

Temporal and Subjective Work Demands in Office-Based Patient Care

An Exploration of the Dimensions of Physician Work Intensity

C. Jeff Jacobson, Jr., PhD,*† Shannon Bolon, MD, MPH,† Nancy Elder, MD, MSPH,†
Brian Schroer, BA,* Gerald Matthews, PhD,‡ Jerzy P. Szaflarski, MD, PhD,‡§
Marc Raphaelson, MD,¶ and Ronnie D. Horner, PhD||

Background: Physician work intensity (WI) during office-based patient care affects quality of care and patient safety as well as physician job-satisfaction and reimbursement. Existing, brief work intensity measures have been used in physician studies, but their validity in clinical settings has not been established.

Objectives: Document and describe subjective and temporal WI dimensions for physicians in office-based clinical settings. Examine these in relation to the measurement procedures and dimensions of the SWAT and NASA-TLX intensity measures.

Design: A focused ethnographic study using interviews and direct observations.

Participants: Five family physicians, 5 general internists, 5 neurologists, and 4 surgeons.

Methods: Through interviews, each physician was asked to describe low and high intensity work responsibilities, patients, and events. To document time and task allotments, physicians were observed during a routine workday. Notes and transcripts were analyzed using the editing method in which categories are obtained from the data.

Results: WI factors identified by physicians matched dimensions assessed by standard, generic instruments of work intensity. Physicians also reported WI factors outside of the direct patient encounter. Across specialties, physician time spent in direct contact with patients averaged 61% for office-based services.

Conclusions: Brief work intensity measures such as the SWAT and NASA-TLX can be used to assess WI in the office-based clinical setting. However, because these measures define the physician work “task” in terms of effort in the presence of the patient (ie, intraservice time), substantial physician effort dedicated to pre- and post-service activities is not captured.

Key Words: physician work, work intensity measurement, qualitative, evaluation and management, NASA-TLX, SWAT

(*Med Care* 2011;49: 52–58)

Evaluation and management (E&M) services provided in the ambulatory or office-based setting represent the most common type of physician work in the largest and most widely used sector of the US health care system.^{1,2} Physician work associated with the evaluation and management of patients involves history taking, physical examination, and medical decision-making activities for acute and chronic problems and is distinguished for reimbursement purposes from other medical services such as surgical procedures or interpretation of tests or medical images. The work intensity (WI) associated with diverse clinical services was assessed as part of the Harvard Resource-Based Relative Value (RBRV) studies; but the measure employed by investigators involved estimates of physician time, mental effort and stress for hypothetical patient vignettes rather than actual patient visits.³ More recent assessments of clinical work intensity have examined physicians in actual clinical settings.^{4–9} However, these studies have focused on a specific specialty, technology, or outcome, with very little attention given to the validity and performance of measures and none to the examination of cross specialty differences.

Of the 2 work intensity measures adapted for prior studies of clinical work—the Subjective Workload Assessment Technique (SWAT) and the National Aeronautics and Space Administration Task Load Index (NASA-TLX)—only the NASA-TLX has been used to assess work intensity in relation to actual patient visits.^{8,9} This brief instrument asks physicians to rate the intensity of a patient visit “task” on 6 dimensions divided between external demands (mental, physical, and temporal) and internal responses to those demands (effort, performance, and frustration). Both instruments were developed for aeronautic and military applications, and despite their use in clinical settings, the only published validation studies involve an adaptation of the NASA-TLX used with residents training in general internal medicine.^{10,11}

From the Departments of *Anthropology, †Family Medicine, ‡Psychology, §Neurology, University of Cincinnati, Cincinnati, OH; ¶The American Academy of Neurology, Chicago, IL; and ||Department of Public Health Sciences, University of Cincinnati, Cincinnati, OH.

Supported (in part) by the American Academy of Neurology (AAN) and American Academy of Dermatology (AAD).

The views expressed are those of the authors, not necessarily those of the AAN or the AAD.

Reprints: C. Jeff Jacobson, PhD, Jr., Department of Anthropology, 466 Braunstein Hall, University of Cincinnati, Cincinnati, OH 45221. E-mail: Jeffrey.Jacobson@uc.edu.

Copyright © 2010 by Lippincott Williams & Wilkins
ISSN: 0025-7079/11/4901-0052

Ratings of perceived WI of a given task, like other subjective ratings of mental states or efforts, are difficult to verify objectively. Whereas the NASA-TLX has been shown to be reliably sensitive to experimental manipulation, it is also vulnerable to reporting bias, context effects, and scaling problems.¹² In clinical settings, reliable measurement depends on a clearly delimited task, for example, a medical procedure such as a biopsy or appendectomy or, in E&M services, a patient office visit. However, the diversity of E&M services and the increasing focus on care of patients with multiple and chronic conditions present particular measurement challenges in terms of specifying the “task” and setting scale anchors.¹³ In the RBRV studies in the 1980s, these problems were addressed by limiting the task and intensity ratings to the intraservice period (ie, period of direct interaction with the patient) and by specifying for each service a standardized anchor case arbitrarily valued at 100.³ As noted, however, surveyed physicians estimated their effort in relation to hypothetical patients (in the form of vignettes), not during actual patient care where diverse services are provided before, during and after the patient encounter and under tight scheduling conditions. It remains unclear how or to what extent these real life contextual factors influence physician perceptions and ratings of intraservice task intensity.

As part of an exploratory, mixed-method investigation of the performance and feasibility of using several work intensity measures in clinical contexts, we conducted interviews with and observations of physicians specializing in internal medicine, family medicine, neurology, and surgery. Reported elsewhere are the preliminary findings related to the convergent validity of 3 work intensity measures administered following each observed clinical session: the SWAT (3 item), NASA-TLX (6 item), and the lengthier (17-item) Multiple Resources Questionnaire, and a measure of stress.¹⁴ In this report, we present the results of our qualitative assessment of the face and content validity of the NASA-TLX and SWAT measures—the instruments we considered sufficiently brief for use in actual clinical settings.

METHODS

Participants

Between December 2008 and February 2009, we conducted in-depth, semistructured interviews with a convenience sample of 19 board-certified physicians (5 family medicine, 5 general internal medicine, 5 neurology, and 4 surgery) to identify factors perceived to influence the work intensity of their own clinical activities. Of the 19 physicians interviewed, 15 volunteered to be subsequently observed during a half-day, office-based or operating room clinical session. Physicians were identified by personal knowledge of the study team members and by referral from initial participants. Within this convenience sample, we purposefully selected physicians of both genders with variable duration of practice experience and practice location. This study was approved by the University of Cincinnati Institutional Review Board.

Data Collection

Physician interviews elicited detailed task and activity inventories and probed the perceived meanings of intensity or effort for various common clinical tasks. We also elicited examples and descriptions of high and low intensity tasks or cases. Interviews lasted about an hour and were audio recorded. Physicians were reimbursed for their time.

Physician observations were conducted between January and March 2009. The physician selected the clinic session for observation to be as convenient and nondisruptive as possible; however, we also asked them to select a clinic session that would be typical or representative of their practice. One of 3 research team members (J.J., S.B., B.S.) observed 1, half-day office session with each participating physician using hand written notes and direct continuous observation. Prior to the start of clinical activities, observers noted the physical lay-out of the practice, staff interactions, and other dimensions of the clinical space related to efficiency, functionality, and flow.

Throughout each doctor-patient encounter, observers took a standing position in the corner of the examination or operating room and began note-taking on physician activities with time markings at 30 to 60 second intervals or more or less frequently as physicians changed activities. While flexible and open to emergent or unanticipated indicators of WI, the protocol for observation emphasized several key foci as identified primarily from the interview findings, including:

1. Keeping a tally of time spent with patients versus time spent on other activities and the nature of these other activities (eg, charting, directing staff, phone calls, record review, mail, etc).
2. Noting the approximate age of the patient; type and number of complaints; physical/cognitive impairments; and presence and role of people accompanying the patient.
3. Recording the sequence, duration and character of patient-related activities including: history-taking; types and duration of physical exams; use and review of electronic or other health records; discussion of diagnosis/treatment/patient education; the nature, duration, and effect of interruptions; emotional expressions on the part of physician or patient; and other potentially relevant behavioral or verbal indicators of work intensity, eg, comments/expressions of frustration, confusion, or worry by the physician.

Data Analysis

Recorded interviews and hand written observation notes were transcribed verbatim with any identifiers removed, and transcripts were entered into a qualitative data-base program (NVIVO8) to assist with data management and analysis. Utilizing an interdisciplinary, team-based approach and a type of content analysis known as the “editing method” which derives categories inductively from pre-existing knowledge and from the data, we compiled intensity factors that were identified by the respondents during their interviews.¹⁴ These categories were further discussed among the qualitative researchers (J.J., S.B., N.E., B.S.) and grouped into analytic themes.

Data from each transcribed observation were also entered into a computer spreadsheet program in the form of a series of chronologically marked events and activities. From these event chronologies, we determined the proportion of time physicians spent performing different clinical activities. We dichotomized these activities based on the most readily observable and measurable aspects of physician time use: time spent with patients in the examination room (interacting with the patient verbally and physically or working at the electronic medical record and time spent and tasks performed outside the examination/operating room, eg, interacting with staff, working at electronic medical record).

For this analysis, we were interested in qualitatively evaluating how the time and intensity factors identified by physicians and observed in clinical contexts related to the dimensions of task intensity measured by the NASA-TLX and the SWAT. In addition, we sought to better understand how physicians' perceptions of the intensity of effort involved with—and observed time spent performing—activities related to, but outside of, the patient encounter might influence intraservice intensity ratings. Our assessment of the conceptual congruence of the measurement dimensions with the physician identified factors involved a qualitative and largely intuitive re-evaluation of these factors in terms of the content of the instrument items.

RESULTS

Participants

Table 1 presents the characteristics of the interviewed and observed physician participants by specialty. All of the physicians were board-certified within their specialty. The typical participant was white, male, aged 45 years with 8 years in practice.

Findings From Interviews: Physician Perceived Intensity Factors

Physicians regarded a number of activities or processes as involving “harder work,” “struggle,” “challenges,” “demands,” “stress,” or “anxiety/worry.” While some examples provided were more indicative of stress or anxiety than of mental effort or WI, we included them because of the theo-

retical role of stress in workload research and because physicians often used the language of stress in their responses to our queries on WI and effort.

We distinguished 9 principal intensity or demand factors among the various topics identified by physicians, and we grouped these into 3 categories based on whether the factor related to the patient encounter or not and the extent to which it was observable (Table 2). The first 2 groups consist of factors related to the immediate and short-term demands of the patient encounter (ie, primarily intraservice period), with factors in the first group (1–4) mostly observable and those in the second group (5–7) not directly observable. The third group (8–9) consists of factors that occur outside of the physician-patient encounter (or examination room) and are readily observable. Examples of each factor were represented among all of the specialties except for factors 8 and 9, which were not mentioned by surgeons.

Observational Findings: Observed Dimensions of Clinical Task Intensity

Table 3 presents physician time and task allotments for several directly observable activities in office-based settings. Due to the fact that only 3 surgical procedures were observed during 2 observation sessions— in comparison to an average of 9 to 10 patient encounters per half-day sessions in office based settings, and also for the purposes of meaningful comparison, we have shown only time and task allotments for the 2 surgeons who were observed in office settings.

Direct patient contact time averaged approximately 60% for all specialties. Surgeons had a relatively larger proportion of direct patient contact time which was partly a function of scheduling and of the focused and often brief preoperative and postoperative follow-up interactions with the patient. The observational finding that nearly 40% of physician office time is spent on activities outside the examination room contrasts with physicians' own estimates of time spent in direct contact with patients. For physicians who provided estimates of their own average direct patient contact time (12/19), the modal value was greater than 90%.

TABLE 1. Participant Characteristics, by Medical Specialty

Characteristics of Interview Respondents	All (n = 19)	Family Medicine (n = 5)	General Internal Medicine (n = 5)	Neurology (n = 5)	Surgery (n = 4)
Male (n)	14	3	5	2	4
Median age in yr (range)	45 (33–66)	48 (33–54)	49 (38–54)	38 (37–45)	48.5 (39–66)
White (n)	15	3	5	4	3
Median yr in practice (range)	8 (2–27)	12 (2–23)	18 (2–22)	6 (4–18)	16.5 (4–27)
Characteristics of Observed Sub-Sample	Subsample (n = 12)	Family Medicine (n = 5)	General Internal Medicine (n = 2)	Neurology (n = 3)	Surgery (n = 2)*
Male (n)	7	3	2	0	2
Median age in yr (range)	45 (33–54)	50 (33–54)	52 (38–54)	38 (37–40)	49 (42–55)
White (n)	10	3	2	3	2
Median yr in practice (range)	10 (2–23)	12 (2–23)	20 (18–22)	6 (4–8)	16 (4–27)

*Due to the small number of procedures observed, we only consider surgical office-visits for this analysis.

TABLE 2. Physician Identified Factors Influencing Intensity of Clinical Activities From Interviews

Intensity/Demand Factor	Example Types	Example Quotations
Group 1: Encounter-focused, generally observable		
1: Complex patient-medical	Co-morbidities, complexity, illness severity, mental illness, treatment non-adherence, poly-pharmacy, unexpected deterioration	<p>"Diabetes (pt) who is very noncompliant and doesn't come in for f/up and has a lot of really serious medical conditions" (f)</p> <p>"The acute stuff gets better ..., the chronic stuff is a lot harder to fix long term" (i)</p> <p>"A woman with an aneurysm who also had some heart trouble, so I had to contact a cardiologist and ask their opinion and take a little extra time to make arrangements" (s)</p> <p>"Disease process ... when I first see (stroke) patients after the hospital, I'm very worried (vs.) 6 or 12 mo later" (n)</p>
2: Challenging interpersonal interactions with patients	Personality conflict, high emotionality, deceptive, drug seeking, uncommunicative, family or social problems or issues	<p>"They keep coming in for the same question" (n)</p> <p>"I found out she was asking her surgeon for narcotic medicines as well" (f)</p> <p>"I've been in the field so long that nothing surprises me. The only difficulty is the patient's personality" (s)</p> <p>"Any time the family or patient is angry, it's much more challenging" (n)</p> <p>"It can be difficult to prepare someone for surgery which he/she views as a major danger" (s)</p>
3: Schedule pacing interruptions	Getting behind, equipment problems, staff or other interruptions, late patients, limited time with many patients scheduled, high caseloads	<p>"I'm always running" (f)</p> <p>"You're trying to fit this (visit) into that, you know, 15 min block, yet you know that person really needs 30 min or an hour for a good solid education" (f)</p> <p>"There's only so much you can talk about ... by the time you fit your history and your physical and all the other stuff that goes into it" (i)</p> <p>"The time schedule demand is what makes it hard" (f)</p> <p>"My schedule is really frenetic and busy" (f)</p>
4: Unexpected event occurrence	Discovery of serious problem during encounter	<p>"Oh doc, by the way I have this crushing chest pain" (i)</p> <p>"Unpredictable schedules and emergencies" (s)</p>
Group 2: Encounter focused, difficult to observe		
5: Risk of bad outcomes	Anxiety about patient health or outcome	<p>"Intense because of the anxiety associated with the possibility of bad outcomes" (i)</p> <p>"In aneurysm surgery I have to think about the consequences of a little slip up" (s)</p>
6: Uncertainty	Etiology, evaluation, treatment	<p>"Anything that requires or involves getting another opinion" (s)</p> <p>"You go in the door and you don't quite know what you're going to expect ..." (i)</p>
7: Physical strain and toll on the physician	On feet all day, strain of reading illegible notes, manipulation of patients, duty after night call	<p>"At the end of the day I often feel tired" (f)</p> <p>"You're on call more frequently because, you know, women can deliver whenever" (f)</p>
Group 3: Nonencounter-focused, observable		
8: System issues and interactions	Managing and (re)directing office staff, complicated referrals	<p>"People are being resistant on the other end of the phone" (f)</p> <p>"... arranging for an urgent specialty appointment involves interpersonal and time challenges" (i)</p>
9: Additional tasks	Non billable activities Charting at home afterhours	<p>"We do so much that isn't billable" (f)</p> <p>"I don't think it's a good use of physician time for me to be making appointments" (i)</p> <p>"I'm finished by 5 thirty; but my notes are not done at all, and I'll probably have to spend another 2 or 3 h doing the notes at another time" (n)</p> <p>"You should see the mountain of referrals I go through" (n)</p>

f indicates family medicine; i, internal medicine; n, neurologist; s, surgeon.

Another source of physician work effort is suggested by time spent entering or retrieving information from the patient's medical record, which represented on average 47% of observed work time. Of the total average time physicians spent focused on the medical record, 20% was in the presence

of the patient, although there were considerable differences among physicians within and across specialties. It is unclear whether these differences reflect different practice styles or different strategies for addressing the time or system variables associated with work in particular office environments.

TABLE 3. Physician Activity Distribution Means, Based on Half-Day Office-Clinic Observations

Physician Activity Distributions (Approximately 4 h Clinic Observation)	Mean (n = 12)	Range	FM (n = 2)	GIM (n = 5)	Neuro (n = 3)	Surgery (n = 2)
Patient contact time (mean % of observed)	61.5%	50–82.3	63.7	52.3	53.5	77.1
EMR/charting time (mean % of observed)*	47.3%	1.7–76.9	47.6	36.3	53.9	9.6
EMR/charting time (% of direct patient time)	20.7%	0–74.8	28.5	0.8	34.9	0
EMR/charting as mean % of non-patient time	78.5%	9.8–92.2	94.2	76.8	70.7	36.2
Patient contact time (min)/encounter	16 min	9.5–30 min	19.4 min	11 min	23.3 min	10.1 min

*All but 2 physicians used electronic medical records; the others used paper records (1 written, 1 dictated).

TABLE 4. Physician Identified Intensity Factors Compared With NASA-TLX and SWAT Measurement Dimensions and Task Definition

Intensity/Demand Factor Described by Physicians	NASA TLX Dimensions Assessed						Task Stage		
	*Mental Demand	Physical Demand	*Temporal Demand	*Frustration/ Stress	Effort	Performance	Preservice	Intraservice	Postservice
Difficult patient-medical	✓	✓	✓	✓	✓	✓	✓	✓	✓
Challenging interpersonal interaction	✓	✓	✓	✓	✓	✓	✓	✓	✓
Schedule/pacing/interruptions	✓	✓	✓	✓	✓	✓	✓	✓	✓
Unexpected event occurrence	✓	✓	✓	✓	✓	✓		✓	✓
Risk of bad outcomes	✓	✓	✓	✓	✓	✓		✓	✓
Uncertainty	✓	✓	✓	✓	✓	✓		✓	✓
Physical strain on the physician		✓	✓	✓		✓	✓	✓	✓
System issues and interactions	✓		✓	✓	✓	✓	✓		✓
Additional tasks	✓	✓	✓	✓		✓	✓		✓

*The SWAT asks respondents to rate “mental load,” “time load,” and “stress load” on 3 point scales. The wording of these items differs slightly from similar items in the NASA-TLX, which uses a 10 or 20 point scale. See also Table 1 in a companion paper in this issue.

✓ = correspondence of physician-described factor with measured dimension. Checkmarks in bold indicate dimensions covered.

SWAT indicates subjective workload assessment technique; NASA TLX, national aeronautics and space administration task load index.

Assessing the SWAT and NASA-TLX Measures

Our analysis focused on 2 aspects of the SWAT and NASA-TLX measures: the conceptual congruence between the scope and content of the item workload dimensions and the physician described intensity factors; and the scope and definition of the “clinical task” to be rated. In Table 4, we depict the conceptual congruence between the 9 intensity factors identified by physicians and the specific, single-item based dimensions assessed by these measures. To simplify the presentation of the analyses we have consolidated the SWAT items regarding time, mental effort, and stress with the cognate items in the NASA-TLX. We also indicate the task stage (pre, intra-, or postservice) relevant to that measure based on interviews and observations. For office-based settings, the shaded regions represent the intraservice time (60% of total time) targeted by the measures, whereas the unshaded regions represent pre- and postservice time and effort (40% of total) that are excluded when “tasks” are defined in terms of patient-encounter (or intraservice) time only.

The NASA-TLX and SWAT measure all of the intraservice-related, work-intensity factors identified by physicians in our interviews. However, for office-based E&M services limiting the task to the intraservice period excludes 2 sets of physician identified factors associated with their work engaged in pre-/postservice activities: system issues and interactions, and the additional tasks exclusively performed

outside of intraservice activities. The intensity dimensions of the instruments capture the psychosocial demands associated with interpersonally challenging patients. However, because the encounter-based task definitions used by the NASA-TLX and SWAT do not include the pre-/postservice period, other potential determinants of that intensity are essentially unmeasured.

DISCUSSION

In this exploratory qualitative study of physician work effort, we have: (1) described a range of subjective work intensity factors that confirm and extend the findings of previous qualitative research; (2) shown that all of the NASA-TLX and SWAT work intensity dimensions are represented among physician-identified factors; and (3) suggested that, especially for physicians in neurology, internal medicine, and family medicine, substantial physician time and effort dedicated to pre- and postservice activities will not be captured when these instruments are used only to assess intraservice work.

Our interviews with this sample of physicians revealed the presence of many of the same intensity factors cited in physician interviews conducted by Hsiao et al (1988), the only other published report that qualitatively examines physician work intensity. The intraservice-related activities represented in groups 1 and 2 (Table 2) correspond with all of

the key intensity factors identified in the RBRV studies (ie, medical complexity, seriousness, uncertainty, fear of iatrogenic harm).³ However, our findings reveal the additional importance of challenging interpersonal interactions with patients requiring emotional or empathic effort. Although mentioned by a majority of our participants and among all specialties, it is unclear how common these interactions are and to what extent they relate to characteristics of the community, office system, patient, or physician. However, a comprehensive understanding of physician work intensity should include a way of assessing this variable in E&M services.

The conceptual congruence of physician identified factors with the measurement dimensions of the SWAT (time-load, mental load, stress load), and NASA-TLX (mental-, physical-, and temporal-demands, frustration/stress, performance, effort) supports the use of these brief self report measures to assess all of the demands described by physicians for intraservice work, including those associated with demanding or challenging interpersonal interactions.

However, analysis of the interviews suggests a third grouping of physician identified intensity factors—not discussed in earlier studies nor mentioned by surgeons here—which encompassed generally observable aspects of the office system and physician-staff relations. These nonintraservice activities, often described by physicians as “nonbillable,” included trouble-shooting equipment failures, refilling prescriptions, making appointments or referrals, and interpersonal interactions with staff and other providers. Often causing frustration and leading to additional time demands and effort for the physician, these system issues and interactions affect overall clinical work intensity and may influence the intensity ratings of direct patient-care activities.

The importance of these pre-/postservice demands for the work effort experienced and rated by office-based physicians is further supported by observations of physician time and task allotments. Across specialties, the proportion of physician work time spent in direct contact with patients versus nonpatient time averaged 61%, which is consistent with findings from other observational studies of office-based clinical work effort.^{16,17} To our knowledge, this study is the first to report observation-based time and task allotments for surgeons and neurologists in office-based settings. Like family physicians and general internists, neurologists spent up to 50% of their clinical effort in pre- and postservice activities. The time, intensity, and value of pre- and postservice work for these specialists could be targeted for more complete evaluation and health policy consideration.

We have noted surgeons’ relatively greater percentage of direct patient time in the care of preoperative and postoperative ambulatory patients who had mostly elective surgeries with generally uncomplicated follow-ups. Because these activities represent only a small sampling of the scope and effort of surgical work, further efforts to gain a more complete picture of WI and effort associated with procedural services are needed.

For physicians in the largely nonprocedural specialties of family medicine, general internal medicine, and neurology,

the large proportion of overall physician time dedicated to nonintraservice—but patient care related—activities suggests the substantial demands represented by these activities. Understood as a contextual effect on the intensity rating of the intraservice task, pre/postservice activities that involve, for example, frustration associated with resource limitations or with failure to complete documentation, could be easily imagined to raise the intensity ratings of subsequent patient visits. A similar effect on intensity is anticipated with an expanded “task” definition that includes the composite (ie, pre-, intra-, post-) service; here too, the physician-rated work intensity related to patient care would likely increase. Patient contact time was, on average about 20% lower for internal medicine, family medicine, and neurology specialists compared with surgeons, and our observational data suggest that documentation of the medical history, examination findings, and medical decision making are largely responsible for this reduction in physician time with patients.

In the RBRV studies, the rationale provided for separating intra- from pre-/postservice activities to assess total physician effort suggested the difficulty for physicians of directly estimating the work of the “composite” (pre-, intra-, post-) service provided.¹⁸ Our examination of office-based E&M services suggests that, on the contrary, it may be difficult for physicians in tightly scheduled office settings to separate the work intensity of the intraservice, direct patient-care task from the wider set of pre- and postservice activities, and interactions associated with the encounter. We did not ask this question of physicians directly, but our findings suggest the overlapping effort associated with direct and indirect patient care activities in E&M services and the need for further study of the work intensity measurement implications of this distinction.

This study has several limitations. Convenience sampling beginning in an academic hospital setting resulted in under-representation of community-based physicians’ experiences and perceptions of work intensity. Additionally, the relatively small numbers and small variation among neurologists and surgeons selected suggests that, for these specialties, the full range of temporal and subjective work demands and conditions may not be represented. The very small number of surgical procedures observed, and the lack of data on nonintraservice activities for one of these observations prevent any meaningful description or comparison of time use versus other specialties.

Nevertheless, our analysis of physician perceived intensity factors reproduced all of the dimensions identified in previous research while highlighting other dimensions that have not been considered. Family physicians, internists, and neurologists dedicate a large proportion of time to pre/postservice activities. These activities and the organizational and interpersonal contexts in which they occur influence overall physician work intensity and may moderate intraservice intensity ratings. The measurement of clinical work intensity using intraservice-task-based measures, therefore, gives an incomplete accounting of the overall effort involved in E&M services.

CONCLUSIONS

Physicians' perceptions of the determinants of WI in office-based settings encompass a variety of observable and unobservable efforts both within and outside of direct patient care activities. Companion research performed by our group addresses the concurrent validity of multiple work-intensity measurement instruments in the clinical setting.¹⁴ Whereas the brief NASA-TLX and the SWAT intensity measures appear to capture the diverse intensity factors described by physicians and are practical for use in clinical settings, our findings suggest the need, in office-based contexts, for either (1) concurrent measurement of nonintraservice effort, or (2) adaptation of the definition of the measured task to include the wider effort associated with complete patient care. Otherwise a source of significant physician effort will be missed.

REFERENCES

- Schappert SM, Rechsteiner EA. Ambulatory medical care utilization estimates for 2006. *Natl Health Stat Report*. 2008;8:1–5.
- Green LA, Fryer GE, Yawn BP, et al. The ecology of medical care revisited. *N Engl J Med*. 2001;344:2021–2025.
- Hsiao WC, Douwe BY, Braun P, et al. Measurement and analysis of intraservice work. *JAMA*. 1988;260:2361–2370.
- Zwaan L, Thijs A, Wagner C, et al. Design of a study on suboptimal cognitive acts in the diagnostic process, the effect on patient outcomes and the influence of workload, fatigue and experience of physician. *BMC Health Serv Res*. 2009;9:65.
- Rutledge T, Stucky E, Dollarhide A, et al. A real-time assessment of work stress in physicians and nurses. *Health Psychol*. 2009;28:194–200.
- Boultinghouse OW, Hammack GG, Vo AH, et al. Assessing physician job satisfaction and mental workload. *Telemed J E Health*. 2007;13:715–718.
- Levin S, France DJ, Hemphill R, et al. Tracking workload in the emergency department. *Hum Factors*. 2006;48:526–539.
- Reid GB, Nygren TE. The subjective workload assessment technique: a scaling procedure for measuring mental workload. In: Hancock PA, Meshkati N, eds. *Human Mental Workload*. Amsterdam, The Netherlands: Elsevier Science Publishers; 1988:185–218.
- Hart SG, Staveland LE. Development of NASA-TLX (Task Load Index): results of empirical and theoretical research. In: Hancock PA, Meshkati N, eds. *Human Mental Workload*. Amsterdam, The Netherlands: Elsevier Science Publishers; 1988:139–183.
- Bertram DA, Hershey CO, Opila DA, et al. A measure of physician mental work load in internal medicine ambulatory care clinics. *Med Care*. 1990;28:458–467.
- Bertram DA, Opila DA, Brown JL, et al. Measuring physician mental workload: reliability and validity assessment of a brief instrument. *Med Care*. 1992;30:95–104.
- Hart SG. NASA Task Load Index (NASA-TLX): 20 years later. In: Proceedings of the Human Factors and Ergonomics Society Annual Meeting; October 16–20, 2006; San Francisco, CA. pp 904–908.
- Anderson GF. Medicare and chronic conditions. *N Engl J Med*. 2005;353:305–309.
- Horner RD, Szaflarski JP, Jacobson CJ, et al. Clinical work intensity among physician specialties. How might we assess it? What do we find? *Med Care*. 2011;49:108–113.
- Miller WL, Crabtree B. Primary care research: a multimethod typology and qualitative road map. In: Crabtree B, Miller WL, eds. *Doing Qualitative Research*. Newbury Park, CA: Sage Publications; 1992: 3–28.
- Gilchrist V, McCord G, Schrop SL, et al. Physician activities during time outside the examination room. *Ann Fam Med*. 2005;3:494–499.
- Farber J, Siu A, Bloom P. How much time do physicians spend providing care outside of office visits? *Ann Intern Med*. 2007;147:693–698.
- Dunn D, Hsiao WC, Ketcham TR, et al. A method for estimating the preservice and postservice work of physicians' services. *JAMA*. 1988;260:2371–2378.