Individual learning plans foster self-directed learning skills and contribute to improved educational outcomes in the surgery clerkship

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ABSTRACT

Background: The Individual Learning Plan (ILP) is a newly implemented curricular element designed to foster self-directed learning (SDL) skills among medical students during our surgery clerkship. Our aim was to determine the impact of ILPs on educational outcomes and acquisition of SDL skills.
Methods: Students were surveyed regarding the educational value of ILPs, their acquisition of SDL skills, and the impact of the surgery clerkship on fostering these skills. Mean scores for the NBME surgery subject exam (SSE) were compared before and after implementation of the ILP requirement.
Results: Students perceived the ILP requirement as having strong educational value. Mean scores for the SSE increased significantly in the year following ILP implementation (74.9 vs 76.6; $p = .042$; $d = 0.21$). Students reported successful acquisition and frequent utilization of SDL skills.
Conclusions: SDL exercises, such as the ILP requirement, lead to improved education outcomes while fostering the acquisition of SDL skills.

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1. Introduction

The surgical community has long recognized the importance of lifelong learning for physicians and has been a leader in promoting this concept.[1] In 1900, Sir William Osler gave a presentation titled "The Importance of Post-Graduate Study."[2] In his address, he cited the need for lifelong learning in order to maintain professional competence and many consider this address as the origin of continuing medical education (CME).[1,2] The importance of lifelong learning, however, is not unique to surgery and has been identified by numerous national medical organizations as a key component of medical student education and residency training regardless of specialty. The Liaison Committee on Medical Education (LCME), The Association of American Medical Colleges (AAMC), and the Accreditation Council for Graduate Medical Education (ACGME) have each emphasized the importance of facilitating the acquisition

of lifelong learning skills during all phases of medical training.[3–5] However, there are no guidelines for the process of acquiring lifelong learning skills for medical professionals.

The LCME has produced a detailed description of expectations for providing educational experiences that foster lifelong learning skills in medicine. In the LCME *Functions and Structure of a Medical School: Standards for Accreditation of Medical Education Programs Leading to the MD Degree* self-directed learning (SDL) and independent study skills have been identified as the necessary components for successful lifelong learning in medicine. In Element 6.3 of this document, the LCME stipulates that "the faculty of a medical school ensure that the medical curriculum includes self-directed learning experiences and time for independent study to allow medical students to develop the skills of lifelong learning." The document goes on to define the three key components of SDL which include: 1) self-assessment of learning needs; 2) independent identification, analysis, and synthesis of relevant information; 3) appraisal of the credibility of information sources.[3]

Malcolm Knowles has written extensively on both SDL and andragogy. His descriptions of SDL remain among the most detailed and widely accepted. The components of SDL highlighted by the

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LCME are similar to those that he originally described in 1975. These components include: diagnosis of learning needs, development of personal learning objectives, identification and selection of resources, implementation of the learning process, and evaluation of the learning outcomes. He also emphasized that when attempting to teach SDL skills, the educators must remain facilitators of the SDL process, and they must allow the learners the freedom to independently pursue the components of SDL.[6,7]

The importance of SDL skills for the development of lifelong learning skills is increasingly being emphasized, and there has been increasing utilization of formal SDL exercises in medical education. Successful implementation of a SDL program utilizing individual learning plans has been described in the context of pediatric residency training, OB-Gyn residency training, and nursing. Several of those who have studied SDL skills among residents have concluded that medical schools must place much more emphasize SDL and lifelong learning so that physicians entering residency will have a higher propensity for further developing these skills.[10,11] We utilized prior reports of SDL in medical education, such as the ones described, to design an SDL exercise that would fit into our surgery clerkship. Although this project was new to our clerkship, it utilized elements of previously described SDL exercises.

Prior to the 2014 academic year, our surgery clerkship had conducted an objective structured clinical examination (OSCE). Starting in 2014, as part of a medical school curriculum change, our medical school assumed responsibility for administration of OSCEs. Additionally, these OSCEs ceased being conducted during the clinical rotations. This created an opportunity to add a new curricular element to the surgery clerkship. In an effort to foster SDL skills among medical students at our institution, we implemented the Individual Learning Plan (ILP) project on the surgery clerkship. This exercise would serve as an introduction to SDL that emphasized the independent identification of a knowledge deficit as the primary objective.

We did not initially intend to study the impact of the ILP project; we felt that SDL was an important concept to teach and that requiring an SDL exercise was a reasonable way for students to begin to understand how to use SDL in clinical practice. After implementing the ILP project, however, we had positive feedback from both students and medical school administration. We therefore began investigating the impact of our ILP project to determine if there were measurable improvements in perceived knowledge, actual knowledge, and perceived acquisition of SDL skills. We initially began with surveys of the third-year students. We later expanded our study to look at an objective education outcome such as NBME SSE scores. We also began surveying students during their fourth year to see if they had utilized the concepts of SDL that they had been exposed to on the surgical clerkship. We hypothesized that the ILPs would be an effective mechanism for acquiring medical knowledge and that the ILPs would also foster the acquisition of SDL skills among third-year medical students.

2. Material and methods

Third-year medical students at our institution rotated on an eight-week surgery clerkship. The clerkship is divided into two four-week surgery rotations. Starting in July 2014, each third-year medical student was required to complete two ILPs at any time during their 8-week surgery clerkship.

An orientation session occurs on the first day of the surgery clerkship during which there is a description and discussion of SDL. Verbal direction regarding the ILP project is then provided. For each ILP, students were first required to identify a personal learning need related to a surgical topic. A learning need could represent a surgery-related knowledge deficit or a surgery-related interest.

Additionally, a learning need could also represent a surgery-related topic that was not likely to be sufficiently covered during their clinical surgery rotations. For example, a student may rotate on the vascular surgery service for the first 4-weeks and the trauma service for second 4-weeks. In this case, the student may not be exposed to breast surgery. Students were asked to anticipate this type of gap in clinical exposure and use the ILP project to fill some of those expected gaps.

Students were required to utilize the Web Initiative for Surgical Education of Medical Doctors® (WISE-MD) online modules to address their perceived learning need. As an introductory SDL exercise, we intentionally limited the resources to allow tracking of the selected topics and assuring that students were utilizing a high-quality resource to address their knowledge gaps. The WISE-MD modules are peer-reviewed video presentations of common surgical topics. Modules cover typical patient presentation, obtaining an appropriate history, physical exam findings, treatment options, preparing for the operating room, and operative interventions. Professionalism and communication are also emphasized within the context of each module. Each module is presented by a national content expert and includes case examples, self-assessment questions, and animations. These online modules were already available to our students through an institutional subscription. After completing a module, each student was required to synthesize the information and complete an essay or craft a board-style multiple-choice question (MCQ) with detailed explanations for each answer based on the module's content. Students submitted their work electronically via Desire2Learn® (D2L). Each ILP was reviewed using an iPad application (Assignment Grader®), and the two ILPs comprised 5% of the total grade for the surgery clerkship. The essays and MCQs were reviewed by the clerkship leadership to determine the quality and accuracy of the content. Students were generally provided full credit for completion of the project unless elements were omitted or inaccurate. In cases where there was inaccurate or incomplete information, feedback was provided.

Beginning in September 2015, the third-year medical students were surveyed at the end of the surgery clerkship regarding the ILP requirement. Students were asked if they perceived that the ILP requirement improved their medical knowledge, improved their clinical skills, and helped with NBME SSE preparedness. They were also asked to rate the overall educational value of the ILPs. Students were also asked to compare the effectiveness of the WISE-MD modules to traditional didactic lectures, and indicate the reason for selecting a given topic for their ILP. Mean scores for the NBME SSE were compared for the year prior to ILP implementation versus the year of ILP implementation using independent t-tests. Cohen's d test was utilized to determine effect size.

In August 2016, we began surveying fourth-year medical students at the completion of their fourth-year surgery acting internship (AI) or surgery elective. Students were asked about their ability to perform SDL and the individual skills that comprise SDL, the frequency with which they performed SDL during the fourth-year surgery rotation, and the effectiveness of the surgery clerkship and ILP requirement in fostering SDL skills. Survey results between students on the AI and SE rotations were compared using the Mann-Whitney U-tests. Statistical analyses were generated with IBM® SPSS® 24.0 (Armonk, New York).

3. Results

Data from twelve consecutive eight-week clerkships following implementation of the ILP requirement was collected. During this time frame, 394 third-year medical students rotated through the surgery clerkship. They completed a total of 788 ILP submissions which represented a 100% completion rate. The ILP submissions