

Hospital Admissions and Resident Physician Education

A. Study Purpose and Rationale

Medical training is constantly a work in progress. The years of residency are formative in molding newly minted physicians in every way. Four years of medical school only begin to scratch the surface of imparting the knowledge and skills necessary to become a competent doctor. It is residency where the bulk of medicine is truly learned, and it is mostly learned by “doing”. There are no longer endless hours of didactic teaching, lectures, small group sessions, and other methods common to medical school. Residency is where new doctors are able to learn directly from clinical decision-making and treating patients. Every admission of a new patient to the hospital should be an opportunity for learning.

At the end of residency, doctors are then considered independent practitioners who no longer require supervision. For this reason, the ACGME has attempted to standardize residency training across every program in the country. Over the years, these guidelines have evolved and changed to reflect new ideas regarding patient care. In recent years, work-hour changes and enforcement of these changes have led to big structural changes in resident schedules, including the implementation of the “night float” system after first year residents were no longer allowed to take overnight call. The work-hour changes stemmed from worries regarding patient safety due to the potential effects of resident fatigue. This change has led to new concerns regarding the number and quality of handoffs and the potential effects on patient care.

ACGME guidelines include limitations on the number of patients a resident is allowed to care for at a given time, as well as the number of new patients they can admit in one day. For example, “a first year resident must not be assigned more than five new patients per admitting day” and “a first year resident must not be assigned more than eight new patients in a 48 hours period”.¹ Individual programs then formulate their own admitting guidelines for residents that function within the limits of these overarching rules. At Columbia, the standard long call admitting day on a ward service consists of three new admissions while the initiation of the “drip” system allows for 1-2 overnight admissions on each of the other days in the Q4 admitting cycle.

The 2013-2014 year in the internal medicine residency program at Columbia saw the initiation of a new general medicine ward service called the “Bard”. The Bard service sought to address the problem of long lengths of stay (24-48 hours) in the ED for patients being admitted to the medicine service in the hospital. One reason for this longstanding problem is that the gen med teams are sometimes “capped” at 10 patients on their admitting day

and thus unable to accept new admissions from the ED. On the Bard service, there were two residents and two interns caring for up to 20 patients. On an admitting day, one intern could admit up to five new patients, while the other intern cared for the remaining (up to 15) patients. On the post-call day, the team could accept two overnight admissions. As a result of this increase in admissions, the team could have 14 new patients over the course of 4 days, compared to 7 new patients via the usual admitting system.

This new service was met with largely negative reviews by interns who experienced it. Among the most common criticisms was that there was such a huge focus on quick patient discharges and speeding through so many simultaneous new admissions that there was very little time for learning about patients and critical thinking about clinical decision-making. This dilemma lends itself to a major question regarding resident education: does increasing patient volume increase resident learning? It might seem at first glance that more patients mean more opportunities for learning. However, given the experiences of interns who struggled with powering through five new admissions in one day, it seems as though increasing volume may increase efficiency but may not ultimately lead to increased knowledge.

There is little existing research in this field. One previous study was conducted at the Mayo Clinic and looked at associations between ITE (in-training exam) score and number of patient encounters (inpatient and outpatient, as calculated by number of notes written) during the previous PGY year. The study found that there was a positive linear association between ITE score during PGY-3 year and PGY-2 inpatient admission and consult encounters but there was no such connection between PGY-1 patient encounters and PGY-2 ITE scores.² One study looking at factors important in resident education showed that reading the medical literature in the context of patient care is thought of as most useful to learning.³ Additionally, previous studies have shown that independent reading and conference attendance has been correlated to ITE score.^{4,5} These studies suggest that patient volume may not be the most important factor in resident education, but that having time to read and learn about the patients can be as important in knowledge acquisition.

The purpose of this proposed study is to investigate the effect of increased volume of new patient admissions on medical knowledge among internal medicine residents at Columbia. If increasing admissions leads to detrimental effects on resident education, this would need to be taken into account in addition to other competing interests when considering changes to hospital admission guidelines, given the responsibility of academic institutions to their residents.

B. Study Design and Statistical Analysis

For the purpose of this study, the Bard service admitting structure would need to be expanded to all ward services for two of the four resident teams on each service (gen med 1, gen med 2, cardiology, Allen). The design would be a prospective, randomized study in which first year residents

would be assigned randomly to either “high admitting volume” (HAV) or “normal admitting volume” (NAV) groups. For the duration of intern year, the HAV group of interns will work under Bard admitting guidelines for each of their ward months while the NAV group of interns will work under normal admitting guidelines for each of their ward months. At the end of intern year (or beginning of PGY-2 year), all interns would complete the “in-service” exam as the outcome measure for the study.

At Columbia, there are 44 categorical medicine interns in each incoming class along with 5 neurology preliminary medicine interns. Given these numbers, roughly 25 interns will be assigned to each group and the study would run for one academic year (June 2014-2015). With this sample size along with an alpha of 0.05 and a power of 0.8, this would allow for detection of a score difference of 8% between groups on the in-service exam, assuming a standard deviation of 10 on this exam.

When creating the schedules for the incoming interns, there are 49 variations of potential schedules created by the chief medical residents, who then assign schedules to interns based on the interns’ ranking of each potential schedule. The 49 variations are grouped into clusters of 4, as groups of interns (“pods”) rotate together during the year through each rotation. For the randomization of interns to HAV and NAV groups, the schedule templates will be examined prior to schedule assignments. Each schedule variation will be pre-determined to be either an “HAV” or “NAV” template by the investigators without the knowledge of the chief residents, so that the chiefs will be blinded when assigning interns to each schedule variation. This blinding is intended to remove any biases that could exist based on chiefs’ pre-existing knowledge of incoming interns (e.g. based on medical school, research or primary care interest, etc).

The method of statistical analysis will be a two-sample t test, comparing the mean exam score of the HAV group to the mean exam score of the NAV group. Sub-group analyses can also be carried out to examine mean scores between groups within each of the 11 major content areas.

C. Study Procedure

The procedure for the study is as described in the above sections. Columbia internal medicine interns will be assigned to either an HAV (high admitting volume) or NAV (normal admitting volume) schedule for all of the ward months (4-5 months) during their first year of training. After completion of their intern year, all interns will complete the in-service exam (“Internal Medicine In-Training Examination”). After the participant’s scores are released to program directors, interns will be given informed consent and encouraged to allow use of their scores in this study. Given that their clinical duties on the wards and participation in the in-service exam are both existing requirements for the residency program, participants will not be informed about this study’s purpose and intentions prior to this point so that their performance on the wards and on the exam are not influenced by knowledge of the existence of this study. Scores would only be

documented/recorded in association with either HAV or NAV group status and not associated with any individual person's name or demographic characteristics.

D. Study Drugs
Not applicable

E. Medical Device
Not applicable

F. Study Questionnaires

The outcome measure for this study is score on the in-service exam. The in-service exam ("Internal Medicine In-Training Examination" or ITE) is a national examination for internal medicine residents written by "11 expert physician-authors, including four representatives from the American College of Physicians and six representatives from the Alliance for Academic Internal Medicine" and a rotating member from one of the two organizations. The questions are written at the level of proficiency expected mid-way through residency and cover many content areas (cardiology, endocrinology, gastroenterology, general internal medicine, geriatric medicine, hematology/oncology, infectious diseases, nephrology, neurology, pulmonary/critical care, and rheumatology). The purpose of the exam is to identify areas of knowledge deficiency in comparison to peers in training programs around the country. Because the goal is to gauge training progress, not to achieve a certain level of performance, examinees are actually encouraged not to study or prepare for the exam.⁶ This test was thus chosen as the outcome measure because it is designed to capture residents' knowledge as gained by only their individual clinical experiences. It has also been shown to correlate with success on the ABIM exam (internal medicine boards).⁷ The ITE exam score is more likely to reflect clinical training differences than other measures including the internal medicine boards (ABIM) or USMLE step 3, as residents spend extra time preparing for those exams. Additionally, the in-service exam is scored as percentage of total questions answered correctly, rather than pass/fail. Thus, numerical scores can be compared in this study, so smaller differences in performance can be measured more easily. Participants also are provided with percentile rank compared to other residents around the country as well as scores/percentiles for each of the 11 major content areas.

G. Study Subjects

Study subjects will include all categorical internal medicine interns and preliminary medicine interns (neurology) who are starting residency at Columba in the upcoming academic year. There are no other inclusion or exclusion criteria. Participants may be excluded from the analysis if they do not take the in-service exam or do not give consent for their scores to be utilized.

H. Recruitment of Subjects
Not applicable

I. Confidentiality of Study Data

No medical data will be utilized. In-service exams scores will remain confidential in the possession of the program director. Informed consent will be obtained from participants to access and utilize these scores. Scores will not be recorded/documentated in association with any individual person's name or demographic characteristics; they will only be associated with HAV or NAV groups.

J. Potential Conflict of Interest
Not applicable

K. Location of the Study

The study will take place at Columbia University Medical Center via the already existing clinical duties of the internal medicine residents. No specific study location within the medical center is necessary other than the rooms typically used for the in-service exams.

L. Potential Risks

There are no major direct personal risks to individual participants, other than potential increased stress from being assigned to the HAV group. Given that the HAV admitting guidelines are compliant with the current ACGME rules, the stress is not likely to cause undue harm to participants. However, given the lack of data in this area, there is a chance that being assigned to the HAV group could lead to an increased risk of depression, burnout, and other negative consequences. The study investigators are aware of this potential and will be sure that existing advisors within the program and junior/senior residents check in with interns on their mental health, etc throughout the year. If there are increasing signs of distress among the HAV group, the study may be forced to end early.

Another potential risk of this study is that individuals assigned to the HAV group may be found to have decreased knowledge compared to the NAV group (or vice versa). If overwhelming evidence of differences between groups is found and there is the potential for detriment to the education of one of the groups, the study may end early and the admitting guidelines associated with increased knowledge may be expanded to both groups.

M. Potential Benefits

There are no major direct personal benefits to individual participants other than the potential benefit of increased knowledge from being assigned to one of the study groups. There is potential to benefit future residents if the data from this study eventually influences or changes admitting policies of academic institutions or the overarching admitting guidelines of the ACGME.

N. Alternative Therapies
Not applicable

O. Compensation to Subjects

There is no compensation for participants (residents) other than the established resident salary, as the study procedure does not involve additional duties for residents other than their expected clinical duties. All residents are already expected to take the in-service exam.

P. Costs to Subjects

There is no foreseeable cost to residents in this study, as both the HAV and NAV admitting guidelines are in accordance with ACGME guidelines. Given prior experiences of interns on the Bard service, the HAV group may have some increased risk of stress compared to the NAV group (see section L).

Q. Minors as Research Subjects
Not applicable

R. Radiation or Radioactive Substances
Not applicable

S. References

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7. Babbott SF, Beasley BW, Hinchey KT, Blotzer JW, Holmboe ES. The predictive validity of the internal medicine in-training examination. *Am J Med.* 2007 Oct;120(10):911.