Use of Breast Simulators Compared with Standardized Patients in Teaching the Clinical Breast Examination to Medical Students

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OBJECTIVE: Simulators have replaced some standardized patients in medical student teaching, and their use seems to decrease anxiety related to the clinical breast examination (CBE). We compared learning the CBE on a breast palpation simulator with learning on a standardized patient with respect to skill acquisition and comfort level.

METHODS: At Penn State College of Medicine, the class of 2008 (historical control group, n = 113) learned the CBE on a standardized patient, whereas the class of 2009 (experimental group, n = 131) learned on the breast palpation simulator. We used measures of the process (conducting the CBE) and measures of the outcome (examination scores and detection of abnormal findings). During their third-year surgical clerkship, students in both groups completed a questionnaire reporting the number of CBEs performed and confidence in performing the CBE. The students then performed an observed examination on the simulator, and the number of positive findings detected was recorded. The mean number of positive findings was compared between groups, and an economic analysis was conducted.

RESULTS: The experimental group had a significantly higher mean examination score than the historical control. In subgroups, this difference was significant for those who reported performing 0-5 clinical examinations but for not those who had performed >6 examinations. On individual items, the experimental group scored significantly higher in examining for neck nodes, nipple retraction, skin changes, and axillary evaluation. The 2 groups did not differ significantly in the mean number of positive findings detected or in ratings of comfort level.

CONCLUSIONS: Medical students who learned the CBE on breast palpation simulators performed as well or better than those who learned on standardized patients; however, a subgroup analysis revealed that the benefit was limited to students with less clinical experience. (J Surg 69:416-422. © 2012 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

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COMPETENCIES: Patient Care, Medical Knowledge, Practice Based Learning and Improvement

INTRODUCTION

Historically, medical students have learned to perform the clinical breast examination (CBE) on standardized and clinic patients.[1] Wiecha and Gann[2] found that 57% of residents, including 36% of third-year residents, had recalled encountering few patients with breast lumps; either the residents were not screening for masses or were not efficient at detecting them during the examination.[2] Fletcher et al.[3] noted that approximately one third of physicians reported that their CBE training in medical school was inadequate.[3] Because standardized patients (SPs) typically have no clinical findings and clinic patients have unpredictable findings, inconsistent educational experiences among medical students can result. The use of standardized and clinic patients as a first exposure to the CBE may contribute to a suboptimal learning environment because of medical student discomfort with the intimate nature of the examination. This discomfort may compromise a student's ability to retain the skills being taught.

Whole-patient simulators and partial-task simulators are being used in many medical education disciplines, including anesthesia, emergency medicine, and surgery. Many simulators are being investigated for teaching the CBE. Tutorials using silicone breast models have been demonstrated to improve breast palpation technique[4-6] and the detection of breast

lumps,[3,7,8] as well as to reduce anxiety[9] among medical students. However, the traditional silicone model of the breast alone serves as a poor simulator for teaching the entire CBE.[10,11] It provides a poor anatomic representation of the nipple and does not allow for the axillary, supraclavicular, and skin evaluation portions of the CBE.

Our primary study objective was to compare 2 classes of medical students to determine whether teaching the CBE using a full-torso simulator results in performance measures (detection of abnormal findings and examination scores) that are as good or better than the traditional technique of using a standardized patient. Our secondary objectives were to assess the impact of the simulator on self-reported comfort levels and to assess the economics of using simulators.

METHODS

Before July 2006, breast surgeons taught the second-year medical students the CBE on live standardized patients. Starting in July 2006, the medical school directed a change in curriculum and substituted the use of simulators for standardized patients in several clinical examination skill sets, including the CBE. At that point, we developed this research study and used a historical control design to compare medical student CBE scores before and after implementation of CBE simulation at Penn State College of Medicine. The population of interest included all third-year surgical clerkship students who were tested for skill acquisition and accuracy of the CBE, from September 2006 to May 2008. The study protocol was approved by our Institutional Review Board. Data collection began in September 2006.

Our historical control (standardized patient) group was the medical school class of 2008. These second-year students were taught the CBE using a standardized patient under the direction of breast surgeons in a 1-hour breast tutorial. The students-patient-instructor ratio was 4:1:1. The students were first taught the CBE by the instructor. This instruction included direction to palpate the neck; to observe the breast for symmetry, skin changes, nipple inversion, and skin retraction; to palpate the breast in sitting and laying positions; to check for nipple discharge; and to evaluate for axillary adenopathy. The grid method of breast examination[12,13] was taught preferentially. Each student then had the opportunity to perform the breast examination individually with immediate clinical feedback from the instructor as well as feedback from the standardized patient.

In contrast, the experimental (simulator) group was the medical school class of 2009. These second-year students were taught the CBE using a full-torso breast simulator (Gaumard model# S230.4; Gaumard Scientific, Miami, Florida) during a 1-hour breast tutorial led by the same group of breast surgeons. The student-simulator-instructor ratio was approximately 8:1:1. Similar to the control group, after receiving group instruction by 1 surgeon, these students performed the CBE individually. Constructive feedback by the surgeon was given immediately. The CBE teaching objectives for both the experimental and control groups were the same. The objectives were to teach visual inspection skills to identify abnormality and palpation skills using the fingers to examine physically all areas of breast tissue to identify lumps that might be cancer.

The full torso Gaumard breast palpation simulator was used for the second-year Class of 2009 CBE teaching tutorial, as well as for the third-year testing tutorial for both the class of 2008 (control group) and 2009 (intervention group). Although the simulator has interchangeable subcutaneous breasts implants with unique pathologic findings, the same left breast implant was used. Figure 1 depicts the study research and data collection.

Clinical Breast Examination Testing

Starting in September 2006, all students were tested during their third-year surgical clerkship for skill retention and accuracy of the CBE using the breast palpation simulator. The testing sessions took place during the surgical clerkship on a day set aside for didactic and simulator education. Two attending surgeons and 1 chief resident served as the evaluators. Before the CBE, all third-year students completed a survey questionnaire that included questions using a 7-point Likert scale addressing comfort level to identify a lesion on the CBE. In addition, the medical students indicated the number of CBEs that they had performed previously (0-5, 6-10, >10). This survey tool was developed by an education psychologist (H.P.). The students were tested individually on the full-torso simulator, with the palpation portion of the examination limited to the left breast only. The breast surgeon observing the examination marked each part of the examination performed by the student on a scoring checklist. This CBE checklist was developed by an education psychologist and the 2 breast surgeons who had taught the second-year medical student tutorials. Although not validated externally, the checklist was compared systematically with other previously published checklists[1,14] used to evaluate the CBE skills of health care professionals and found to be similar. It is also consistent with guidelines published by the American Cancer Society.[15]

The observed examinations were scored using a weighted scoring system (maximum possible score of 27) developed by assigning point values of 1 through 3 to each checklist item based on the clinical importance of each item. The 2 breast surgeons made their decisions independently and then discussed the checklist weighting to arrive at a consensus. Also, the breast palpation simulator contained 4 positive findings that included 3 distinct breast masses as well as grossly enlarged fixed axillary nodes. All positive findings reported by students were recorded also on the checklist. False positive findings noted by students were excluded and, thus, did not impact their score negatively. Students were not explicitly aware of the contents of the checklist; however, the teaching objectives of the training for both groups were reflected in the checklist items. After the testing, students were given individual feedback and attended a 3-hour breast tutorial session.