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Novel use of an OSCE to assess medical students' responses to a request for a low value diagnostic imaging test: A mixed methods analysis

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ABSTRACT

Objective: Evaluate medical students' communication skills with a standardized patient (SP) requesting a low value test and describe challenges students identify in addressing the request.
Methods: In this mixed-methods study, third-year students from two medical schools obtained a history, performed a physical examination, and counseled an SP presenting with uncomplicated low back pain who requests an MRI which is not indicated. SP raters evaluated student communication skills using a 14-item checklist. Post-encounter, students reported whether they ordered an MRI and challenges faced.
Results: Students who discussed practice guidelines and risks of unnecessary testing with the SP were less likely to order an MRI. Students cited **several** challenges in responding to the SP request including patient characteristics and circumstances, lack of knowledge about MRI indications and alternatives, and lack of communication skills to address the patient request.
Conclusions: Most students did not order an MRI for uncomplicated LBP, but only a small number of students educated the patient about the evidence to avoid unnecessary imaging or the harm of unnecessary testing.
Practice implications: Knowledge about unnecessary imaging in uncomplicated LBP may be insufficient to adhere to best practices and longitudinal training in challenging conversations is needed.

1. Introduction

Uncomplicated low back pain (LBP) is one of the most common reasons for seeking medical care in the United States (U.S.) [1]. When red flags are absent on history and physical, recommended treatment is usually pharmacologic (e.g., acetaminophen, NSAIDs, muscle relaxants) and non-pharmacologic (e.g. physical therapy) [2]. The majority of patients will have resolution of symptoms regardless of treatment [3]. According to the American College of Radiology Appropriateness Criteria, most patients with uncomplicated acute LBP with or without radiculopathy do not require imaging, with imaging considered only in patients who have had medical management and physical therapy for 6 weeks that results in little improvement [4].

Despite these recommendations, inappropriate use of imaging in uncomplicated LBP is a significant driver of healthcare costs to both patients and the U.S. healthcare system [5]. A national survey of Veterans Affairs (VA) clinicians identified several perceived barriers to following these recommendations and avoiding imaging for uncomplicated LBP, including: being unable to refer a patient to a specialist without getting an image first, not enough time during a visit to discuss the risks and benefits of imaging, and concern about upsetting the patient and risking a lawsuit [6]. Given these barriers, as well as other areas of disconnect between guidelines and practice, the American Board of Internal Medicine (ABIM) Foundation partnered with medical societies in establishing the Choosing Wisely (CW) campaign to encourage resource stewardship and promote conversations between clinicians and patients about low value testing [7,8]. Currently, eight specialty societies have CW recommendations against ordering imaging for uncomplicated LBP [9].

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Building evidence-based practice habits starts early in training, so it is incumbent on educators to train learners to consider value in their care of patients [10] and assess how learners communicate with patients about these decisions, particularly when patients request low value tests or treatments [11]. The Liaison Committee on Medical Education (LCME), which accredits U.S. and Canadian medical schools, specifically asks institutions to identify the courses and clerkships where learning objectives related to "patient safety" and "value-based care" are taught and assessed [12,13].

Studies have reported changes in clinician attitudes and beliefs towards the management of acute uncomplicated LBP after educational interventions [14] but few demonstrate outcomes for interventions with medical students. One Australian study described positive changes in student knowledge, beliefs and attitudes that were in keeping with evidence-based practice after watching a short video on LBP [15]. A U.S. study reported significantly better performance in history and physical examination skills during an observed, structured clinical examination (OSCE) by students completing a web module on LBP than students who did not [16]. There are many instruments that assess medical students' general communication skills overall, however none assess students' ability to communicate with patients about imaging requests for nonspecific low back pain [17].

This study reports the use of a newly developed OSCE case to assess medical students' communication skills with a standardized patient (SP) who requests low value imaging for uncomplicated LBP and describes the challenges that students most frequently encounter when communicating with SPs who request unnecessary testing.

2. Methods

2.1. Setting & participants

We conducted this cross-sectional, mixed-methods study at two private, LCME-accredited, mid-size urban medical schools located in the Northeast U.S. (School A, School B, to bolster the generalizability of study findings). At School A, students received a one-hour lecture during the Radiology clerkship on appropriate use of imaging in the evaluation of low back pain. Additionally, students have a two-hour small group session focused on communication strategies for difficult encounters during a longitudinal third-year course. At School B, third year students received a one-hour session on the use of diagnostic imaging in the evaluation of low back pain and are required to complete a patient encounter that involves the management of low back pain (simulated or real) during their Family Medicine clerkship.

All (100%) third year medical students at both institutions who had completed their core clinical clerkships participated in a summative multi-station clinical skills assessment. For each encounter, students had fifteen minutes to evaluate the SP, followed by ten minutes to complete a post-encounter exercise. The institutional review board at both institutions approved this study.

2.2. OSCE development

The authors developed a new OSCE case for inclusion in this established, yearly clinical skills assessment. In the case, students were instructed to obtain a history, perform a physical examination, and counsel an SP presenting with acute low back pain that developed after lifting heavy furniture. The findings point either to a lumbar muscle strain or a herniated lumbar intervertebral disc. During the encounter, the patient requests an MRI, which would be advised against by several specialty societies as part of the CW campaign [8]. The presenting medical details of the case portrayals were identical across both schools except that at School A, the patient portrayed by the SP is employed as a medical assistant at an orthopedic surgeon's office and at school B, the patient does not work in healthcare.

2.3. Data collection instruments

Two study authors (SKO, FM) developed three assessment checklists for the case: an 11-item history checklist (yes/no) comprising the essential pieces of information that a physician would need to obtain in order to collect a thorough understanding of the patient's symptoms, with an additional 2 items reporting whether a student had referenced medical guidelines (yes/no) and informed them of any risks to unnecessary medical testing (yes/no) in their response to the MRI request; a 9-item physical examination checklist (done correctly/attempted but incorrect/not done) comprising the inclusion and technical execution of the components of the physical exam that would be most relevant to perform in order to further evaluate the patient's symptoms; and a 14-item communication skills checklist. We based this checklist upon a behaviorally anchored 12-item communication skills rating scale developed in 2004 including elements discussed in the Kalamazoo Consensus statement [18]. It was revised in 2006 to more closely align with the three-function model, PEARLS model of rapport building developed by the American Academy of Communication in Healthcare [19,20]. SPs rate students' performance on each item at one of three defined levels (does not meet competency, meets competency and exceeds competency). For this study we expanded to 14 items; one item from the original 12-item checklist was modified, and two items were added for this study to align with communication skills recommended by the CW campaign.

Students at School A were assessed by SPs using all three checklists while students at School B were assessed using **only** the 14-item communication skills checklist. At both schools, SPs provided a global rating on a 5-point Likert scale of their impressions of the student's performance on the case (rated clear fail/borderline/clear pass/very good pass/excellent pass).

Students also completed a post-encounter exercise in which they documented whether they agreed to order an MRI **(yes/no)**, and **to describe any** perceived challenges in responding to the patient's request for an MRI.

2.4. Standardized patient raters

SPs served as the assessors of student performance. Both School A and School B use experienced professional actors trained as SPs. They are recruited and trained for each case by a physician and an experienced SP trainer. Each year one of the authors works with the SP trainer to administer a frame of reference rater training session on use of the communication skills checklist [21,22]. Frame of reference training is an extension of performance dimension training and has been shown to be very effective in increasing inter-rater reliability [21]. While viewing video clips of previous students performing at various competency levels interviewing the SPs portraying the same cases they would be rating, the SPs completed portions of the communication skills checklist. After each clip the SPs responded to a show of hands to report their rating on a given item. When there was disagreement, raters explained their reasons for their choice. We referred raters to the behavioral anchors, categorized behaviors into appropriate dimensions and explored the effectiveness of each behavior. Each item was discussed until consensus was reached.

2.5. Data analysis

2.5.1. OSCE reliability

At School A, we determined the reliability of this OSCE case using the borderline regression method [23,24]. We calculated the

percentage of students who reported that they would order an MRI based on self-report in the post-encounter exercise and sought to investigate the relationship between students' clinical skills performance on the OSCE (measured via the checklists described above) and the reported decision to order an MRI. We determined a total score for each individual skill checklist (0–100%) as well as a total examination score (0–100%) for each student at School A only (School A: history, physical examination, communication skills; School B: communication skills).

2.5.2. Communication skills checklist

We performed univariate *t*-tests to compare student performance on the communication skills checklist between School A and B, as well as evaluate the relationship between student performance on the history, physical examination and communication skills checklists and the decision to order an MRI. We performed Pearson chi-square analysis and calculated the Phi coefficient to assess the relationship between (1) whether a student had referenced medical guidelines and (2) informed the patient of any risks to unnecessary medical testing, and whether they ordered an MRI. Finally, we conducted an unpooled Z-test of proportions to determine whether there was a differential rate of MRI orders by School. All statistical analyses were performed using R base package (The R Foundation for Statistical Computing, Vienna, Austria).

2.5.3. Post-encounter exercise

Two of the authors (SKO, FM) performed a conventional content analysis of the challenges that students described in the post-encounter exercise [25]. The authors initially reviewed each student response to generate an initial coding list and categories of themes. After an initial coding list of themes had been developed, the authors independently reviewed and coded each student's response, and each response was coded for all applicable themes, and the number of themes per response was determined. Discrepant coding was resolved by discussion between the study investigators.

3. Results

178 students completed the OSCE from School A and 73 from School B, with complete checklist data available from only 60 students at School B. There was no significant difference in student performance on the 14-item communication skills checklist between School A and School B (Mean of checklist for A=0.62, B=0.63, t = 0.37, df=101.09, p = 0.71), suggesting the different occupational background for the SP's did not produce a detectable meaningful effect.

3.1. Quantitative results: relationship of OSCE performance to ordering an MRI

The mean total examination score was 62.2% (SD 12.2%, range 40%–92%) and the reliability of this OSCE case was R^2 = 0.65 using the borderline regression method. A total of 55 students (22%) indicated they would order an MRI, 42 from School A (**24%**) and 13 from School B (17%). At School A, student's self-reported decision not to order an MRI corresponded significantly with the SP having indicated that the student discussed practice guidelines (c^2(1,N = 178) = 28.94, p < 0.001, r = 0.42) or discussed risks of unnecessary testing (c^2(1,N = 178)= 15.84, p < 0.001, r = 0.31) during the encounter. Of the 44% (N = 79) of students who discussed practice guidelines, 4% ordered an MRI, and of the 34% (N = 60) of students who talked about the risk of unnecessary testing, 5% ordered an MRI. Overall performance on the OSCE case, as well as performance on the history, physical examination and communication skills checklist did not correspond with the self-reported decision to order an MRI or not (Table 1).

3.2. Qualitative results: student reflections on communication challenges

Across both schools, > 99% (250 out of 251) of participating students provided responses to the prompt. The number of codes applied to each response ranged from 1 to 8. Six percent of students reported no challenges in responding to the patient's request. We identified ten thematic categories of codes, one of which was a category for a response that did not answer the question prompt - responses that were excluded from our analyses. We applied a total of 598 codes to student responses. In Table 2 we present the total number and percentage of responses in each thematic category.

3.2.1. Challenges posed by patient characteristics & circumstances

Students frequently cited patient characteristics (such as being persistent or demanding) as posing a challenge in responding to the request. One student described the challenge of:

> *His persistence and insistence that it would provide a "definitive" diagnosis. I had to politely deflect by proposing this conservative management strategy, which he eventually accepted.*

Students also found the particular circumstances of the patient (such as work or family obligations, or the fact that the patient was presenting in considerable pain) as adding to the challenge of responding to the patient's request:

> *The patient clearly did not want to just wait until she feels better since she has a life and three children to take care of, so it was difficult to tell her to keep doing what she's doing and just manage the pain with OTC medications and rest. However, and [sic] MRI is not indicated at this time and would likely cause more harm than good in her situation, not only putting her through an uncomfortable test while in pain but likely being inconclusive.*

At School A, where the patient's occupation was as medical assistant in an orthopedic surgeon's office, the circumstance of the patient's perceived medical knowledge was cited by students as posing a challenge:

> *I wanted to give the patient a clear answer as to the cause of her pain, and it was challenging to refuse a request that she felt might be indicated to treat her pain adequately. This patient, with a background in healthcare, knew what to ask for, which made me uncomfortable as a student doctor with limited experience.*

3.2.2. Challenges posed by student's lack of knowledge

A number of students cited a lack of knowledge as presenting a challenge to responding to the patient's request. Students often described a lack of knowledge about the MRI test itself, including things like the risks of MRI testing as well as the potential benefits, how the test itself works, to knowledge of the cost of, indications for, and implications of incidental findings on MRI. Additionally, students commented upon a lack of knowledge of what the alternative workup, or alternative treatment, would be for this patient:

> *I told the patient that I thought imaging would be the best course of action (the patient was not too insistent about the MRI to me, so that was not difficult). The difficult part was thinking about whether or not the MRI was the right imaging modality vs. CT. Although I said that an MRI [sic] In thinking about it now, I'm not so sure that imaging was necessary as it may have simply been musculoskeletal from her moving the couch (it actually probably was that).*

3.2.3. Challenges posed by student's lack of skills

When students mentioned a lack of skills as the challenge in the encounter, they most frequently wrote that they felt they lacked the interpersonal and communication skills necessary to respond to the

Table 1
Counts of self-report MRI orders, means and standard deviations of assessment scores, and predictors of MRI order decisions.

	Counts	p-value for relationship to ordering MRI
Student self-reported ordering an MRI (N, %)	School A: 42 (24%) School B: 13 (17%)	0.90
	Scores	
Overall exam score (mean, SD)	31.11 (6.11)	0.14
History skills checklist score (mean, SD)	9.87 (1.71)	0.12
Discussed clinical practice guidelines (N, %)	79 (44%)	< 0.001 *
Discussed risks of unnecessary testing (N, %)	60 (34%)	< 0.001 *
Physical exam skills checklist score (mean, SD)	3.83 (1.75)	0.10
Communication skills checklist score (mean, SD)	School A: 17.42 (4.51) School B: 17.67 (4.54)	0.83

Note: * indicates that the value was a meaningful predictor of MRI order.

Table 2
Results of thematic analysis – most frequently reported challenges.

Challenges - Thematic Categories	N (%) of responses citing one of the codes in this category as a challenge
Patient characteristics	113 (18.8%)
Patient circumstances	134 (22.4%)
Student characteristics	11 (1.8%)
Challenges stemming from lack of knowledge	63 (10.5%)
Challenges stemming from lack of skills	150 (25.0%)
Challenges stemming from attitudes/beliefs	32 (5.3%)
Clinical/case context circumstances	65 (10.8%)
Characteristics of the intervention	21 (3.5%)
Other contextual features (e.g. the testing environment)	9 (1.5%)

request. The challenges reported spanned the skills necessary for rapport building, conflict resolution/negotiation, limit setting and patient education. One student wrote:

> *It was most challenging to explain in a clear way why I did not think an MRI was indicated, without trying to belittle her pain or make her feel like her suggestion is invalid.*

3.2.4. Challenges posed by student's attitudes/beliefs

Some students described challenges stemming from the attitudes and beliefs they held about their role, and the roles of physicians, in balancing the application of clinical practice guidelines with the desires of those individual patients. Some students described the belief that the physician's role to help the patient made it challenging to respond to the request:

> *It is challenging to disappoint patients, because as their care provider I want to give them a satisfying experience at the doctor's office. I don't want my patients to leave feeling that they didn't get what they needed or wanted from a visit, which can sometimes be the case when patients hope for imaging or antibiotics, etc. Hopefully, but [sic] explaining my reasoning and showing that I'm being thorough even though I am not pursuing the management they expected, they continue to trust me and continue to see the doctor's office as a resource and support.*

Other students described a concern that a bias held against patients who request testing or pain medications proved challenging during the encounter.

3.2.5. Other challenges

Students infrequently cited as challenging the characteristics of the MRI intervention itself – the cost, risk of false positives (e.g., overtreatment), and balance of benefits and harms. A few students described constraints of the testing environment (e.g. lack of time) as challenging.

4. Discussion and conclusion

4.1. Discussion

Uncomplicated LBP continues to be a driver of high healthcare costs in the U.S even during the early stages of the CW campaign [8,26,27]. We describe the **use** of a performance-based assessment (OSCE) to assess student communication skills when responding to an SP requesting an MRI for uncomplicated LBP. While a majority of students adhered to clinical practice recommendations outlined in the CW campaign to avoid ordering an MRI, only a small number of students educated the patient about the evidence informing the decision to avoid the tests or the risks of harm in proceeding with an unnecessary test. These trends mirror previously published studies among providers who struggle to communicate harms and benefits for common medical conditions and may overestimate these when discussing with patients [27].

In our study, students reported a lack of knowledge as a significant challenge in responding to the patient's request. One might hypothesize that the solution could simply be to address the knowledge deficit and train students in the indications for imaging. However, previous studies among providers demonstrate that despite knowledge that imaging studies are not indicated, many still order them [5]. Key challenges included the need for imaging for referral to a specialist, concern about the patient becoming upset, limited time to discuss harms and benefits, and concern over litigation. While students in our study did not cite concerns about litigation or specialty referral, they did identify concerns regarding communication with patients. Students described as challenging the desire to balance the therapeutic alliance with the patient while also "saying no." Studies of this phenomenon would suggest that students' concerns are well founded. A small study conducted in Norway investigating physician accounts of what happened to the doctor-patient relationship after refusing a patients' request described that in some instances the relationship was permanently damaged and/or terminated [28]. A separate study of practicing general practitioners (GP) and GP trainees in the United Kingdom revealed that trainees found this conflict to be difficult, with some resorting to a workaround to preserve the patient-physician

relationship (e.g. deflecting blame to distant third parties) [29]. The challenge of saying no may be exacerbated when confronting a patient who is particularly insistent. In our study, some students found it challenging to communicate with a patient they perceived to be persistent/demanding, findings mirrored in a survey study of pediatric residents' confidence during, and anxiety about, difficult patient encounters [30]. The communication challenges faced by students reinforces previous findings that knowledge about best practices, such as those through the CW campaign, may alone be insufficient to alter provider practice patterns [5,31].

Students in our study occasionally cited personal attitudes and beliefs about the role of the physician. Students described ambiguity about the physician role both as a steward of limited resources and as someone committed to improving the health of an individual person, a finding similar to one uncovered in a survey of practicing physicians in a large healthcare network in Massachusetts in which one third of respondents felt it was unfair to physicians to be tasked with being both cost-conscious as well as attentive to individual patient welfare [32]. A separate study conducted in the Netherlands examined attitudes towards high-value care amongst patients, graduate trainees, and practicing physicians and found that practicing physicians held the most favorable attitudes towards the physician providing high-value care, and patients holding the least favorable attitudes, with trainees falling in the middle [33].

Implementing curricula to equip students with the knowledge, skills and attitudes to confront these challenges alone may not be sufficient. The classic adage "assessment drives learning" describes the foundational ideal that what is tested is an important tool to help learners understand what is valued and/or important and thus drives students' focus and preparation. OSCE-type exams such as the one in this study can drive learning and the articulation of learning goals. A key element that is needed to ensure that assessments - and in particular assessments of communication skills - do indeed drive learning is that learners receive feedback on their assessment performance [34,35]. Consideration must be given to how curriculum development can be viewed within a cycle of training-assessment-feedback to help grow learner's abilities and continually monitor them over time.

The limitations of our study include that the performance based OSCEs were delivered at two schools in the Northeast U.S., both in urban settings, which may limit the generalizability of the findings to other diverse clinical practice environments across the U.S. The assessment utilized a single case with a single cohort of students during a snapshot in time and did not follow students longitudinally into clinical practice. Other variables that may impact learner performance include student variation in didactic and clinical experiences related to uncomplicated LBP and differences in SP training at both institutions.

These limitations provide guidance on how future studies may continue to explore learner performance. One path is to follow learners longitudinally into clinical practice to see whether challenges change over time with various levels of clinical experience. Such longitudinal data may also be tracked by specialty, practice type, and practice location to assess for attributable variations. As noted earlier, knowledge of best practices alone is insufficient to alter practice patterns. Further exploring the communication barriers described by learners in the context of previously published barriers (e.g. risk of malpractice) may further elucidate how these communication skills evolve over time.

4.2. Conclusion

While a majority of students adhered to clinical practice recommendations outlined in the CW campaign to avoid ordering an MRI, only a small number of students educated the patient about the evidence informing the decision to avoid the tests or the risks of harm in proceeding with an unnecessary test. This is consistent with students reporting lack of knowledge as a significant challenge in responding to the patient's request.

Our study also highlights that knowledge of clinical guidelines alone isn't enough to alter practice behaviors and that there are unique challenges that learners face when encountering a patient requesting an unnecessary test. Students were challenged by balancing the therapeutic alliance with the patient when "saying no" and their role as stewards of limited resources. The identification of these challenges can inform curricular interventions which better equip students to face these challenges. At our institutions, we need to continue our efforts to teach the knowledge (what) and expand our curricula to train students in the skills (how) to have these conversations and impress upon students the attitude (why) that stewardship is a professional obligation, particularly as preparation to practice in the US healthcare system where there is a widespread idea that "more is better." Finally - our study also demonstrates reliable assessment of these communication skills using OSCEs. Further work is needed to determine the impact of these assessments on professional development and practice behaviors, and implementation of longitudinal assessment of knowledge, skills and attitudes could be considered in order to measure this impact.

4.3. Practice implications

The communication challenges faced by students reinforce previous findings that knowledge about best practices may alone be insufficient to alter provider practice patterns [5,31]. Data from our study reflect the need for specific training in having these types of difficult conversations across the continuum of practice; furthermore, adjuncts such as patient education and public health campaigns may play an important role in the communication strategies employed in the provider-patient relationship.

CRediT authorship contribution statement

Sandra K. Oza: Conceptualization; Formal analysis; Writing – original draft; Writing – review & editing, **Pablo Joo:** Conceptualization; Formal analysis; Writing – original draft; Writing – review & editing, **Joseph Grochowalski:** Data curation; Formal analysis; Writing – review and editing, **Steven Rougas:** Conceptualization; Writing – review & editing, **Paul George:** Conceptualization; Writing – review & editing, **Felise Milan:** Conceptualization; Formal analysis; Writing – original daft; Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no relevant competing interests relevant to the content of this work.

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