ORIGINAL REPORTS

Simulating the Surgical Patient Pathway for Undergraduates

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BACKGROUND: A changing National Health Service structure and a reduction in time available for teaching have led to the increasing tensions in both clinical and university settings, to deliver high-quality patient care, research, and teaching. This, coupled with the increasing emphasis placed on ensuring safe surgical practice, has resulted in a need for change in teaching methods. We have designed an innovative surgical teaching program that aims to overcome these difficulties, by providing undergraduate medical students with a *simulated surgical patient pathway*.

METHODS: This prospective study compared 2 independent groups of medical students during their first-year clinical attachments, with the study group receiving the newly implemented simulated surgical patient pathway compared against a control group receiving traditional surgical education programs.

RESULTS: Students in the study group demonstrated a significantly improved subjective experience of surgical teaching, with greater awareness and confidence of safe surgical principles. Additionally, these students receiving the newly implemented simulation pathway performed significantly better than the control group in an objective knowledge-based assessment.

DISCUSSION: Simulation is not a substitute to clinical experience and it should not be considered as a replacement to real patients; but when used carefully, it can be an effective and essential adjunct in bridging the gap between classroom medicine and clinical practice. (J Surg Ed ▮:▮▮▮-▮▮▮. © 2016 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: undergraduate education, simulation teaching, patient pathway, clinical teaching, surgical teaching

COMPETENCIES: Medical Knowledge, Practice-based Learning & Improvement, Interpersonal & Communication Skills, Professionalism, Systems-based Practice

INTRODUCTION

A multitude of factors influence the medical education environment. Budgetary constraints, a changing National Health Service structure and a reduction in time available for teaching lead to increasing tensions in both clinical and university settings, with competing priorities to deliver high-quality patient care, research, and teaching.[1] As a result of this changing structure and a reduction in patient bed-days,[2-4] adequate student contact with surgical patients is becoming more difficult to achieve.

Given these challenges, it is not surprising to find that surgical teaching is often harshly criticized by students.[5] The Society of Academic and Research Surgery recognizes the challenges faced when trying to deliver a sufficiently robust surgical teaching program and argues that the single most important function of modern surgical teaching is the provision of a well-structured and imaginative educational program for undergraduates.[6] This, coupled with the increasing emphasis placed on ensuring safe surgical practice, has resulted in a need for change in teaching methods.[7] We have designed an innovative surgical teaching program that aims to overcome these difficulties by providing undergraduate medical students with a *simulated surgical patient pathway* (SSPP) program to supplement their clinical exposure, to provide consistency in teaching delivered, and to highlight the importance of safe surgical principles.

Traditionally, a small group of students are allocated to a surgical team to gain adequate general surgical experience. However, this method of providing surgical teaching has been open to criticism, as different students gain different exposure depending on the team and the time of allocation. Unfortunately, it is fast becoming common for National Health Service hospitals to face the burden of winter pressures, where the increase in morbidity associated with the colder weather, along with seasonal outbreaks of

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influenza and norovirus resulting in hospitals being faced with an overwhelming number of patient requiring emergency treatment.[8] This often leads to cancellation of elective surgeries or ward closures to control outbreaks of infectious diseases. Alongside this, there are numerous on-call commitments and generalized vs. subspecialist practice, not to mention individual surgeon's enthusiasm for educating, which can all influence each student experience.

Simulation in healthcare is certainly not a new concept and has been used in one form or another for many centuries.[9] Simulation is now expanding within undergraduate medical education and a worldwide survey identified numerous centers that were involved in educating students using simulation templates.[10] These can be of varying format, from mannequins and models to the use of simulated patients. In fact, the Objective Structured Clinical Examinations widely used both in Europe and the United States can be seen as a form of a simulated patient pathway.[11]

The new program used in this study comprised the traditional teaching methods but with a supplementary standardized simulation program. The program included 7 discrete sessions, each with a different theme, and were broken down into 1 breast session following the pathway of a patient with a breast lump, 2 vascular sessions to review common arterial and venous diseases, and 4 general surgery sessions to cover hernias, gallstone disease, the acute abdomen, and colorectal disease. The content and frequency of sessions for each subspecialty was taken directly from the learning outcomes produced by the University of Birmingham. For example, greater than 50% of the student learning outcomes were related to pathology and disease processes commonly managed by general surgical team, hence 4 of 7 sessions were allocated to general surgery.

Each themed event involved 25 to 30 students and included 5 to 6 small group–based teaching sessions, so that each student could experience the complete patient pathway for a specific patient presentation over a half-day, equating to approximately 21 hours of teaching time per semester. All sessions were conducted in the undergraduate teaching center with computer and projector facilities as well as a simulated ward capable of accommodating patients and actors.

The small group activities varied according to each themed session, but all involved history taking from a simulated or expert patient, clinical examination using models, stations outlining investigation and management principles of disease often following an interactive small group tutorial format with consultants from that discipline, and a final section discussing a specific safe surgical principle. Specifically, the breast patient pathway required the use of clinical breast models, and a consultant radiologist and an histopathologist were involved to review the different aspects of investigation of a breast lump, and clinical nurse specialists were on hand to discuss aftercare and counseling. For the vascular sessions, a handheld Doppler was used to demonstrate measurement of ankle-brachial pressure index, and again nurse specialists were involved to demonstrate different dressings and compression bandages for ulcer dressing. For the general surgical pathways, the only specific equipment used was a rectal examination simulator and a selection of stoma bags, which were used by the colorectal specialist nurses. In addition, safe surgical principles were embedded within each session such as consent or the World Health Organization safety checklist with the relevant documentation being shown to the students, and each participant was given a part-filled workbook to make key notes.

The aim was to evaluate the effectiveness of this teaching method and compare it against traditional teaching techniques, with 4 specific objectives: Do students view this teaching method as a valuable technique? Do students have a better understanding of the surgical patient pathway? Are students more familiar with safe surgical principles? Do students have better surgical knowledge relating to their learning outcomes?

MATERIAL AND METHODS

This prospective study compared 2 independent groups of medical students during their first-year clinical attachments.

Group 1: *Study group*: Medical students undertaking the SSPP during semester 1 of their first clinical year.

Group 2: *Control group*: Medical students undertaking traditional surgical education programs at alternative teaching hospitals during semester 1 but being assigned to the study hospitals for semester 2.

Students' perceptions of the teaching methods used and their confidence in the assessment of surgical patients was ascertained using a 5-point Likert-scale questionnaire at the end of semester 1 for both study groups.[12] Only complete questionnaires were included and any part-filled questionnaires were removed from analysis. Additionally, a short written-answer assessment of clinical knowledge mapped to the students' learning outcomes was conducted for both groups. Group 2 were re-evaluated at the end of semester 2 with the same questionnaire having then received both traditional and SSPP teaching. Univariate and multivariate logistic regression analyses were conducted using StatView 5.0. Results were deemed statistically significant if $p < 0.05$.

All participants within the study were at the same stage of their medicine degree and were undertaking their first year of clinical attachments at the University of Birmingham. The University was responsible for allocating clinical placements and all students allocated to the study group were assigned randomly and independently. All participants and data remain anonymous and informed consent of participants was obtained. The University of Birmingham granted full ethical approval and the authors declare no conflict of interest. There was no specific additional cost for each teaching session as all teaching resources and room availability were already in place.