should be added to the vaginal ulcers and granulomas that can develop following polypropylene slingplasty [1].

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# Improving medical students' competence at breast examination

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Development of medical students' clinical skills is an essential element of medical student education. Unfortunately, since the adoption of restricted resident duty hours in the United States in 2003, a simultaneous diminishing of the quality of clinical education for medical students has been documented [1]. In addition to reduced accessibility of house officers and faculty, and reduced opportunities for students to be observed in the clerkships, in 2004 we saw a drop in student performance on several of the physical examination stations on our summative Objective Structured Clinical Examination (OSCE). The most significant decrease was on the breast examination station.

Previous reports have identified the breast examination as an essential skill to be learned during medical school, but have also reported low skill retention as medical students transitioned from preclinical education into clinical clerkships [2]. A survey of over 80 clinical skills course directors from US medical schools indicated that practice with standardized patients [3] incorporated into clerkship activities helps to standardize learning and enhance students' breast examination skills [4].

After seeing a precipitous drop in performance as measured on a multistation summative OSCE, we wanted to improve our clinical students' competence in performing a breast examination. Using the research literature as a guide, we developed a structured breast examination intervention with a standardized patient during the obstetrics/gynecology clerkship. Examination skills on the intervention were the same skills (breast examination) measured on the OSCE. We hypothesized that such an intervention would improve students' performance in a breast examination on a summative graduation OSCE.

Between 2005 and 2006, we added a breast examination standardized patient (SP) exercise that incorporated oral feedback to the student from the SP to the required obstetrics/gynecology clerkship. Student performance on the obstetrics/gynecology SP exercise was scored on a checklist with 15 items that specifically measured breast examination skills.

All of our senior medical students complete a 12-station OSCE; passing each station is required for graduation. On the breast examination station, students are instructed to do a breast examination on an SP who presents with a breast lump. Student performance was scored on a checklist with the same 15 items that specifically measured breast examination skills. Performance on both the exercise and the OSCE station was calculated as the percentage of all checklist items performed correctly.

We used the $t$ test to determine if there were any statistically significant changes in overall OSCE performance over 5 years (2002–2006), and also to determine if there were statistically significant improvements by specific skill (checklist item) between 2005 and 2006.

On the OSCE breast examination station we observed significantly diminished student performance between 2003 (85.8%; 10.53 SD) and 2004 (69.2%; 10.90 SD) ($P < 0.000$). In 2005 we integrated an SP breast examination exercise with feedback based on performance as indicated on the checklist

**Table 1**
Mean performance on breast examination M4 OSCE station, 2002 to 2006

| Year | N | Performance, % (Mean±SD) | Mean change from previous year[a] | Significance of change from previous year |
|---|---|---|---|---|
| 2006 | 159 | 76.00±10.79 | +8.15 | $t=6.52$, $df=330$, $P=0.000$ |
| 2005 | 173 | 67.85±11.90 | −1.37 | NS |
| 2004 | 162 | 69.22±10.90 | −16.58 | $t=14.10$, $df=330$, $P=0.000$ |
| 2003 | 170 | 85.80±10.53 | +1.45 | NS |
| 2002 | 157 | 84.35±11.32 | N/A | NS |

[a] The mean increase from 2005 to 2006 was statistically significant, as was the mean decrease from 2003 to 2004. The other mean changes were not significant.

into the obstetrics/gynecology clerkship; mean performance on the station was 71.1% (15.9 SD). Subsequently, we observed significantly improved performance on the OSCE breast examination station between 2005 (67.8%; 11.90 SD) and 2006 (76.0%, 10.79 SD; $P<0.000$) (Table 1).

An itemized analysis of the OSCE breast examination checklist revealed significantly improved performance between 2005 and 2006 on 11 out of 15 items, and improved performance, although not significant, on another 2 (Table 2). Performance decreased on 2 of the 15 items, although this was not significant.

In summary, at our institution we observed precipitous drops in performance of our fourth year students on the breast, cardiac, and abdominal examination stations on a required

OSCE. The timing of this diminished performance coincided with the implementation of restricted resident duty hours. This study demonstrates that integration of an SP exercise that gives students an opportunity to practice fundamental clinical skills and receive feedback can significantly improve student performance on a high-stakes graduation OSCE.

Physician observation of students' clinical skills with actual patients is critical to educational quality. Unfortunately, limited observation of their interactions with patients as well as limited formal, formative feedback allows bad habits to develop and be carried through clinical training. However, as we work to address the observation/feedback issue, there are other pedagogical steps we can take to fill such gaps. The OSCE provides an excellent opportunity to detect problems with clinical skills. We found that integration of an SP breast examination exercise into our obstetrics/gynecology clerkship to address problems with those skills, coupled with feedback on areas that needed attention, improved student performance significantly.

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**Table 2**
Comparison and item analysis of performance on breast examination station, 2005 and 2006

| Item | Performance in 2005, % (n=173) Mean±SD | Performance in 2006, % (n=159) Mean±SD | Mean difference | t | P value |
|---|---|---|---|---|---|
| Cleaned his/her hands | 99.42±7.65 | 97.48±13.55 | −1.94 | 1.63 | 0.105 |
| Used an appropriate draping technique | 93.31±24.93 | 91.40±19.76 | −1.91 | 0.77 | 0.442 |
| Visually inspected the breast | 64.23±33.46 | 74.05±38.57 | 9.82 | 2.49 | 0.013[a] |
| Asked the patient to put arms over her head | 56.13±38.89 | 65.41±28.66 | 9.28 | 2.46 | 0.014[a] |
| Asked the patient to put arms on her waist and elbows forward | 45.93±34.92 | 70.57±38.74 | 24.64 | 6.10 | 0.000[b] |
| Asked patient to lean forward with arms out in front | 51.72±42.73 | 81.01±29.11 | 29.29 | 7.24 | 0.000[b] |
| Nodes of neck and chest | 47.37±42.69 | 76.27±30.23 | 28.90 | 7.07 | 0.000[b] |
| Nodes of axilla and arm | 52.90±29.00 | 70.57±29.93 | 17.67 | 5.47 | 0.000[b] |
| Performed bimanual palpation of the breast | 44.94±41.06 | 76.90±32.24 | 31.96 | 7.85 | 0.000[b] |
| Asked patient to put arm overhead during supine position | 72.39±41.73 | 76.42±40.10 | 4.03 | 0.90 | 0.371 |
| Complete palpation of the breast | 66.28±26.49 | 76.42±25.04 | 10.14 | 3.58 | 0.000[b] |
| Palpation of the nipple | 53.56±41.68 | 69.50±35.09 | 15.94 | 3.76 | 0.000[b] |
| Gentle expression of the nipple | 69.60±39.31 | 71.20±36.26 | 1.60 | 0.39 | 0.701 |
| Palpation of axillary tail | 62.41±39.91 | 70.89±37.10 | 8.48 | 2.00 | 0.046[a] |
| Provided instruction in self-breast exam | 43.07±41.99 | 67.61±37.79 | 24.54 | 5.59 | 0.000[b] |

Note: Analysis restricted to those items appearing both years. Significant difference across items detected by $t$ test.
[a] $P<0.05$.
[b] $P<0.001$.