JOURNAL of MAINE MEDICAL CENTER

Volume 1 | Issue 1 Article 3

2019

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Acknowledgements
None

ORIGINAL RESEARCH

Faculty Entrustment of Students in Core Clerkships: A Comparison between Block and Longitudinal Integrated Clerkships

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Introduction: Entrustable Professional Activities (EPAs) have been proposed for use in undergraduate medical education. The ability of faculty to entrust students with EPAs may differ between Longitudinal Integrated Clerkships (LICs) and traditional block clerkships.

Methods: Participants were core clerkship faculty, 64 in an LIC and 31 in a sequential block clerkship. We administered a web-based survey at the end of the core clerkship year to measure preceptors' typical entrustment (on a scale of 0–10) in students for the 13 American Association of Medical Colleges Core EPAs. We compared entrustment between LIC and block faculty using a Mann-Whitney test.

Results: LIC faculty were more entrusting of students than block faculty in 12 out of 13 Core EPAs ($p < 0.05$), including taking a patient history and performing a physical examination (median = 8.7 vs. 7.1), documenting an encounter (median = 8.5 vs. 7.3), and giving an oral presentation (median = 9.4 vs. 8.0). There was no difference between the groups in clerkship exam scores.

Discussion: LIC faculty were more likely than block clerkship faculty to entrust core clerkship students with performance of most EPAs. This finding is likely the result of LIC faculty having increased familiarity with student abilities because of the continuity of supervision and education inherent to LIC. More research is needed to ascertain the specific features of longitudinal clerkships that increase faculty entrustment of students.

Conclusions: Longitudinal educational experiences may facilitate the assessment of medical students with EPAs.

Keywords: entrustable professional activities, longitudinal integrated clerkships, longitudinal integrated curriculum, supervision, assessment

The best means of learner assessment in medical education is the subject of much consternation and debate.[1,2] Acknowledging that past efforts dependent on standardized tests and subjective clinical assessments in time-defined training periods are inadequate, the graduate medical education community has adopted competency-based assessment as the most appropriate means of assessment.[3-6] The most recent iteration of these efforts includes using Entrustable Professional Activities (EPAs) to assess learning.[5] EPAs are specific and discrete aspects of clinical work, such as responsibilities and tasks (e.g., discharging a patient), that supervisors may allow ("entrust") learners to complete with varying levels of supervision.[7–9] EPAs provide "real-world" significance by assessing the performance of practical and observable tasks central to the practice of medicine.

Although graduate medical education has been moving toward competency-based medical

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education (CBME), a similar progression has not occurred at the undergraduate level.[5,10] Despite the widespread adoption of observed structured clinical encounters and high-fidelity simulation, CBME remains the exception rather than the rule in medical student education.[11] Most undergraduate programs appear focused on identifying students that struggle rather than ensuring that all graduates possess the knowledge and abilities to succeed as interns.[10,11] This deficiency in CBME is the result of multiple drivers, including the need to educate students in multiple clinical disciplines, the large number of students requiring evaluation, and advancement committees that focus primarily on struggling students.[10,12]

As a result, residency programs have noted that medical students may enter residency without the basic abilities needed to succeed as interns.[13,14] To address this need, the American Association of Medical Colleges (AAMC) established the Core Entrustable Professional Activities for Entering Residents (CEPAERs) or AAMC Core EPAs (Table 1).[11] Ten pilot institutions are currently assessing the best means of implementing an EPA-based assessment program in the undergraduate setting.[15,16] One major hurdle in this implementation is the relative lack of longitudinal student-faculty interactions in undergraduate medical education, which limits the ability of schools to make informed decisions regarding formal entrustment.[17–20]

A recent parallel advance in undergraduate medical education is the development of the Longitudinal Integrated Clerkship (LIC).[21–23] Although LICs vary widely in structure and clinical content, all are based on the concepts of continuity of education, patient care, and supervision.[22,24] Students work longitudinally with faculty over an extended period of time, often forging strong preceptor relationships and providing faculty with an enhanced view of the capabilities of individual learners.[19,25–27] In addition, other features of the LIC, including the time spent on observation and a clear role of faculty as both teachers and evaluators, may increase the trust faculty members have in learners.[27] The use of LICs may therefore be one strategy for incorporating EPAs into the assessment framework at the undergraduate level.[19] We thus aimed to assess differences between LIC and traditional block faculty in their entrustment of medical students in their third-year core clerkship for each of the Core EPAs.

Table 1. Association of American Medical Colleges Core Entrustable Professional Activities

1. Gather a history and perform a physical examination
2. Prioritize differential diagnosis following a clinical encounter
3. Recommend and interpret common diagnostic and screening tests
4. Enter and discuss orders and prescriptions
5. Document a clinical encounter in the patient record
6. Provide an oral presentation of a clinical encounter
7. Form clinical questions and retrieve evidence to advance patient care
8. Give or receive a patient handover to transition care responsibility
9. Collaborate as a member of an interprofessional team
10. Recognize a patient requiring urgent or emergency care and initiate evaluation and management
11. Obtain informed consent for tests and/or procedures
12. Perform general physician procedures
13. Identify system failures and contribute to a culture of safety and improvement

METHODS

The Tufts University School of Medicine Maine Track LIC began in 2012 and includes 11 sites spread across a wide geographic area within the state of Maine. Participating centers range from 25-bed rural critical access hospitals to a 637-bed urban tertiary care medical center. Most sites host two students for nine months, during which six core clerkships (family medicine, internal medicine, obstetrics/gynecology, pediatrics, psychiatry, and surgery) are completed. Core clerkship students are assigned to the LIC based on a ranked preference system (lottery) with approximately 22 students completing the LIC each academic year. The remaining Maine-based students, approximately 15–20 students per year, complete the core clerkship year in a traditional block model at an urban tertiary care center. The traditional block model consists of six- or eight-week sequential rotations in each of the core specialties.

To determine faculty assessment of student abilities relating specifically to the Core EPAs, an anonymous voluntary web-based survey (Qualtrics, Seattle WA) was sent to all LIC faculty via email by the local LIC site director at each participating hospital. The EPA survey was part of a larger faculty survey designed to assess faculty attitudes towards participating in the LIC. A literature search did not reveal a validated survey to assess degree of entrustment in medical students. Although one published scale was available when the study started, we considered it too complex to use without significant faculty training.[10] Thus, we constructed a simple EPA scale and subsequently modified it based on pilot testing with several LIC faculty who would not be participating in the study. The scale was based on a list of the 13 Core EPAs (Table 1) and an additional EPA regarding advanced procedures ["Perform advanced procedures of a physician (e.g., nerve block)"]. The survey was sent at the conclusion of the clerkship year in 2017. Faculty were asked to assess their students on a continuous visual analog scale of 0–10 [0 = entrusted student to practice activity only under proactive full supervision (i.e., "you are with the student in the room"); 10 = entrusted to practice activity unsupervised (i.e., "student acts independently without contact with you")]. To evaluate block faculty assessment of student abilities, an identical survey was sent to block preceptors by specialty site directors at the tertiary care medical center where the block rotations were conducted. Two follow-up requests were sent by email to all potential participants.

For each EPA, we compared scores between LIC and block faculty using a Mann-Whitney test. We calculated an overall score as each preceptor's mean score for the 13 Core EPAs and compared overall scores between LIC and block faculty. As a sensitivity analysis, we repeated this test excluding results from 21 surgery and pediatric LIC preceptors (no surgery or pediatric block preceptors completed the survey). To assess if performance differed between students completing LIC and block rotation as determined by a means other than faculty ratings, we compared mean scores of clerkship exams between LIC and block students with two-sample *t*-tests. Clerkship exams included four National Board of Medical Examiners subject examinations and a national online clerkship exam in Pediatrics (MedU, Hanover, NH). Statistical analyses were performed using SAS (version 9.3; SAS Institute).

This study protocol was evaluated and deemed exempt by the Maine Medical Center Institutional Review Board (IRB).

RESULTS

Out of 212 preceptors (130 LIC and 82 block) invited to participate, we received responses from 95 (64 LIC and 31 block), for an overall response rate of 44.8% (49.2% and 37.8% for LIC and block preceptors, respectively). Teacher characteristics are displayed in Table 2. Most teachers had been teaching in the program for at least a year, and over a third in each group had been teaching for more than five years. LIC preceptors from all six core specialties completed the survey, with the most surveys completed by Family Medicine, Internal Medicine, and Pediatrics faculty. The most block rotation preceptors were based in Internal Medicine. No block rotation pediatricians or surgeons completed the survey.

Entrustment scores for LIC and block preceptors are presented in Table 3. LIC and block preceptors reported a high degree of entrustment in students for many Core EPAs. With the exception of the EPA related to Interprofessional Care (EPA #9), LIC preceptors were significantly more likely than block preceptors to entrust students to carry out all professional activities. These activities included performing a history and physical examination

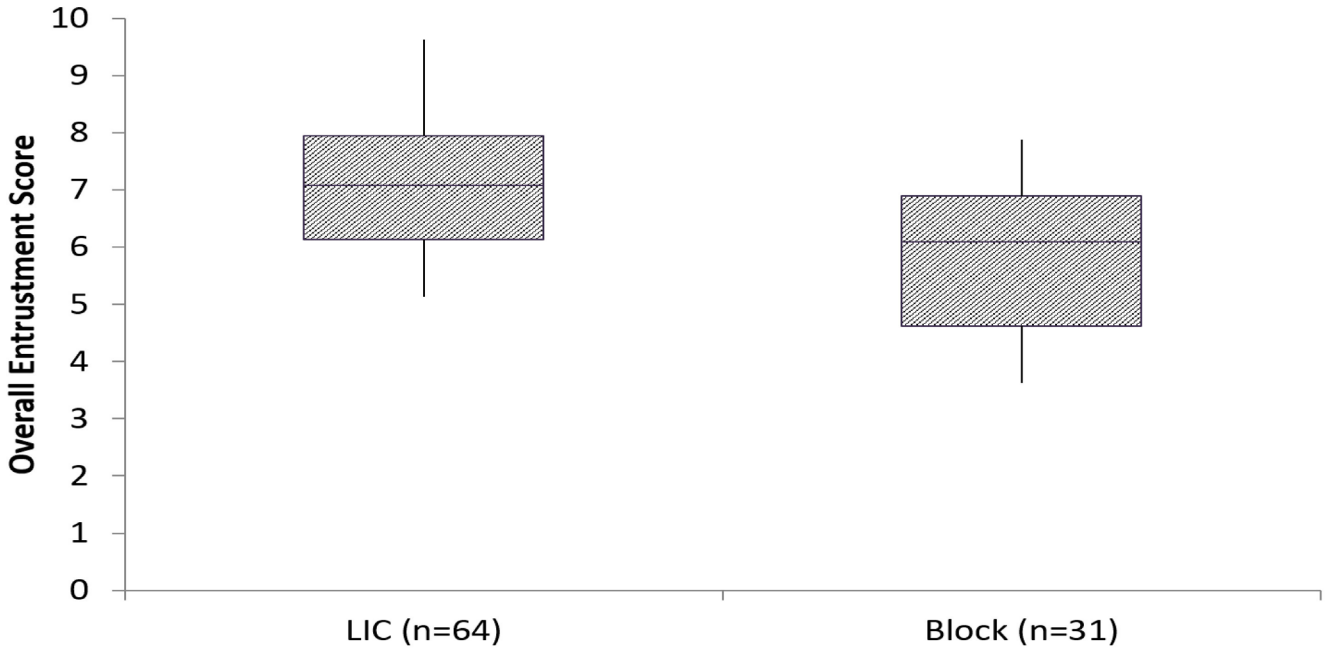

Figure 1. Overall entrustment for Core Entrustable Professional Activities was increased in Longitudinal Integrated Clerkships. Overall entrustment was calculated as the average of reported entrustment for 13 Entrustable Professional Activities. Box = 25th and 75th percentiles; bars = min and max values.

(median = 8.7 vs 7.1, $p < 0.01$), documenting an encounter in the record (median = 8.5 vs 7.3, $p < 0.01$), providing an oral presentation (median = 9.4 vs 8.0, $p < 0.01$), and forming clinical questions (median = 8.9 vs 8.0, $p = 0.04$). The overall level of entrustment for the 13 Core EPAs was also significantly higher among LIC faculty (Figure 1). Although neither group of preceptors reported a high degree of entrustment in students for performing general (median = 5.0 vs 3.0, $p < 0.01$) or advanced (median = 1.1 vs 0.1, $p < 0.01$) procedures, LIC preceptors reported greater entrustment in these activities than block preceptors. We obtained similar findings when we excluded scores from surgery and pediatric preceptors (results not shown).

LIC preceptors were also more likely than block preceptors to report complete entrustment (score = 10/10) in students for several activities, including gathering a history and performing a physical exam (25% vs. 9.7%) and prioritizing a differential diagnosis (11% vs 0%); however, p-values were not statistically significant (Table 4).

During the academic year of the survey, we obtained clerkship exam scores for the 15 block students and 20 LIC students who completed exams in medicine (n = 35), obstetrics/gynecology (n = 35), psychiatry (n = 35), pediatrics (n = 34), and surgery (n = 35). Scores (out of a possible 100) varied by exam discipline, ranging from a mean of 72.2 (standard deviation (SD) = 7.6) for surgery to a mean of 80.0 (SD = 7.5) for psychiatry. Therefore, we compared scores for block and LIC students only within an exam topic. We did not observe statistically significant differences in exam scores between block and LIC students for any topic.

DISCUSSION

In this study of core clerkship faculty, LIC faculty were significantly more likely than block rotation faculty to entrust students with performing professional activities, despite no difference in student knowledge as assessed by exam performance. These results suggest that longitudinal clinical rotations, such as the LIC, may be an effective strategy for structuring clinical medical education to facilitate the recent shift to competency-based medical education.

One of the central attributes of the LIC is the longitudinal relationship that develops between preceptor and learner. Although this relationship is most immediately apparent in the continuity of education, these results suggest the continuity of supervision inherent to the LIC enables a more robust and informed evaluation of the student's abilities. Because LIC faculty can observe students over an extended period of time with an increased degree of observation, they can assess learners

Table 2. Educator Characteristics

Characteristics	LIC (N = 64) n (%)	Block (N = 31) n (%)
Years teaching in the medical school program		
<1 year	3 (4.7)	7 (22.6)
1–5 years	37 (57.8)	14 (45.2)
> 5 years	24 (37.5)	10 (32.3)
Specialty*		
Family Medicine	15 (23.4)	6 (19.4)
Internal Medicine	13 (20.3)	13 (41.9)
Obstetrics/Gynecology	7 (10.9)	7 (22.6)
Pediatrics	13 (20.3)	0 (0)
Psychiatry	8 (12.5)	5 (16.1)
Surgery	7 (10.9)	0 (0)
Hospital size†		
25 or fewer beds	23 (35.9)	-
26–200 beds	16 (25.0)	-
>200 beds	22 (35.4)	31 (100)

LIC, longitudinal integrated clerkship

*Missing data for 1 observation. †Missing data for 3 observations.

in a continuous and informed manner while also appropriately balancing supervision and autonomy. This strategy encourages learners to enter the "zone of proximal development".[27,28] Other aspects of the LIC may also encourage the development of trust, including the learners' meaningful participation in patient care and significant understanding of the clinical setting. The clear role of the faculty as evaluator as well as teacher may also contribute to faculty developing trust in learners.[27]

The impact of the longitudinal rotation on elements of entrustment other than competence, specifically truthfulness, conscientiousness, and discernment of limitations, provides further rationale for these findings.[29] Developing an appreciation of a learner's abilities in each of these domains requires a degree of grounded trust that is based on the collection of significant data over time in many different situations.[12] For example, entrusting a student to complete a history and physical requires the faculty member to have observed the behavior, discussed the experience with the learner, and delved into not only the learner's approach to the task but also their reactions to completing the task. This is challenging for any faculty member. Thus, it is not surprising that block faculty, who may be limited to working with an individual student for only days, may be reluctant to entrust a student with even the most basic professional activities.

Some authors have suggested that several of the Core EPAs are more appropriate for assessment during the fourth year of school, including during acting internships when students assume a higher level of responsibility for patient care.[30,31] For example, the professional activities of entering orders, participating in handovers, and recognizing a patient in need of urgent/emergent care may be most appropriately addressed when a student has more clinical responsibility or experience in the clinical setting. Our results bolster this impression, as faculty in both groups were less likely to entrust students with these activities than other activities that are considered more central to the education of a core clerkship student, such as taking a patient history.

Interestingly, faculty in both groups had relatively low entrustment in students' ability to obtain informed consent, an activity that may be considered appropriate for assessment in the core clerkship year. Not surprisingly, neither group of faculty were likely to entrust students with performing basic or

advanced procedures. It is unclear whether this tendency represents a lack of student exposure to these procedures or a true lack of entrustment.

Our study is subject to multiple limitations. It was limited to a single year at one medical school with a relatively small number of faculty. Also, the response rate among block rotation faculty was low, increasing the likelihood of response bias. In addition, the LIC is set in many small hospitals where patient acuity and complexity may be lower than that of the tertiary care hospital in which the block rotation is set. Faculty may have been more likely to entrust students in the setting of less complex patients. Similarly, several specialties were underrepresented among block faculty; however, our findings were not meaningfully altered when we excluded specialties with skewed representation (i.e., pediatrics and surgery). The higher level of entrustment accorded LIC students may also indicate a higher level of performance among the LIC students compared with the block students. Clerkship exam performance, however, did not differ between the two groups of students. Finally, our simple but unvalidated entrustment scale may have affected the validity of the results. We chose to use this scale because no validated scales existed for use in undergraduate medical education, and the remarkable geographic spread of the LIC limited the opportunity to train faculty in the use of more complex scales. The concept of entrustment as applied to medical students is also problematic. Unlike residents, it is not clear that medical students should be entrusted to perform tasks completely independently. This ambiguity makes it difficult to apply existing entrustment scales, especially for faculty unfamiliar with the concept of entrustment.

CONCLUSIONS

We demonstrated that LIC faculty are more likely than block rotation faculty to entrust core clerkship students with professional activities. As competency-based medical education expands into undergraduate medical education, longitudinal clerkships may provide an effective way to assess students through EPAs. Future studies may focus on determining the specific characteristics of LICs that increase entrustment, the length of longitudinal preceptor-student relationships needed to build entrustment, and how longitudinal educational experiences can be incorporated into the structure of more traditional models of medical education.

Table 3. Faculty Entrustment of Professional Activities

Entrustable Professional Activity	LIC N = 64 Median (range)*	Block N = 31 Median (range)	p-value†
Gather a history and perform a physical examination	8.7 (3.1–10)	7.1 (0–10)	<0.01
Prioritize a differential diagnosis following a clinical encounter‡	7.3 (3.0–10)	6.2 (1.4–9.1)	<0.01
Recommend and interpret common diagnostic and screening tests	7.3 (2.0–10)	5.6 (0–9.1)	<0.01
Enter and discuss orders/prescriptions‡	5.2 (0–10)	3.5 (0–8.2)	<0.01
Document a clinical encounter in the patient record	8.5 (2.1–10)	7.3 (0.4–10)	<0.01
Provide an oral presentation of a clinical encounter	9.4 (5.1–10)	8.0 (0–10)	<0.01
Form clinical questions and retrieve evidence to advance patient care	8.9 (0–10)	8.0 (0–10)	0.04
Give or receive patient handover to transition care responsibility‡	7.2 (0–10)	5.0 (0–10)	<0.01
Collaborate as a member of an interprofessional team	9.0 (1.2–10)	8.2 (0–10)	0.33
Recognize a patient requiring urgent or emergent care and initiate evaluation and management	6.1 (0–10)	3.5 (0–9.8)	<0.01
Obtain informed consent‡	6.0 (0–10)	4.4 (0–9.9)	0.04
Perform general procedures of a physician (e.g., IV, foley catheter)‡	5.0 (0–10)	3.0 (0–10)	<0.01
Identify system failures and contribute to a culture of safety and improvement‡	7.6 (0–10)	5.5 (0.01–10)	<0.01
Perform advanced procedures of a physician (e.g., nerve block)‡, §	1.1 (0–8.1)	0.1 (0–6.1)	<0.01

*0 = Entrusted to practice activity only under proactive, full supervision (i.e., you are with the student in the room); 10 = Entrusted to practice activity unsupervised (i.e., student acts independently without contact with you)

†Calculated using a Mann-Whitney test.

‡n missing: EPA #2, n = 1; EPA #4, n = 2; EPA #8, n = 1; EPA #11, n = 5; EPA #12, n = 11; EPA #13, n = 2; EPA #14, n = 21.

§Additional EPA added to 13 Core EPAs.

Table 4. Proportion of preceptors reporting a typical entrustment score of 10

Entrustable Professional Activity	Proportion of preceptors reporting a typical entrustment score of 10		
	LIC* (n = 64)	Block (n = 31)	p-value†
Gather a history and perform a physical examination	25% (16/64)	9.7% (3/31)	0.10
Prioritize a differential diagnosis following a clinical encounter	11% (7/63)	0% (0/31)	0.09
Recommend and interpret common diagnostic and screening tests	6.3% (4/64)	0% (0/31)	0.30
Enter and discuss orders/prescriptions	3.2% (2/62)	0% (0/31)	0.55
Document a clinical encounter in the patient record	19% (12/64)	9.7% (3/31)	0.37
Provide an oral presentation of a clinical encounter	39% (25/64)	29% (9/31)	0.37
Form clinical questions and retrieve evidence to advance patient care	28% (18/64)	19% (6/31)	0.45
Give or receive patient handover to transition care responsibility	4.8% (3/63)	3.2% (1/31)	1.0
Collaborate as a member of an interprofessional team	28% (18/64)	26% (8/31)	1.0
Recognize a patient requiring urgent or emergent care and initiate evaluation and management	3.1% (2/64)	0% (0/31)	1.0
Obtain informed consent	10% (6/60)	0% (0/30)	0.17
Perform general procedures of a physician (e.g., IV, foley catheter)	1.8% (1/55)	6.9% (2/29)	0.27
Identify system failures and contribute to a culture of safety and improvement	16% (10/62)	12.9% (4/31)	0.77
Perform advanced procedures of a physician (e.g., nerve block)	0% (0/0)	0% (0/0)	n/a

*LIC, longitudinal integrated clerkship

†Calculated using a Fisher's exact test

Conflicts of Interest: None

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