A Qualitative Study of Drivers for Use of the Primary Care Exception Among Internal Medicine Teaching Faculty

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Background: The Primary Care Exception (PCE) is a billing rule created by the Centers for Medicare and Medicaid Services (CMS) which allows supervising physicians to bill for the care of a patient without direct supervision of the resident in ambulatory settings. There are limited regulations for use of the PCE. CMS does not provide guidance to institutions on how to apply the PCE among trainees, nor defines how to best determine individual trainee readiness for indirect supervision. Previous studies have demonstrated that entrustment is a key piece for unsupervised practice, but this has not been examined through the lens of the PCE. This qualitative study seeks to explore what factors influence attending use of the PCE for a given clinical encounter and how they develop trust with their trainees in ambulatory settings.

Methods: Participants in this qualitative, multi-institutional study were supervising attendings from Yale and University of Connecticut Schools of Medicine, representing four internal medicine training programs. A semi-structured interview template was developed based on previously defined axes from the entrustment literature including characteristics of supervisors, trainees, their relationship, tasks, and the environment. Faculty were recruited via purposive and snowball sampling techniques over email. Interviews were conducted and recorded via the Zoom platform, then transcribed. The study team employed thematic content analysis using a grounded theory approach to identify major themes among attending responses regarding use of the PCE.

Results: 27 interviews were complete at time of final data analysis. Four predominant categories were identified that positively and negatively influenced individual use of the PCE, including attending related factors, resident-related factors, patient-related factors, and the clinical environment itself. Among attending-related factors “reflexive trust,” which includes internal rules and prior experience with trainees, was a significant driver of PCE non-use regardless of the trainee, patient, or clinical context. Among resident-related factors there was a common conflict between use of PCE to promote resident autonomy vs non-use of PCE to promote educational opportunities. Among factors related to the clinical environment, telehealth was a large driver of PCE use regardless of other visit factors.

Conclusions: Data analysis reveals that use of the PCE involves complex internal decision-making schema in which attendings weigh internal, patient, resident, and environmental-related factors that lead them towards or away PCE use. Many attendings revealed that decisions regarding PCE use are largely driven by internal processes and time constraints that supersede other influencing factors, which leaves room for potential bias in determining individual trainee readiness for independent practice. This identifies a need for dedicated training for attendings on appropriate PCE use or perhaps a need for an improved system for standardized evaluation of trainees to determine competency and readiness for independent practice.
Augmented Informatics Journal Club: Seizing Opportunity Presented by the COVID Pandemic

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**Objectives:** Increasing diversity of perspectives presented at imaging informatics journal club. Reduce uncertainty of journal club article analysis through direct involvement of journal author, journal editorial staff, and industry. Large journal club to promote collaboration within the community.

**Background:** Traditional journal club meetings involved a department sub-specialty section (like radiology informatics) meeting in-person with faculty and trainees only from a single institution (about 10 in attendance). Despite having the most expert faculty present, we were sometimes left wondering what the authors really meant, why the journal editorial staff permitted or solicited a publication, or how industry fits into the picture. In-person journal clubs would not draw a large crowd and including guests from outside of our institution would be logistically difficult to coordinate schedules and arrange travel. Once COVID happened, video conferencing became routine. Video conferencing provided an opportunity to invite guests from near and far, taking travel out of the equation. This provided an opportunity to invite guests from around the country without anyone needing to pay for their travel expenses (and forgoing travel reducing pollution from vehicles). It also provided the prospect of growing our audience by making attendance possible despite social distancing, and nationally known guests would generate hype and interest within the department (and on social media).

**Methods:** Our imaging informatics group invited a radiology trainee to present the journal club article overview. Guests were invited, including: journal article author (first or senior author), journal editorial staff member (editor-in-chief or senior editor), and a member of industry that has a product relevant to the journal article as well as used or potentially used in our department. Invited guests are also often leaders in national organizations.

**Results and Conclusions:** As of abstract submission, the first 2 journal clubs had great attendance of 41 and 37 people just from our department and guests (invitations not yet expanded to guests’ institutions, general public, or social media), and monthly journal club topics have been planned for the next 2 years. All invited guests actively interacted with our staff to answer all questions, generate robust discussion, and provide diverse perspectives. Guests did include several prominent figures from national organizations for radiology & imaging informatics, promoting engagement with specialty societies. Collaborations seemed to naturally develop from these journal clubs. These augmented journal clubs resulted in richer learning and educational experiences. Subsequent collaborations will help keep practice of medicine up to date and promote the advancement of cutting edge research in our field.
Development and validation of a novel instrument to measure the community well-being of residency programs

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Objective: To develop and validate a Residency Program Community Well-being measure (RCWB), a novel instrument to measure the subjective community well-being of residency programs.

Background: Residents have higher rates of burnout than the general population, and they report worsening burnout as they progress through residency [1]. Understanding what influences a residency program’s community well-being may help identify areas for intervention [2], as community well-being impacts individuals’ ability to “flourish and fulfill their potential [3,4].” A community well-being measure has yet to be adapted to the residency program experience.

Methods: An initial questionnaire to measure RCWB was developed after literature review [1-4]. Items were pilot tested, and the questionnaire was reviewed by experts in the fields of residency education, survey design, and sociology. The questionnaire was administered electronically to 366 U.S. residents in 18 specialties between March and July of 2021. Participants were recruited through convenience and snowball sampling using social media, email listservs, and personal emails to residency program leaders. Data were analyzed with descriptive statistics, and exploratory factor analysis was performed using principal component analysis with varimax rotation to reduce the items and define subscales [5]. Three previously validated scales were administered with the RCWB measure to examine criterion validity (the Professional Fulfillment Index, Brief Inventory of Thriving, and a single item measure of burnout).

Results: 219 of 366 participants who began the survey finished it (completion rate 60%). Most respondents were female (61%), reported age 26-30 years (60%), and identified as white (68%). Five subscales emerged with 24 total items: Program Leadership, Structures, and Practices; Resident Interpersonal Relationships; Resident Mistreatment; Fairness of Assignments; Workload. Interitem reliability (Cronbach’s alpha) for each subscale were 0.95, 0.92, 0.82, 0.71, and 0.62, respectively, and for the total RCWB was 0.83. The RCWB score positively correlated with professional fulfillment (r=.57, P<.001) and thriving (r=.49, P<.001) and inversely correlated with burnout (r=-.46, P<.001).

Conclusions: The RCWB measure demonstrates high internal consistency and content and criterion validity. These analyses suggest that the RCWB could be a valuable tool for measuring the subjective community well-being of residency programs. Further research is needed to establish normative values, determine what factors influence scores, and understand how organizational interventions can improve residency program community well-being.
Live-streaming surgeries across specialties to increase preclinical medical students’ exposure to surgical fields

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**Objective(s):** To provide preclinical medical students with early exposure to various surgical specialties in order to inform their decision-making about clerkship rotations and to facilitate mentorship with faculty.

**Background:** With the challenges in medical education created by the COVID-19 pandemic and the increasing competitiveness of surgical specialties, early exposure is crucial for engaging medical students and providing them with the resources to pursue these fields. While clerkship rotations provide an immersive experience, students can only experience a limited number of fields. Innovations in virtual medical education can widen the breadth of exposure.

**Methods:** First and second year medical students were sent a survey link to indicate their interest in the live stream series and in a surgical specialty by providing their email address. Prior to each live stream session, these students were emailed details about the procedure and operating surgeon and a Zoom link. A mobile audiovisual cart comprising a computer mounted with a webcam and microphone/speaker were utilized to live-stream from 4 sources: video-assisted telescope operating monitor (VITOM) exoscope, microscope, endoscope, and room camera. A dedicated faculty member, who was not the operating surgeon, was present to answer questions and facilitate student understanding of the procedure by reviewing anatomy, surgical instruments, clinical presentation and imaging, etc. Following each live stream session, students were sent an anonymous survey to gather feedback about the experience and its impact on their consideration of pursuing a surgical career.

**Results:** Of the 77 preclinical medical students who indicated interest in the live stream surgery series, 50 (64.9%) were in their first year and 27 (35.1%) in their second. 45.5% (n=35) of students were ‘Very Interested’ in a surgical specialty, 35.1% were ‘Somewhat Interested’ (n=27), 16.9% (n=3) were ‘Neutral’, and 2.6% (n=2) were ‘Not Very Interested’ prior to the series. 53.3% of students indicated they were undecided about which surgical specialty. There were five live stream sessions across the following specialties: Surgical Oncology, Cardiac Surgery, Urology, Plastic Surgery, Otolaryngology, and Neurosurgery. 5-15 students participated in each live stream session. Sixteen students completed the post-session survey. On a scale of 1 to 5, with 1 indicating ‘Not Educational at All’ and 5 indicating ‘Very Educational’, average rating of interactions with the operating surgeon was 4.3 compared to 4.9 for interactions with the facilitator. 94% (n=15) of participants indicated that the live stream series increased their interest in a surgical field and 94% were ‘Very likely’ to recommend the series to a colleague.

**Conclusions:** We present a novel interactive way to engage preclinical medical students in surgical education and provide exposure to a breadth of surgery types and specialties. The presence of a dedicated facilitator to teach during the case enhanced students’ learning experience, and the series was able to effectively increase students’ interest in surgical fields. Future efforts will expand the series to showcase other surgical specialties.
Quantifying the Surgical Residency Match in the Zoom Era: Applicant Volume, Match Rates, and Where We Go Next

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Objectives: Characterize how (1) number of applicants, (2) number of applications submitted per student, and (3) overall number of residency spots available impact surgical match rates and analyze the effects of virtual interviewing on these three variables.

Background: During the Covid-19 pandemic, residency interviews transitioned to exclusively virtual, and much discussion has ensued around continuing virtual interviews post-pandemic. This issue is of particular salience in highly competitive surgical specialties.

Methods: We gathered 10-years of NRMP and ERAS data for: Cardiothoracic Surgery, General Surgery, Neurosurgery, Orthopedic Surgery, Otolaryngology, Plastic Surgery, and Vascular Surgery. We calculated descriptive statistics and built a multivariate linear model to analyze the underlying non-linear relationship between the mean number of applications submitted per student and the yearly match rate, while controlling for the number of residency spots available and total number of applicants. Uni- and multivariate regression models were used to model predictors of matching. Linear regression models were constructed for continuous variables (match percentage) to calculate crude and adjusted relative risks (RRs and aRRs) with 95% confidence intervals (CIs).

Results and Conclusions: Our analysis shows a statistically significant increase in mean applications submitted during the 2011 to 2021 time period with no clear trend in overall match rates, with the 2021 virtual interview year continuing to follow ten-year trends. We use a multivariate linear model to show that overall match rates have a significant positive association with both the number of US MD-filled residency spots (aRR: 0.09 (CI: 0.02 – 0.16)) and the number of applications submitted per student (aRR: 0.31 (CI: 0.15 – 0.46), and a negative association with the total number of applicants per year (aRR: -0.09 (CI: -0.16 – -0.02). The impacts of these variables on match rates are significant with and without including the 2021 virtual interview cycle. Our analysis of factors affecting how the next generation of surgeons are chosen can inform both how many applications applicants in highly competitive specialties choose to send out, as well as future decisions on virtual versus in-person residency interviews. We recognize that we have applied a linear model to a system that is likely non-linear in nature. In the future, we aim to gain access to more granular NRMP data than is currently publicly available which would enable us to logistically model the likelihood of matching before and after the start of virtual interviews, rather than relying on a linear model and accepting its inherent limitations in representing a non-linear relationship. Further research is also needed to stratify the impact of virtual residency match cycles on applicants underrepresented in medicine and women in medicine.