed and written comments by assessor group.

Assessor Group	Forms per student (median, range)	Items per form	Internal consistency (Cronbach's alpha)	Number of assessors	Total forms completed	Written comments
Physician (surgeon/anaesthesiologist)	8 (8-11)	10	0.875	145	1132	918
Chief resident	2 (2-2)	26	0.948	17	254	282
Nurse: OR	2 (2-3)	11	0.856	120	255	277
Nurse: ward/ward manager	2 (2-5)	12	0.932	21	287	142
Patient	6 (6-7)	6	0.870	764	764	692
Administrator	1 (1-1)	6	N/A ^a	1	127	91
Students (self-assessment)	1 (1-1)	24	0.942	127	127	63
Students (peer assessment)	4 (3-6)	8	0.930	127	555	586
Total	26 (25-30)	-	-	1068	3501	3051

Note: ^aNot measurable due to low number of assessors ($n = 1$).

Physician (Surgeon/Anesthesiologist) Assessment of Medical Student

Instructions: Please complete this form based on your observation of the performance of this student. You should try to be as honest as you can, noting areas where the student did well and highlighting areas for improvement. Your assessment will be combined with those from a number of health professionals to generate a final grade; the student will not pass or fail based on your assessment alone.

Physician Name (Please Print): _____

This student:	strongly disagree	disagree	neither agree nor disagree	agree	strongly agree	not able to assess
1. Behaved professionally	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Was prepared for learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Demonstrated an appropriate level of knowledge	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Was able to apply knowledge to solve clinical problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Was able to present their clinical findings effectively	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Demonstrated a logical approach to diagnosis & management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Demonstrated appropriate communication skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Demonstrated appropriate examination skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Demonstrated appropriate procedural skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Will, in my opinion, make a good doctor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

One area in which the student excelled:

One area in which the student could improve:

Date of Evaluation: _____

Signed: _____

Figure 1. Sample of physician assessment form.

or upset individuals. All assessors, including patients, were free to refuse to complete an assessment form. Students were informed that it was their responsibility to ensure that the requisite number of signed and dated assessment forms was completed over the period of the clerkship, and that failure to hand in the minimum number of completed assessment forms (6 surgeon, 2 anaesthesiologist, 2 chief resident, 2 OR nurse and 6 patient) would result in a failing grade. Assessors were also provided with information and training about the new assessment method in person and online. Students and assessors were informed that a student would not pass or fail based on a single assessment, but that the presence of multiple deficiencies (multiple 1s or 2s on a five-point scale) would trigger a meeting with the clerkship director to discuss the student's performance; a meeting which could potentially result in a failing grade.

At the end of each clerkship, assessment forms were collected and electronically scanned to compile numerical data and all comments. Cronbach's alpha, an index of internal

consistency or reliability of item responses, was calculated for the items in each assessment form. All of the written comments provided to students were transcribed. A pass/fail grade was issued for this component of student assessment. Each student was provided with a one-page Summary of Assessment which contained information on all the assessment information generated during the clerkship (Figure 2). The most positive comments were selected by administrative staff for inclusion in the student's Dean's letter, regardless of which assessor group they came from.

Throughout the academic year, students and assessors were asked for informal feedback on the acceptability and feasibility of the instrument, and field notes were kept to record these interactions. The number of forms filled out by each physician was monitored, and the costs of the scanning and data processing were estimated. At the end of the academic year, one-on-one structured interviews were conducted with physicians, residents and nurses to gauge their opinions of the acceptability of the assessment method; no

Student: Medical STUDENT	Rotation Dates: 1/1/09 – 3/3/09
<p>Elements of Assessment</p> <p><u>Multiple Choice Examination:</u> PASS Score: 75% (56th percentile)</p> <p><u>Objective Structured Clinical Examination:</u> PASS (11/12 stations) Score: 70% (45th percentile)</p> <p><u>Reflective Written Assignment:</u> PASS Score: 85% (34th percentile)</p> <p><u>Multi Source Feedback:</u> PASS</p> <p><u>Overall Grade:</u> PASS</p> <p>Comments for Dean's Letter</p> <p>"Excellent communication skills"</p> <p>"Very pleasant and caring"</p> <p>"Jumped at opportunities"</p> <p>"Very knowledgeable, would love to have on my team again"</p> <p>"Very caring and detail oriented, punctual and hard-working"</p>	<p>Multi Source Feedback Comments</p> <p><u>Areas of Excellence</u></p> <p>Physician</p> <ul style="list-style-type: none"> • good procedural ability for experience level • excellent communication skills • good knowledge and very good attitude • highly professional demeanor <p>Patient</p> <ul style="list-style-type: none"> • very friendly • was very pleasant and caring • great bedside manner • relating to the patient –made me feel very comfortable, like someone was actually listening to my concerns <p>Chief Resident</p> <ul style="list-style-type: none"> • very good daily notes and orders • well organized <p>OR Nurse</p> <ul style="list-style-type: none"> • polite with staff • jumped at opportunities – i.e. bladder catheterization <p>Peer</p> <ul style="list-style-type: none"> • very knowledgeable, would love to have on my team again • enthusiastic, a pleasure to work with • very caring and detail oriented, punctual and hard-working <p>Ward Nurse</p> <ul style="list-style-type: none"> • receiving constructive feedback • excellent communication with nursing team, hard worker <p>Administrator</p> <ul style="list-style-type: none"> • very pleasant student <p><u>Areas for improvement</u></p> <p>Physician</p> <ul style="list-style-type: none"> • pre-reading before rotations • presentation/confidence <p>Chief Resident</p> <ul style="list-style-type: none"> • surgical skills <p>OR Nurse</p> <ul style="list-style-type: none"> • ask questions about how to assist nursing staff <p>Peer</p> <ul style="list-style-type: none"> • give more thought to colleagues' learning needs <p>Self</p> <ul style="list-style-type: none"> • need to work on communicating my knowledge

Figure 2. Sample of summary of assessment – each bullet point indicates a single assessor's comments.

interviews with patients were conducted. Focus groups with students were also held. Questions used to stimulate discussion were: What was it like to assess your students/be assessed in this way? Do you think it is good to have lots of different types of people assessing students? A thematic analysis technique was used to summarize the opinions expressed. All students participating in the study gave informed consent, and approval for this study was granted by the local Health Research Ethics Board.

Results

In all, 1068 assessors completed a total of 3501 forms for 127 students, comprising 37,007 individual assessment items and 3051 written comments. Students also completed peer assessment forms on each other (555) and self-assessment forms on themselves (127). Table 1 describes the number of individuals participating from each assessor group, the reliability of the item responses for each assessment form, and the number of forms completed. The internal consistency of each assessment form was acceptable, ranging from 0.856 to 0.948, excluding the administrator form which was completed by only one assessor.

All 127 students in the 2009–2010 academic year submitted the required number of signed assessment forms on time; no student had any more than two scores of 2 or less ('strongly disagree' or 'disagree' on a five-point Likert scale); no student was required to meet with the clerkship director solely because of this element of assessment, and no student failed this element of their assessment. Some students submitted more than the required number of forms, with some submitting up to seven forms completed by a surgeon or patient. A total of 124 of 127 students completed the clerkship calendar, 109 students listing the names of individual team members they had worked with.

Students reported working with a median of nine different surgeons and four different anaesthesiologists over the 6 weeks. A total of 41 surgeons completed a total of 859 assessment forms. Surgeons assessed a median number of 18 students during the academic year (range 1–56), and 86% of teaching encounters recorded by students were associated with an assessment. An assessment form was completed on average after a student working 2.2 days with a surgeon (range 1–8.1).

A total of 104 anaesthesiologists completed a total of 273 student assessment forms during the year, each assessing a median number of two students in the year (range 1–11). About 90% of teaching encounters with an anaesthesiologist were associated with an assessment. An assessment form was completed on average after 1 day working with an anaesthesiologist (range 1–4).

A total of 116 students (91%) gave consent for their written comments to be analysed. Each student received an average of 188 words of written feedback divided into an average of 26 'Areas of Excellence' comments and 5 'Areas for Improvement' comments. In all, students were given 3051 written comments containing 22,183 words which noted areas of excellence in 2400 cases and areas for improvement in 651 cases. The approximate cost of the printing, binding and scanning of the assessment books for the year was CAN \$1500 or \$12 per student.

Interviews were conducted with five physicians, two chief residents, two nurses, two administrators and three students. Although the proportion of assessors and students attending for interview was low, the opinions expressed concurred with those obtained by informal feedback throughout the year. All but one of the physicians interviewed at the end of the pilot phase considered this method of assessment acceptable. There was a general consensus that having assessors other than physicians was a good idea. The physicians also appreciated the immediacy of giving feedback right after a teaching encounter, and appeared to prefer this to the online evaluation system in which they would sometimes complete an assessment weeks or months after the student had worked with them. One surgeon did not like the move to team-based learning, although the surgeon did not object to other people evaluating the student. Physicians reported being happy with all assessment items except 'this student will, in my opinion, make a good doctor' as they felt it was too general and too difficult to complete after a short exposure to a student.

Of the chief residents interviewed, one believed the method of assessment made sense, while the other did not like the method in general, preferring the former preceptor-based model. Both considered that their assessment form contained too many items. One resident stated that he had observed students 'going the extra mile' for patients who would be completing a form on them. The chief residents also stated that they thought senior residents should also be involved in assessment, as they worked more closely with students on call and observed student performance not seen by the chief residents.

Nurses reported that they valued the opportunity to give feedback to medical students to praise good performance and identify areas for improvement. Both unit managers found the Ward Nurse assessment form acceptable. Both said the main problem they observed was that students would often fail to introduce themselves to the nursing team they were working with. Operating room nurses reported liking the ability to provide immediate feedback on performance, being able to assess how students worked on their team, and being happy that others were assessing too. Our administrator preferred this method to the online system in which assessments were often overdue and welcomed the ability to provide feedback on professional behaviours such as respect for office staff, adherence to clerkship regulations and punctuality.

Interviews with students suggested that the majority liked being assessed by more than one physician. They stated that they liked the immediacy of the assessment, as opposed to systems in other clerkships that would offer feedback only after that clerkship was over. The assessment items were considered to be straightforward and easy to understand, although students reported valuing written comments over the numerical Likert-scale items. Assessments from residents and patients were particularly highly valued by students. Students stated that patient assessments were sometimes difficult to obtain, or awkward to ask for, and some felt they were giving the impression of caring more for the patient because they were going to ask for an assessment to be completed. Students were also pleased that they could have some control in choosing the timing of their assessments. Some reported

being able to temper negative feedback from one team member in the light of positive feedback from others. Some students reported being worried about having to strategize to get the right number of assessment forms completed, and reported trouble in tracking down assessors, or in remembering to get forms signed. One student stated 'having to ask people how they think you're doing is now the most scary thing about the surgery clerkship.' Another reported 'I have to be on my best behaviour all the time now, as everyone I work with is assessing me!'

Discussion

This study demonstrates that a team-based model of assessment based on the principles of MSF is a feasible and acceptable form of assessment for medical students learning in a clinical clerkship.

By engaging assessors and students in the development of the assessment tool, and by providing instruction and advice on how the tool should be used, we achieved 'buy-in' from multiple groups of assessors and students working in complex clinical environments at multiple sites. We also succeeded in engaging members of the healthcare team who have not traditionally been involved in the assessment of medical students. This method of assessment gives a voice to non-physician team members not traditionally involved in medical student assessment: nurses, patients, administrators and peers. Before, a physician might have solicited the opinion of these members informally before completing a student's assessment; now these members of the team can comment directly on aspects of student performance that they observe, and for the first time at our school, comments from non-physicians can appear on a student's Dean's Letter. Other authors have shown that non-physicians are able to evaluate the communication skills and humanism of physicians in training and practice (Kaplan & Centor 1990; Weinrich et al. 1993). We believe that using a team-based method of assessment also encourages students to interact more with non-physician members of the healthcare team and to pay attention to how their behaviour is perceived by their non-physicians and peers, coming much closer to a true 360-degree assessment of medical students than other studies which have claimed the same (Schell & Lind 2003). Demonstrating the importance of collaboration with other team members is an important message to send to medical students in training (Farmer et al. 2002; Pelling et al. 2011). We believe that soliciting the opinions of peers, patients and administrators is important – many of the comments provided by these groups related to areas of performance not usually observed by a supervising physician.

In our experience, the information provided to students using this method is mainly formative in nature. No students failed the assessment, and most of the comments provided to students were positive and encouraging: the median number of areas for improvement identified for a student was five. As each student was observed by up to 25 observers in 6 weeks, and no single assessor had the power to fail a student, we believe this method of assessment is essentially a series of low-stakes 'mini-assessments' which are cumulated into a final report containing all of the feedback received. It should be

noted here that this method of assessment was only one part of a larger assessment plan employed in addition to other traditional summative methods including a multiple-choice examination and an OSCE. We believe that assessment is made more robust using a variety of tools to measure student performance, and that this method may be one way of achieving the 'frequent look' system of assessment proposed by Ricketts and Bligh (2011).

For students with deficient performance, information given by multiple observers allows a more complete picture of their performance to be obtained, to help guide discussions with the student after the conclusion of the clerkship. Having a one-page summary of a student's performance including detailed information from all the methods of assessment used and including comments from all observers proved helpful in our experience when making decisions on academic promotion and advancement in the months after the clerkship had finished. As Lockyer and Clyman (2008) write, 'additive value is accrued from comparison of multiple sources'.

This method of assessment appeared to be relatively labour-intensive compared to an automated online assessment system. Most of the 'work' of scheduling assessments is done by students and assessors completing an assessment form shortly after the student have been working in a real clinical environment. We believe that this method of assessment offers the ability to provide immediate feedback on recently observed student behaviour, a major advantage over the online system which we previously employed. The financial cost of printing, binding and scanning assessment books is also acceptable to our institution. Having the assessment book retained by students for the full 6 weeks of the clerkship has some limitations, as the book is vulnerable to loss or damage and there is a potential risk of 'forward-feeding' if an assessor looks at other assessment forms completed before completing his/her own form.

Physicians reported being comfortable with the assessment tool and with the fact that students were being evaluated by others in the patient-care team. We had anticipated some resistance from physicians who had traditionally been the 'source of truth' in student assessment relinquishing this role to the team, but this did not turn out to be the case.

Using a method in which students are required to initiate or ask for an assessment was initially challenging, but was gradually accepted by both learners and assessors. This finding of learner discomfort concurs with Rees and Shepperd (2005) who noted that MSF can decrease students' enjoyment of the learning environment, given the constant feeling of being evaluated in every part of their professional activity. When developing this tool, students claimed they were 'hungry for feedback' – we hope that this tool has gone some way to satisfying their appetite! We anticipate that getting students used to thinking about how their own performance is perceived by others, and to asking for feedback and seeking out areas for improvement will enhance their learning in other clerkships and later in residency and practice (Gordon 2003).

As a result of this study, we have elected to employ this method in all of the surgery clerkships at our school: it is now in use in the 6-week Year 4 clerkship in Specialty Surgery as well as in Year 3 clerkship in General Surgery,

Anaesthesiology and Pain Medicine. We also made a number of changes to the assessment method in the second year of its use including removing two surgeon assessment forms and adding two senior resident assessment forms, reducing the number of items on the chief resident form, allowing students to select their own ward nurse assessors, allowing physicians to record how long they had spent with a student, and allocating more space on the forms for written comments. We also removed the item 'this student will, in my opinion, make a good doctor', for the reasons given above.

This study demonstrates that team-based assessment can indeed be implemented and accepted in a clinical clerkship. We plan to continue to study this method of assessment to determine its strengths and weaknesses, to further examine its reliability and validity, and to compare this method with more traditional methods of assessment used elsewhere in our school.

Conclusions

This study demonstrates that a team-based model of assessment based on the principles of MSF is a feasible and acceptable form of assessment for medical students learning in a clinical clerkship, and has some advantages over traditional preceptor-based assessment. Further studies will focus on the strengths and weaknesses of this novel assessment technique.

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Notes on contributors

NISHAN SHARMA, MSc EdD, was team lead for Undergraduate Surgical Education in the Faculty of Medicine and Dentistry at the University of Alberta, Canada.

YING CUI, PhD, is an assistant professor in the Centre for Research in Applied Measurement and Evaluation in the Faculty of Education at the University of Alberta, Canada.

JACQUELINE LEIGHTON, PhD, R Psych, is a chair of the Department of Educational Psychology and Professor in the Centre for Research in Applied Measurement and Evaluation in the Faculty of Education at the University of Alberta, Canada.

JONATHAN WHITE, MB BCh BAO BMedSci (Hons) MSc (Med Ed) PhD FRCS (Gen Surg), is an associate professor in the Department of Surgery, and is the Tom Williams Endowed Chair in Surgical Education in the Faculty of Medicine and Dentistry at the University of Alberta, Canada.

References

Alberta Physician Achievement Review 2009. Information about the PAR Program [Internet]. Edmonton: College of Physicians and Surgeons of

- Alberta. [Published 2009 June 1]. Available from: <http://www.par-program.org/>.
- Bunton SA, Sabalis RF, Sabharwal RK, Candler C, Mallon WT. 2008. Medical school expansion: Challenges and strategies. Washington DC: American Association of Medical Colleges.
- Davies HA, Archer JC. 2005. Multi source feedback using Sheffield Peer Review Assessment Tool (SPRAT): Development and practical aspects. *Clin Teach* 2(2):77–81.
- Edwards MR, Ewen AJ. 1996. 360 Feedback – The powerful new model for employee assessment & performance improvement. New York: AMACOM.
- Evans AW, Leeson RMA, Newton John TR, Petrie A. 2005. The influence of self-deception and impression management upon self-assessment in oral surgery. *Br Dent J* 198:765–769.
- Farmer EA, Beard JD, Dauphinee WD, LaDuca T, Mann KV. 2002. Assessing the performance of doctors in teams and systems. *Med Educ* 36:942–948.
- Fleenor JW, Taylor S, Chappelow C. 2008. Leveraging the impact of 360-degree feedback. San Francisco, CA: Wiley.
- Foy NF, Schlisselberg G. 2002. Using 360-degree performance assessment techniques in student evaluation (Report no. NCRITL-TM034724). East Lansing, MI: National Center for Research on Teacher Learning. (ERIC Document Reproduction Service no. ED473152), 2002.
- Frank JR, editor. 2005. The CanMEDS 2005 physician competency framework. Better standards. Better physicians. Better care. Ottawa: The Royal College of Physicians and Surgeons of Canada.
- Gordon J. 2003. Assessing students' personal and professional development using portfolios and interviews. *Med Educ* 37(4):335–340.
- Hampton T. 2008. US medical school enrollment rising, but residency programs too limited. *JAMA* 299(24):2846.
- Hesketh EA, Anderson F, Bagnall GM, Driver CP, Johnston DA, Marshall D, Needham G, Orr G, Walker K. 2005. Using a 360 degrees diagnostic screening tool to provide an evidence trail of junior doctor performance throughout their first postgraduate year. *Med Teach* 27(3):219–233.
- Kaplan CB, Centor RM. 1990. The use of nurses to evaluate house officers' humanistic behavior. *J Gen Intern Med* 5: 410–414.
- Lockyer JM, Clyman SG. 2008. Multisource feedback (360-degree evaluation). In: Holmbie ES, Hawkings RE, editors. Practical guide to the evaluation of clinical competence. Philadelphia, PA: Mosby Elsevier. pp 75–85.
- Pelling S, Kalen A, Hammar M, Wahlström O. 2011. Preparation for becoming members of health care teams: Findings from a 5-year evaluation of a student interprofessional training ward. *J Interprof Care* 25(5):328–332.
- Rees C, Shepherd M. 2005. The acceptability of 360-degree judgments as a method of assessing undergraduate medical students' personal and professional behaviours. *Med Educ* 39(1):49–57.
- Ricketts C, Bligh J. 2011. Developing a "frequent look and rapid remediation" assessment system for a new medical school. *Acad Med* 86(1):67–71.
- Risucci DA, Tortolani AJ, Ward RJ. 1989. Ratings of surgical residents by self, supervisors, and peers. *Surg Gynecol Obstet* 169(6):519–526.
- Schell SR, Lind DS. 2003. An Internet-based tool for evaluating third-year medical student performance. *Am J Surg* 185(3):211–215.
- The Association of Faculties of Medicine of Canada 2010. Canadian Medical Education Statistics 32:11. Available from http://www.afmc.ca/pdf/Cmes_2010_Shrink.pdf
- Waldman D, Bowen D. 1998. The acceptability of 360° appraisals: A customer-supplier relationship perspective. *Hum Resour Manage* 37(2):117–129.
- Weinrich MD, Carline JD, Giles LM, Ramsey PG. 1993. Ratings of the performances of practicing internists by hospital-based registered nurses. *Acad Med* 68:680–687.
- Woolliscroft JO, Howell JD, Patel BP, Swanson DB. 1994. Resident-patient interactions: The humanistic qualities of internal medicine residents assessed by patients, attending physicians, program supervisors and nurses. *Acad Med* 69(3):216–224.