The Effects of a Decade of Progressive Duty Hour Limitations at a Multi-Hospital Internal Medicine Residency Program

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Background: In July of 2003, the Accreditation Council for Graduate Medical Education (ACGME) mandated that resident duty hour limitations be implemented (including a maximum shift length of 24+6 hours and 80 hours of work per week). Eight years later, the ACGME required more restrictive measures, limiting interns to no more than 16 hours of continuous duty. The effects of changes in work hours on resident well-being, patient care, and education remain unclear. The purpose of our IRB-approved study was: 1) to look for measurable changes in resident well-being and burnout prevalence over the last decade and 2) to investigate residents’ perception of the impact of July 2011 changes.

Methods: In spring of 2012 we sent all current internal medicine residents at a large university-based, multi-hospital residency program an anonymous mailed survey consisting of: 1) a validated depression screening questionnaire 2) the Maslach Burnout Inventory, and 3) a previously described questionnaire on career satisfaction. All three of these instruments were used in prior resident surveys at our institution in 2001 and 2004. The results from each time point were compared using pairwise comparisons for Z-tests of proportion and the p value was set at <.004 after Bonferroni correction for multiple comparisons. Additionally, in the current survey we queried residents about the impact of the latest work hour restrictions on resident well-being, patient care, and education.

Results: Overall, 112 out of 170 residents returned the survey (66%). Table 1 compares 2012 resident data with results from 2004 and 2001. Significantly fewer residents had a positive screening result for depression in 2011 compared with 2004. Career satisfaction remains high after improvement seen from 2001 to 2004. There was a non-significant trend toward reduction in burnout. 58% of 2012 survey respondents favored returning to the pre-July 2011 work hour limitations (ie interns able to work 24+6 hours continuously) rather than keeping the current system (16%) or limiting both interns and senior residents to 16 hours (26%). Senior residents were more likely than R1s to favor reversion to the previous system (69% vs. 40%). Most residents (62%) felt that the 2011 duty hour limitations negatively impacted their education.

Table 1. Resident Well-Being in 2011 Survey Compared to Historical Results
No. (%) of respondents: 2011 (n=112) 2004 (n=118) 2001 (n=115)

<table>
<thead>
<tr>
<th>Burnout: Met burnout criteria</th>
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<tr>
<td>2011 68(61)</td>
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<tr>
<td>2004 75(68) p value 0.267</td>
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<td>2001 87(76) p value 0.015</td>
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<th>Career satisfaction: Happy with career choice</th>
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<tr>
<td>2011 89(79)</td>
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<tr>
<td>2004 94(80) p-value 0.851</td>
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<tr>
<td>2001 76(66) p-value 0.029</td>
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<tr>
<th>Depression: Positive result on screen</th>
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<tr>
<td>2011 35(32)</td>
</tr>
<tr>
<td>2004 65(56) p-value 0.0003</td>
</tr>
<tr>
<td>2001 52(45) p-value 0.045</td>
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Conclusions: Indicators of resident well-being at our institution have changed over time from 2001 to 2011 as duty hour limitations have evolved. Fewer residents screened positive for depression in 2011 compared with 2004, which we hypothesize may be related to reduced sleep deprivation. Career satisfaction improved after the 2003 duty hour limitations and has remained high. Burnout rates continue to be high despite dramatic alterations in duty hour regulations. Residents believe that the latest duty hour limitations negatively affected their education, and most prefer to work under pre-July 2011 conditions. This study contributes to the ongoing national conversation about duty hour limitations.
Resident-led intervention targeting high-utilizing patients in a resident continuity clinic shows promise in improving residents' competency in systems-based practice

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Background: Effective systems-based practice has the potential to improve quality and reduce cost for high-utilizing medically and psychosocially complex patients. Residents training in internal medicine continuity clinics provide care for a disproportionate number of such complex patients, making resident clinics an ideal place to develop competency in systems-based practice. In 2011, internal medicine residents at Johns Hopkins Bayview created and implemented a multimodal intervention to improve care for high-utilizing patients in their continuity clinic.

Methods: We included patients insured by a Medicaid HMO who had 4 or more ED visits or inpatient admissions and 3 or more visits to the continuity clinic in the preceding year. We assigned each intern (PGY-1) starting in July 2011 to a high-utilizing patient whose primary care physician had just graduated from the residency program. The intervention consisted of structured home visits, action plan development, collaboration with an insurer-based nurse case manager (NCM), and monthly multidisciplinary conferences that included problem-solving discussions for selected high-utilizing patients and didactic sessions. Residents (PGY-2 and PGY-3) continued usual care with their established high-utilizing patients and served as a comparison group. We administered surveys to both interns and residents matched with high-utilizing patients at the end of the 2011-2012 academic year. All trainees rated their competency in systems-based practice (4 questions summed, scaled 4-20), ability to work with NCMs (2 questions, each scaled 1-5), and satisfaction with the care they provided (visual analog scale of 0-100), and they completed the Difficult-Doctor Patient Relationship Questionnaire (scores over 30 indicate a difficult relationship). Interns completed an additional series of questions assessing their satisfaction with the intervention.

Results: 15 intern-patient dyads (intervention group) and 23 resident-patient dyads (usual care group) were included in the analysis. Most interns felt that the intervention improved their ability to care for their high-utilizing patient (86%) and for their other patients not involved in the intervention (79%). Every intern (100%) agreed that the home visits were personally rewarding, changed their perception of their patient, allowed them to know their patient better as a person, and permitted them to provide better care for their patient. Interns, compared to residents, had a trend toward higher perceived competency in systems-based practice (12.4 (SD 3.2) vs. 10.9 (SD 4.2), p=0.23) and felt more strongly that they understood the role of NCMs (3.6 (SD 1.2) vs. 2.4 (SD 1.3), p=0.01), and could employ NCM help (3.5 (SD 1.1) vs. 2.3 (SD 1.3), p=0.01). Residents, compared to interns, had greater satisfaction with their care of their patients (63.9 (SD 27.2) vs. 55.3 (SD 25.0), p=0.34) and did not perceive their patients to be as difficult (28.3 (SD 8.2) vs. 35.6 (SD 11.0), p=0.04).

Conclusions: A resident-led intervention to improve care for high-utilizing patients in resident continuity clinic was well received by interns. The intervention may have led to greater competency in systems-based practice, especially interprofessional collaboration. Further study would be needed to determine why residents reported better relationships with patients. Potential reasons include residents' longer patient relationships and training experience.
Transitions of Care: Internal Medicine PGY1 Ambulatory Education

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Background: Transitions of care pose significant risks for complex medical patients. In July 2007, the American College of Physicians, Society of Hospital Medicine, and Society of General Internal Medicine came together to address quality issues and to develop consensus standards for transitions of care between inpatient and outpatient settings. In parallel, the Accreditation Council of Graduate Medical Education (ACMG) has identified systems-based practice as a core competency all residents. Still, there are scarce educational interventions for trainees to learn principles of safe transitions. Most also do not actively engage the learners. Our hypothesis was that an internal medicine transitions of care curriculum that spanned the hospital to home through small, interactive group didactics and a post-hospitalization discharge home visit would increase residents' confidence and knowledge in implementing safer discharges.

Methods: Two cohorts of Internal Medicine interns (PGY1) at a large academic medical center participated in this study between 7/2010 and 12/2011 in the four week ambulatory block. A one hour small group session focused on: identifying vulnerable patients, the interprofessional team, home services and skilled nursing facilities, medication reconciliation, discharge summaries/instructions, and patient communication. The interns went on a post-hospitalization discharge home visit with a visiting nurse led by the University of Pennsylvania Transitions of Care Nursing Team or selected Penn Care at Home nurses. In a debriefing session, each pair of interns described the patient they had seen in the home and key transitions issues that they encountered.

Results: Interns’ knowledge and attitudes about transitions of care were captured using pre/post test questions with a 5-point Likert scale. The assessment tool contained questions of knowledge and self-assessment of confidence and attitudes about transitions of care themes. The pre-post analysis on 107 pretest and 90 post-test was conducted using independent t-test analysis. The first six items of the knowledge tool were scored and a pre-post analysis using independent sample t-tests on unmatched data found a statistically significant increase in knowledge (t=-7.268, p=.000). Overall, the interns showed an increased degree of confidence in: identifying potential threats to a well executed transition between sites of care (p<0.001); managing the discharge process of complex patients with chronic illness (p<0.001); performing medication reconciliation at the time of hospital discharge (p<0.001); and knowledge of the home health care services available to patients with chronic illness (p<0.001). In addition, they showed increased knowledge in the roles of physical therapists (p<0.001), occupational therapists (p<0.001), nursing (p<0.010), and social work (p<0.046). Open ended comments included themes of greater awareness of interprofessional roles and services available in the discharge process, importance of medication reconciliation and discharge documentation.

Conclusions: This transitions of care education initiative for internal medicine interns showed increased confidence in high risk discharge issues and increased knowledge of community resources and the role of multidisciplinary team members in safe transitions of care. Future directions include narrative analysis of the interns’ reflections of the curriculum and further evaluation of the long term impact of a transitions of care education program.
Attending and Intern Evaluations of Residents

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**Background:** Residents are evaluated in medicine residencies by attendings using questions developed by by the ACGME. Many programs also evaluate residents using ratings by interns. We sought to answer several questions: 1) the factor structure of attending and intern evaluations, 2) the correlation between evaluations and ABIM certifying exam scores, 3) whether interns and attendings agreed on resident evaluations and value the same characteristics.

**Methods:** We included internal medicine residents at the Medical College of Wisconsin between 2004-2012. Attending evaluations assessed residents on 6 ACGME domains (patient care, medical knowledge, interpersonal communication, professionalism, practice-based learning and improvement, systems based practice). Intern evaluations rated residents using 12 questions, many modified from ACGME attending questions. Both interns and attendings provided an "overall" rating of residents. In addition, we had ABIM certifying examination scores for most residents. Analyses included principal component factor and regression analysis, adjusted for clustering on resident.

**Results:** There were 232 residents who had 6345 attending and 6817 intern evaluations. Both attending and intern evaluations were consistent (Cronbach's α=0.96 for both). The correlation between all questions were high for questions asked of attendings (r=0.69-0.86) and interns (r=0.56-0.86), but there was little correlation between intern and attending ratings (r=0.09-0.20), even when of the same construct (medical knowledge: r=0.11). Both intern and attending evaluations had a single factor solution. Aspects Interns valued included being supportive (β=0.22, 95% CI: 0.14-0.31), explaining decisions (β=0.28, 95% CI: 0.17-0.40), being organized (β=0.23, 95% CI: 0.14-0.33), enthusiasm (β=0.23, 95% CI: 0.14-0.33) and medical knowledge (β=0.18, 95% CI: 0.17-0.29). Attendings valued all the ACGME domains, but resident knowledge (β=0.20, 95% CI: 0.17-0.22) and interviewing skills (β=0.23, 95% CI: 0.19-0.25), were the two most important variables. Of all questions asked of interns and attendings, no intern questions and only one attending question (medical knowledge) was associated with performance on the ABIM examination (β=9.6, 95% CI: 4.9-14.4), but attending ratings of resident medical knowledge only explained 2% of the variance in ABIM scores.

**Conclusions:** Interns and attendings value different characteristics in residents and had low agreement, even on common questions such as resident medical knowledge. While the ACGME form evaluates residents on multiple domains, attending evaluations suggest they are only evaluating residents on a single construct. this suggests that attendings either don't understand or are not assessing residents on the multiple ACGME domains. Only medical knowledge ratings by attendings correlated with resident performance on the ABIM certifying examination, though it was a very poor predictor. This suggests that neither attending nor intern evaluations can help program directors predict residents at risk of failing their boards.
Teamwork Assessment in Internal Medicine: A Systematic Review of Validity Evidence and Outcomes

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Background: Effective teamwork among health professionals improves patient safety and is an essential competency for physicians across the education continuum. Valid teamwork assessment is imperative to determine physician competency and to optimize preparedness to function in teams. Numerous organizations have made teamwork a top priority in their recommendations for improving healthcare, yet there is little consensus on how to measure it. Therefore, we conducted a systematic review of published instruments used to measure teamwork in undergraduate, graduate, and continuing medical education in general internal medicine and all medical subspecialties. We synthesized the validity evidence and outcomes for each unique teamwork assessment tool with the goal of providing a resource for educators, clinicians and other health professionals to identify appropriate assessments to apply to their settings and teams.

Methods: We searched MEDLINE, MEDLINE In-process, CINAHL and PsycINFO from January 1979 through June 2012, as well as references of included articles and abstracts from 5 professional meetings. Two content experts were queried for additional studies. Included studies described quantitative tools designed for measuring teamwork among medical students, residents, fellows, and practicing physicians on single or multi-professional teams in general internal medicine and all medical subspecialties. Instrument validity and study quality data were abstracted using established frameworks with existing validity evidence. For each tool identified, the literature was again searched for additional validity evidence. Two authors independently abstracted one-third of articles and agreement was calculated.

Results: Of 12,256 citations, 140 articles describing 64 unique teamwork assessment tools met inclusion criteria. Interrater agreement for data abstraction was ICC 0.73 (95% CI 0.63-0.81). Most (57, 89%) teamwork assessments involved practicing physicians, 31 (48%) involved residents/fellows, and 5 (8%) involved medical students. The majority (58, 91%) assessed interprofessional teams. Teamwork tools were applied in inpatient (34, 53%), outpatient (21, 33%), and classroom settings (8, 13%). Fifteen teamwork tools used simulation. General internal medicine was the medical specialty with the greatest number of published tools (29, 45%), followed by critical care medicine (23, 36%). Of the 64 tools, 17 (27%) assessed individuals working within teams, 45 (70%) assessed teams as a whole, and 7 (11%) assessed both individuals and teams. Validity evidence for teamwork tools included content (50, 78%), internal structure (47, 73%), relationships to other variables (25, 39%), and response process (12, 19%). Attitudes and opinions were the most frequently assessed outcomes. Relationships between teamwork scores and patient outcomes were examined for 12 (19%) tools. Scores from the Safety Attitudes Questionnaire and Team Climate Inventory have substantial validity evidence and have been associated with improved patient outcomes.

Conclusions: Numerous tools exist to assess teamwork of physicians and trainees functioning in interprofessional teams across a variety of settings and specialties within internal medicine. There is strong validity evidence for several tools, although few teamwork assessments have been directly linked to patient outcomes. This review may help educators, clinicians, and other health professionals identify appropriate teamwork assessment tools to apply to their own teams.
Using OSCE Cases to Assess Resident Physicians' Competence in Inter-professional Collaborative Practice

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**Background:** Inter-professional collaboration (IPC) is essential to effective and safe practice, especially within new models of team-based, patient-centered care. An understanding of resident physicians’ current levels of competence in this area is a critical first step to designing targeted curricula and workplace learning experiences. This study sought to assess internal medicine residents’ competence through the use of OSCE cases designed to require IPC. In addition, we examined whether skills in IPC were distinct from other core clinical skills.

**Methods:** Widely accepted conceptual frameworks for IPC were used to create checklist items that included clarifying roles; inter-professional communication (using SBAR strategies, eliciting full information from team members); respect (valuing team member information and assessments); and teamwork (in developing a plan, delegation). Response options were not done, partly done and well done, each with descriptive behavioral anchors to enhance accuracy. These skills were assessed in two clinical cases designed to assess IPC with a “Standardized Nurse” – an outpatient case that called for the physician to collaborate with an RN to assess the patient, identify an error, and develop a treatment plan (annual OSCE for Primary Care IM Residents, PGY1-3, n=21) and an emergency department case in which the resident needed to collaborate effectively with an ED RN to evaluate and respond to a patient’s chest pain (annual OSCE for PGY 2 Categorical IM residents, n=35). Checklists were completed by the “Standardized Nurse” and included, in addition to IPC, competence in communication, history gathering and physical exam skills. Summary scores were computed as % of items rated well done (Cronbach’s alpha >.75 for both cases). Analyses include frequencies for specific items and examination of summary scores.

**Results:** Our OSCE cases documented deficits in IPC skills. Only 43% of residents introduced themselves and clarified their role. Less than half of residents (n=26/56) fully explored the RN’s knowledge of the situation and even fewer (n=22/56) fully explored the RN’s assessment of the situation. More residents demonstrated respect for the RN’s contributions (60% for the information the RN was scripted to provide and 67% for the RN’s suggestions) – however, a third did not. Finally, 38% of Primary Care residents failed to even discuss the follow-up plan with the RN in the outpatient case. Residents, on average, received an overall inter-professional collaboration score of 53% (items rated well done) (SD 25%). Inter-professional collaboration was not significantly correlated with any of the other core clinical skills assessed in the OSCE (e.g., correlation with communication skills = .04, p=.88).

**Conclusions:** Findings document the need among our residents for education and training in inter-professional collaboration. Our data also suggest that this is a distinct domain of competence, largely unrelated to other core clinical skills, including communication. While data are not from actual practice and are based on one sample of performance, the fact that many residents were unable to effectively collaborate with the RNs in an “examination” context reinforces that residents may simply lack the necessary knowledge and abilities. Further research should expand beyond collaboration with nurses, however findings are likely to be generalizable to other members of inter-professional care teams.