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Introduction to Clerkship: Bridging the Gap Between Preclinical and Clinical Medical Education

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Financial Disclosures:
None reported.

Support: None reported.

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Submitted

February 18, 2018;

final revision received

November 6, 2018;

accepted

November 19, 2018.

Background: Despite a diverse range of curricular advancements to address the difficult transition from classroom learning to clinical training during medical education, hurdles persist. A 4-week course was designed at the Philadelphia College of Osteopathic Medicine (PCOM) to make this transition easier.

Objectives: To determine whether PCOM students' comfort and preparedness increased after taking a 4-week clinical transition course before third-year clinical clerkships, and to determine whether faculty perceptions of student preparedness and comfort were improved after participation in the course compared with previous third-year students.

Methods: Second-year osteopathic medical students at PCOM participated in a 4-week course, Introduction to Clinical Clerkship (I2C). The course included 16 small-group exercises, which all took place before students began their third-year clerkship rotations. The exercises in the course extended beyond the skills learned during their classroom years. Students were given a pre- and postcourse survey to evaluate their comfort level with 58 different aspects of clinical practice. Participating faculty were surveyed to evaluate their perception of student preparedness and comfort compared with previous third-year students who had not undergone the exercise.

Results: After completing the I2C course, third-year osteopathic medical students (n=232) reported increased comfort with 57 of the 58 learning objectives and each of the 5 coded clinical competency areas (patient assessment, effective communication, hospital logistics, procedural skills, and core knowledge) ($P<.01$). Preceptors reported that students who completed the I2C course were more prepared (54.5%) and more comfortable (63.4%) with clinical duties, as compared with their recollections of previous third-year osteopathic medical students.

Conclusion: Within the 5 competencies, students on average felt more comfortable and were perceived by faculty as better prepared than previous students who had not taken the I2C course. The establishment of a preclinical transition exercise appears to help bridge the gap between the preclinical and clinical years. This learning model allows medical students to feel both more comfortable and better prepared throughout the transition from classroom learning to clinical rotations.

J Am Osteopath Assoc. 2019;119(9):578-587

doi:10.7556/jaoa.2019.101

Keywords: clinical clerkship, clinical competencies, medical education, practiced-based learning

Medical curriculum reform has been an ongoing challenge since the first medical school opened in 1765.¹ Although medical education today is overseen by multiple levels of governing bodies to maintain the provision of high-quality education,² before the early 20th century, it was held to few standards.^{2,3} Institutions were plentiful, but most possessed substandard admission prerequisites and lacked curricular homogeneity.³ Three basic educational models predominated: apprenticeship, proprietary school, and university systems.²

In the late 19th century, scientific advancements denounced various mainstays in treatment, prompting movement toward the application of scientific and experimental medicine.² Aiming to eliminate those resistant to change, the American Medical Association organized the Council on Medical Education to conduct a survey of medical education across the United States.² Abraham Flexner governed this operation and concluded the presence of a “widespread and fatal disparity among America’s medical schools.”²⁻⁴ With the publication of the Flexner Report in 1910, medical school curriculum became grounded in what would become the “2+2” model. This design immersed students in 2 years of strictly separated basic science followed by 2 years of clinical education, and it became the cornerstone of medical school curriculum over the past 100 years.^{5,6}

After a period of stagnation, the American Association of Medical Colleges released its 1984 *Report of the Panel on the General Professional Education of the Physician*, which promoted integration of the biological sciences and clinical education, in addition to the application of active and self-directed learning.^{3,7,8} Most recently, a 2010 Carnegie Foundation study examined professional education across a variety of disciplines to produce *Educating Physicians: A Call for Reform of Medical School and Residency*.^{3,8} This report ultimately supported a curriculum founded on competency-based and individualized learning, along with integration of knowledge at all levels.³

These events represent only a fraction of the milestones in medical education; however, their review evidences the lack of novelty in the necessity of curricular reform. Despite initiatives toward an integrated 4-year curriculum, the majority of institutions continue to practice the traditional 2+2 curriculum.⁹ Two studies^{10,11} found that although students gained a vast amount of medical knowledge in the classroom setting, clinical faculty felt students lacked many of the critical thinking skills and core competencies needed for clinical practice. The disconnect between classroom learning and clinical practice has pushed many schools to supplement their curriculum with problem-based learning modules, preceptorships, and transition courses aimed to develop these competencies and ease the transition to third-year clerkships.⁵

Many preclinical transitional courses have been described, all varying in content and structure.¹² One example involves clinical-focused large and small classroom group lectures divided among the preclinical years.¹² Another model, termed *transitional clerkship*, is based on workplace learning theory, which is structured around preceptor-directed hospital exposure to the routines, roles, and responsibilities modelling a clerkship workplace environment.¹² Dual learning years, alternating between skills training and clerkships, have also been described, aiming to lower stress by decreasing workload perceptions and skill level expectations to ease the clinical transition.¹³

Chittenden et al¹² previously incorporated a week-long course to prepare medical students to manage their evolving roles during clinical clerkships. Student satisfaction with the course was high; however, statistically significant differences in performance were not identified. Despite the diverse range of existing transition courses, most fail to address critical objectives, such as outlining the medical student’s role and responsibility in patient care.¹² Additionally, the ability to retrieve, evaluate, and interpret patient information is rarely taught or addressed.^{9,12} Often, students feel as though they do not possess a meaningful role in patient care because they shadow others who carry

out actual tasks.¹² As a consequence, students have decreased confidence and overall level of performance.¹²

To ease the transition between classroom-based instruction and clinical clerkships, the Philadelphia College of Osteopathic Medicine (PCOM) modified the traditional 2+2 model. Students are provided with a number of courses and exercises that facilitate an easier transition from the classroom to clerkship. These pedagogic changes began with an initiative termed *Clinical Reasoning in Basic Sciences*, where traditional classroom learning was supplemented with a problem-based clinical component. Based on the unpublished internal data we found, while these curricular changes generated positive academic results, such as an increase in scores on the Comprehensive Osteopathic Medical Licensing Examination-USA and rotation examinations, many students continued to feel underprepared and overwhelmed at the inauguration of clerkships. Preceptors found that although students had adequate academic knowledge, there was a substantial impediment in the application of this knowledge to clerkship experiences. This perceived deficiency spawned an effort to provide students with a month-long introductory transitional course teaching skills necessary to be more effective and efficient in their clinical clerkships. We hypothesize that a transition course integrating key basic science and clinical material would reinforce skills necessary to function more efficiently on rotations with increased confidence. This amelioration would lead to greater student comfort, faculty-perceived improved performance, and, ultimately, overall success.

Methods

Setting and Participants

A retrospective review of 232 third-year osteopathic medical students at PCOM for the 2015-2016 academic year was performed after PCOM institutional review board approval. All third-year students were enrolled in the course, Introduction to Clinical Clerkship (I2C),

at the completion of their second year of medical school before beginning clinical rotations, and all 232 students completed the course. Course attendance was mandatory.

In addition, all faculty that precepted third-year PCOM students were invited to participate in the faculty survey. Faculty were excluded if they were first-time preceptors to third-year medical students or if the rotation for which they were serving as preceptors was not a core third-year clinical rotation.

Description of Curriculum

In June 2015, a new curricular initiative was launched at PCOM as part of an ongoing pedagogical reform aiming to bridge the gap between the preclinical and clinical years of medical education. This course, I2C, consisted of 16 exercises ([Table 1](#)) with 58 learning outcomes coded into 5 clinical competency categories (patient assessment, effective communication, hospital logistics, procedural skills, and core knowledge; [Table 2](#)). Each exercise accommodated 17 students, and the program spanned 4 weeks; each exercise was designed to be interactive and hands-on and included small-group activities, role-play, and simulation. Supplemental materials were also provided in the form of online lectures and videos. Multiple disciplines were involved in providing instruction over the course of I2C, including more than 45 teachers, standardized patients, nurses, residents, and advanced practitioners. Upon completion of the course, all students achieved certifications in advanced cardiac life support, basic life support, gown/gloving, and compliance with the Health Insurance Portability and Accountability Act.

Evaluation

Participating students were asked to complete pre- and postcourse surveys regarding their comfort level with topics addressed during the course. Surveys were completed immediately before and after the course to encourage high response rates.

Clinical faculty at all rotation sites were asked to complete an anonymous survey 4 months into the

Table 1.
Description of Exercises in the Introduction to Clerkship Course for Third-Year Osteopathic Medical Students

Exercise Title	Description	Duration, h
Chart Analysis	Timed chart review, interpretation of chart data, medical history and physical examination findings, case presentations to attending/resident panel	4.5
Abdominal Pain	Pertinent history, thorough abdominal examination, fluid management, inflammatory cascade, therapy initiation	1.0
Approach to the Pediatric Patient	Developmental milestones, interview strategies, abuse/neglect, point-of-care resource review	4.0
Transition-Inpatient/Outpatient	Clinical situations requiring transfer, communication between health care professionals, medication reconciliation, introduction to minicognitive assessment, patient safety	6.0
Critical Care Simulation	Initial assessment, triage, interpret laboratory data, initiate therapy	1.5
Obstetrics and Gynecology Skills	Simulated breast examination, speculum & bimanual pelvic examination, intrapartum cervical assessment, perform spontaneous vaginal delivery, cardinal movements labor, signs placental separation	2.0
Electrocardiogram Interpretation	Rate, rhythm, axis, intervals, diagnosis	4.5
Transitions—Outpatient/Inpatient	Identifying emergencies, effective communication, thorough and efficient history taking, developing differential diagnosis and emergency plan of care, writing hospital admission orders, determining postdischarge level of care and access to appropriate ancillary services, discharge planning and follow-up	6.0
Preparing to Operate	Cleaning areas of operating room, scrub technique, don gown/gloves, sterile technique, removing contaminated clothing	1.25
Common Hospital Procedures	IV line, nasogastric, and Foley catheter insertion	4.0
IPE/Obtaining Consent	Patient encounter: obtaining informed consent, team strategies, interprofessionalism, geriatric-focused care	5.0
ACLS	American Red Cross ACLS course parts 1 and 2	20.0
OMM in the Hospital	Treatment of ileus, pneumonia, and congestive heart failure	7.0
Radiology Review	Discussing different imaging modalities and appropriate use, IV contrast use, review ACR, fracture review	5.0
Ventilator Management	Ventilator types and modes, indications for use	2.0
OMM	Outpatient OMM	7.0

Abbreviations: ACLS, Advanced Cardiac Life Support; IPE, interprofessional education; IV, intravenous; OMM, osteopathic manipulative medicine.

clinical training year. The survey inquired how this cohort of students who participated in the I2C course compared with previous third-year students who had not participated in the I2C course with regard to clinical ability.

Three survey instruments were developed: precourse, postcourse, and preceptor surveys. Questionnaire development incorporated recommendations from PCOM's 10-member group of faculty for the I2C, comprising experts in medical education and clinical practice.

Table 2.
Self-Reported Clinical Competencies of Third-Year Osteopathic Medical Students Before and After
the Introduction to Clerkship Course by Learning Objective (N=232)

Learning Objective	Score, Mean (SD) ^{a,b}	
	Before the Course	After the Course
Patient Assessment		
1. Critically review a patient's medical record	2.5 (0.8)	2.6 (1) ^c
2. Obtain an accurate abdominal history	2.7 (0.8)	3.2 (0.6)
3. Perform an accurate physical examination	2.9 (0.7)	3.3 (0.5)
4. Perform an initial assessment	2.6 (0.7)	3.3 (0.5)
5. Triage the patient's problems	2.4 (0.7)	3.3 (0.5)
6. Identify an emergent medical situation and communicate effectively with the patient and his or her caregivers	2.5 (0.7)	3.1 (0.6)
7. Competently assess the patient, complete a medical history and physical examination, and develop a differential diagnosis	2.8 (0.7)	3.2 (0.5)
8. Develop an emergent plan of care and write hospital admission orders	2.2 (0.7)	3.3 (0.5)
9. Identify elements required for checking an injured or ill patient	2.1 (0.7)	3.2 (0.6)
Effective Communication		
1. Present a clinical case to a panel of resident and staff physicians	2.6 (0.7)	3.1 (0.6)
2. Describe challenges with interviewing parents and children	2.4 (0.8)	3.2 (0.5)
3. Present a patient to an interdisciplinary team using FREE TIPSS rounding tool	1.9 (0.7)	3.3 (0.5)
4. Provide follow-up communication regarding this medical outcome and competently mediate the discussion of options with the patient and of caregivers	2.3 (0.7)	3.0 (0.6)
5. Effectively communicate information concerning a transition patient to another health professional	2.4 (0.8)	3.1 (0.5)
6. Demonstrate the ability to communicate empathetically with distressed or cognitively impaired patients	2.6 (0.8)	3.2 (0.5)
7. Explain before giving care	2.3 (0.7)	3.0 (0.6)
Hospital Logistics		
1. Identify when and where to wear scrub suit	2.5 (0.9)	3.1 (0.6)
2. Identify the sections of the operating room	2.1 (0.9)	3.3 (0.6)
3. Define "Patient-Centered Interdisciplinary Care Rounds"	2.2 (0.8)	3.3 (0.5)
4. Locate a minimum of 3 point-of-care resources used in pediatrics	2.0 (0.8)	2.9 (0.7)
5. Determine an appropriate postdischarge level of care for the patient and access the appropriate ancillary services to assist him or her in making the transition out of hospital	2.2 (0.7)	3.1 (0.6)
6. Review and master medication reconciliation, ensure correct transmission of information	2.2 (0.8)	3.0 (0.6)
7. Develop and initiate a discharge plan	2.1 (0.7)	2.9 (0.7)

(continued)

Table 2 (continued).
Self-Reported Clinical Competencies of Third-Year Osteopathic Medical Students Before and After the Introduction to Clerkship Course by Learning Objective (N=232)

Learning Objective	Score, Mean (SD) ^{a,b}	
	Before the Course	After the Course
8. Determine when a patient requires transfer from an outpatient setting to an acute-care setting	2.2 (0.7)	3.3 (0.6)
9. Complete medication reconciliation for a transitioned patient	2.2 (0.8)	3.2 (0.5)
10. Recognize discharge planning errors, which may result in patient readmission or actual harm	2.2 (0.7)	2.96 (0.7)
11. Describe roles of members within an interdisciplinary health care team	2.5 (0.8)	3.1 (0.6)
12. Identify requirements for informed consent	2.6 (0.8)	3.2 (0.5)
Procedural Skills		
1. Demonstrate proper scrubbing technique for surgery	2.1 (0.9)	3.1 (0.6)
2. Demonstrate proper procedure for donning a surgical gown	2.1 (1)	3.2 (0.6)
3. Demonstrate proper procedure for removal of contaminated clothing	2.1 (1)	3.2 (0.6)
4. Locate a vein and insert an intravenous tube	2.4 (0.88)	3.1 (0.6)
5. Insert a nasogastric tube	1.9 (0.9)	3.12 (0.6)
6. Insert Foley catheters into male and female simulators	2.1 (1)	3.0 (0.6)
7. Perform a simulated breast examination	2.7 (0.8)	3.1 (0.5)
8. Perform a simulated pelvic examination (speculum and bimanual)	2.6 (0.8)	3.3 (0.5)
9. Perform a simulated intrapartum cervical assessment	2.1 (0.9)	3.3 (0.5)
10. Perform a simulated spontaneous vaginal delivery	2.0 (0.9)	3.3 (0.5)
11. Demonstrate osteopathic manipulative treatment techniques used for the hospitalized patient	2.6 (0.8)	2.9 (0.7)
12. Treat soft tissue injury	2.6 (0.8)	3.1 (0.6)
13. Treat musculoskeletal injury of muscles, bones, joints	2.6 (0.7)	3.1 (0.6)
14. Perform citizen cardiopulmonary resuscitation	3.0 (0.8)	3.2 (0.6)
Core Knowledge		
1. Demonstrate understanding of fluid issues	2.3 (0.7)	3.3 (0.5)
2. Describe the inflammatory cascade	2.7 (0.7)	2.9 (0.6)
3. Identify appropriate initial therapy for abdominal injury management	2.2 (0.7)	3.0 (0.6)
4. Define pediatric medicine	2.5 (0.8)	3.0 (0.6)
5. Identify significant developmental milestones in infants and young children	2.4 (0.7)	3.3 (0.5)
6. Define the cardinal movements of labor	2.3 (0.9)	3.2 (0.6)
7. Identify the signs of placental separation and explain their clinical significance	2.3 (0.9)	3.3 (0.5)
8. Interpret laboratory results	2.6 (0.7)	3.2 (0.6)
9. Identify appropriate initial therapy for critically ill patients	2.1 (0.6)	3.1 (0.6)

(continued)

Table 2 (continued).
Self-Reported Clinical Competencies of Third-Year Osteopathic Medical Students Before and After the Introduction to Clerkship Course by Learning Objective (N=232)

Learning Objective	Score, Mean (SD) ^{a,b}	
	Before the Course	After the Course
10. List imaging modalities along with their appropriate uses, contraindications, and contrast administration	2.3 (0.8)	3.3 (0.5)
11. Distinguish between normal and abnormal images	2.4 (0.7)	3.2 (0.6)
12. Identify the American College of Radiology's Appropriateness Criteria Guidelines	2.0 (0.8)	3.1 (0.6)
13. Identify common fractures along with their radiographic appearance and mechanism of injury	2.2 (0.8)	2.9 (0.6)
14. Interpret electrocardiogram results, including rate, rhythm, axis, intervals, and diagnosis	2.6 (0.7)	3.1 (0.6)
15. Identify abnormal arterial blood gas results	2.5 (0.8)	3.3 (0.5)
16. Explain how ventilator settings influence arterial blood gas results	2.1 (0.7)	3.2 (0.6)

^a Mean scores were determined based on students' responses to a 4-point Likert-type scale: 1, strongly disagree; 2, disagree; 3, agree; and 4, strongly agree.

^b All comparisons from before to after the course were statistically significant at $P < .05$ except Item 1 under Patient Assessment.

^c Not statistically significant.

Abbreviations: FREE TIPPS, family/team introductions, recap, events overnight, exam pertinents, tests, impressions, problem-based plan, staff input, summary for family.

Questionnaires were delivered online using Survey Monkey through the students' Blackboard site to all participating third-year medical students and to all third-year clinical preceptors in PCOM's clinical education database. The survey instruments consisted of Likert-type items with opportunities to provide open-ended comments for each section.

Students were surveyed both before and after the course on the same 58 learning objectives. In addition, the precourse survey asked about the I2C assigned group and overall experience "so far" (eg, ease of signing up). The postcourse survey asked about the course format and overall experience (eg, satisfaction). For the 58 learning objectives, each student was asked to rate his or her answers on a Likert-type scale, with assigned values from 1 (strongly disagree) to 4 (strongly agree). The means and SDs for student pre- and post-course data were obtained. As 58 t tests could increase

the probability of significant differences, a Bonferroni correction was used. To further evaluate the data, each response (corresponding to each of the course learning outcomes) was coded into 1 of 5 clinical competency categories (Table 2). An examination of the homogeneity of the content domain for each of the 5 clinical competency categories was assessed with the Chronbach α .

The faculty were asked whether students were (1) better prepared for their rotation and (2) appeared to be more comfortable engaging with patients compared with previous third-year students. The choices were valued on the same 1 to 4 Likert-type scale, with an additional option of 5 for "not sure." Four faculty provided feedback and pilot tested the online surveys prior to administration. A χ^2 test was used to evaluate potential significant difference across the distribution of faculty who knew about the I2C course before survey completion vs those who did not.

All data were de-identified before data processing. Data from the surveys (precourse, postcourse, and preceptor surveys) were extracted from Survey Monkey using Microsoft Excel (Microsoft Corporation) and analyzed using SPSS software (IBM), version 21. For both instruments, analysis consisted of descriptive statistics, means, and SDs.

Results

A total of 232 third-year students in the 2015-2016 academic year completed both pre- and postcourse surveys, providing a 100% response rate for both surveys. An increase in student comfort for each of the 5 clinical competency categories was observed and found to be statistically significant (Table 3). Of the 58 course objectives surveyed, 57 revealed statistically significant improvement. Critical review of a patient's medical record did not exhibit a significant postcourse change ($P=.69$). The Chronbach α for each competency was determined, and all 5 clinical competency categories appeared to consist of homogenous and reliable content domains as seen by $\alpha>0.8$ (Table 3).

Faculty surveys ($n=145$) were examined to determine perception of medical student performance on rotation after participation in I2C. Of the 145 faculty responses, 22 (15%) were excluded for failure to meet inclusion

criteria. Of the 123 faculty members included for analysis, 67 faculty (54.5%) reported that student participants were better prepared on their initial rotations compared with previous students, and 32 (26%) reported that they were unsure whether participants were better prepared. Regarding perceived comfort levels, 78 faculty (63.4) reported that student participants were more comfortable and 16 (13%) reported that they were unsure whether participants were more comfortable. Faculty perceived I2C students to be better prepared (mean [SD] score, 3.6 [1.1]) and more comfortable in their ability to engage their patients (mean [SD] score, 3.6 [1.1]). Faculty were also surveyed on their knowledge of the I2C course at the time of the student evaluation. Based on χ^2 analysis, a statistically significant higher proportion of faculty did not know about the course ($P<.05$), with 13.7% aware prior to survey completion.

Discussion

The goal of I2C is to provide students with integrated, level-appropriate skill sets and accurate expectations during the transition from the classroom to the clerkship setting. Participation in I2C resulted in a marked change in students' perceptions of their abilities and established improvement in the majority of topics. While these

Table 3.
Self-Reported Clinical Competencies of Third-Year Osteopathic Medical Students Before and After the Introduction to Clerkship Course by Learning Objective (N=232)

Competency	Score, Mean (SD) ^a		Chronbach α
	Before the Course	After the Course	
Patient assessment	2.5 (0.3)	3.2 (0.3)	0.9
Effective communication	2.4 (0.3)	3.1 (0.3)	0.89
Hospital logistics	2.2 (0.3)	3.1 (0.3)	0.95
Procedural skills	2.3 (0.3)	3.2 (0.3)	0.93
Core knowledge	2.3 (0.3)	3.2 (0.3)	0.95

^a Mean scores were determined based on students' responses to a 4-point Likert-type scale: 1, strongly disagree; 2, disagree; 3, agree; and 4, strongly agree. All comparisons by overarching competency from before to after the course were statistically significant at $P<.05$.

principles are taught throughout the first 2 years of medical school, many times they are done in conjunction with a systems-based approach to learning, resulting in limited exposure until experienced on rotation. By providing students with a basic understanding of rotation responsibilities and integrating basic science principles with clinical medicine, students had enhanced comfort and ease of adaptation to this new learning environment.

Students reported a statistically significant improvement in every topic except critically reviewing a patient's medical record. Lack of statistical improvement may be due to inadequate focus on this subject, difficulty in short-term improvement, or preexisting comfort. Given the low mean response scores, strong preexisting comfort with these topics remains unlikely. Perhaps this is the most difficult topic with which to gain confidence. Medical record review may be a topic that is the newest and most foreign to students at this level of training. Extracting relevant medical data requires the development of critical thinking skills and is likely the most alien to classroom work.

Evaluation of faculty responses revealed that no statistical significance was observed in those who had knowledge about the course in relation to their responses. The favorable attending responses and improvement in student's confidence suggest that the addition of the course translated to improved preceptor perception of the students. This finding suggests an absence of bias for those with knowledge of the course. Chittenden et al¹² exercised a similar course, which incorporated didactic as well as hands-on experience to prepare medical students for third-year clerkships. The course labelled "Transitional Clerkship" by Chittenden et al¹² was 1 week in duration, compared with I2C, which was 4 weeks. Upon evaluation of students by faculty, Chittenden et al¹² did not find a statistically significant difference between participants in the traditional curriculum and their Transitional Clerkship course. This finding is contrary to the I2C course, which led to a statistically significant difference. Moving forward, both Chittenden et al¹² and our study

revealed high student satisfaction and feeling of preparedness after completion of the respective courses. Although the Transitional Clerkship and I2C course were structured somewhat differently and varied substantially in length, each revealed positive outcomes based on student feedback. The fact that faculty feedback was more positive for the I2C course could be related to the structure and length of the I2C course.

This study has several limitations. The study design did not allow for control groups for the student and preceptor surveys. Therefore, direct comparison of survey responses between I2C participants and the traditional curriculum was not possible. Additionally, preceptor surveys were based on perception and experience with students prior to I2C introduction. This method of comparison is not only subjective but also relies on preceptor recollection. Outcome measures based on competency would likely strengthen future studies. While the anonymous student surveys were intended to provide constructive feedback for further course iterations, students may not have felt the responses were anonymous, leading to biases in the responses. Moving forward, the anonymity of the student survey led to the lack of direct comparisons between a given individual's pre- and postcourse survey. Finally, this course was designed to give students a general idea of expectations while participating in clerkships. It was by no means all encompassing. Each clerkship rotation has individualized requirements and expectations, which may not have been addressed during the course. Such differences in rotations may have factored into how students were perceived by faculty members.

Conclusion

Osteopathic medical education is known for its biopsychosocial approach to medicine. Yet, students still have difficulty when transitioning from preclinical to clinical education. Our study highlights significant deficiencies in modern medical education, which may ultimately hinder the production of competent future physicians. Our positive outcomes identified a potential evolutionary course in medical education. We have shown that

the establishment of an introductory course on clinical skills and decision-making provided students with increased confidence at the onset of their clinical clerkship years. Additionally, students were perceived as better prepared by precepting faculty members.

Acknowledgments

We thank the more than 45 teaching and administrative staff who conceptualized and facilitated this course, as well as the 232 enthusiastic students who completed the course.

Author Contributions

Drs Butts, Speer, Brady, Stephenson, Langenau, DiTomaso, and Sesso provided substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; all authors drafted the article or revised it critically for important intellectual content; all authors gave final approval of the version of the article to be published; and all authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

References

1. Papa FJ, Harasym PH. Medical curriculum reform in North America, 1765 to the present: a cognitive science perspective. *Acad Med*. 1999;74(2):154-164.
2. Beck AH. The Flexner report and the standardization of American medical education [STUDENTJAMA]. *JAMA*. 2004;291(17):2139-2140. doi:10.1001/jama.291.17.2139
3. Drake RL. A retrospective and prospective look at medical education in the United States: trends shaping anatomical sciences education. *J Anat*. 2014;224(3):256-260. doi:10.1111/joa.12054
4. Future Directions for Medical Education: a report of the Council on Medical Education, Adopted June 15, 1982, by the American Medical Association House of Delegates. *JAMA*. 1982;248(24):3225-3239. doi:10.1001/jama.1982.03330240005002
5. Flexner A. Medical education in the United States and Canada: a report to the Carnegie Foundation for the Advancement of Teaching. Bulletin No. 4. Boston, MA: D.B. Updike, The Merrymount Press; 1910:1-346.
6. Duffy TP. The Flexner report—100 years later. *Yale J Biol Med*. 2011;84(3):269-276.
7. Task Force on the Clinical Skills Education of Medical Students. *Recommendations for Preclerkship Clinical Skills Education for Undergraduate Medical Education*. Washington, DC: Association of American Medical Colleges; 2008. https://www.aamc.org/download/163788/data/recommendations_for_preclerkship_skills_education_for_ugme.pdf
8. Physicians for the twenty-first century: report of the Project Panel on General Professional Education of the Physician and College Preparation for Medicine. *J Med Educ*. 1984;59(11 pt 2):1-208.
9. Chumley H, Olney C, Usatine R, Dobbie A. A short transitional course can help medical students prepare for clinical learning. *Fam Med*. 2005;37(7):496-501.
10. O'Brien B, Cooke M, Irby DM. Perceptions and attributions of third-year student struggles in clerkships: do students and clerkship directors agree? *Acad Med*. 2007;82(10):970-978.
11. Windish DM, Paulman PM, Goroll AH, Bass EB. Do clerkship directors think medical students are prepared for clerkship years? *Acad Med*. 2004;79(1):56-61.
12. Chittenden EH, Henry D, Saxena V, Loeser H, O'Sullivan PS. Transitional clerkship: an experiential course based on workplace learning theory. *Acad Med*. 2009;84(7):872-876. doi:10.1097/ACM.0b013e3181a815e9
13. Van Hell EA, Kuks JB, Borleffs JC, Cohen-Schotanus J. Alternating skills training and clerkships to ease the transition from preclinical to clinical training. *Med Teach*. 2011;33(12):e689-e696.

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