

# *The core learning objectives education model: an approach to the teaching of core concepts in the clinical clerkship*

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**Introduction and objective:** *The classical approach to the undergraduate medical clerkship has several limitations, including variability of clinical exposure and method of examination. As a result, the clerkship experience does not ensure exposure to and reinforcement of the fundamental concepts of a given specialty.*

**Materials and methods:** *This article reviews the classic approach to clerkship education within the undergraduate medical education. Specific attention is placed on clinical*

*exposure and clerkship examination.*

**Results:** *We describe the introduction of the Core Learning Objective (CLO) educational model at the University of Chicago Section of Urology. This model is designed to provide an efficient exposure to and evaluation of core clerkship learning objectives.*

**Conclusions:** *The CLO model has been successfully initiated, focusing on both technical and clinical skill sets. The proposed model has been introduced with positive initial results and should allow for an efficient approach to the teaching and evaluation of core objectives in clerkship education.*

**Key Words:** clerkship, clinical, education, examination, learning objectives, site

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## Introduction

As the practice of medicine becomes increasingly specialized, an understanding of the basic concepts within each specialty is fundamental to all physicians.

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Providing students with a broad understanding of the core concepts of clinical specialties is difficult for several reasons. Clinical volume and patient encounters are often variable, resulting in a diverse level of exposure between students. Further, reinforcement of the concepts through supplemental activities, reading, and lectures is often inefficient. Finally, classic methods of examination often focus on more obscure material in contrast to the more fundamental concepts crucial to the specialty. Changes in clinical curricula are needed so that students may gain a more universal understanding of the core concepts of each specialty.

Several of these limitations are inherent to any clinical experience and are mostly unavoidable. The first of these limitations is the great variability that

exists between the clinical settings to which a student may be assigned. Although identical clinical experiences would provide a uniform exposure for all students, the limited resources of many medical institutions make varied clinical settings a necessity.<sup>1</sup> Second, even within the same clinical setting, student exposure often differs by the type and volume of patient/operative encounters that may present during a given clerkship period. Despite this variability in clinical exposure, a significant amount of literature supports the conclusion that variation between type and volume of clerkship experience does not adversely affect student performance.<sup>1-4</sup>

In contrast, several factors that contribute to learning deficiencies throughout students' clinical education can be addressed. The first of these factors is the type of examination that often accompanies these rotations. Historically, one component of student evaluation has been a standardized written examination, commonly the National Board of Medical Examiners (NBME) shelf examination. However, many authors have criticized this form of examination due to the fact that a large portion of the material tests isolated recall as opposed to data interpretation and application of principles.<sup>5</sup> Through the use of this type of examination, focus on the general principles that are directly applicable to future practice is often overshadowed by a concentration on more obscure topic material that results in student differentiation for the purpose of grade stratification. Such a tendency can be seen in a comparison of several examination types used to evaluate surgical medical students performed by Minion et al, in which the authors found the NBME examination to add most to the discrimination of students.<sup>5</sup>

As an alternative to traditional written examination, objective structured clinical examination (OSCE) has been implemented to provide direct observation and feedback to students in their workup and evaluation of patients.<sup>6</sup> Similarly, standardized patient examination has been found to facilitate learning.<sup>7</sup> In an evaluation of medical students participating in an orthopedic surgery clerkship, Grifka et al report that a considerable portion of the technical knowledge was found to be acquired through an orthopedic practical, and that open-ended questions may be a more accurate assessment of actual knowledge when compared with multiple choice questions.<sup>8</sup> However, critics of more clinically oriented examinations may point out that performance on the NBME has been shown to correlate significantly with OSCE, clinical performance simulations and peer evaluation, whereas the reverse

correlation is generally low.<sup>5</sup> The controversy surrounding the ideal testing method is manifested in the great variability between methods of student evaluations that are used by medical institutions.

A second factor underlying the educational deficiencies results from the infrastructure of the clinical experience itself. Under the classic approach to clerkship education, students shadow resident and attending physicians in their practice of medicine. Accordingly, when relevant cases arise, the student is expected to obtain the educational value inherent to that case through a combination of observation and participation in the patient care. It is the hope that after 2 years of similar experiences, supplemented by reading and lectures, students will have gained a sufficient knowledge base in the major medical specialties.

This approach to student education is inefficient and incomplete. Because there exists only a limited amount of clinical material during a given medical rotation, the student experience is often "hit-or-miss" as dependent on clinical volume and diversity. Further, when patient and case volume is low, students are often left to wait for such cases to present. This tendency is particularly evident on in-patient services, in which student experience is often related to emergency department exposure. More specific to the surgical clerkship, due to the length of many surgical procedures, students are often occupied in more routine operative cases when unique cases do arise. This tendency often prevents a more widened exposure to the specialty. Clerkships that are organized in this fashion do not ensure that students will learn the basic and most important concepts of a given surgical specialty.

In addition, time occupied waiting for clinical material may be better used to focus on the variety of new and effective educational supplements that have been shown to augment student learning. Johnson et al describe the effective use of a web-based course in the instruction of residents in the basic principals of ambulatory pediatrics.<sup>9</sup> Thomas et al also report the use of computer-based education to achieve ACGME-required competency in specific areas of orthopedic surgery.<sup>10</sup> Seabra et al found the same level of learning to be achieved by students using a computer aided program to provide urologic instruction when compared with those attending a standard lecture.<sup>11</sup> These data suggest the importance of supplemental resources in the teaching of medical education and it then becomes imperative that students be directed to utilize these resources when more traditional clinical exposure becomes limited.

TABLE 1. Core competencies of RCPSC and ACGME

RCPSC	ACGME (corresponding competency)
Medical expert	Medical knowledge
Communicator	Communication skills
Collaborator	Interpersonal skills
Manager	Patient care
Health advocate	Practice-based learning
Scholar	System-based practice
Professional	Professionalism

These issues have stimulated focus on the development of core learning objectives throughout both undergraduate and post-graduate medical education. The Association of American Medical Colleges (AAMC) developed the core learning objectives felt to be required knowledge of all medical school graduates.<sup>12</sup> In a similar fashion, the Accreditation Council for Graduate Medical Education (ACGME) issued a new model of accreditation in 2002, focusing on six core competencies felt to be a necessary part of post-graduate medical training.<sup>13</sup> Concurrently, the Royal College of Physicians and Surgeons of Canada (RCPSC) issued a framework designed to establish key competencies necessary to optimizing patient-centered care, Table 1.<sup>14</sup> Previous experience using core objectives has yielded varied results. Little and Rodnick reported increased student self-confidence and subjective educational experience associated with the institution of core learning objectives in ambulatory care.<sup>15</sup> In contrast, Hauer et al report that the use of learning objectives for the teaching of

internal medicine objectives did not enhance student learning as assessed by ward evaluations, a written examination, and satisfaction surveys.<sup>16</sup>

Despite these mixed outcomes, the implementation of core competencies is becoming standard to undergraduate medical education in an attempt to address the deficiencies outlined previously. These deficiencies are particularly evident within surgical subspecialties, in which the short length of the clinical experience demands that students gain a rapid and directed exposure to the most important topics within those specialties. We describe the Core Learning Objectives (CLO) education model, designed to address the previously detailed deficiencies to the classic teaching model and to implement the learning of core concepts and technical skills applicable to all prospective medical school graduates, Table 2. The CLO model has been introduced within the University of Chicago Section of Urology clerkship curriculum. Although the following description details the curriculum reform as applied to the Urology clerkship, the conceptual framework was developed to be applicable to all undergraduate clinical clerkships.

## Material and methods

### *Curriculum reform of the surgical clerkship: the core learning objectives educational model*

The described model focuses on the instruction of core concepts within three main fields of urology: oncology, stone disease, and incontinence. Knowledge of these pathologies is applicable in the practice of most specialties and integral to the practice of primary care. Accordingly, a clerkship designed to ensure an understanding of these core concepts is important to all medical students, irrespective of the ultimate career path.

TABLE 2. Deficiency of classic teaching model and solutions proposed by the CLO model

Deficiency of classic teaching model	Solution proposed by the CLO model
Variability of clinical setting	Projection of clinical volumes and creation of tentative clerkship outline Pagers to alert students to indexed cases
Lack of integrated exposure to fundamental clinical concepts of a specialty	Chronological model of patient encounter, surgical intervention, and follow-up
"Shadowing" model of instruction	Freedom of assignment to focus on outstanding CLOs
Standardized written examination	OSCEs and standardized patient encounters Examination focus on general concepts
Time wasted waiting for clinical material	Educational supplements (e.g. internet-based teaching modules)

*Clinical/operative volume prediction*

The first step necessary to creating a directed clerkship experience is projecting the number and type of cases that typically present during a given clerkship period. The department operative and clinic records can provide a reasonably accurate estimate of these figures, which can be used to create a tentative clerkship outline for each student. Accordingly, the urology core learning objectives (CLO) are used in conjunction with these projected numbers to design student assignments, Table 3. As possible, students are assigned to operative cases individually to ensure 1:1 instruction. However, limited clinical resources often result in multiple students per clerkship site and, because of this, it becomes necessary to design clerkship schedules involving several students. When multiple students are present, they may be assigned individually to procedures that are performed frequently, such as ureteral stent placement. However, in cases performed with less frequency such as radical

cystectomy, it becomes necessary to assign multiple students to these cases so that exposure can be assured during the clerkship period. Although emergency department encounters are not predictable, a similar rotation may be designed based on common emergency department presentations. Using this template, students can be directed to accompany faculty and residents when specific cases arise through the emergency department or consult services. A clerkship directed in this fashion encourages a widened, but not repetitive, exposure to the core concepts of the specialty.

*Integration of clinical/operative principals*

A second step that is integral to more effectively teaching core concepts is the integration of operative principles with those gained through other clinical settings, including out-patient clinics, emergency patient encounters, ancillary procedures, and structured lectures. Accordingly,

TABLE 3. Operative objectives

Operation Type	Projected cases (weekly)	Relevant clinic experience/ procedure (pre-operative)	Clinical experience (post-operative)
Oncology			
Radical prostatectomy	3	Patient with elevated PSA/ prostate biopsy	Post-op clinic
Radical cystectomy	1	Patient with hematuria	Post-op clinic
Radical nephrectomy	2	Patient with renal mass	Post-op clinic
Radical orchiectomy	2	Patient with scrotal mass	Post-op clinic
Other			
Stone disease			
Ureteral stone extraction	5	Patient with flank pain	Post-op clinic
Percutaneous renal stone extraction	2	Patient with flank pain	Post-op clinic
Ureteral stent placement	10	Patient with flank pain	Post-op clinic
ESWL	5	Patient with flank pain	Post-op clinic
Incontinence			
Urethral sling placement	5	Patient with incontinence/ urodynamic study	Post-op clinic
Collagen injection	3	Patient with incontinence/ urodynamic study	Post-op clinic
Suprapubic tube placement	5	Patient with incontinence/ urodynamic study	Post-op clinic

TABLE 4. Emergency department objectives

Presenting diagnosis	Radiographic skills	Relevant operative management
Stone disease	KUB/Abd CT/renal US	Stone disease (see Table 3)
Scrotal pain	Scrotal US	Oncology (see Table 3)
Pyelonephritis	Abd CT	NA

when possible, student exposure will begin with the relevant out-patient/pre-operative encounter and students will learn concepts related to patient presentation and work-up. Subsequently, the student will observe the given operation, focusing on operative technique and anatomical concepts. Finally, exposure will concentrate on post-operative follow-up and related issues. In each step, related reading will be assigned to prepare students for each portion of the patient encounter. When reading is assigned in this fashion, student understanding and retention of the material relevant to the case is maximized.

Examples of this chronological learning process are detailed in Table 3. As a specific example, we describe the use of the CLO model in providing directed student instruction of prostate cancer. The pre-operative patient encounter begins with an out-patient clinic visit of a patient referred for elevated prostate specific antigen (PSA) level and the related interview and physical exam. When indicated, the student follows this patient through a prostate biopsy for further work-up. Following diagnosis of prostate cancer, the student is involved in the counseling and decision making between the physician and patient. Subsequently, the student then observes a radical prostatectomy, focusing on technical aspects and pelvic anatomy. Finally, the patient is followed into the post-operative period, with focus on common problems, such as impotence, incontinence, and long-term cancer surveillance.

This educational approach may be applied in a similar fashion to emergency department patient encounters, Table 4. In this case, the emergency department encounter serves as the pre-operative clinical component. Subsequently, the student may follow the patient through the operative and post-operative management of the presenting complaint when appropriate. During the first portion of the clerkship, students are encouraged to complete reading that reviews the most common urologic emergencies, so that they can be familiar with the most common concepts should the urologic emergency arise.

### *Freedom of assignment*

The third component integral to CLO instruction is the effective utilization of student time. The first principle fundamental to the effective utilization of student time is the concept that unexpected emergency department patients or in-patient clinical consults often provide students the opportunity to observe new patient presentations and learn other components of the CLOs. Rare learning opportunities should be encouraged over more routine or repetitive experiences. Therefore, when students are occupied in routine operative cases or out-patient clinics at the time of unique emergency department or in-patient presentations, they should be paged and encouraged to participate in the evaluation and management of these more unique cases.

Further, we believe that student time may be spent effectively by using ancillary instructional materials to learn new concepts. Accordingly, when students are not involved in a specific operation, clinic, or emergency department presentation, they should be encouraged to focus on educational supplements and available reading. In contrast, the common but pointless ritual of students accompanying residents as they complete their floor work should be actively discouraged. This time may be better used to read assigned lectures or receive instruction on the supplemental technical skills applicable to all medical students, Table 5. While the vast majority of floor work does not contribute to a student's learning, if there are specific skills that faculty designate as important, the student may be encouraged to participate. An example might include the opportunity for a student to learn the basics of foley catheter insertion if not previously encountered through an emergency department experience.

TABLE 5. Supplemental lectures and technical skills

Urologic radiology
Urologic pathology
Foley catheter placement
Other

### *Supplemental leaning experiences*

Finally, supplemental topics should be covered to finalize the instruction of the CLO. Lectures should be designed to supplement topics not covered during other clinical experiences, Table 5. In addition, a technical skills laboratory may be held to teach those urologic skills most useful to prospective physicians. In this fashion, complete and effective teaching of the CLOs is maximized.

### *Method of examination*

Examinations must be designed that ensure students' understanding of the concepts basic to the medical specialty. Further, the concepts tested should be applicable to prospective physicians of all specialties, as opposed to more specific concepts that are more useful to prospective surgeons. In using a basic examination that stresses these concepts, it must be not only acceptable, but also expected, that all students score highly on these examinations. When student differentiation is then needed for the purpose of grade assignment, the subjective evaluation of a student's performance during the clerkship and/or other methods may be used for differentiation.

## Results

### *Implementation and evaluation of the core learning objectives model*

Subjective evaluation of the initial experience with the CLO model has revealed several issues. First, the model requires a significant level of participation from both faculty and residents. In classic approaches, students shadow faculty and resident physicians (service physicians), which requires a minimal level of student direction from supervising physicians. In contrast, the CLO model requires that service physicians participate significantly in the student assignments. As students are often involved in other activities, service physicians must remember to page them when educational opportunities arise. This task was most demanding with respect to emergency cases, when supervising physicians often forgot to page students in an effort to address the emergent nature of the case. Despite this finding, the overall attitude of service physicians was very positive towards the CLO model. Faculty and resident recognition may be provided in the form of academic promotion or award. At our institution, for example, yearly awards are given to those physicians excelling in student education.

A second concern raised by students was the potential effect that this model may have on their

subjective evaluation. Specifically, students expressed concerns that leaving a faculty-supervised activity in progress to observe a different activity may result in a negative evaluation by the initial faculty member, despite being a requirement of the CLO model. In response, student assurance and reinforcement of the CLO model principles was given to help reassure students that all supervising physicians supported this educational model and the prioritization of clinical cases.

Formal investigation is ongoing to evaluate for statistically significant improvements in the learning of core concepts associated with this educational model.

Accordingly, students will be formally surveyed following completion of the CLO model to assess for subjective satisfaction with the various components of the educational model. In addition, objective improvements will be assessed using a formal examination focused on the CLO model. Students participating in the CLO model will be compared with those completing the clerkship using the classic approach, with both examination results and subjective evaluation being compared for statistical difference.

Although formal evaluation is pending, preliminary feedback from students regarding the introduction of the CLO model has been positive. Subjective evaluation reveals strengths to include diversity of clinical exposure, reinforcement of reading material, and freedom of assignment. Further, students have reported a high level of satisfaction with the opportunity to develop individualized relationships with specific faculty and residents. Finally, participating students reported feeling that the CLO model maximized effective use of student time.

## Conclusion

The teaching of core concepts is a valuable component of the clinical clerkship. Directed student learning based on projected clinical volume and the integration of operative principles with those gained through other clinical exposures are two steps that may be used to facilitate instruction of these concepts. Further, effective direction of student instruction may encourage the use of educational supplements when clinical volume is low. When these techniques are utilized, the clinical clerkship is efficient, exposing students to clinical material specifically designed to promote the learning of core concepts. In addition, this model facilitates exposure to a diverse number of clinical settings and type of cases. Through the focused

teaching of these core concepts, we can assure that prospective physicians have a basic understanding of those concepts that will be fundamental to their practice of medicine. □

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