

Evaluation of an Infectious Diseases Elective for Early Clinical Medical Students on Their Internal Medicine Clerkship

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Background. Early medical subspecialty training is an emerging trend in medical education. These electives are still rare for Early Clinical Medical Students (ECMS). We describe the introduction of an Infectious Disease (ID) inpatient consult rotation elective for ECMS.

Methods. In addition to seeing patients and rounding with the inpatient ID consult team, we created a supplemental curriculum to provide added support for ECMS that included a checklist of clinical skills learning objectives, self-directed, publicly available mini-lectures on ID topics, and an ID Coach who provided directed and personalized tutoring for students. We surveyed ECMS, ID fellows and attendings on service, and ID Coaches to evaluate the acceptability, feasibility, and effectiveness of this rotation and curriculum.

Results. The majority of ECMS reported that the rotation was a useful educational experience and that the ID Coach was one of the most valuable aspects of the rotation. The majority of ID fellows and attendings reported that working with ECMS improved their job satisfaction and well-being.

Conclusions. This multifaceted approach to early medical subspecialty training was valuable for ECMS, ID fellows, and faculty. Ongoing improvements in this curriculum will provide a useful tool for medical education.

Keywords. coaching; infectious disease education; medical students.

Introducing subspecialty clinical experiences earlier in medical school training is an emerging trend in medical education [1, 2]. Such electives for Early Clinical Medical Students (ECMS) have been implemented in a few Internal Medicine subspecialties

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[1–4]; however, surveys of US medical schools report that the majority of core Internal Medicine (IM) clerkships offer no subspecialty experience [5–7].

Prior studies demonstrate that students and clinicians alike have suboptimal working knowledge of the management of infectious disease syndromes [8, 9]. Improving trainees' ability to manage infections would be beneficial to patient care, regardless of which field trainees enter. Additionally, early, positive educational experiences in ID have been shown to influence learners to pursue this field [10, 11]. Finally, burnout among clinical ID faculty at large academic centers is high [12, 13]. While addressing structural issues related to overwork and under-reimbursement for ID physicians is key, it is not known whether having students rotate on the ID consult service could help mitigate burnout [12, 13].

To address these gaps and opportunities, in July 2020 the University of California San Diego (UCSD) IM clerkship for ECMS in their third year of medical school was modified to provide students with the option to participate in a 2-week elective on the inpatient Infectious Diseases (ID) consult service during the 12-week IM core clerkship. We evaluated the acceptability, feasibility, and effectiveness of this rotation and curriculum among participating medical students and ID educators.

METHODS

We used Kern's 6-step approach to curriculum development to design the rotation [14].

Step 1: Problem Identification and General Needs Assessment

As outlined above, early ID subspecialty educational experiences are rare, and these early experiences may improve future clinicians' management of infectious diseases and potentially influence trainees to pursue ID as a career.

Step 2: Targeted Needs Assessment

Next we conducted a targeted needs assessment via discussions at division meetings with UCSD ID faculty and fellows to understand barriers and facilitators to successfully incorporating ECMS into an ID consult rotation. We also met with IM clerkship directors to understand how this rotation could fill current learning gaps and to determine specific, level-appropriate clinical skills and learning objectives for ECMS.

Step 3: Goals and Objectives

We developed the goals and objectives for the rotation taking into account the major challenges that emerged from the discussions in our targeted needs assessment, namely that ECMS are very early clinical learners requiring intensive guidance and teaching and that the inpatient ID services are often very

busy with complicated patients. Our primary goal was to create a rotation on the inpatient ID consult service that developed general and ID-specific clinical skills for ECMS in a way that was not only feasible and acceptable for learners but also for busy ID fellows and faculty. Working with UCSD ID educators and the IM clerkship leadership, we developed specific learning objectives for ECMS on the rotation, prioritizing ID-relevant history-taking, physical exam, and clinical reasoning skills that learners were likely to have the opportunity to apply through their patient care experiences ([Supplementary Data 1](#)).

Step 4: Educational Strategy

In addition to learning through the provision of clinical care (with students assuming primary ownership of 2–4 patients on the consult service each day), there were 3 foundational components of the curriculum. The “ID Passport” was a tool that allowed us to operationalize the rotation’s learning objectives by providing a checklist of clinical skills that students could aim to practice and get signed off on by their supervising fellow or attending ([Supplementary Data 1](#)). We utilized the passport sign off to help clarify and focus learning objectives for both students and ID educators. We also provided students access to a curated compilation of >70 five-minute, publicly available mini-lectures on clinical ID topics [15]. Students were instructed to watch the videos at their discretion in order to supplement learning about patients they were following or to review infectious syndromes that were not related to patients on the service (eg, rare infections such as malaria). We chose to use these mini-lectures because they contained targeted content tailored to an appropriate learning level, promoted self-directed learning, and could potentially help decrease the teaching burden on busy ID fellows. Finally, we created the role of the ID Coach (a senior ID fellow or ID attending not currently on the consult service) who volunteered to meet individually with students weekly for 1–2 hours to review and discuss common ID topics and student-driven questions. We employed the ID Coach strategy based on data that suggest that deliberate practice with coaching facilitates skill development and expertise [16, 17].

Fellows and attendings were oriented to the curricular components and instructed on strategies for incorporating the ID Passport and mini-lectures into their teaching. Coaches did not receive formal training for their role but were given guidance on teaching high-yield topics frequently requested by students (eg, antibiotics). Coaches were encouraged to take a student-centered approach and tailor their teaching to what students wanted to learn about.

Step 5: Implementation

We implemented the rotation and curriculum during the 2020–2021 academic year.

Step 6: Evaluation and Feedback

We evaluated the impact of having ECMS on the ID consult rotation by surveying 4 key stakeholders: ECMS on the rotation, ID

fellows and faculty on service, and ID Coaches. ([Supplementary Data 2–5](#)). Students were surveyed after their clerkship grades had been submitted. Surveys were developed using a systematic 7-step process for survey design in medical education [18]. Responses were submitted on a 5-point Likert scale and using qualitative, free response. Quantitative data were reported as descriptive statistics.

Participant Consent

The study proposal and surveys were reviewed and approved by UCSD’s Human Subjects Protections Program.

RESULTS

Third-Year Medical Students

Of the 40 ECMS who rotated on the ID consult services between July 2020 and June 2021, 31 (77%) completed the survey. The majority of students reported that the curriculum was either extremely or very effective in facilitating learning across ID-specific as well as more generalized clinical skills ([Figure 1](#)). Seventy percent of students rated the ID Coach and the self-directed mini-lecture curriculum as being extremely or very effective, while only 40% found the ID Passport extremely or very effective. Medical students’ qualitative reflections on the rotation highlighted that they appreciated the broad-scale application of content learned during the rotation, demonstration of clinical reasoning, and the role of the ID Coach in establishing a safe learning environment. Nineteen percent of students reported that they were either extremely or somewhat likely to pursue a career in Infectious Diseases following the rotation.

Infectious Diseases Fellows and Faculty on Service

Eight out of 13 (62%) ID fellows and 8 of 14 (57%) ID attendings completed the survey evaluating the impact of having ECMS on the ID consult rotation. Less than half of fellows and attendings felt that ECMS were helpful in assisting with work-related tasks ([Figure 2](#)). The majority of fellows reported that having ECMS on service not only helped to develop their teaching skills but also facilitated their own learning of ID concepts. The majority of attendings agreed that students gave fellows an opportunity to develop teaching skills. Fellows reported that students increased their job satisfaction and well-being despite experiencing a longer workday (increased by 30–60 minutes) and increased stress levels when students were on service ([Figure 3](#)). Nearly 90% of fellows and faculty reported that the ID Coach was extremely or very useful and that students should continue to rotate on the service.

Infectious Diseases Coaches

Ten of the 14 (71%) fellows and faculty who participated as an ID Coach completed the ID Coach survey. ID Coaches participated in 2.4 teaching sessions per year, on average, with 70% spending 60–90 minutes per session. A majority of ID Coaches (60%) rated their teaching sessions as extremely or very

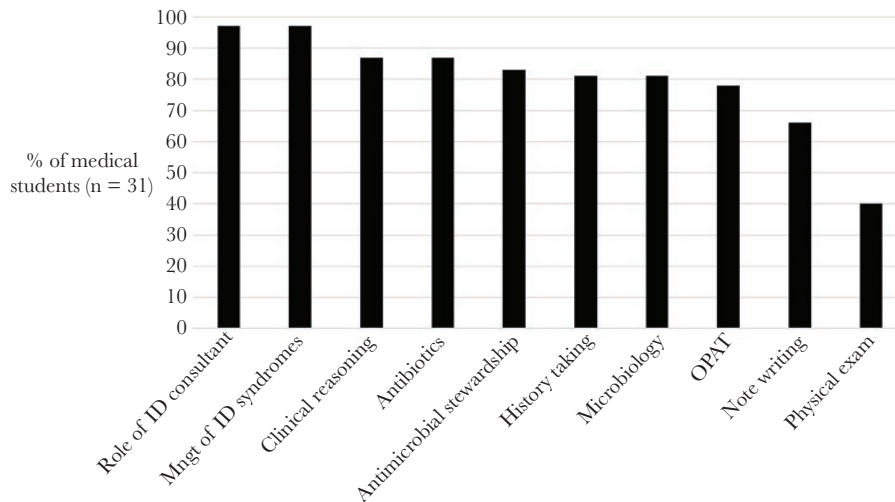


Figure 1. Percentage of medical students rating the rotation and curriculum as either extremely or very effective in facilitating their learning across 10 domains. Abbreviations: ID, Infectious Diseases; OPAT, outpatient parenteral antimicrobial therapy.

effective in helping students learn the role of the ID consultant. Fifty percent thought they were effective at teaching core ID content. While only 40% felt at least moderately prepared for their role as an ID Coach, 60% reported that the experience was extremely or very effective in improving their teaching skills.

DISCUSSION

Having ECMS rotate on the ID consult service as part of their IM clerkship was highly effective in helping students learn general and ID-specific clinical skills across many different domains. The rotation was least helpful in developing physical exam skills. We hypothesize that this is because the rotation took place during the COVID-19 pandemic, which may have limited opportunities for physical exam teaching.

ID Coaches and a self-directed curriculum with mini-lectures were essential components that contributed to the success of the rotation. The ID Passport, with specific clinical skill learning objectives, was not particularly useful. One hypothesis for this finding is that students may have perceived the checklist as mandatory items that they were required to be signed off on, and this may have created additional stress or pressure on them to perform.

While the majority of both ID fellows and faculty felt that medical students should continue to rotate on the ID consult service, a larger proportion of fellows reported improvement in job satisfaction and well-being compared with faculty when medical students were present. There are many potential explanations for this finding, including the possibility that fellows and students spend more time together on service, fellows may

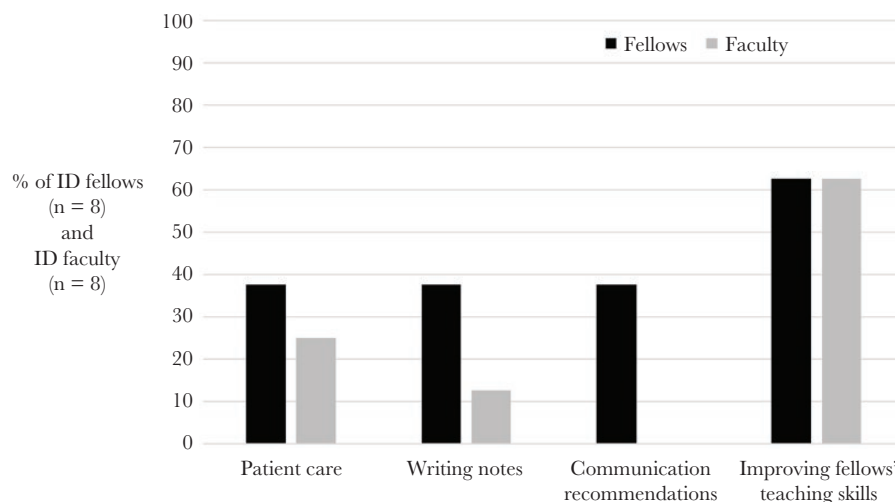


Figure 2. Percentage of Infectious Diseases fellows and faculty rating the impact of having a third-year medical student as either extremely or very useful across 4 domains. Abbreviation: OPAT, outpatient parenteral antimicrobial therapy.

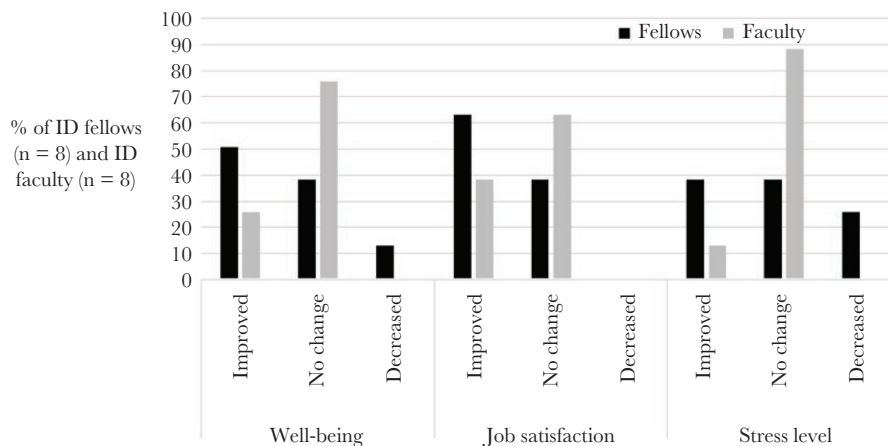


Figure 3. Fellows' and faculty's self-reported well-being, job satisfaction, and stress levels attributed to having a third-year medical student with them on the Infectious Diseases consult service. Abbreviation: OPAT, outpatient parenteral antimicrobial therapy.

derive more benefit in developing their teaching skills with ECMS, and/or fellows may have felt that the team environment mirrored favorable experiences they had in residency. The dichotomy between the increased workload or stress of teaching students on service and the concurrent improvement in job satisfaction and well-being that fellows experienced is an interesting yet complicated one that warrants further exploration. Increased job satisfaction and well-being are important considerations for ID fellows and potentially provide further support for this model of clinical experiential teaching.

Fellows, faculty, and students acknowledged that when the service was especially busy, teaching and learning had to be deprioritized. One solution could be to increase the role of the ID Coach on this rotation; however, to do this effectively, ID Coaches should be provided with protected time, compensation, or credit toward promotion. ID Coach development workshops could be employed to better prepare ID educators to teach and coach students.

This study's generalizability is limited. It was conducted at a single center and included students who selected to rotate on the ID consult service (vs other IM subspecialty services). These students may have represented a group with a higher affinity for ID compared with the general student population. Survey response rates were low among ID fellows, faculty, and Coaches, potentially skewing the results toward an overly positive impression of the rotation. We were only able to assess students' self-reported learning and satisfaction with the rotation and could not follow learners' exam scores or clinical practice outcomes over time. Finally, while a sizeable proportion of students expressed interest in pursuing a career in Infectious Diseases, we cannot determine if this interest was cultivated by the rotation, nor do we have long-term follow-up data on learners' career trajectories.

Despite these limitations, this novel approach of introducing early clinical learners to Internal Medicine subspecialty training within a supportive student-centered curriculum that included

ID Coaches was feasible, acceptable, and perceived to be a highly effective educational experience. Additional curriculum improvements to this model hold tremendous promise as an educational tool for the future.

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