Impact of Internal Medicine Resident Workload and Handoff Training on the Quality of Care in Hospitals

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BACKGROUND: Recent modifications to Accreditation Council for Graduate Medical Education (ACGME) duty hour restrictions have resulted in increased transitions of care by housestaff and variation of resident workload in clinical settings. In this study, we evaluated the association between resident workload, transitions of care training and evaluation, and patient outcomes.

METHODS: We linked the 2008 survey of Association of Program Directors of Internal Medicine (APDIM) to the 2008 Hospital Quality Alliance (HQA) and 2007 American Hospital Association (AHA) databases in order to assess if resident workload and training and evaluation of patient hand-offs are associated with outcomes of 30 day readmission rate and mortality rate for 3 conditions: acute myocardial infarction (AMI), congestive heart failure (CHF), and pneumonia. Predictors of interest were residency program training and evaluation of patient hand-offs (both “yes” vs. “no”) and resident workload, characterized by reported average maximum number of patients per intern on non-call days (maximum census) and average maximum number of patients admitted per intern on call days (maximum number of admissions) during general medicine rotations. We utilized linear regression models to examine the relationship between these predictors and each study outcome, controlling for hospitals’ geographic location, ownership, setting (urban versus rural), nursing intensity (nurses/1000 patient days), teaching intensity (resident/beds), presence of an ICU, and insurance mix, and the residency program’s board certification three-year pass rates and affiliation with a cardiology fellowship.

RESULTS: Of the 372 internal medicine residency programs surveyed, 268 (72%) responded. Of these, 180 (67%) programs reported training housestaff in conducting hand-offs and 133 (50%) programs reported evaluating housestaff in hand-offs. The mean maximum census was 11 patients on non-call days with a mean maximum of 5 patients admitted on call days. Results of the multivariate analysis demonstrated no association between hand-off training or evaluation or resident workload on readmission rates for any condition, or mortality rates for AMI or CHF. However, programs that evaluated their residents on patient hand-offs had a significantly increased adjusted pneumonia mortality rate (11.4% versus 10.8%, p=0.03) and programs that trained their residents on hand-offs had a significantly decreased adjusted pneumonia mortality rate (10.9% versus 11.8%, p=0.005) compared with programs that did not.

CONCLUSION: In this nationally-representative study of internal medicine residency training programs and their primary affiliated hospitals, we found no association between resident workload and evaluated outcomes. There were discordant findings on pneumonia mortality rates in programs that evaluate and programs that train their housestaff on patient hand-offs. Programs that evaluate their residents on care transitions have significantly higher pneumonia mortality rates than programs that do not, possibly suggesting programs with poorer outcomes are more likely to evaluate housestaff on hand-offs. Conversely, programs that provide hand-off training show significantly decreased mortality rate for pneumonia than programs that do not. This association between care transitions training and outcomes is particularly important in today’s climate of further duty hour restrictions necessitating increased hand-offs. Future work must further assess the impact of care transitions on quality of care, including process measures, in order to further characterize these findings.
BACKGROUND: Although many medical schools expect clinician-educators (CEs) to produce external scholarship to earn promotion, the value of specific scholarly products and the availability of institutional support for scholarship are uncertain. We therefore conducted a national survey of GIM Division Chiefs concerning CE scholarship.

METHODS: A sampling frame for US GIM Division Chiefs was assembled from: (1) AAMC list of accredited medical schools; (2) SGIM membership directory; (3) ACLGIM membership directory; (4) GIM Division websites; and (5) telephone calls to GIM Division offices. For institutions with more than one GIM division, each Chief was surveyed. The survey included 4 sections: (1) general information; (2) rating of the importance of CE scholarly activities for promotion to Associate Professor; (3) availability of institutional research support for CEs; and (4) an open-ended hypothetical question "If you had $100,000 per year to spend to enhance the scholarly productivity of your CEs, how would you spend it?".

RESULTS: Of the 134 AAMC accredited medical schools, we identified 145 Chiefs in 128 GIM divisions, excluding Johns Hopkins. To date, we received responses from 54 Chiefs (37%) from 51 institutions. There were no significant institutional differences between responders and non-responders regarding geographic region (p= 0.45), number of medical students (p=0.26), or quartile of NIH research funding (p=0.47). Among responding Chiefs, median duration of service was 6 years (IQR: 3 - 11); 27% were women. They reported a median number of full-time CEs per GIM Division of 20 (inter-quartile range (IQR): 11-32). 73% of GIM Divisions had a separate promotion track for CEs. The Figure illustrates the distribution of perceived importance of various scholarly activities in promotion of CEs to Associate Professor. Curriculum development and administration, presentations at national meetings and other institutions, and review articles and book chapters were all rated as 'most/very important' or 'important/somewhat important' by over 90% of Chiefs. The exception was publishing original peer-reviewed articles: about half of Chiefs surveyed rated these 'most/very important', but slightly less than half rated these 'not important' at all. This difference was significantly associated with having separate promotion tracks: in Divisions with a separate track, 37% of Chiefs rated publishing original articles "most/very important" vs. 80% in Divisions without a separate track (p=0.02). Many Chiefs lacked divisional resources to promote CE scholarship, including lack of protected time (72%), project coordination (61%), overall career mentorship (46%), and statistical analysis (43%). If $100,000 per year were available to enhance the scholarly productivity of CEs, Chiefs most frequently cited the following priorities: faculty development (39%), protected time (29%), methods/statistics support (24%), project coordination/assistance (24%), and project funding (22%).

CONCLUSION: Scholarly productivity is important for promotion of CEs and there is a wide range of acceptable products. Original, peer-reviewed articles are very important in about half of GIM Divisions, but Chiefs report limited resources to facilitate original scholarship. Investment in core statistical support, faculty mentorship, and project coordination represent promising approaches to improve CE scholarly productivity.
Risk of Resident Clinic Handoffs: Showing up is Half the Battle. Amber T Pincavage 1; Shana Ratner 1; Megan Prochaska 1; Meryl Prochaska 1; Julie Oyler 1; Vinny Arora 1. 1University of Chicago, Chicago, Illinois. (Tracking ID # 10986)

BACKGROUND: Continuity of care in the primary care setting is associated with greater patient satisfaction and fewer hospital admissions. Nationally, many patients experience a change in their PCP when departing Internal Medicine (IM) residents handoff their patients to junior residents. No studies to date have examined the specific patient risks relating to these handoffs. Our study aims to characterize patients at higher risk of adverse events after a clinic handoff.

METHODS: In June 2010, graduating IM residents listed clinic patients they perceived to be at "high risk" during the clinic handoff on a signout worksheet which included reasons for high risk status, target follow-up date, and tasks to be done. During a designated handoff meeting, departing residents discussed their patients with the junior resident taking over their clinic. Clinic coordinators used worksheets to facilitate scheduling of patients. For all patients, signouts and charts were reviewed to determine if and when patients were scheduled and if they saw their new PCP. We also examined associations between follow-up, patient factors (no show rates), and outcomes (ED visits or hospitalizations) in the three months after the transition. PGY2 residents assuming care were surveyed regarding their beliefs of the clinic handoff process.

RESULTS: Thirty graduating residents identified 258 clinic patients as high risk. Mean age was 61 (range 27-95), 63% were female, and on average the patients were transitioning to their 3rd PCP in 5 years. Patients were deemed high risk due to complexity (59%), new diagnoses (28%), psychiatric diagnoses (18%), and non-adherence (12%). Nearly all patients (97%, 250/258) were scheduled for their follow-up appointment. However, one third (29%, 75/258) of patients "no showed" or cancelled their first visit with their new PCP. Ultimately, less than half (44%, 113/258) of patients saw the correct PCP. The average time between visits with the old and new PCP was 110 days (range 11 to 350). Six months after the handoff, one fifth (19%, 50/258) of patients had not yet been seen. A significantly higher overall 'No Show' rate (NSR)(reported in Epic) was more likely to be noted among patients missing their first visit with their new PCP (22% vs. 16% NSR, p<0.001), transitioning to the wrong PCP (19% vs. 16% NSR, p=0.05), and those lost to follow-up (21% vs. 17% NSR, p=0.02). Overall, 26% (68/258) of patients visited the ED or were hospitalized during the 3 months after the handoff. Patients who missed at least one appointment with their PCP in the last year were more likely to have an acute care visit in the ED or hospital (33% vs. 22%, p=0.038). Most (95%) PGY-2 residents completed surveys. While half (47%) of residents worried about missing important patient data during the transition, a similar proportion (48%) reported they do not take ownership of a patient until the first clinic visit.

CONCLUSION: Resident clinic handoffs are a vulnerable time for high risk patients. While most patients were scheduled for appointments, over half were not seen by the correct resident who was to take over their care. Patients who miss appointments are especially at risk of adverse consequences during this care transition. Because residents do not feel responsible for patients until after their first clinic visit, improving patient attendance to the first visit with their new PCP is imperative. Future interventions to improve resident clinic handoffs should incorporate these findings.
Resident Satisfaction with Ambulatory Continuity Clinic is Associated with a Career Choice in General Internal Medicine Lauren Peccoralo 1; Lawrence Ward 2; Alex Federman 1; Ira Helenius 1; David C. Thomas 1.
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BACKGROUND: Despite the increased time devoted to ambulatory training in Internal Medicine (IM) residencies, the percentage of IM residents entering primary care has decreased from 50% in 1998 to 20% in 2006. Little is known about the association of residents' satisfaction with ambulatory continuity practice and career choice, specifically General Internal Medicine (GIM). This study sought to determine if IM residents' satisfaction with ambulatory continuity care experience is associated with their interest in GIM careers.

METHODS: Investigators conducted a cross-sectional survey IM of residents at two academic medical centers: Mount Sinai School of Medicine in New York City, NY and Temple University School of Medicine in Philadelphia, PA from April 2010 through July 2010. The survey assessed satisfaction with elements of ambulatory continuity practice using a modified version of the VA Learner's Perception Survey, which asks residents to rate their satisfaction with 35 elements of clinic in the following five domains: clinical preceptors, learning environment, working environment, clinical environment and personal environment. Investigators dichotomized responses for analysis from 4-point Likert responses to either very satisfied or not very satisfied (somewhat satisfied, somewhat dissatisfied and very dissatisfied). Consideration of a career in GIM was measured using a 4-point Likert scale of responses to the question: "AS A RESULT of your continuity clinic experience, how likely would you be to consider a future employment opportunity in General Internal Medicine?" Investigators dichotomized responses for analysis into either likely or unlikely. The authors examined bivariate associations between satisfaction of clinic elements and considering a career in GIM using the Chi-square test. A logistic regression model tested the association between elements on the satisfaction survey and GIM career plans as a result of the clinic experience, adjusting for demographic characteristics and the residents' baseline interest in a GIM career before the clinic experience. Investigators conducted collinearity diagnostics of the predictors and a literature review of the most relevant clinic factors to achieve balanced representation of domains in final adjusted model.

RESULTS: A total of 192 residents completed the survey (92% response rate). Fifty one percent were Mount Sinai residents, 49% percent were female, and participants were equally distributed across postgraduate years. In the bivariate analysis, residents who were very satisfied with 15 of the 35 specific clinic elements were more likely to report considering a GIM career than those who were not very satisfied. The adjusted model included 8 clinic elements and the collected demographics. In the final adjusted model, residents who were very satisfied with continuity with patients (OR 3.2, p = 0.03), the number of patients per session (OR 6.5, p = 0.02) and room availability for seeing patients (OR 3.3, p = 0.04), and those who intended to enter GIM before the clinic experience (OR 30.8, p = .001) were more likely to consider a career in GIM as a result of the clinic experience. Gender, postgraduate year, and training site were not associated with intention to enter GIM in the adjusted model.

CONCLUSION: IM residents' satisfaction with ambulatory continuity practice is associated with a proclivity towards entering a career in GIM. More research is needed to determine the impact of various clinic experiences on residents' career decision-making process.
CONTROLLED STUDY OF OUTCOMES FROM A RESIDENT SCHOLARSHIP CURRICULUM Colin P West 1; Andrew J Halvorsen 1; Furman S McDonald 1. Mayo Clinic, Rochester, Minnesota. (Tracking ID # 11305)

BACKGROUND: Training in research is an important component of residents' preparation for their future careers, whether their focus will be on appraisal and application of the scientific literature to the care of their patients or on the academic pursuit of knowledge through independent scholarship. Recognizing this, the Accreditation Council for Graduate Medical Education requires accredited training programs to implement and support research curricula. The Mayo Clinic Internal Medicine (IM) Residency Program has developed a multifaceted research curriculum to meet this requirement. This curriculum is available to residents online and spans the full three years of training. Additional key elements include rigorous review of mentor-approved research elective proposals and a comprehensive mentorship structure. We assessed residents' peer-reviewed scholarly output associated with this program to that of peers training elsewhere.

METHODS: For residents beginning training in 2003 through 2006, we conducted MEDLINE searches for peer-reviewed articles between July of their match year and the end of their expected graduation calendar year. To provide an appropriate comparison, we evaluated outcomes for applicants who matched to Mayo relative to those of applicants who were ranked higher than the lowest ranked Mayo-matched applicant (i.e., were ranked to match) but matched elsewhere due to personal preference. Only data from ERAS (name, medical school) and the NRMP (matched residency program) were considered eligible search parameters to avoid potential familiarity bias for Mayo residents. Outcomes included mean peer-reviewed articles and case reports per applicant, the proportion of applicants with at least 1 publication, and the median 2009 journal impact factor of the resident publications.

RESULTS: The study included 192 Mayo-matched and 429 ranked-to-match non-Mayo residents. Results are displayed in the Table. The curriculum was associated with more than three times as many peer-reviewed articles (2.1 vs. 0.6 per resident) and over four times as many case reports (0.57 vs. 0.13 per resident) than alternative research curricula (both p<0.0001). Nearly twice as many Mayo-matched residents published at least 1 article (65.6% vs. 36.0%, RR=1.82; p<0.0001). The median journal impact factor for articles associated with this curriculum was also greater. (p=0.003).

CONCLUSION: When compared to their equally-qualified peers, residents participating in a multifaceted research curriculum produced more peer-reviewed articles, more case reports, were more likely to publish at least 1 paper, and published in higher impact journals. Many factors contribute to these results, but the Mayo IM resident scholarship curriculum is a key part of the research environment fostering this productivity. Understanding the successful components of this curriculum, and the resources necessary to implement them, may assist other training programs in developing effective research curricula.
Read Around Your Cases: Does Clinical Exposure Activate Medical Students to Learn More from Computer Modules? Adina Kalet 1; Hyuk-Soon Song 2; Michael Nick 2; Martin Pusic 2. 1NYU School of Medicine, Brooklyn, New York ; 2NYU School of Medicine, New York, New York . (Tracking ID # 11926)

BACKGROUND: Authentic clinical experiences as learning activities have been a foundation of medical education since the Flexner report. More recently, medical students on clinical rotations have had available to them computer modules on relevant clinical topics. Modules such as the CLIPP cases (Pediatrics) and WISE-MD modules (Surgery) are used to ensure complete curriculum coverage in over 50 medical schools. The modules are generally designed as a self-contained activity meant to be completed at a time separate from clinical activities.

In this study, we postulate that students who have had any prior exposure to a clinical condition learn more from a given computer module than do those who are encountering the module without this experience. Evidence of greater learning would argue for a system of post-clinical encounter knowledge support.

METHODS: We performed a prospective cohort study of clinical year medical students on surgery rotation. We made available two web modules, on "Appendicitis" and "Carotid Stenosis", covering History, Physical, Imaging, Operative Process and Postoperative Care. Instructional strategies included video narration, graphic visualizations and self-questioning. The modules were to be done at the student's convenience during an eight week surgical clerkship. Within the module, each student reported their experience with the clinical condition and completed multiple-choice pre-tests (8 items) and post-tests (12 items) of declarative knowledge. We contrasted final score by clinical exposure, controlling for pre-test score (ANCOVA).

RESULTS: 166 students completed a module: Appendicitis 38/86 (44%) had any prior clinical exposure; for Carotid Stenosis 26/80 (33%). For both the topics, prior exposure was associated with higher post-test scores (Appendicitis effect size 0.40; 95% CI -0.03, +0.83; Carotid Stenosis effect size 0.31; 95% CI -0.16, +0.78). Adjusted for pre-test knowledge, the Appendicitis module still showed a significant effect of clinical exposure (ANCOVA F2,83= 4.45, p=0.04); for the Carotid Stenosis module, while the effect was in the same direction, it did not reach statistical significance (ANCOVA F2,78= 0.31, p=NS).

CONCLUSION: Students had measurably higher learning from a module when they had had at least some prior clinical exposure. There are several reasons why this might be. With an already partially developed mental model, students may encode new material more easily. Authentic cases engage the students emotionally, possibly resulting in higher motivation while considering the module. However, in terms of limitations for this observational study, we cannot exclude confounding due to systematic differences in motivation or other student characteristics. Our results should be viewed as pilot data for further study with a view to more systematically organizing students' study after key clinical encounters.