Final Report:

RESIDENT SUPERVISION INDEX:

ASSESSING FEASIBILITY AND VALIDITY

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T. Michael Kashner, Ph.D., J.D.; John M. Byrne, D.O.; Stuart Gilman, M.D.;
with David C. Aron, M.D., M.S.; Grant W. Cannon, M.D.; Linda Godleski, M.D.;
Richard M. Golden, Ph.D.; Steven S. Henley, M.S.; Catherine P. Kaminetzky, M.D., M.P.H.;
Sheri A. Keitz, M.D., Ph.D.; Susan Kirsh, M.D.; Elaine A. Muchmore, M.D.;
and Annie B. Wicker, B.S.

also Barbara K. Chang, M.D.; Robert S. Hinson, M.A., M.C.P.M.; Keith A. Hoffman;
Lei Xuan, M.S.; and Gloria J. Holland, Ph.D.

and for the Clinical Research Center at the Loma Linda VA Medical Center
Guizhi Ding C.C.R.C.; Tiffany Gunneman; Myra Peterson, R.N.;
Lynne Ruybalid, M.P.H., C.C.R.C.; Vicki Simpson, R.N.; and Mariam Wadie.

With the VA Medical Center and the Department of Medicine at the Loma Linda University School of Medicine, Loma Linda, CA (T.M.Kashner, J.M.Byrne, A. Wicker, G Ding, T Gunneman, M Peterson, L Ruybalid, V Simpson, M Wadie); Department of Veterans Affairs, Veterans Health Administration, Office of Academic Affiliations, Washington, DC (B.K.Chang, S. Gilman, G.J.Holland, T.M.Kashner, A.Wicker); the Departments of Psychiatry and Clinical Sciences at The University of Texas Southwestern Medical Center at Dallas, TX (T.M.Kashner, L.Xuan); University of California Irvine School of Medicine (S. Gilman); VA Medical Center and Department of Medicine and Epidemiology and Biostatistics, Case Western Reserve University, Cleveland, OH (D.C.Aron and S. Kirsh); VA Medical Center and the Department of Medicine at The University of Utah School of Medicine, Salt Lake City, UT (G.W.Cannon); VA Medical Center, Louisville, KY and Department of Medicine at The University of New Mexico School of Medicine, Albuquerque, NM (B.K.Chang); VA Connecticut Health Care System and Department of Psychiatry, Yale University School of Medicine (L Godleski), The School of Behavioral and Brain Sciences at The University of Texas at Dallas, Richardson, TX (R.M.Golden); Mixingale Group, Inc., Plano, TX (S.S.Henley); VA Medical Center, Durham NC, and Department of Medicine at the Duke University School of Medicine, Durham, NC (C.P.Kaminetzky); Miami VA Healthcare System and Department of Medicine at the University of Miami Miller Medical School, Miami, FL (S.A.Keitz); VA Medical Center at San Diego CA and the Department of Medicine at the School of Medicine, University of California at San Diego (E.A.Muchmore); VA Allocation Resource Center in Braintree MA (K Hoffman).

EXECUTIVE SUMMARY

Background: Resident supervision has been linked to patient safety and quality care. However, valid, psychometrically-tested, quantitative measures of resident supervision currently do not exist. In this study, we developed and tested the Resident Supervision Index (RSI), a survey instrument designed to measure the quantity of attending supervision in non-procedural, outpatient clinics.

Method: The RSI reported here is the result of an extensive literature review, followed by a consensus conference made up of an Expert Panel in graduate medical education (GME), clinical medicine, health administration, and health services research. The 9-member expert physician panel was supported by a mathematical psychometrician, computational statistical scientist, and a health econometrician, three data management experts, and two national consultants in Graduate Medical Education. Conference calls and email exchanges occurred for 6 weeks followed by a face-to-face meeting to reach consensus on a content-valid instrument. Feasibility and reliability of the RSI was tested at one VA Medical Center with 125 resident-patient encounters in primary care general internal medicine clinics.

Results: We found high consent rates among both attending (97%) and resident physicians (93.8%). Reliability was demonstrated through test-retest for total supervision minutes with intra-class correlations (ICC) of 0.88 and 0.93 for attending and resident physicians respectively. Concurrent reliability in reported minutes between resident and attending physicians agreed with an ICC of 0.69.

Conclusions: We found the RSI has content validity, is practical and feasible in actual practice, and offers reliable estimates to assess resident supervision.

Future Directions: We plan to test the RSI for construct validity by exploring the Graduate Medical Education (GME) Conceptual Model that ties predictors of resident supervision with the outcomes of resident supervision in the context of patient care, resident education, attending physician burden, and system costs and patient retention.

(I). Introduction.

The clinical supervision of resident physicians is a core principle of graduate medical education (GME), and thus is a great concern for not only program directors and clinical supervisors,[1] but also for regulatory agencies,[2, 3] accrediting bodies, [4, 5] consumer groups,[6] and the U.S. judicial system.[7, 8, 9] Yet, little research has focused on how GME supervision should be conceptually defined or empirically quantified.[10, 11] Although increased supervision has been shown to change clinical assessments, diagnoses, and treatment decisions,[12, 13] and improve patient outcomes,[11, 14] supervision is not always examined when accounting for variations in resident provided quality of care,[15] or in assessing resident education.[10, 11]

The Resident Supervision Index, or RSI, was developed through VHA's Office of Academic Affiliations (OAA) under a grant from VHA's Health Services Research and Development Service (SHP08-164). Partnering with 107 U.S. medical schools,[16, 17, 18] VHA is the largest healthcare system and second largest financial supporter of graduate medical residency training in the U.S,[19] and thus is well positioned to prepare and test an instrument to measure resident supervision.

For this Final Report, we begin with a literature review [*see* II.A] and describe our version of a Graduate Medical Education (GME) Resident Supervision Conceptual Model [*see* II.B] that provides the basis to create the RSI and form the context to judge its content validity. The Resident Supervision Index (RSI, *ver*. 3.11) is describe [*see* (III)] with the actual survey form provided in Appendix I, Instruction Manual (*ver*. 3.11.06) provided in Appendix II, and patient, resident, and attending physician listing forms provided in Appendices III-V. The development of the RSI and conceptual model was done under the review and direction of the Expert Panel with members [*see* IV.A] and meeting schedule [*see* IV.B] consistent with the HSR&D funded study protocol. The Expert Panel held a consensus judgment on its content validity [*see* IV.C] before the RSI entered a Pilot Study. We describe the methods [*see* V.A] and data collection [*see* V.B] for the Pilot Study, and give the results assessing the feasibility [*see* V.C.1] of administering the RSI in actual clinical teaching settings, determining reliability based on test-retest for residents [*see* V.C.2.1] and for attending physicians [*see* V.C.2.2], and computing concurrent reliability that compared responses between residents with their attending physician for the same clinical education encounter [see V.C.3]. Implications for future studies are also discussed [*see* V.D] where we describe the development of a Supervision Intensity Score to test hypotheses derived from the GME Resident Supervision model [*see* VI.A]. We also provide specific hypotheses mathematically derived from the GME Resident Supervision model that can be used to further assess RSI construct validity [*see* VI.B]. We also devote some discussion to the endogenity of GME Resident Supervision as both an outcome from the exchange between patient, resident, attending physician, and care system, and a predictor of patient care outcome, educational achievement, attending burden, and system costs and patient retention. To handle this endogenity problem, we outline a new statistical strategy designed to measure the impact of resident supervision intensity on outcomes based on instrumental variable techniques [*see* VI.C]. Finally, we describe current efforts to download and read VA's electronic medical record as part of our effort to construct a measure of education outcomes based on the thinking process, or logic, that went into a therapeutic or diagnostic decision, rather than focusing only on the final decision itself.

(II). Development of Resident Supervision Index.

II.A. *Literature Review.*

Resident supervision has been defined as: "… the provision of guidance and feedback on matters of personal, professional, and educational development in the context of a trainee's experience of providing safe and appropriate patient care." [10] This definition states that attending physicians must: (*a*) assume responsibility for managing care to ensure patient safety and care quality; and (*b*) provide feedback for the resident's professional development. Other educators have expanded the attending physicians' role to: (*c*) evaluate the resident's progress over time for the purpose of assessing overall professional growth and noting areas where the resident needs improvement;[20] (*d*) serve as a role model, professional mentor, and clinical consultant to the resident;[21] (*e*) conduct "backstage" oversight, while not directly observable by the resident, by reviewing patient charts and discussing resident progress with other professional staff, and (*f*) conduct "responsive" oversight by evaluating the resident's knowledge level, experience, and professional progress to determine the degree of oversight that resident requires.[22] These elements have been captured by the definition for supervision offered in VA regulation: "… an intervention provided by a supervising practitioner to a resident … (that) is evaluative, extends over time, and has the simultaneous purposes of enhancing the professional functioning of the resident while monitoring the quality of professional services delivered … (and) is exercised through observation, consultation, directing the learning of the resident, and role modeling."[23]

While supervision definitions broadly include several clinical education goals, we sought to develop a measurement of supervision that is intended to have a direct effect on patient care, and therefore focuses on encounters among the patient, the residents who are engaged in the patient's care, and the attending physicians responsible for the resident's supervision. Rather than designing a survey instrument intended to describe the appropriateness, quality, or timeliness of supervision, we specifically sought a quantitative measurement of supervision. With these goals in mind, we developed a framework for measuring resident supervision intensity in the outpatient setting for the purpose of determining both the predictors and the outcomes of resident supervision.

As a starting point, the surgical supervision literature describes "levels of supervision" that details the level of an attending surgeon's involvement in procedural care. [24, 25] As part of the National Surgical Quality Improvement Program, the Veterans Health Administration (VHA) developed a scale that measures the attending physician's involvement with the resident that ranges from performing the case without a resident to the resident performing the procedures without the attending present. (Table 1) Data are recorded by a VHA operating room nurse who observes and enters the level of supervision into a computerized database. This scale captures attending physician physical presence, a measure that has been correlated with patient outcomes. For example, Itani et al[14] retrospectively reviewed over 600,000 VHA surgical cases and found no difference in mortality and lower morbidity for level 3 (level d, e and f in 2004) compared to level 0 to 2 (levels a, b, c in 2004) cases. Patients undergoing procedures with level 3 supervision had lower relative value complexity scores suggesting that attending physicians appropriately chose cases in which residents could exercise more independence in operating room care. Thus, the operating room levels of supervision and its correlation with patient outcomes suggest that attending physician presence and involvement in care are important elements of supervision intensity. However, procedural supervision

intensity measured in terms of the attending physician's hands-on involvement does not adequately reflect the cognitive supervision that occurs when the attending assesses and supervises residents caring for patients in other settings. That is, the conceptual framework for supervision in non-procedural care requires additional measures of supervision intensity.

Towards that end, Kennedy et[22] al proposed a conceptual framework for resident supervision that focuses on the attending physician. Specifically, he identified "clinical oversight" as "patient care activities by supervisors for the purpose of ensuring quality of care." Kennedy et al. used grounded theory methodology, a qualitative approach that develops novel theories to explain social phenomena, to elucidate supervisory behaviors of attending physicians, and to discover the "triggers" that lead to increasing the intensity of resident supervision. Clinical activities of supervisors were classified as "routine oversight," "responsive oversight," and "direct patient care." Routine oversight involves scheduled activities such as patient presentation in clinic. Responsive oversight is an increase in the direct participation by the attending physician such as directly interviewing or examining the patient. Direct patient care means that the attending physician moves beyond oversight and actively provides care for the patient. An additional form of supervision, backstage oversight, occurs when the trainee is not directly aware of the attending supervision, say when the attending physician reviews charts to inspect what the resident is doing, personally evaluates patients after rounds, or discusses the resident's patient care with nursing staff. Kennedy et al. found that attending physicians used a number of triggers that would lead to an increase the intensity of supervision. These triggers include clinical cues from the patient's history, information from non-physician staff, descriptive discrepancies by the resident, or the attending's assessment of the capacity of the trainee to handle a given case. Thus, the conceptual framework describing clinical oversight that has been elucidated by Kennedy et al. provides an important typology of attending physician supervisory activity, or intensity, to ensure safe, effective and quality patient care.

While assuring quality patient care is of utmost importance, the role of supervision to expand trainee knowledge and extend their clinical skills and experience should not be overlooked. Empirical evidence suggests that direct attending physician involvement with patients changes patients' evaluations and management decisions. For example, Gennis et al[12] examined the effect of the attending physician having interaction directly with patients on resident-provided patient care in a university-based, urban primary care clinic. The attending physician rated the quality of the residents' history, physical examination, assessment, and plan, both before and after the attending directly interacted with the patient. The study found that not only were the residents' history and physical examinations rated differently after the attending physician had a direct contact with the patient, but also the interaction led to changes in patient diagnoses and treatment plans in about one-third of patient cases. In addition, attending interactions with patients increased the time spent with residents from an average of around 6 minutes to 15 minutes. These findings were confirmed by Cyran et al[13] study using a cross-sectional survey of residents and attending physicians to assess the attending physician's contribution to patient management and teaching in over 400 outpatient encounters. For cases in which the attending physician interacted directly with the patient, both resident and attending physicians perceived greater overall contribution by the attending physician, including the impact the patient's final diagnosis. Finally, in a study of an emergency department staffed by attending physicians and non-emergency medicine residents, attending supervision of second-year residents resulted in changes in care in nearly 40%

of cases.[26] Therefore, the available literature suggests that supervision is increased by attending physicians' direct interaction and that this interaction changes patient assessments and patient care treatment plans.

In addition to direct patient interaction and physical presence, time is another measure of supervision. Time is an integral component of the GME theory of graded responsibility where less experienced residents require more supervision to ensure effective and safe patient care and more experienced residents require more autonomy to further enhance their professional development. In support of this theory, several studies illustrate time as a measure of the intensity of supervision.[27, 28, 29] Xakellis et al [27] performed a time-and-motion study of faculty activities in an academic family medicine clinic. Teaching time was greatest for first-year residents both in terms of the frequency of consultation with the attending physician but also in terms of the time spent in consultation. Specifically, early in the academic year, second and third year residents required about 4 minutes of supervision per patient while first year residents required 10 minutes. In addition, in a comprehensive review of teaching in the ambulatory care setting, Irby[28] also found that the duration of interactions between residents and attending physicians in outpatient clinics ranged from 4 to 6 minutes up to 15 minutes and that the average length of the interaction decreased with increased levels of training. Finally, Griffith et al [29] demonstrated an effect of time in supervision with process of care. In a prospective cohort study, they showed that interns in a neonatal intensive care unit ordered more tests such as arterial blood gases as the workload increased and when attending physicians spent less time on rounds and over weekends. Therefore, time has been substantiated in the literature as one measure of supervision intensity, is grounded in the theory of graded levels of responsibility, and is correlated with residents' training levels and education outcomes.

However, time, physical presence and attending physician direct interaction with patients does not fully characterize supervision intensity. In fact, an attending physician could potentially spend a great deal of time supervising while not affecting patient care while in another instance may spend a very short amount of time supervising a resident and have profound effects on patient care. Therefore the contribution the attending physician makes to the residents understanding of the patient's case, and to diagnostic and therapeutic decisions that impact patient care are also important measures of supervision intensity. Resident physicians often indicate that supervisory attending physicians will make contributions that change the patient's history, diagnostic testing, diagnosis, medication management, monitoring, and follow up.[12, 13] On the other hand, Laidley et al[30] found that mere confirmation (leading to no change in patient care) is the most frequent learning need of residents. Using a cross-sectional survey, they sought to determine if attending physicians accurately identify resident's learning needs in an outpatient clinic setting. Although overall agreement on learning needs was modest, agreement was highest for the need identified most frequently by residents, validation of the resident's plan. Therefore, measuring supervision intensity through the attending physician's contribution to patient management should be measured not only in terms of whether the patient's evaluation was changed by the attending physician but also through confirmation of the resident's plan.

Although attending supervision changes resident patient care, a limited number of studies have associated supervision with patient outcomes and nearly all of the studies lack an explicit measurement of supervision. Sox et al[31] used medical record reviews to assess residents' compliance with a range of process-of-care guidelines for selected conditions

encountered in emergency departments and found that when the residents were directly supervised, the quality of care improved. However, in this study, measurement of supervision was limited to chart documentation where an attending note indicated direct supervision and the absence of an attending note meant less supervision. In a study of surgical procedures, and resuscitations in a trauma service, Fallon et al[32] found that attending physician physical presence rated by the residents on a 5-point scale was positively correlated with outcomes (death, complications) and that supervision had more effect with less experienced residents. However, the scale only measured physical presence in a procedural setting. A review of junior doctors in surgery, anesthesia, trauma, obstetrics and pediatrics showed an increased number of deaths associated with less supervision but this study lacked a standard measurement of supervision. [33] In the setting of patient imaging, Velmahos et al[34] found that resident physician preliminary readings of computed tomography scans revealed discrepancies with the attending physicians' final reports resulting in nearly half of the patients requiring a change in management. Finally, lack of supervision has been associated with medical errors and malpractice claims. Singh et al[7] reviewed closed malpractice claims and found that teamwork problems were found in 70% of the cases and lack of supervision was the most prevalent teamwork problem. However, supervision was a qualitative judgment derived from case reviews. In summary, these studies offer empirical evidence that resident supervision plays an important role in the quality of patient care in teaching institutions. These studies underscore the importance of quantitative assessments of resident supervision intensity that can guide future research to elaborate and explain the relationship between supervision on patient care outcomes and on trainee education outcomes.

II.B. *GME Resident Supervision Model.*

With assistance and guidance from the Expert Panel, we developed a Graduate Medical Education (GME) Resident Supervision Model to describe both the predictors of the intensity of resident supervision and its subsequent impact on patient health, trainee education, workload, costs, and system retention of patient clients. The model includes elements from Donabedian's[35] "structure-process-outcome" framework, Andersen's[36] need-predisposing - enabling factors, Donabedian's[37] patients as "throughputs," and Penchansky's[38] dimensions of patient access to care.

Figure 1 about here

The model presented in Figure 1 begins with patients entering a care delivery site where they each encounter a trainee, an attending physician, the facility where care occurs, and the GME program housing the trainee. The essence of this GME Resident Supervision Model is the role assigned to supervision intensity as both a system outcome and a predictor of system outcomes. For example, the intensity of supervision will be predicted by the complexity of the patient's case, the resident's training level, and the clinical experience of the attending physician. Other factors such as the number of trainees assigned to the attending physician for supervision and the characteristics of the residency program (e.g. subspecialty program with focused patient problems versus primary care clinic, training agreements, etc.) also determine supervision intensity. On the other hand, resident supervision also is an input into patient care quality and ultimately patient health outcomes, resident education outcome, attending burden, and system effects including cost of care and patient retention. Predictor and predictive roles of

resident supervision intensity are statistically referred to as an “endogenous” factor. This contrasts factors that are exogenous or predetermined. Predetermined factors include characteristics that are given factors to the model (e.g., patient health needs, resident experience levels), and are not determined by the model. By contrast, the model is designed to explain patient outcomes and education outcomes as factors being “modeled.”

The GME Resident Supervision model describes several types of encounters involving differently the patient, the resident providing care, and attending physician responsible for supervising the resident. In resident-attending-patient (RAP) encounters, resident physicians seek supervision from an attending physician while a patient is physically present in the care delivery area. This encounter may or may not involve direct contact between the attending physician and the patient. Resident-attending (RA) encounters are supervisory interaction between the attending physician and resident physician in the absence of the patient; for example, when a resident requests supervision to review a patient’s lab results after the patient has been discharged from the clinic. In the attending-patient (AP) encounter, an attending physician directly interviews and examines a patient to verify a resident’s findings. An attending alone (A) encounter involves background oversight; for example, when the attending physician follows up the resident’s orders, patient’s tests results, or inspects the resident’s documentation of patient care progress. Finally, supervision may not occur at all when the resident cares for a patient (RP) in the absence of the resident.

The predictors of resident supervision appear on the left-hand side of Figure 1. The outcomes of resident supervision appear on the right-hand side of Figure 1. The outcomes of resident supervision include the patient care process (did patients with given medical condition get appropriate care) that, in turn, impacts patient care outcomes (did patients achieve the clinical goal). For example, a patient with elevated blood pressure may or may not have an adjustment in medication or appropriate follow up scheduled after a supervisory encounter. This will ultimately affect the clinical goal of achieving an appropriate blood pressure. Trainee and attending physician outcomes include satisfaction, learning, and clinical workload.

Facility outcomes include both costs and patient retention. To retain its client base and further its clinical training mission, teaching facilities will use its resources to help patients access its services. Elements of access include services availability (the range and mix of services offered), accessibility (physical location relative to patient residences), affordability (out-of-pocket expenses the patient incurs, listed as a preferred provider), accommodation (convenient operating hours for patients to attend), and acceptability (clinic management, professional staff and trainees, and cultural environment are acceptable to the patient). Alternatively, patients may turn to alternative care providers. For these purposes, decisions to use alternative providers include patient characteristics, patient access to the teaching facility, and patient access to alternative care providers.

In terms of cost, supervision is conceptualized as a series of educational encounters conducted between the attending and resident on behalf of the given patient. Educational encounters may involve only the attending alone (e.g., review of charts to oversee resident care), the attending and resident physician (e.g., attending and resident discuss), or the attending, resident physician, and patient (e.g., attending overseeing the resident engaged in a clinical procedure with the patient). The cost of these encounters includes the time resources of the attending that otherwise would be producing patient care, the

resident physician salary, support and administrative costs, and equipment and building depreciation. Total costs for the patient's care in the teaching facility will include care costs plus education costs. We have, however, limited the purpose of our analyses to assessing resident supervision in the context of a specific patient. Thus, education activities not assignable to the care of a specific patient, such as didactic sessions, research activities, are considered outside the focus of the model. We denote the accumulation of prior resident training and collective prior educational experiences as trainee "experience" and are considered as an "exogenous" covariate to the model explaining resident supervision.

There are several implications to this theoretical framework that will have implications for both how resident supervision should be defined, operationalized, and measured, and the statistical context by which it can be analyzed to explain patient, education, attending, and system outcomes. First, relationships between supervision and patient health and trainee education outcomes will be complex. Such models will include both main and interactive effects and will be recursive with supervision endogenously determined by patient, trainee, attending and facility covariates. Secondly, by focusing on a selected patient cohort and with the patient encounter as the unit of analysis, the model is not designed to assess the accumulated professional development of a given resident physician. Thirdly, the impact of supervision on clinical workload is ambiguous. While more supervision may mean attending physicians will spend more time with residents and less time producing clinical workload, the reduction in attending-provided workload may be off-set by greater workload from residents working in the clinic under more supervision. Thus, total cost comprising both education and clinical care costs may in fact decline as more residents are added to the teaching facility or as supervision increases. Fourthly, for a given patient cohort, the level of supervision that optimizes patient health outcomes may be different from supervision that optimizes trainee education outcomes.

(III). Resident Supervision Index.

The RSI version 3.11 consists of the survey instrument (Appendix I), Instruction Manual (Appendix II), and patient (Appendix III), resident (Appendix IV), and attending physician (Appendix V) enlistment forms. The RSI is based on several main concepts that emerged from the literature review and from the Expert Panel's deliberations on the RSI and the GME Resident Supervision model.

Consistent with the GME outcomes model, the RSI was designed around a "follow the supervision" concept. That is, the RSI was designed to be administered to residents to describe any education encounter involving the care of a patient enrolled in a list of patients, or patient cohort. The Expert Panel recognized that patient care and the supervision intended to effect patient care is not limited to when the patient is physically present in a face-to-face encounter but occurs continuously or at other times when the patient is not physically present. In fact, in the psychotherapy supervisory model and in many outpatient clinics, supervision may occur at any time from shortly before the visit to several days to weeks afterwards when test results or patient outcomes becomes known and the resident can thus discuss the case with an attending physician. Therefore, the RSI unit of analysis is the resident-attending physician supervisory encounter and the patient cohort is the basis for selecting those supervisory encounters. This enables the RSI to accommodate a broad range of supervisory models including one-time supervisory encounters with an attending physician for a consult or urgent care visit, as well as the

psychotherapeutic supervisory and continuity of supervision models that occur in primary care clinics and outpatient settings.

Thus, we constructed the RSI survey to contain two mutually exclusive sections: resident-attending-patient encounters (RAP) and resident-attending encounters (RA) (See Appendix). RAP encounters apply when the resident, attending physician and patient are present during a patient care encounter, such as a clinic visit. RAP includes encounters when the attending physician is expected to be present or available in the clinic but in fact is not. RA encounters apply when the resident has a supervision encounter with the attending physician when the patient is physically absent from the clinic. These encounters usually occur when the resident has an issue pertaining to some aspect of the patient's care, such as reviewing lab results or assessment from a group psychotherapy session (when therapy occurs on a group of patients).

An additional form of supervision is the background oversight that attending physicians perform in the absence of the resident and the patient in order to assure appropriate care. This includes a review of test results, review charts to ensure appropriate documentation and care processes, and discovery through discussions with nursing staff and other health professionals familiar with the patient's case. The Expert Panel recommended that this form of supervision be captured in a separate measurement tool as this activity is mostly performed for quality assurance purposes but often does not result in a supervisory encounter with a resident physician. However, background oversight could result in an RA encounter that had been initiated by the attending physician. In these cases, background oversight would be captured with the RSI when administered to the resident.

The RSI measures supervision by the length of time of attending-resident interaction, the physical presence of the attending physician, the time spent by the attending physician in direct contact with the patient, and the contribution of the attending physician to the patient evaluation. Supervision time covers the attending physician and resident speaking, asking and answering questions, and making comments, but only if such communication is in regards to the care of a particular patient selected for study (included in the patient cohort). It includes the attending physician performing care on the study patient while the resident observed, the resident assisting the attending physician perform care, the attending physician observing the resident physician perform care, the resident physician performing care while the attending physician is or is expected to be physically in the clinic area or otherwise is available by phone or pager. Supervision time does not include the attending physician providing general education, general knowledge, or clinical direction that is not specific to the study patient and does not include performing administrative tasks (e.g. searching for the attending physician, dialing a phone). Discussion designed to improve the resident's general knowledge is supervision time if the knowledge is applicable to the specific case of the study patient. However, supervision time does include the attending physician describing the case to drive an education or learning point.

For RA encounters, a single time entry is recorded along with the discussion mode (e.g. a face-to-face individual discussion with the attending physician, a telephone contact, e-mail or text message, a note left in the patient's chart, etc.) (See Appendix I, RSI item #1). For a RAP encounter, time is recorded by counting the number of minutes the resident and attending physician discussed the case (See Appendix I, RSI item [#2(A)]). In addition, the RSI captures the time when the attending physician had a physical presence with the patient, and the time the attending physician had in contact with the patient with, or

without, the resident physician being physically present (See Appendix I, RSI items [#2(B)-2(C)]).

Resident supervision intensity is also quantified by considering how the attending physician's contributions to the supervisory encounter impacted resident-provided care and the resident's understanding of the care (See Appendix I, RSI "All Encounters."). This is assessed whenever an RA or RAP encounter occurs (one of the first two sections of the form is completed). Specifically, the "All Encounters" section assesses the contribution of the attending physician to the residents' understanding of the patient's case and to the patient's evaluation and care. Question [#3(A)] is a dichotomous assessment of the perceived contribution of the attending physician to the resident's knowledge to evaluate and manage the patient. Item [#3(B)] captures the attending physician's contribution to specific aspects of the patient's care. For each item [#3(B)(i.-vi)], the resident and attending physician may have not discussed the particular aspect of the patient's care in which case the appropriate box in the "not discussed" column is marked. If the items were discussed, then the discussion is recorded as either confirmed, changed or had no effect (neither) on each aspect of the patient's care.

The RSI was specifically designed for applications to future studies where it will be administered by trained research assistants guided by the RSI Instruction Manual and follows a cohort of selected study patients. Included are all of the residents and their attending physicians who were responsible for the care of those study patients.

(IV). Expert Panel.

With the assistance of the Office of Academic Affiliations, Department of Veterans Affairs Veterans Health Administration (VHA), an Expert Panel was convened for this study. Its objectives were to refine the GME Resident Supervision Conceptual Model, to help refine the RSI, and to judge by consensus the content validity of the final version of the RSI within the context of the GME conceptual model as a survey tool to measure quantitatively the intensity of an attending physician supervision of a resident physician during the resident physician's clinical rotations through VA medical centers.

The efforts of the Expert Panel lead to refining the present version of the RSI survey instrument (ver 3.11) and instruction manual (ver.3.11.06). The Expert Panel also reviewed and helped develop the GME Resident Supervision Model that was devised to assess the construct validity of the RSI index by outlining the theoretical relationships between RSI and its predictors, and between the RSI and its outcomes on patients, trainees, and the health care system.

IV.A. *Members and Supporting Members.*

Members of the Expert Panel included the following: (**1**) *Stuart Gilman, M.D., M.P.H.*, as Chair of the Expert Panel. Dr. Gilman is the Director, Advanced Fellowships and Professional Development, Long Beach VA Medical Center, Long Beach, CA and Clinical Professor of Medicine, Department of Medicine, University of California Irvine School of Medicine, Irvine, CA. The Physician members of the Expert Panel were; (**2**) *David C. Aron*, M.D. M.S., Associated Chief of Staff for Education, VA Senior Scholar, Louis Stokes Cleveland DVA Medical Center, and Professor of Medicine & Epidemiology &

Biostatistics, Case Western Reserve University School of Medicine, and Professor of Organizational Behavior, Weatherhead School of Management, Case Western Reserve University, Cleveland, OH; (**3**) *John M. Byrne, D.O.*, Associate Chief of Staff for Education at the Jerry L. Pettis Memorial VA Medical Center, Loma Linda VA Healthcare System, and Assistant Professor of Medicine, School of Medicine, Loma Linda University, Loma Linda CA; (**4**) *Grant W. Cannon, M.D., F.A.C.P.*, Associate Chief of Staff for Academic Affiliations, George E. Wahlen VA Medical Center, Salt Lake City, Utah, and Thomas E. and Rebecca D. Jeremy Presidential and Endowed Chair for Arthritis Research, School of Medicine, University of Utah, Salt Lake City, UT; (**5**) *Linda Godleski, M.D.*, Associate Chief of Staff for Education, VA Connecticut Health Care System, West Haven, CT, and V.H.A. Lead for Telemental Health, Care Coordination Services, Washington, D.C., and Associate Professor, Yale Department of Psychiatry, New Haven, CT; (**6**) *Catherine P. Kaminetzky, M.D., M.P.H.*, Associate Chief of Staff for Education, Durham VA Medical Center, Durham, NC, and Assistant Professor of Medicine, Duke University, Durham, NC; (**7**) *Sheri A. Keitz, M.D., Ph.D.*, Chief of Medical Service, Miami VA Healthcare System, Miami, FL, and Professor Department of Medicine and Associate Dean for Faculty Diversity and Development, University of Miami Miller School of Medicine, Miami, FL; (**8**) *Susan Kirsh, M.D.*, Louis Stokes Cleveland DVA Medical Center, Cleveland, OH and Associate Professor of Medicine & Epidemiology & Biostatistics, Case Western Reserve University School of Medicine; and (**9**) *Elaine A. Muchmore, M.D.* Associate Chief of Staff for Education, VA San Diego Medical Center, San Diego, CA and Professor of Clinical Medicine, Vice-Chair for Education, Department of Medicine, School of Medicine, University of California at San Diego, San Diego CA.

Supporting members attending conference calls and face-to-face meetings included the Study Principal Investigator *T. Michael Kashner, Ph.D., J.D., M.P.H.*, Department of Veterans Affairs, Office of Academic Affiliations, Washington, DC and Professor, Department of Psychiatry, University of Texas Southwestern Medical Center at Dallas, Dallas, TX; *Richard M. Golden, Ph.D, M.S.E.E., B.S.E.E.*, Professor of Cognitive Science and Engineering, Program Head Undergraduate Cognition Science Program, Program Head Masters Program in Applied Cognition and Neuroscience, The School of Behavioral and Brain Sciences, University of Texas at Dallas, Richardson, TX; *Steven S. Henley, M.S.*, President, Mixingale-Group, Inc., Plano, TX

Other supporting members, policy collaborators, and data consultants included: *Christopher T. Clarke, Ph.D.*, Director, Data Management Center, Office of Academic Affiliations, Veterans Health Administration, and VA Medical Center, St. Louis, MO; *Barbara K. Chang, M.D., M.A., F.A.C.P.*, Director of Medical and Dental Education, Office of Academic Affiliations, Veterans Health Administration, Department of Veterans Affairs, Washington, DC, and VA Medical Center, Louisville, KY; *Robert S. Hinson, M.A.*, Executive Assistant, Office of Academic Affiliations, Veterans Health Administration, Department of Veterans Affairs, Washington, D.C.; *Gloria J. Holland, Ph.D.*, Special Assistant for Policy and Planning, Office of Academic Affiliations, Washington, D.C.; and *Annie Wicker, B.S.*, Data Coordinator, Loma Linda VA Medical Center, Loma Linda CA.

We also acknowledged the support and consultation advice received from Malcolm Cox, M.D., Chief Academic Affiliations Officer, and from Karen M. Sanders, M.D., Deputy Chief Academic Affiliations Officer, of the Veterans Health Administration.

IV.B. *Meetings.*

The Expert Panel met during seven formal conference calls (March 14th, April 4th, April 11th, April 18th, April 25th, May 2nd, and May 9th, 2008) with a All-Hands meeting held in Loma Linda CA on July 8th and 9th, 2008. Punctuating these formal conference calls were countless pages of email and text messaging (with reply-all) that continued through the May 9th 2008 conference call when present version 3.11 of the RSI form and version 3.11.06 of the Instructions Manual was approved for the feasibility and reliability study to be conducted at the Loma Linda VA Medical Center. The All-Hands meeting in July 8-9, 2008 discussed preliminary findings and reviewed the application of the RSI form and instructions. A detailed agenda was prepared and disseminated to members prior to each conference call. Detailed minutes were maintained and disseminated within 2 days after each conference call. The Expert Panel discussed and approved by consensus voice vote all call minutes. All agendas were reviewed by the Principal Investigator, Co-Principal, and Expert Panel Chair before dissemination prior to each call meeting. However, during any call or the All-Hands meetings, any member could bring up any off-agenda issue upon recognition from the Expert Panel Chair (Gilman). All agendas and minutes for all seven conference calls and the All hands Meeting are available from the investigators (Kashner, Byrne).

The investigators presented RSI ver. 1.09 to the Expert Panel for the first call on March 14, and went through 13 separate and distinct iterations before being finally approved as version #3.11. All versions of the index were discussed by the Panel, including those prepared and disseminated by email off-call. All RSI form versions are available from the investigators (Kashner, Byrne). The instructions manual went through 6 iterations.

IV.C. *Content Validity.*

The Expert Panel meet on July 8-9th at the Loma VA Medical Center and after reviewing ver. 3.11 and hearing preliminary discussion regarding its implementation, agreed by consensus that the RSI ver. 3.11 did represent the appropriate content to describe the intensity of resident supervision within the context of the GME Conceptual Model.

(V). Pilot Study.

V.A. *Methods.*

We conducted a pilot study to assess the performance of the RSI in an actual teaching clinical care setting: a primary care general internal medicine outpatient clinic and two subspecialty surgical clinics at one VA medical center. The Study Procedure's Manual is provided in Appendix VI. The Baseline Questionnaire administered to both resident and attending physician at the beginning of data collection and after informed consent, is provided in Appendix VII, and data codebook provided in Appendix VIII.

The study received approval from the Loma Linda VA Medical Center's Research and Development Human Subjects Subcommittee as the designated Institutional Review Board.

Briefly, four research assistants were trained by two of Principal (T.M.Kashner) and Co-Principal (J. M. Byrne) during a three hour session, with continuing review of procedures in face-to-face project management teach meetings (described below). Training consisted

of an explanation of the goals of the pilot study and future studies using the RSI, an explanation of each survey item, and role playing of supervisory encounters to practice interviewing and recording information. An RSI Instruction Manual explaining the administration of the instrument including examples was provided to the research assistants (Appendix II).

Patients were first identified from a patient pool limited to those patients attending the VA medical center in selected study clinics. To be included, patients had to have a diagnosis of diabetes or major depression based on chart-based diagnosis, and to have a scheduled appointment in the primary care continuity or ambulatory block rotation clinic. The diagnoses of diabetes and depression were chosen based on their high prevalence in the VA population and the complexity of care involved in managing these conditions. In the third month of the study (August 2008), two additional study clinics were added, vascular and orthopedic surgery, in order to diversify the types of supervisory encounters.

At the start of each week of the study, a script in the VA's computer system VistA (Veterans Information System Technology Architecture) was run to generate reports that listed patients with diabetes or depression who had scheduled "index" appointment in the selected study clinic during that week. The report was developed from the Clinical Reminders software in VistA, listing patients chronologically by appointment date. A random numbers table was used to select at random 10 to 15 patients from the VistA report list. Additional patients could be added to the list in the same manner if more supervisory encounters were needed because of patient no-shows or cancellations. Patients were maintained on the patient cohort list for four weeks in order to query resident physicians about any additional supervisory encounters outside of the patients' index clinic visit.

After obtaining written informed consent from the resident and their attending physicians, the research assistant asked each resident and attending physician to complete the Baseline questionnaire (Appendix VII) to gather baseline information about study participants. The Baseline questionnaire (Appendix VII) administered to both resident and attending physicians at the beginning of the study included demographic data, as well undergraduate education, medical school and graduate medical education. Details about graduate medical education including dates and medical specialty for each year of training were obtained in order to determine precisely the residents' level of training and experience.

The RSI was administered by thee trained research assistants in the study clinic. On each clinic day, the research assistant asked each resident, and each attending physician, if they had had a supervision encounter regarding any patients listed in the patient cohort list during the clinic shift. If yes, the RSI was administered as soon as possible. The RSI was not self-administered. The RSI was re-administered on the next day to recapture (retest) the information covering the same supervision encounter. Re-testing was allowed up to 7 days from the initial test. Residents were also queried at least once each week about patients on the cohort list for additional supervisory encounters. For purposes of this study, a resident was first asked if they had had a supervision encounter on behalf of a given study patient listed on the patient cohort list. If the resident claimed they had had such an encounter, the research assistant approached the attending physician and administered the RSI. If the attending physician reported no supervision encounter, the information was recorded on the RSI form for study comparison purposes.

Feasibility was determined by examining acceptability of the RSI as a data collection tool among residents and attending physicians based on acceptance rates of informed consent and withdrawal rates after consent. Reliability was assessed by comparing responses from residents and from attending physicians with responses from a second administration of the RSI for the same supervision episode (re-tests reliability). We also compared resident responses with those of their attending physician for the same supervision encounter (concurrent reliability). Agreement was expressed in terms of Cohan's kappa, mean reported differences (bias), and intraclass correlation coefficients (ICC) based on one-way random effects models.[39]

To determine construct validity and verify the GME Resident Supervision Model, we obtained de-identified patient data on the patient cohort list. Information included demographics, diagnoses using ICD-9 codes, and evaluation and management codes, by a chart review and downloading VistA administrative files. Resident training levels and case complexity was correlated with supervision intensity to determine RSI construct validity (i.e. more complex cases and less trained residents require more supervision). We also administered the Learner's Perception Survey (LPS)[40, 41] to residents at the end of the study as part of the outcome evaluation for the RSI. LPS measures resident satisfaction with VA as a training, learning, clinical care, working, and physical environment. We determine the association between RSI supervision intensity to resident satisfaction after controlling for trainee experience and case complexity.

V.B. *Data Collection.*

The RSI was administered by trained clinician interviewers in the outpatient care clinics at the Loma Linda VA Medical Center. Data collection continued at the end of the day shift during business days from between June 9th through September 5th 2008, at the Loma Linda VA Medical Center, Loma Linda CA. Data collectors met as part of a Project Management Team (PMT) meeting with the study coordinator (Wicker) and Principal (Kashner) or Co-Principal investigators (Byrne). Fifteen meetings were held during data collection, data entry, and codebook preparation on June 5th, 18th, 20th, 27th, July 3rd, 11th, 18th, 25th, August 1st, 8th, 15th, 22nd, 29th, and September 5th and 18th, 2008. Detailed minutes were kept for each data meeting and are available upon request from the Investigators (Kashner or Byrne). The purpose of these PMT meetings was to ensure accurate collection of the data consistent with the RFI index and Instruction Manual. The meeting also assisted the data coordinator (Wicker) to properly prepare accurate code books, data manuals, and research ready files consistent with the research protocol, as described elsewhere.

Data collection was conducted by: *Guizhi (Grace) Ding*, Certified Clinical Research Coordinator, Clinical Research Center, Loma Linda VA Health Care System, Loma Linda, CA; *Tiffany Gunneman*, Team Manger and Research Liaison, Clinical Research Center, Loma Linda VA Healthcare System, Loma Linda, CA; *Myra Peterson, R.N.* Clinical Research Center, Loma Linda VA Healthcare System, Loma Linda, CA; *R. Lynne Ruybalid, M.P.H., C.C.R.C.*, Managing Director, Clinical Research Center, Jerry L. Pettis Memorial VAMC, Loma Linda, CA; *Vicki Simpson, R.N.*, Clinical Research Center, Loma Linda VA Healthcare System, Loma Linda, CA; *Mariam Wadie*, Clinical Research Center, Loma Linda VA Healthcare System, Loma Linda, CA.

We prepared both raw and research ready files consistent with the Data Accounting System, or DAS, described by Kashner et al. [42]

V.C. *Results.*

V.C.1. Feasibility.

During the study period held between the dates of June 9th through September 5th 2008, a total 80 residents rotating through selected study clinics were invited to participate in the study. Of these, 4 (3.8%) refused consent, 1 (2.5%) consented but later withdrew, leaving 75 (93.8%) residents completing the study. Study residents were followed for a mean 63 days (sd=23, range 2–88). During the same study period, a total 38 attending physicians from the same selected clinics were invited to participate in the study. All 38 physicians (100%) signed informed consent with 1 later withdraw from the study, leaving 37 (97%) attending physicians completing the study. Characteristics of both attending physicians and residents are provided in Table 2.

The RSI was administered 547 times in 548 attempts, as either a test or retest, covering a total 148 episodes of supervision involving 60 of the 75 total consenting residents, all 37 consenting attending physicians, and 143 unique outpatients who met study criteria.

Among the 60 consenting residents who were asked to respond to the RSI for a given episode of supervision, 19 residents (19 of 60, 32%) reported on only one patient, 18 (30%) reported on two patients, 8 (13%) on three patients, 6 (10%) on four patients, and 9 (15%) on the maximum 5 patients. Also among the 60 reporting residents, 29 (48%) were paired with only one attending physician, 18 (30%) were paired with two, 8 (13%) with three, 4 (7%) with four, and 1 with five different attending physicians. There were two cases in which the same resident-patient pair was attended by two different physicians during two separate supervision episodes.

All residents reported values for resident-attending-patient encounters from section #2 of the RSI (See Appendix). Among 125 supervision episodes with test-re-test data, residents reported 122 (98%) episodes that included discussion of the case directly with attending [#2(A)], 4 (3%) when the resident only observed [#2(B)(a)], 125 (100%) when the resident had direct contact with the patient [#2(B)(b)], 35 (28%) involved the attending physician participating in care [#2(B)(b)(*i*)], 3 (2%) involved the attending physician in the room but otherwise not participating in the care [#2(B)(b)(*ii*)], 124 (99%) involved the attending physician not in the room but in the clinic area [#2(B)(b)(*iii*)], 0 (0%) involved the attending physician not in the clinic area but available by phone or pager only [#2(B)(b)(iv)], and 0 (0%) when the attending physician was unavailable [#2(B)(b)(v)]. No episodes were reported where the attending spent time with the patient without the resident being present [#2(C)].

V.C.2. Test-Retest Reliability.

V.C.2.1. *Residents*.

Residents were administered the RSI during the shift when the patient care encounter occurred. The 60 responding residents completed RSI's on 145 episodes, with retests conducted on 125 (86%). Overall, re-tests were administered within 1.4 days (sd=1.3, range=[1.0 hours – 7.9 days]) of the initial RSI administration. For the 125 RSI's for which retests were captured, residents initially reported supervision episodes lasting a total 36.71 minutes per episode (sd=16.22, range=[13, 130]). On re-test, residents reported a mean 36.76 minutes (sd=13.79, range=[8, 80]), for a difference of –0.05 minutes

(sd=10.04, 95%CI[–1.83, 1.73], t(124)=0.1, p=.95), with r=.79, and ICC=.88 (F(124,125)=8.0, p<.0001, CI95%[0.82, 0.91]). (Table 3)

Concerning specific items among these 125 episodes, residents initially reported discussing the case with the attending physician [item#2(A)] in 122 (98%) episodes, with 98% of responses agreeing on retest (κ=.74). Residents reported an average 7.73 minutes per episode (sd=4.46, range=[0, 30]), and a mean of 7.70 minutes (sd=4.18, range=[0, 20]) on retest, for a test-retest difference of 0.03 minutes (sd=1.93, 95%CI[-0.31, 0.37], t(124)=0.2, p=.87), with r=.90, and an ICC=.95 (F(124, 125)=19.2, p<.0001, CI95%[0.93, 0.96]). Residents reported direct contact with patients for all 125 supervision episodes [item #2(B)(b)(*i-v*)] with 100% agreement on retest. Residents reported an average 28.80 minutes per episode (sd=14.68, range=[10, 120]) and a mean 28.49 minutes (sd=12.44, range=[5, 70]) on retest, for a test-retest difference of 0.31 minutes (sd=9.83, 95%CI[-1.43, 2.05], t(124)=0.4, p=.72), with r=.75, and an ICC=0.85 (F(124,125)=6.7, p<.0001, CI95[0.79, 0.90]). Residents reported in 28% (35 of 125) of episodes that the attending physician was directly involved in the patient's care [#2(B)(b)(*i*)], with 91% of responses agreeing on retest (κ=.77). When both test and re-test reported minutes (n=27), the resident reported a mean 7.17 minutes per episode (sd=3.81) and a mean 7.83 minutes (sd=4.72) on retest, for a test-retest difference of –0.67 (sd=3.13, 95%CI[-1.91, 0.57], t(26)=1.11, p=.28), with r=0.75, and ICC=.84 (F(26,27)=6.4, p<.0001, CI95[0.66, 0.93]).

V.C.2.2. *Attending Physicians***.**

Attending physicians were administered the RSI during the shift when the patient care encounter occurred. The 37 responding attending physicians completed RSI's on 143 episodes, with retests conducted on 132 (92%). Overall, re-tests were administered within 1.4 days (sd=1.5, range=[1.2 hours – 8.0 days]) of the initial RSI administration. For the 132 RSI's for which retests were captured, attending physicians initially reported supervision episodes lasting a total 40.32 minutes per episode (sd=17.12, range=[10, 110]). On re-test, attending physicians reported a mean 38.95 minutes (sd=16.81, range=[8, 110]), for a difference of 1.36 (sd=8.39, 95%CI[–0.08, 2.81], t(131)=1.9, p=.064), with r=.88, and ICC=.93 (F(131, 132)=15.1, p<.0001, CI95%[0.91, 0.95]).

Concerning specific items among these 132 episodes, attending physicians initially reported discussing the case with the resident [item#2(A)] in 129 (98%) episodes, with 100% of responses agreeing on retest (κ=1.00). The attending physician initially reported an average 8.33 minutes per episode (sd=4.64, range=[0, 30]), with a retest mean of 8.24 minutes (sd=4.67, range=[0, 30]) for a difference of 0.09 (sd=2.52, 95%CI[-0.35, 0.52], t(131)=0.4, p=.69), with r=.85, and an ICC=.92 (F(131, 132)=12.7, p<.0001, CI95%[0.89, 0.94]). Attending physicians also reported that their resident had direct contact with the patient for all 132 supervision episodes [item #2(B)(b)(*i-v*)], with 100% agreement on retest. The attending physician reported the resident spent an average 31.55 minutes per episode (sd=15.09, range=[5, 97]), and a mean 29.94 minutes (sd=14.64, range=[5, 97]) on retest, for a test-retest difference of 1.61 minutes (sd=8.60, 95%CI[0.12, 3.09], t(131)=2.2, p=.033), with r=.83, and an ICC=0.91 (F(131,132)=10.7, p<.0001, CI95[0.87, 0.93]). Attending physicians reported in 33% (43 of 132) of episodes that they were directly involved in the patient's care when the resident was present [#1(B)(b)(*i*)], with 91% of responses agreeing on retest (κ=.79). When both test and re-test reported minutes (n=35), the attending physician reported a mean 7.63 minutes per episode (sd=4.98) and

a mean 7.10 minutes (sd=4.85) on retest, for a test-retest difference of 0.53 minutes (sd=3.05, 95%CI[-0.52, 1.58], t(34)=1.02, p=.31), with r=0.81, and ICC=.89 (F(34,35)=6.4, p<.0001, CI95[0.79, 0.95]).

V.C.3. Concurrent Reliability.

From among the original 148 episodes, both residents and attending physicians completed RSIs on 140 (95%) episodes. Among these 140 episodes, residents reported supervision episodes lasting a total 38.73 minutes per episode (sd=16.25, range=[8, 110]), while their attending physician reported a mean 37.68 minutes (sd=13.87, range=[8, 81]), for a difference of 1.05 minutes (sd=14.71, 95%CI[–1.41, 3.51], t(139)=0.8, p=.40), with r=.53, and ICC=.69 (F(139, 140)=3.2, p<.0001, CI95%[0.57, 0.78]).

Concerning specific items among these 140 episodes, residents reported discussing the case with the attending physician [item#2(A)] in 137 (98%) episodes, with 99% of resident's responses agreeing with their attending physician (κ=.74). Residents reported an average 8.27 minutes per episode (sd=4.61, range=[0, 30]), with the attending physician reporting a mean 7.91 (sd=4.24, range=[0, 20]) for a mean difference of 0.35 minutes (sd=4.90, 95%CI[-0.47, 1.17], t(139)=0.9, p=.40), with r=.39, and an ICC=.56 (F(139, 140)=2.3, p<.0001, CI95%[0.39, 0.68]).

Residents reported direct contact with patients for all 140 supervision episodes [item #2(B)(b)(*i-v*)], with 100% agreement with responses from their attending physician. Residents reported an average 29.73 minutes per episode (sd=14.17, range=[5, 97]), with their attending physician reporting a mean 29.25 minutes (sd=12.39, range=[5, 70]), for a difference of 0.47 (sd=12.75, 95%CI[–1.66, 2.60], t(139)=0.4, p=.66), with r=.55, and an ICC=0.70 (F(139,140)=3.4, p<.0001, CI95[0.59, 0.79]).

Among the supervised encounters, residents reported in 27% (38 of 140) of episodes that the attending physician made direct contact with the patient [#1(B)(b)(*i*)], with 89% of responses agreeing with their attending physician (κ=.72). When both resident and attending physician reported minutes (n=29), the resident reported a mean 7.36 minutes per episode (sd=4.91), with their attending physician reporting a mean 7.59 minutes (sd=4.67), for a difference of –0.22 minutes (sd=4.10, 95%CI[–1.78, 1.33], t(28)=0.30, p=.77), with r=0.64, and ICC=.78 (F(28, 29)=4.6, p<.0001, CI95[0.54, 0.90]).

RSI items #1 and #3 are not included in this report. Too few resident-attending supervisory encounters (RSI item [#1]) occurred to provide analysis. Data from item #3 will be reported in a separate paper describing RSI's construct validity.

V.D. *Discussion*

Unlike other means used to assess the quality of or satisfaction with resident supervision, the RSI is the first and only tool developed to quantitatively measure supervision in non-procedural patient care. The RSI was developed within the GME Resident Supervision model that conceptualizes both predictors of, and outcomes from, resident supervision measured quantitatively in terms of supervision intensity.

The RSI pilot study demonstrates the feasibility and reliability of the RSI. In fact, all of the attending physicians and nearly all of the resident physicians who were approached

consented and participated in the study with only two individuals withdrawing consent. These data suggest that the RSI is acceptable to both resident and attending physicians and that it can be administered while residents and attending physicians are caring for patients in outpatient clinics. In addition, despite the fact that re-testing occurred on average nearly 36 hours and up to one week later and that the length of supervisory encounters was variable, the RSI demonstrates internal consistency and re-test reliability for both resident and attending physicians' reports of supervisory minutes. However, concurrent testing between resident and attending physicians showed somewhat lower reliability and internal consistency. This finding likely reflects attending physicians' uncertainty of the time residents actually spent alone with patients and suggests that residents may provide the most reliable source for assessment of supervision minutes. However, confirmation of this finding should be further assessed using independent observers. Additionally, further data analysis will examine the RSI's construct validity by testing resident and attending physicians' assessment of the attending contribution to patient's evaluation as well as the correlation between supervision intensity and resident training level and patient case complexity, and comparing supervision intensity with resident satisfaction with VA learning after controlling for patient, resident, and attending characteristics.

By quantifying supervision, the RSI provides a potential opportunity to define optimal supervision or the ideal balance between ensuring safe, high quality, cost-effective care and the autonomy that is believed by accrediting bodies and residents to be necessary for professional development in graduate medical education. [33,43] Despite the fact that progressive responsibility is integral to GME, it is not well defined, objectively measured or used effectively in resident promotion.[52] In fact, Kennedy et al challenges the assumptions about progressive independence finding little empirical basis for this tradition. [46] In a review of the medical as well as psychology education literature, Kennedy found theoretical support for increased supervision and decreased autonomy for more experienced residents but little if any data for educational outcomes. Currently, supervision is measured through compliance with regulations governing supervision based on medical record documentation. These regulations are intended to provide only minimum standards that are necessary to prevent attending physicians from under-supervising residents (e.g., an inexperienced resident independently caring for a complex patient) and to assure safe patient care. On the other hand, attending physicians may limit the role of residents beyond what their experience, training, and professional development would otherwise allow. As an example, the recent introduction of duty hour limits policies require greater attending physician involvement and direct patient care which may threaten resident autonomy.[44] Such "over-supervision" reduces opportunities for residents to experience practice autonomy considered important to further professional development.[45, 46, 47] As stated before VA OAA Federally Chartered Advisory Board convened to review the importance of resident training to Veterans Health Administration:[48, 49, 50, 51] "Residents cannot learn if they do not do." Therefore, by correlating the intensity of supervision with patient case complexity, resident training level, and patient as well as educational outcomes, the RSI provides an opportunity to better understand the role of progressive responsibility in GME and to use empirical evidence to guide supervision regulations.

In addition to patient health and resident education goals, the teaching facility has other interests in guiding how residents are supervised. For instance, resident trainees produce clinical workload that cares for the facility's patients, reduces clinical burden allowing staff to pursue research activities, reduces facility costs, and provides an academic

environment furthering staff development, retention, and recruitment.[52, 53, 54, 55] Therefore, supervisory responsibilities present multiple competing goals and challenges to the practitioner at the academic medical center. The level of supervision that optimizes patient health outcomes and optimizes resident education may not necessarily be the same as the level that maximizes workload, or minimizes costs. Thus, attending physicians, their institutions and their governing bodies must decide how to supervise residents in a way that properly balances these diverse goals. With the RSI, a better understanding of the relationship between supervision and patient outcomes, trainee learning, cost, efficiency and workload may provide empirical evidence to guide resource allocations in GME.

In conclusion, these data demonstrate that the RSI is an instrument with a high potential for successful measurement of resident supervision. We believe that resident supervision should be scientifically guided not only to ensure patient safety and promote clinical outcomes, but also to promote professional growth and to provide teaching facilities with clinical workload at reasonable costs. Recognizing the inherent challenges of linking medical education with outcomes [56, 57] and that supervision is a complex interaction between attending physicians, the resident physicians they supervise, and the patients they treat, the establishment of the RSI as a feasible and reliable instrument is a first step in studying the central role supervision plays in GME. Ultimately, a better understanding of supervision will benefit regulatory bodies, GME institutions and leaders, clinical teachers, and most importantly patients and the quality of their care, as well as residents and the education they receive to become future health professionals.

(VI). Future Directions.

We are proposing future studies that will use the RSI, and these study data, to assess outcomes of education and training programs on patient outcomes, including quality of care, patient health outcomes, and patient satisfaction; trainee outcomes including education, learning, and resident satisfaction with training environments; and system outcomes including patient retention, costs of education and care, clinical workload, patient access to care, and staff satisfaction. For these purposes, we propose three areas for future directions.

VI.A. *Supervision Intensity Index*

As a measure of supervision intensity $\{R\}$, we constructed an index from RSI responses that equals the percent of the resident's total time during education and care encounters on behalf of a given patient that was supervised by the attending physician being *physically* present. These encounters included time the resident spent discussing the case with the attending plus time the resident spent with the patient, either engaged or observing care. $\{R\}$ is computed from RSI items (see Appendix 1 - RSI *ver*. 3.11) as:

$$R = \frac{\left[2A + 2Ba + 2Bb(i) + 2Bb(ii) + 2C\right]}{\left[2A + 2Ba + 2Bb(i) + 2Bb(ii) + 2C\right] + \left[2Bb(iii) + 2Bb(iv) + 2Bb(v)\right]}$$

Using data collected representing supervised care for 110 study patients, we computed *R* averaging 0.28, s.d.=0.14, ranging from .02 to 0.75, with 25th percentile at 20.0%, median of 26.2%, and 75th percentile at 33.3%. Residents were tested within one day to one week after the initial RSI was administered during the resident's shift when the encounter

occurred. Resident test-retest comparisons of computed R values suggested little under-reporting biases in the re-test report (r=.74, p<.0001; bias=–1.2%, 95%CI(-8.6%, 6.1%), t(109)=.34, p=.74). Resident-attending comparisons also suggested little under-reporting biases, though agreement expectedly varied by case (r=.42, p<.0001; bias=–0.2%, 95%CI(-12.9%, 12.6%), t(218)=0.03, p=.98). Disagreement tended to increase rapidly when the RSI survey re-tests were administered after the resident's shift ended. Thus, RSI data must be captured on the day of the encounter (as we propose to do in this study).

VI.B. *RSI and Predictors of Supervision Intensity and Impact of RSI on Outcomes.*

An important consequence of the GME Resident Supervision Model is consideration for tradeoffs between patient clinical care needs, resident education and training requirements, attending physician burden, and system cost, workload, and patient retention goals. We thus use an economic model to render mathematically the GME Resident Supervision model as a structural model {eq. 1}. From this model, we create reduced form equations {eq. 2} to derive specific testable hypotheses reflecting both predictors and outcomes of the intensity of resident supervision. We also derive specific statistical models to test those hypotheses with data.

Briefly, we assume the "care system" of patients, residents, attending physicians, and facilities determine supervision levels for each patient case in order to maximize the overall value of both patient care and resident education subject to the constraint of a limited VA budget. Under our null hypotheses, we assume that resident supervision, among other factors, drive patient's health, resident's education, attending physician's workload, and facility's retention of patients as clients. The model emphasizes potential tradeoffs between patient, education, and facility goals. Before inquiring how these tradeoffs may resolve, we first look to see if these goals are independent or related. The model provides a statistical framework to estimate associations. Of importance is that the derived equation {eq. 2.6} describes an instrumental variable that introduces the notion supervision intensity is actually an endogenous factor. This mathematical version suggests that supervision intensity should be considered as an endogenous factor when assessing the impact of intensity on patient, trainee, or system-level outcomes.

Because of possible endogenity of the supervision intensity variable, we derive a strategy to estimate intensity-outcome relationships. We begin with each study patient's index VA outpatient visit (t=0) and follow the patient's care and the resident's education encounters through time T. The value function U {eq. 1.1} has arguments: patient health outcome, H, resident's education outcome, E, attending physician's clinical workload attributed to the attending and resident, W, and facility retention of the patient as a client, F, subject to a pool of covariate factors representing the patient, p (demographic characteristics, initial condition, case complexity), the resident, r (demographic characteristics, clinical experience), the attending, a (demographic characteristics, clinical experience, number residents supervised), and the facility, f (teaching accreditation, size, location). The pool of relevant factors, or supervision covariates, is represented by: $\Lambda=[p, r, a, f]$. The budget constraint {eq. 1.2} specifies that a given VA budgeted amount in dollars for the patient, C, is set to equal facility costs incurred to produce clinical workload, W. Workload is computed {eq. 1.3} by matrix multiplying the schedule of VA's Reasonable Charges, P_c, by the vector of medical procedures, m. The vector of medical procedures is an implicit

function of resident supervision intensity, R_t, and supervision covariates, Λ. Budgeted costs in {eq. 1.2} can be computed by multiplying the cost to charge ratio, P_r, by workload measured in Reasonable Charges. Our prior studies estimated P_r between 15% and 35%. To include care process, patient health outcomes {eq. 1.4} are assumed to be a function of care process over time, ρ_t, and supervision covariates, Λ. ρ_t is the probability in continuous time t that the patient was receiving appropriate care for their condition as an implicit function of prior supervision intensity (R_τ for $\tau \leq t$) and supervision covariates Λ {eq. 1.5}. Education, E, and facility, F, outcomes are computed from implicit functions {eq. 1.6} and {eq. 1.7} comprising resident supervision intensity and supervision covariates.

$$\max U(H, E, W, F \mid \Lambda) \qquad \text{eq. 1.1}$$

$$C = P_r W \qquad \text{eq. 1.2}$$

$$W = \int_T P_c \times m(R_t \mid \Lambda) dt \qquad \text{eq. 1.3}$$

$$H = \int_T H(\rho_t \mid \Lambda) dt \qquad \text{eq. 1.4}$$

$$\rho_t = \int_{\tau \leq t} \rho(R_\tau \mid \Lambda) d\tau \qquad \text{eq. 1.5}$$

$$E = \int_T E(R_t \mid \Lambda) dt \qquad \text{eq. 1.6}$$

$$F = \int_T F(R_t \mid \Lambda) dt \qquad \text{eq. 1.7}$$

{Eq. 2} lists reduced form equations to test study hypotheses. As a starting point, supervision intensity R_i is defined to be the proportion of time the resident spends with patient i when the attending was physically present [*see* VI.A]. However, other ways can be explored to compute supervision from RSI data. We use logistic regression[58] to estimate effect sizes. Since $0 \leq R_i \leq 1$, we can interpret supervision as a probability that on any given moment during an education or care encounter on behalf of patient i, the resident will have the physical presence of the attending physician. w_{vai} and $w_{non\text{-}vai}$ represent services (workload) that patient i received from VA and from all non-VA providers, respectively, measured in Reasonable Charge dollars.

The model is designed to control for both observable and unobservable supervision covariates that biases estimates of the association between resident supervision and outcomes in observational data (e.g., if case complexity is associated with both greater supervision and poorer outcomes, then without adjusting for case complexity, more supervision will appear in the data to be associated with poorer outcomes). Thus, Λ is divided into variables that directly predict both supervision and outcomes – Λ^0–, and variables that predict supervision and is otherwise unrelated to outcomes – Λ^1 –. Λ^0 covariates are entered directly into the model to control for known covariates. Excluding Λ^1 does not bias the estimate of the association between supervision and outcomes, since Λ^1 is unrelated to outcomes. To avoid selection biases from unobservable covariates,[59] actual resident supervision R_i is replaced in each equation {eq. 2.1-.4} by its predicted value $\hat{R}_i$ as an instrumental variable {eq. 2.6}. Used in program evaluation,[60] economic choices,[61] intervention trials,[62] outcomes research,[63] and physician behavior studies,[64]

instrumental variable techniques are designed to handle endogenous predictor variables. Here, the instrument variable is the predicted logit of supervision based on covariates Λ^1 {eq. 2.6}. For hypothesis testing, Λ^* in {eq. 2.5} contains all covariates in Λ^0, excluding patient case complexity, p^0, resident's clinical experience, r^0, and attending physician's resident ratio, a^0. While facility level characteristics are important, we will have only 4 sites and thus cannot distinguish between multiple factors that distinguish these sites. Thus, facility effects are treated as simple random effect. To correct for nesting generally, we include random effects, α and v, indexed for the resident "r", attending "a", facility "f" and patient "i". (Patient-level nesting occurs when a single patient falls outside of two or more clinical control thresholds, with each control analyzed separately nested within patient).

$$\ln\begin{pmatrix} pr[\rho_i = 1] \\ 1 - pr[\rho_i = 1] \end{pmatrix} = \beta_0^\rho + \beta_1^\rho \hat{R}_i + \beta^\rho \Lambda_i^0 + \alpha_r^\rho + \alpha_a^\rho + \alpha_f^\rho \qquad \text{eq. 2.1a}$$

$$\ln\begin{pmatrix} pr[H_i = 1] \\ 1 - pr[H_i = 1] \end{pmatrix} = \beta_0^H + \beta_1^H \hat{R}_i + \beta_2^H \rho_i + \beta^H \Lambda_i^0 + \alpha_r^H + \alpha_a^H + \alpha_f^H \qquad \text{eq. 2.1b}$$

$$\ln\begin{pmatrix} pr[E_i = 1] \\ 1 - pr[E_i = 1] \end{pmatrix} = \beta_0^E + \beta_1^E \hat{R}_i + \beta^E \Lambda_i^0 + \alpha_r^E + \alpha_a^E + \alpha_f^E \qquad \text{eq. 2.2}$$

$$\ln(W_i) = \beta_0^W + \beta_1^W \hat{R}_i + \beta^W \Lambda_i^0 + v_i + v_r + v_a + v_f \qquad \text{eq. 2.3}$$

$$\ln\begin{pmatrix} \begin{pmatrix} w_{VAi} \\ w_{VAi} + w_{nonVAi} \end{pmatrix} \\ 1 - \begin{pmatrix} w_{VAi} \\ w_{VAi} + w_{nonVAi} \end{pmatrix} \end{pmatrix} = \beta_0^s + \beta_1^s \hat{R}_i + \beta^s \Lambda_i^0 + \alpha_r^s + \alpha_a^s + \alpha_f^s \qquad \text{eq. 2.4}$$

$$\ln\begin{pmatrix} R_i \\ 1 - R_i \end{pmatrix} = \beta_0^R + \beta_1^R p_i^0 + \beta_2^R r_i^0 + \beta_3^R a_i^0 + \beta^R \Lambda_i^* \qquad \text{eq. 2.5}$$

$$\ln\begin{pmatrix} \hat{R}_i \\ 1 - \hat{R}_i \end{pmatrix} = \gamma_0 + \gamma \Lambda_i^1 \qquad \text{eq. 2.6}$$

Effect sizes are computed as odds ratios (exponentiating the estimated coefficients) or as change in logs. Thus, we can test for: (**1**) patient outcomes; such as, if physician residents who received greater intensity of clinical supervision will more likely provide appropriate clinical care for a given patient {expβ_1^ρ>1 from eq. 2.1a}, and, in turn, the patient will more likely achieve an appropriate clinical outcome, after adjusting for supervision covariates {expβ_1^H>1 from eq. 2.1b}; (**2**) for *trainee effects*; that is, will physician residents who received greater intensity of clinical supervision be more likely to be satisfied with their clinical learning environment at the end of their rotation, after adjusting for supervision covariates, or {expβ_1^E>1 from eq. 2.2}; (**3**) for *attending effects*; that is, will attending physicians who provided a greater intensity of clinical supervision be associated with less patient care workload produced at the facility, after adjusting for

supervision covariates, {β_1^W<0 from eq. 2.3}; (**4**) for *facility effects*; that is, will residents who received greater intensity of clinical supervision be more likely to treat patients who seek a higher proportion of their total care at the given facility, after adjusting for supervision covariates, {expβ_1^S>1 from eq. 2.4}; and (**5**) for *supervision predictors*; that is, will residents receive greater intensity of clinical supervision whenever the patient presents with greater case complexity {expβ_1^R>1 from eq. 2.5}, the resident has less experience { expβ_2^R<1 from eq. 2.5}; or the resident ratio decreases (i.e., the number of residents assigned to the attending decreases), after adjusting for supervision covariates, {expβ_3^R<1 from {eq. 2.5}. These tests can be determined with their complex error distributions from significance tests and standard errors computed using robust standard errors calculated from bootstrapped samples.[65]

We will handle the observable covariates $-\Lambda^0-$ in two ways. Propensity scoring[66, 67] is often applied to smaller observational datasets when the researcher faces many confounding factors[68] and little theory to limit variable selections. Propensity scoring collapses covariates Λ^0 into a one dimensional measure, thereby increasing power by reducing the statistical model's demands for degrees of freedom from the data. We can thus estimate $\tilde{R}_i$ from {eq. 3} to replaces Λ^0 in {eq. 2.1-2.4} (not shown). Alternatively, we match patients by similar $\tilde{R}_i$ scores and compare outcomes across actual differences in R_i.

$$\ln\left(\frac{\tilde{R}_i}{1-\tilde{R}_i}\right) = \lambda_0 + \lambda\Lambda^0 \qquad \text{eq. 3}$$

Propensity scoring can offer improved power. However, the approach is subject to model misspecification error that can lead to incorrect statistical inferences.[69, 70, 71, 72] To avoid misspecification error, we will do a second method based on an exhaustive search of correctly specified models directly predicting each respective outcome across the covariate space $-\Lambda^0-$. Maximum likelihood recoding will transform all continuous and ordinal covariates into binary covariates using nonparametric bootstrapped maximum likelihood cut point estimates for each outcome model. Models comprising covariates will be determined from an exhaustive model search[73] using the Generalized Akaike Information Criteria (GAIC)[74] over the proposed datasets and then validated using a 10-fold cross-validation approach[75] for each target response variable. A non-nested model selection test[76, 77] further refined by the investigators[78, 79] is then applied to compare each model {eq. 2.1-2.4} without Λ^0 terms and with Λ^0 terms arranged according to the results of the exhaustive search. A similar approach is used for Λ^* in {eq. 2.5}. Final models are tested for fit, model misspecification, and multicollinearity. Because of the potential for misspecification, robust estimation methods valid in the presence of model misspecification will be used to compute both parameters and their standard errors.[69, 70, 71, 72, 78, 79, 80]

There are additional problems. Workload regression {eq.2.3} poses problems common when analyzing bimodal, skewed, and heteroscedastic "cost" data.[81, 82, 83, 84, 85, 86] In our case, however, two part approaches[87, 88] are not necessary since all patients selected for study will use some VA care. Furthermore, based on our pilot data on similar patients/residents proposed for this study, the RSI R_i follows a near normal distribution that is only slightly skewed. However, investigators will consider log and Fisher

transformation for workload data to avoid over-fitting models.[89] Estimates will also be corrected for re-transformation error[90] and for heteroscedastic variances[91] in the transformed distribution.

VI.C. *Bayesian Robust Latent Variable Technique*

The above method offers a traditional single-model approach based on instrumental variable technique designed to handle endogenous GME supervision. The models are linear in covariates, with a researcher determined division of covariates into Λ^0 and Λ^1 to handle the endogenity of the resident supervision intensity covariate. This approach also fails to consider if the final model is empirically misspecified to properly reflect the actual data generating process on the collected dataset. This approach does not handle non-linear and interaction relationships, or the presence of alternative, empirically and conceptually defensible alternative models that may lead to different conclusions, or so-called model *uncertainty*. We have developed a new method designed to handle the endogenity of GME supervision while managing both model misspecification and model uncertainty in the final model. This work builds on 10 years of NIH funding in mathematical statistics, computational science, and algorithm development in applied health services research. Our new approach considers resident supervision as a latent covariate. We combine an exhaustive model search that includes both interactions and non-linear forms of the covariates listed in the GME Resident Supervision model. We apply Bayesian model averaging to handle model uncertainty, and we treat the endogenity issue as a missing value problem with the missing covariate distribution based on covariates that meet threshold criteria for an instrumental variable technique; that is, covariates that have a direct association on supervision but no direct association on supervision outcomes. This lead to an HSR&D application submitted in December 2008.

VI.D. *VistA Extracts.*

The investigators also want additional information from VA VistA files to assess complexity of patient care as predictors of supervision intensity. In addition, we are preparing a medical informatics grant working with Dr. Richard Golden (above) and Sanda M. Harabagiu, Ph.D., Associate Professor, Department of Computer Science, University of Texas at Dallas, Richardson, Texas, to apply natural language processing to extract information from the text that, at least in some cases, discern the physicians logic to lead to particular treatments, mediation, or therapeutic choices or diagnostic decisions. Thus, we would test the outcome of the decision logic rather than the final choice itself as a basis for understanding how residents think under resident supervision.

To accomplish that goal, we have hired Lloyd Miligan, of Sea Island Systems, Inc. Isle of Palms, SC, through Rob Durkin, MD, MS, IT Specialist, at the at Jerry L. Pettis Memorial VA Medical Center, Loma Linda VA Healthcare System, Loma Linda CA to create a mumps-based program that will run from a remote procedure call to extract information from VA VistA / CPRS and produce electronic files that can be downloaded on a secured hard drive for analyses using our advances statistical software. This program runs on a Remote Procedure Call to capture information contained in patients VistA files including clinical care encounters and text entries.

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TABLES and FIGURES

FIGURE 1: Conceptual Model of Resident Supervision, Predictors, and Outcomes.

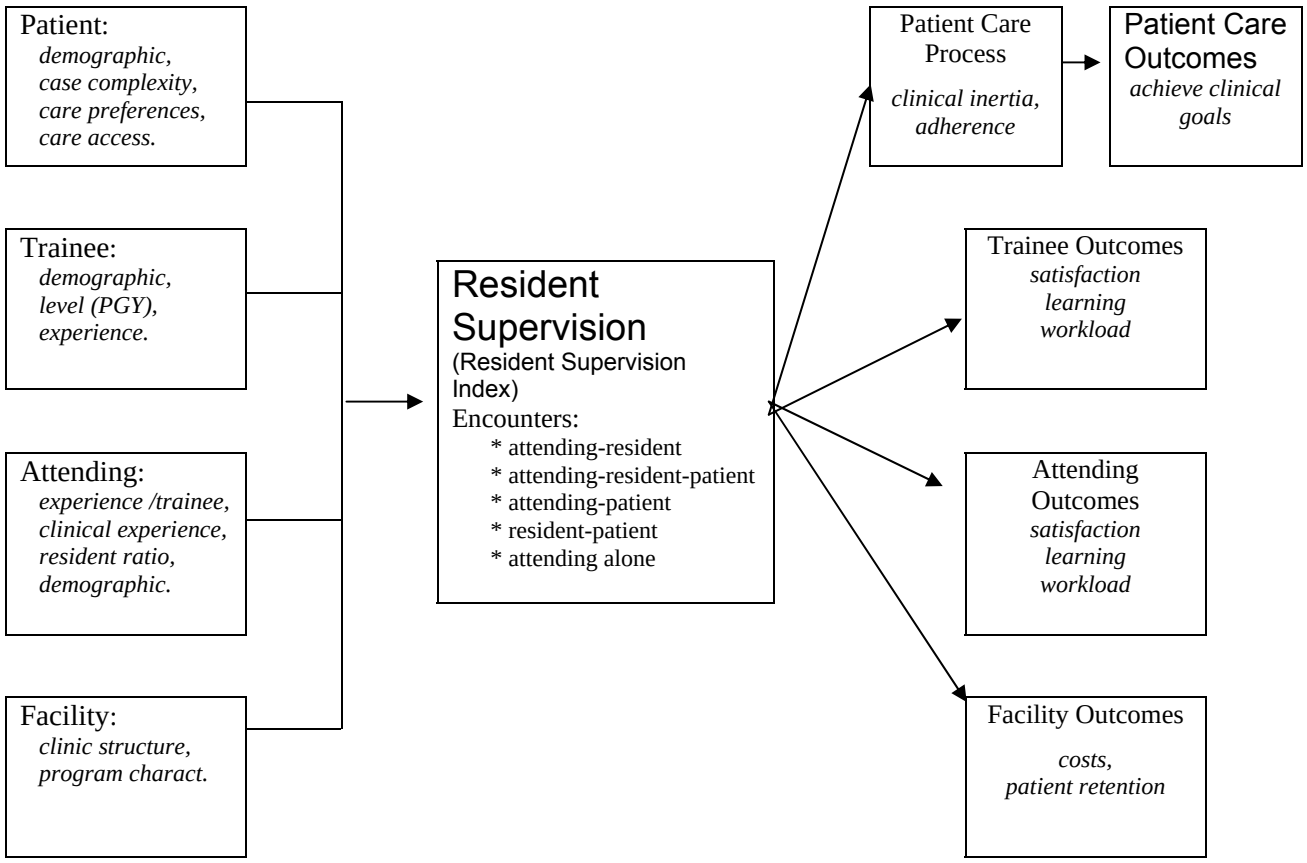

TABLE 1: Levels of Operating Room Attending Supervision from the National Surgical Quality Improvement Project (NSQIP)[1]					
1998-2002		2002-2004		2004	
Level 0	Staff alone	Level 0	Attending performing the operation	Level A	Attending performing the surgery
Level 1	Attending in OR	Level 1	Attending in OR assisting the resident	Level B	Attending in OR, scrubbed
Level 2	Attending in OR suite	Level 2	Attending in OR, not scrubbed	Level C	Attending in OR, not scrubbed
Level 3	Attending not present, but available	Level 3	Attending not present in OR suite, immediately available	Level D	Attending in OR suite, immediately available
				Level E	Emergency care, attending contacted as soon as possible
				Level F	Non-OR procedure performed in OR, attending identified
1 - Adapted from Itani et al. reference #14.					

Table 2: Demographic, Specialty, and Medical Education Characteristics of Responding Residents and Attending Physicians

	Resident Physicians		Attending Physicians	
Number	75		37	
Demographic characteristics:				
Age[1]	32	(5), [25 − 46]	44	(10), [30 − 73]
<25	0	0%	0	0%
25-34	56	76%	9	24%
35-44	15	20%	10	27%
45-54	3	5%	12	32%
55-64	0	0%	5	14%
65+	0	0%	1	3%
Gender (female)	29	39%	11	30%
Race/ethnicity				
African American	3	4%	5	14%
Asian	32	42%	19	51%
Latino	3	4%	1	3%
Middle Eastern	5	7%	0	0%
Native American	5	7%	1	3%
White	22	29%	9	24%
Other	5	7%	2	5%
Years since college graduation	9	(4), [4 − 26]	23	(10), [8 − 51]
Medical School				
Class:				
US / US grad.	42	56%	28	76%
US/ non-US grad.	2	3%	0	0%
nonUS/ nonUS grad.	31	41%	9	24%
Years since graduation	4.8	(5.9), [0 − 22]	18	10, [4 − 47]
Medical Degree:				
MD	63	84%	32	86%
DO	10	13%	5	14%
DPM/MBBS	2	3%	0	0%
Other advanced degree				
Doctorate	3	4%	0	0%
Master	12	16%	6	16%
None	60	80%	31	84%

Table 2: Demographic, Specialty, and Medical Education Characteristics of Responding Residents and Attending Physicians

	Resident Physicians		Attending Physicians	
US Residency Program				
Number attended				
1	73	97%	31	84%
2	2	3%	5	13%
3	0	0%	1	3%
Total years completed	2.0	(1.1), [0.9 − 7.0]	3.7	(1.0), [3.0 − 7.0]
Specialty:				
Internal medicine	64	85%	32	87%
Surgery	4	6%	5	13%
Psychiatry	3	4%	0	0%
Preventive medicine	3	4%	0	0%
Podiatry	1	1%	0	0%
Yrs since completed	N/A		13	(9), [0 − 40]
Current or Last PGY level:				
1	32	43%		
2	19	26%		
3	21	28%	23	64%
4	1	1%	10	28%
5	0	0%	1	3%
6	1	1%	2	5%
7	1	1%	0	
Non-US Residency Program				
Number attended:				
0	68	91%	33	89%
1	6	8%	3	8%
2	1	1%	1	3%
Number of post graduate years completed	2.7	(1.0), [1.0 − 4.0]	3	(2), [1 − 6]
Number of years since last post graduate training	12.3	(6.2), [6 – 21]	23	(9), [17 − 36]

1 - Standard deviation in parentheses, minimum and maximum values in square brackets.

Table 3: Test-Re-test Reliability and Concurrent Reliability

		k	Mean minutes±S.D.[1]	Mean minutes±S.D.[2]	Difference (95% CI)	t (n=124)	r	ICC (95% CI)
Supervision time	Resident	*	36.71±16.22	36.76±13.79	-0.05 (-1.83-1.73)	0.1, p=0.95	0.79	0.88 (0.82-0.91)
	Attending	*	40.32±17.12	38.95±16.81	1.36 (-0.08-2.81)	1.9, p=0.064	0.88	0.93 (0.91-0.95)
	Attending vs. Resident	*	38.73±16.25	37.68±13.87	1.05 (-1.41-3.51)	0.8, p=0.40	0.53	0.69 (0.57-0.78)
2(A) Outside the presence of the patient, minutes spent discussing case with attending physician	Resident	0.74	7.73±4.46	7.70±4.18	0.03 (-0.31-0.37)	0.2, p=0.87	0.90	0.95 (0.93-0.96)
	Attending	1.00	8.33±4.64	8.24±4.67	0.09 (-0.35-0.52)	0.4, p=0.69	0.85	0.92 (0.89-0.94)
	Attending vs. Resident	0.74	8.27±4.61	7.91±4.24	0.35 (-0.47-1.17)	0.4, p=0.90	0.39	0.56 (0.39-0.68)
2(B) In the presence of the patient, how minutes did the resident								
2(B)(b) in direct contact with the patient while the attending physician was	Resident	*	28.20±14.68	28.49±12.44	0.31 (-1.43-2.05)	0.4, p=0.72	0.75	0.85 (0.79-0.90)
	Attending	*	31.55±15.09	29.94±14.64	1.61 (0.12-3.09)	2.2, p=0.033	0.83	0.91(0.97-0.93)
	Attending vs. Resident	1.00	29.73±14.17	29.25±12.39	0.47 (-1.66-2.60)	0.4, p=0.66	0.55	0.70 (0.59-0.79)
(i) in the room participating in care	Resident	0.77	7.17±3.81	7.83±4.72	-0.67 (-1.91-0.57)	1.11, p=0.28	0.75	0.84 (0.66-0.93)
	Attending	0.79	7.63±4.98	7.10±4.85	0.53 (-0.52-1.58)	1.02, p=0.31	0.81	0.89 (0.79-0.95)
	Attending vs. Resident	0.72	7.36±4.91	7.59±4.85	-0.22 (-1.78-1.33)	0.30, p=0.77	0.64	0.78 (0.54-0.90)

1 - For each section (Supervision time, 2(A), 2(B), 2(B)(b) and 2(B)(b)(i)), mean minutes initially reported by Resident in the Resident test-retest reliability comparisons (n=125), and initially reported by Resident in the Resident vs. Attending concurrent reliability comparison (n=140).
2 – For each section (Supervision time, 2(A), 2(B), 2(B)(b) and 2(B)(b)(i)), mean minutes initially reported by Attending in the Attending test-retest reliability comparisons (n=132), and initially reported by Attending in the Resident vs. Attending concurrent reliability comparison (n=140).
* - Insufficient data to calculate value.

APPENDIX I

Resident Supervision Index – ver. 3.11

RESIDENT SUPERVISION INDEX

Responder: ☐ -Resident. ☐ -Attending Physician. ☐ -Other:_____.

Date Beg: Select / / | : am pm
mm dd yy hr min

Date End: Select / / | : am pm
mm dd yy hr min

[pres_nam] Resident: _____ [pres_id] _____

[pphy_nam] Attending Physician: _____ [pphy_id] _____

[0a] ☐ **None** [ppat_nam] Patient: _____ [ppat_id] _____

[0b] ☐ *Resident-attending encounter*

1. For how many minutes was this case discussed with attending? min: _____

1(A). How was this case discussed (check one)?

[*i*] ☐ face-to-face /group. [*iv*] ☐ telephone.

[*ii*] ☐ face-to-face /individual. [*v*] ☐ patient's chart.

[*iii*] ☐ telemedicine /video confer. [*vi*] ☐ email/letter/text message.

1(B). For what purpose was this case discussed (check all)?

[*i*] ☐ case generally, [*iii*] ☐ chart review or test result,

[*ii*] ☐ patient call / email / letter, [*iv*] ☐ prior patient encounter.

[0c] ☐ *Resident-attending-patient encounter*

2(A). Outside the presence of the patient, how many minutes did the resident discuss the case with the attending? min: _____

2(B). In the presence of the patient, how many minutes did resident spend:

2(B)(a). observing only? min: _____

2(B)(b)- in direct contact with patient while the attending was…

(*i*). in the room and participating in care? min: _____

(*ii*). in the room but not participating in care? min: _____

(*iii*). in the clinic area? min: _____

(*iv*). not in the clinic area but available by phone / pager? min: _____

(*v*). not available? min: _____

2(C). For how many minutes did attending spend time with the patient when the resident was not present? min: _____

☐ *All encounters*

3(A). Did discussion contribute to case understanding? ☐ - yes ☐ - no

3(B)- Interaction with attending….	confirmed	changed	neither	not discussed
(*i*). patient's history?	☐	☐	☐	☐
(*ii*). examination findings?	☐	☐	☐	☐
(*iii*). interpretation of diagnostic testing?	☐	☐	☐	☐
(*iv*). diagnosis?	☐	☐	☐	☐
(*v*). assessment?	☐	☐	☐	☐
(*vi*). plan?	☐	☐	☐	☐

Interviewer: _____ DATE: mm_____/dd_____/yy_____ TIME: ____:____ am / pm.

APPENDIX II

Resident Supervision Index
Instruction Manual – ver. 3.11.06

Resident Supervision Index

INSTRUCTIONS

I. Overview.

The following instructions describe procedures and define terms needed to properly administer the Resident Supervision Index [RSI]. With these instructions, a trained interviewer may administer the RSI in face-to-face interviews to properly consented residents, their attending physicians, and nurses familiar with the clinical care provided by the resident and attending. The RSI is intended to measure the volume and intensity of supervision. The RSI does not measure the appropriateness, timeliness, completeness, or quality of that supervision.

II. Definitions.

(A1a) Patient cohort: Patients selected for study comprise the "study" patient cohort. The interviewer administers the RSI form to capture all supervision encounters that occurred during the observation period on behalf of each study patient listed in the patient cohort. The term "study" is dropped from these instructions and the RSI form for convenience.

(A1b) Resident Physician: All resident physicians who are involved in the care of patients listed in the patient cohort are "study" resident physicians. The term "study" is dropped from these instructions and the RSI form for convenience.

(A1c) Attending Physician: All physicians who are involved in supervising "study" resident physicians are "study" attending physicians. The term "study" is dropped from these instructions and the RSI form for convenience.

(A2a) Study period: The study period indicated for each resident physician defines which supervision encounters are to be recorded for study purposes. The study period is operationalized to be the duty shift of the named resident physician.

The "shift" for these purposes refers to when the resident physician comes on duty to the clinic and ends when the resident physician leaves the clinic and clinic duty. This excludes incidental leave (e.g., bathroom, meals, personal calls, study breaks).

(A2b) Observation period: In cases when the RSI is administered before the resident physician's shift ends, the observation period begins when the shift begins and ends when the RSI is administered. The observation period encompasses, but does not extend beyond, the study period.

(B1) Supervision: Supervision includes any encounter between the resident and the attending physician when the case of a specified patient is the object of the discussion and the intent is to advance the clinical care of the patient. Supervision also includes when the resident is actually with the patient when the patient is receiving clinical care. The resident physician may either be an observer while the attending physician interacts with the patient, or the resident physician may be involved with the care of the resident.

(B2) Clinical Care: A patient is said to be "receiving clinical care" at a given point in time if the patient is undergoing a clinical encounter with a licensed practitioner in the study facility as an inpatient, outpatient, or patient in the emergency room, or by telephone contact or remote telemedicine access, or off-site in a mobile clinic, ambulance, remote station, or in the patient's home or place of work. A patient is also said to be

"receiving clinical care" if a licensed practitioner is taking a patient history, reviewing examination findings, interpretation diagnostic testing, making a diagnosis or diagnoses, conducting an assessment, or formulating a care plan. A patient is also said to be "receiving clinical care" if the patient is anywhere in the facility waiting for a clinical encounter. A "licensed practitioner" includes an attending physician, a resident physician, or other licensed health professional. Otherwise, the study patient is said to be "not receiving clinical care." Study patients are "not receiving clinical care" if they are in the facility being discharged, processing first party billing and third party insurance claims, or picking up medications.

(B3) Clinical Encounter: A clinical encounter involves the interaction between a patient and resident physician involving obtaining medical history, conducting a physical examination, interpreting laboratory/imaging or other diagnostic results, rendering advice/education or other instructions to a patient, ordering tests/consults or administering therapy. These encounters most often take place in the context an office visit in the outpatient setting but can also include other contact with the patient including a review of the patient's chart, telephone, e-mail, text message or a letter to or from the patient.

(C) Supervision Encounter: In the context of resident supervision, encounters refer to contacts between the resident and his or her attending physician pertaining to the care of a specific patient.

A form is administered for each supervision encounter. A supervision encounter indicated for a given observation period issues for each named resident, named attending physician, named patient, type (resident-attending versus resident-attending-patient), and mode (face-to-face/group, face-to-face/individual, telemedicine/video conferencing, telephone, patient's chart, and email/letter/text message).

(C1) R/A Encounter: A **resident-attending** encounter occurs when the resident meets directly with the attending when the patient is not receiving clinical care. The resident attending physician meeting may be described by the mode in which the interaction occurred. That is, the attending and resident may meet either face-to-face in a group setting, face-to-face in an individual setting, or one-on-one, by telemedicine or video conferencing, by telephone, through messages left in the patient's medical chart or electronic medical record, or through email, formal letter, or text messaging. An R/A encounter can only be described by one mode. Thus, there will be as many R/A encounters during a given observation period as there are different modes of administration.

A resident-attending encounter may occur to discuss the case generally, discuss contents of a patient call, email or letter, discuss information contained in the patient's chart or test results, or discuss a prior clinical care encounter the resident had with the patient.

(C2) R/A/P Encounter: A **resident-attending-patient** encounter occurs when the patient is being treated and the opportunity for supervision exists. The R/A/P encounter occurs when the resident is merely observing the patient receiving care. The R/A/P/ encounter also occurs when the resident is assisting the attending physician with the care of the patient. The R/A/P encounter also occurs when the resident is directly involved in the care of the patient and the attending physician is either: in the room but is not participating in the care of the patient, is not in the room but otherwise in the clinic area, is not in the clinic area but available by phone or pager, or otherwise is unavailable. The R/A/P encounter also occurs in the instance when the resident is directly involved in the care of the patient, the attending physician is not in the room, and the resident leaves the room seeking the attending physician in the clinic

or by phone and discusses the patient case with the attending physician but not in the presence of the attending physician.

(D1) Supervision Time: Supervision time is measured in whole minutes (integers with no decimal points or fractions) describing the amount of time the resident received supervision on behalf of a specific study patient. Write 1 minute to record a time interval between 1 second to 89 seconds. Write 2 minutes to record a time interval between 90 seconds to 2 minutes plus 29 seconds, or 149 seconds. Write three minutes to record a time interval between two minutes and 30 seconds, or 150 seconds, to three minutes and 29 seconds, or 209 seconds, and so forth.

Supervision time includes the attending physician and resident speaking, asking and answering questions, and making comments, but only if such communication is in regards to the care of the specific study patient.

Supervision time includes the attending physician performing care on the study patient while the resident observed; the resident assisting the attending physician perform care, the attending physician observing the resident physician perform care, the attending physician is not physically present in the room while the resident physician performs care but is physically in the clinic area or otherwise is available by phone or pager.

Supervision time does not include the attending physician providing general education, general knowledge, or clinical direction that is not specific to the study patient.

Supervision time does not include performing administrative tasks; the resident physician searching for the attending physician or looking up and dialing a telephone or other communication device to contact the attending physician; or the attending physician searching for or looking up and dialing a telephone or other communication device to contact the resident physician. Times spent on searching or on administrative tasks do not become supervision time even though the purpose of such tasks or the object of the search is for a supervision encounter.

Supervision time does include discussion designed to improve the resident's general knowledge if the knowledge is applicable to the specific case of the study patient. However, supervision time does include the attending physician describing the case to drive an education or learning point. On the other hand, supervision time excludes the attending physician using specifics about a study case to motivate discussion about various concepts, but otherwise the attending physician does not describe the specifics of the case.

If communication between attending physician and resident is by written communication (e.g., email, letter, text message, or entries in the patient's medical chart), the amount of supervision time equals the amount of time the resident spent reading what the attending physician wrote. Time the resident or attending physician spent entering text is not to be included as supervision time.

(D1) Zero Supervision: We define the concept of "zero supervision" to occur during an R/A/P encounter when the resident is involved with the care of the patient presenting an opportunity for attending physician to supervise the resident, but the attending is unavailable.

There is no concept of "zero supervision" during an R/A encounter. That is, if the resident and attending physician did not discuss the case during the observation period, then no R/A encounter is said to exist.

(D2) In clinic area: The attending physician is considered to be "in the clinic area" if the attending physician was physically in the clinic. The attending physician may be accessible (ready for immediate consultation) or inaccessible (not ready for immediate

consultation by being engaged in a clinical encounter with a different patient or in contact with another resident).

(D3) Unavailable: The attending physician is unavailable if the resident is involved with the care a patient is receiving in the clinic and the attending physician cannot be reached by pager, by telephone, or is otherwise not in the clinic area.

An attending physician may be in the clinic but is engaged with other residents or is involved in the care of another patient is not necessarily "unavailable." "Unavailable" means that the resident is alone with no recourse in locating and communicating with the attending physician while the resident is directly involved in the clinical care of the patient.

III. Elements.

Interviewer: At the end of the interview, the interviewer should write his or her initials to indicate that the RSI form has been successfully administered and is complete. By writing his or her initials in the space provided, the interviewer acknowledges that all sections or boxes left "blank" are intended to be either "zero," "not applicable," or "blank."

DATE / TIME: At the beginning of the interview, write the date (mm-dd-yy) and time (hh-mm) when the interview started. Clarify the time by designating the hour as "am" or "pm" by crossing over the appropriate response.

Responder: Check the corresponding box to indicate whether the respondent is a resident, the attending physician, or other. If other, specify the type of practitioner (e.g., nurse, physician assistant, social worker) and write the name. Before proceeding with the interview, all responders must have signed an IRB-approved informed consent.

Date Beg: Enter the beginning date and time when the named resident's shift begins. Mark single digit numbers with leading zeros (e.g., "3" would be written "03"). Indicate whether "am" or "pm" by marking a line through the appropriate indicator.

Date End: Enter the ending date and time when the named resident's shift ended. Mark single digit numbers with leading zeros (e.g., "3" would be written "03"). Indicate whether "am" or "pm" by marking a line through the appropriate indicator.

Note that the period between [Date Beg] and [Date End] is the Study Period, while the period between [Date Beg] and the earlier of [Date End] and [DATE / TIME] is the actual observation period. The observation period does not extend past the study period. All supervision encounters eligible for reporting are drawn from the observation period. The observation period is usually less than the study period because it is impractical to administer the RSI to the resident physician exactly when the shift ends.

pres_nam: Write the name of the resident to the encounter. Ensure that the named resident has signed an IRB-approved informed consent before proceeding with completing the rest of this form.

pres_id: Write the study number assigned to the resident physician named in [pres_nam].

pphy_nam: Write the name of the attending physician to the encounter. Ensure that the named attending physician has signed an IRB-approved informed consent agreement before proceeding with the rest of this form. If the attending physician did not consent to the study, write "non-consented."

pphy_id: Write the study number assigned to the attending physician named in [pphy_nam]. If the attending physician did not consent to participate in the study, mark a line through the box (and write "non-consented" under [pphy_nam]).

ppat_nam, [0a]: Identify the patient to the supervision encounter. This is accomplished by the following. Approach the respondent (resident, attending physician, or nurse) near the end of the shift of the named resident (described in [pres_nam] and [pres_id]). Ask the respondent if the named resident [pres_nam] had a supervision encounter on behalf of any of the patients listed on the study cohort patient list during the observation period. If the duty shift of the named resident is completed at the time of the RSI interview, then the observation period is the study period, or [Date Beg] to [Date End]. If the RSI interview is conducted before the resident physician's duty shift has ended (i.e., [DATE / TIME] occurs before [Date End]), then the observation period extends between [Date Beg] to [DATE / TIME].

If the respondent states that no patient on the patient cohort list was seen or was the subject of a supervision encounter during the observation period, then check the box at [0a] and leave [ppat_nam] blank. The form is now completed.

If the respondent identifies one of the listed study cohort patients was seen or was the subject of a supervision encounter during the observation period, write the name of the patient in the blank at [ppat_nam] and complete the form. If the respondent identifies more than one patient on the list has having seen or was the subject of a supervision encounter during the observation period, initiate a separate form for each study patient identified and write their respective name at [ppat_nam].

Note: the form may proceed if the identified patient was either properly consented with an IRB-approved consent agreement or the study has been approved by the IRB for a waiver.

Note: only one box indicating encounter form type should be checked on any given form: [0a], [0b], or [0c].

ppat_id: Write the study number assigned to the study patient named in [ppat_nam].

[0b], [0c] If a patient is named in [ppat_nam] and the box at [0a] is not checked, then check the box at [0a] if the contact is a resident-attending encounter; otherwise, check the box at [0b] if the contact is a resident-attending-patient encounter.

If both R/A and R/A/P encounters occurred for the same observation period, resident, attending physician, and study patient, two forms will need to be completed, one to describe the R/A encounter and one to describe the R/A/P encounter.

[1.] If the box at [0b] was checked indicating a "resident-attending encounter," enter the number of minutes the resident [pres_nam] spent with the attending physician [pphy_nam] during the observation period to discuss the care of the named study patient [ppat_nam]. If the attending and the resident spent several sessions during the observation period, provide a sum of the total time spent. The observation period is defined as ([Date Beg] to [Date End]) if the interview was conducted after the duty shift ended, and [Date Beg] to [DATE / TIME] if the interview was conducted before the duty shift ended.

[1(A)[*i*] – [*vi*].] If [0b] was checked indicating a "resident-attending encounter," mark only one of the six boxes to describe how the case was discussed. If more than one response option are appropriate to describe how the case was handled, administer separate forms for each mode.

[1(B). (*i*) – (*iv*).] If [0b] was checked indicating a "resident-attending encounter," check all boxes that are appropriate to describe what was discussed on behalf of the patient [ppat_nam].

[2(A).] If [0c] was checked indicating a "resident-attending-patient encounter," record the total number of minutes the resident [pres_nam] and attending physician [pphy_nam] discussed the case outside the presence of the patient [ppat_nam] but while the patient [ppat_nam] was receiving clinical care. This includes cases when the resident leaves the patient in the examining room to seek advice from the attending.

[2(B)(a).] If [0c] was checked indicating a "resident-attending-patient encounter," record the number of minutes the resident [pres_nam] spent observing the clinical care provided by the attending physician [pphy_nam] to the study patient [ppat_nam].

[2(B)(b)(*i*).] If [0c] was checked indicating a "resident-attending-patient encounter," record the number of minutes the resident [pres_nam] was in direct contact with the patient [ppat_nam] while the attending physician [ppat_nam] was in the room and participating in care. This includes when the resident is assisting or helping the attending provide care.

[2(B)(b)(*ii*).] If [0c] was checked indicating a "resident-attending-patient encounter," record the number of minutes the resident [pres_nam] was in direct contact with the patient [ppat_nam] while the attending physician [ppat_nam] was in the room but not participating in the clinical care or procedures [pres_nam] performed on the patient [ppat_nam].

[2(B)(b)(*iii*).] If [0c] was checked indicating a "resident-attending-patient encounter," record the number of minutes the resident [pres_nam] was in direct contact with the patient [ppat_nam] while the attending physician [pphy_nam] was not physically in the room but otherwise was in the clinic area.

[2(B)(b)(*iv*).] If [0c] was checked indicating a "resident-attending-patient encounter," record the number of minutes the resident [pres_nam] was in direct contact with the patient [ppat_nam] while the attending physician [pphy_nam] was not physically in the room but otherwise was available by phone or pager.

[2(B)(b)(*v*).] If [0c] was checked indicating a "resident-attending-patient encounter," record the number of minutes the resident [pres_nam] was in direct contact with the patient [ppat_nam] while the attending was not in the clinic area and was otherwise not available to the resident.

[2(C).] If [0c] was checked indicating a "resident-attending-patient encounter," record the number of minutes that the attending physician [pphy_nam] spent with the patient [ppat_nam] in clinical care while the resident [pres_nam] was not physically present in the room.

[3(A).] If [0b] was checked indicating a "resident-attending encounter" or [0c] was checked indicating a "resident-attending-patient encounter," mark "yes" if the supervision encounter with the attending physician [ppat_nam] contributed to the resident's [pres_nam] case understanding, and mark "no" if the supervision encounter did not contribute to case understanding.

[3(B)(*i*)-(*vi*).] If [0b] was checked indicating a "resident-attending encounter" or [0c] was checked indicating a "resident-attending-patient encounter," describe the supervision encounter with the attending physician [ppat_nam] as having confirmed, changed, having neither confirmed nor changed, or was not discussed, the resident's [pres_nam] patient's history, examination findings, interpretation of diagnostic testing, diagnosis/diagnoses, assessment(s), or plan.

IV. Examples.

1. *The attending physician calls a resident physician into her office and says: "You know, we have had several cases, such as Mr. Smith, where an antidepressant is prescribed for a patient with a history of substance abuse. When you are prescribing an antidepressant, always check to see if there is any indication of substance abuse or dependence in the patient's chart."* **Assessment**: Even though Mr. Smith may be a study patient, the case was used to inspire knowledge or enhance the learning experience and thus would not be considered a supervision encounter or supervision time, and no form issues.

2. *The attending physician spends 5 minutes to find and call a resident physician into her office and spends 1 minute saying: "Regarding Mr. Smith, did you look in the medical chart to see if he has had a history of substance abuse or dependence before prescribing an antidepressant?" The resident physician spends 10 minutes looking up Mr. Smith's medical chart, noting no prior diagnosis of substance abuse/use/ or dependence, and reports back to the*

attending physician. The resident physician reports what he found in the chart, and the attending physician reaffirms the original antidepressant prescription in discussion that took 2 minutes. **Assessment**: If Mr. Smith is a study patient, the 1 minute discussion is a R/A supervision encounter that continued for another 2 minutes, for a total 3 minutes. A form issues with [0b] checked, 3 minutes entered [1], face-to-face/individual checked [1(A)(*ii*)], and case generally checked [1(B)(*i*)]. Excluded from the supervision time is the time spent searching for the resident physician or the time spent looking up and reviewing the medical chart. The resident physician reports the discussion contributed to case understanding marking "yes" [3(A)] and that the interaction confirmed the patient's plan marking "confirmed" [3(B)(*vi*)] and "not discussed" [3(B)(*i*) – (*v*)].

3. *The attending physician talks to a group of resident seeing patients in the clinic and spends 1 minute asking: "Regarding Mr. Smith, did any of you bother to see if his medical chart indicated a history of substance abuse or dependence before prescribing an antidepressant?" The resident physician spends 10 minutes looking up Mr. Smith's medical chart, noting no prior diagnosis of substance abuse/use/ or dependence, and reports back to the attending physician. The resident physician reports what he found in the chart, and the attending physician reaffirms the original antidepressant prescription in discussion that took 2 minutes.* **Assessment**: Two supervision encounters have occurred, and thus two supervision encounter forms must issue. Both forms list the same attending physician [pphy_nam], the resident physician [pres_nam], and patient Mr. Smith [ppat_nam]. On the first form, [0b] is checked, 1 minute is entered in [1], and 1(A)(*i*) is checked. In the second form, [0b] is checked, 2 minutes are entered in [1], and [1(A)(*ii*)] is checked. The resident reports that, taken together, the discussion contributed to case understanding and confirmed the patient's treatment plan. Mark on both forms "yes" [3(A)] and that the interaction confirmed the patient's plan marking "confirmed" [3(B)(*vi*)] and "not discussed" [3(B)(*i*) – (*v*)].

4. *The resident physician talked with the first attending physician regarding a study case. The first attending physician asked the resident physician to look up the symptoms for Parkinson's disease. The resident physician accomplishes this task while the second attending physician goes on duty. The resident physician discusses his search with the second attending physician.* **Assessment**: Two forms must issue listing each attending physician. If the responding resident physician is unable to separate the discussion, both forms should provide the same responses to [3]. If the responding resident physician is able to separate the discussion between the two attending physicians, responses to [3] may differ.

5. *The resident physician has had no discussion about a study cohort patient with an attending physician during the current shift that began 11:00 pm on May 5th. The interview occurred at 1:30 pm on May 6th.* **Assessment**: Mark 05/05/08|11:00 pm at [Date Beg]; 05/06/08|01:30 pm at [Date End]; 05/06/08|01:30 pm as date of interview on interviewer line; check [0a] and leave patient name blank at [ppat_nam].

6. *The resident physician begins a shift in the internal medicine continuity clinic at 7:00 am on June 15 and is interviewed for study at 4:00 pm on June 15. At 1:00 pm, the resident physician took the history and examined one of the study patients. The attending physician was physically in the clinic, but not in the examining room, throughout the time the patient was in clinic. The resident physician spends 5 minutes with the patient, then talks to the attending physician for 10 minutes in the clinic area about the patient who informs the resident to record additional examination findings. The resident physician returns to the patient for an additional 7 minutes. After the patient left, the resident physician confers with the attending physician for 2 minutes to discuss the resident physician encounter with the patient.* **Assessment**: Complete two forms listing the attending physician [pphy_nam], resident physician [pres_nam] and patient [ppat_nam]. Mark the observation period 06/15/08|07:00 pm at [Date Beg]; 06/15/08|04:00 pm at [Date End]; 06/15/08|04:00 pm. On one of the forms, check R/A/P encounter [Oc], record 10 minutes in [2(A)], record a total 5+7=12 minutes in [2(B)(b)(*iii*)]. On the other form, check R/A encounter [0b] and enter 2 minutes at [1], check [1(A)(*ii*)], and check [1(B)(*iv*)].

7. *The resident physician sees a patient in the internal medicine continuity clinic for 10 minutes while the attending physician is physically available in the clinic area. The resident physician leaves the patient in the examining room and confers with the attending physician in the hall for 6 minutes. The attending physician then follows the resident physician into the examining room and observes the resident physician for 2 minutes. The attending physician asks the patient several questions and turns to the attending and describes a possible diagnosis, requiring 5 minutes. The attending then leaves the room but remains in the clinic area. The resident physician finishes requiring 3 minutes.* **Assessment**: Check [0c], enter 6 minutes at [2(A)], enter 2 minutes at [2(B)(b)(*ii*)], and enter 10+3=13 minutes at [2(B)(b)(*iii*)]. Inquire if the resident physician continued to have direct contact with the patient, or was assisting, while the attending physician was questioning the patient. If so, enter 5 minutes at

[2(B)(b)(*i*)]. Otherwise, if the resident was standing off to the side and merely observing, then enter 5 minutes at [2(B)(a)].

8. *The resident physician sees a patient in the internal medicine continuity clinic, takes the history and examines the patient for 7 minutes, and then leaves the patient to discuss the case with the attending in the clinic for 10 minutes. The attending physician sees the patient without the presence of the resident physician for 5 minutes.* **Assessment**: Check R/A/P encounter [Oc], record 10 minutes at [2(A)], 7 minutes at [2(B)(b)(*iii*)] and 5 minutes at [2(C)].

9. *A nurse informs the resident physician that the study patient is very unhappy and wants to see an attending physician. The resident physician informs the attending physician in the hall for 1 minute, and then both go into the room where the attending physician takes the history and examines the patient for about 20 minutes while the resident watches and takes notes.* **Assessment**: Enter 1 minute at [2(A)] and 20 minutes at [2(B)(b)].

10. *The resident physician sees a patient in the internal medicine continuity clinic, taking the history and examining the patient on his/her own for about 20 minutes. The resident seeks the attending physician to discuss the case. The nursing staff informs the resident that the attending physician called in sick and no other attending physician is available to discuss the case.* **Assessment**: Enter the resident physician's name [pres_nam], attending physician's name [pphy_nam] and the patient's name [ppat_nam], and corresponding identification numbers [pres_id], [pphy_id], and [ppat_id]. Check R/A/P encounter [Oc] and record 20 minutes at [2(B)(b)(*v*)]. Do not describe the time the resident physician took to determine the attending was unavailable.

11. *The resident physician leaves a patient in the clinic and seeks the attending physician to discuss the case but the attending is busy talking on his cell phone about his golf game scheduled for the next day. The resident waits for 5 minutes for the attending to get off of the phone. The attending then states that he has to run for a cup of coffee and will be right back. The attending physician returns in 10 minutes. The resident and the attending physician then discuss the case for 2 minutes. The resident physician returns to the patient and continues an examination for 4 minutes.* **Assessment**: Check R/A/P encounter [Oc], record 2 minutes at [2(A)]. Inquire if the attending physician was in the clinic area during the resident physician and patient encounter and if yes, record 4 minutes at [2(B)(b)(*iii*)]; and otherwise if no, record 4 minutes at [2(B)(b)(*v*)].

12. *The resident physician saw a patient on June 1st with attending physician Jones. The case was discussed and the RSI was completed for both Dr. Jones and the resident physician. On June 5th during another observation period, the resident receives a telephone call from the patient inquiring about his recent CAT scan. The resident reviews the CAT scan result and consults Dr. Smith about the results for 15 minutes.* **Assessment**: For the supervision encounter on June 1, initiate an RSI and check R/A/P Encounter [0c]. For the second supervision encounter on June 5, initiate an RSI and check R/A Encounter [0b], and RSI, Complete one form each for the resident physician and attending physician. Check R/A encounter [Ob], record 15 minutes in [1], check [1(A)(*ii*)] indicating a face-to-face/individual encounter between the attending and resident physicians; and check [1(B)(*ii*)] to indicate the case discussed concerned a patient call, email, or letter.

APPENDIX III

Patient Cohort List

Patient Cohort List

[ppat_id]	Patient's Name [ppat_nam]	VA Identifying Number	Week Entered Study	Date Entered Study mm / dd / yy
001				
002				
003				
004				
005				
006				
007				
008				
009				
010				
011				
012				
013				
014				
015				
016				
017				
018				
019				
020				
021				
022				
023				

APPENDIX IV

Participating Residents List

Participating Resident Physicians List

[pres_id]	Resident Physician's Name: [pres_nam]	Date Entered Study mm / dd / yy	Date Exited Study mm / dd / yy
001			
002			
003			
004			
005			
006			
007			
008			
009			
010			
011			
012			
013			
014			
015			
016			
017			
018			
019			
020			
021			
022			

APPENDIX V

Participating Attending Physicians List

Participating Attending Physicians List

[pphy_id]	Attending Physician's Name: [pphy_nam]	Date Entered Study mm / dd / yy	Date Exited Study mm / dd / yy
001			
002			
003			
004			
005			
006			
007			
008			
009			
010			
011			
012			
013			
014			
015			
016			
017			
018			
019			
020			
021			
022			

APPENDIX VI

RSI - Study Procedure

Resident Supervision Index (RSI): Assessing Feasibility and Validity

(SHP-08-164)

Procedures Manual

(I). **Consent / Baseline Questionnaire / Participant Lists / LPS Survey**.

a. *Consent*:

a.1. *Who is consented*: All resident physicians and attending physicians who are asked to respond to the RSI Index, RSI Baseline Questionnaire, or the Learner's Perception Survey for purposes of this study are to be consented. Patients listed on the Patient-Cohort list need not be consistent for purposes of this IRB approved protocol.

a.2. *Procedures*: Administer the approved consent form for study SHP 08-164 consistent with procedures required by the IRB and R&D committee for the Loma Linda VA Healthcare System.

a.3. *Security*: Each potential participants should be told that data security is of utmost importance to both study staff and study investigators. The purpose of this study is not to measure supervision at the Loma Linda VA Medical Center, but rather to test the properties of an instrument (RSI) designed to measure supervision. Thus, only aggregate results designed to determine the feasibility, reliability, and validity of the RSI instrument will be reported. No individual responses will be reported. Potential participants, however, should be asked to read the consent form for specific language describing data security.

b. *Study Patients*: Patients whose care is being monitored as part of this study are not to be directly or indirectly contacted. For this approved protocol, patients do not need to be consented.

c. *Participants*: Study participants include resident physicians and attending physicians who sign informed consent.

c.1. *Participating Resident Physicians List*: Enter the name of each resident physician who signs informed consent on the first available row on the Participating Resident Physicians List. The number displayed in the column labeled [pres_id] becomes the participant's assigned study number. Enter the date when the participant signed informed consent. If the resident physician wishes to exit the study before the study ends, enter the date when the participant exited the study. If the participant remained in the study until data collection was concluded, enter the date when data collection was concluded.

c.2. *Participating Resident Attending Physicians List*: Enter the name of each attending physician who signs informed consent on the first available row on the Participating Attending Physicians List. The number displayed in the column labeled [pphy_id] becomes the participant's assigned study number. Enter the date when the participant signed informed consent. If the attending physician wishes to exit the study before the study ends, enter the date when the participant exited the study. If the participant remained in the study until data collection was concluded, enter the date when data collection was concluded.

d. *Baseline Questionnaire*: Administer the RSI Baseline Questionnaire consistent with instructions described on the survey.

e. *RSI Forms*: After the resident physician signs informed consent and is entered on the Participating Resident Physician List and completes the Baseline Questionnaire, begin administering the RSI Form consistent with procedures described below.

f. *LPS Survey*:

f.1. *On-line*: Each participating resident physician must complete the Learner's Perception Survey (LPS) on line.

f.2. *When*: The LPS is to be taken only once immediately before the time when the participating resident physician exits the study. The LPS survey must be administered on a VA computer that is within the VA firewall and can access VA's intranet service.

f.3. *Prior LPS Surveys*: Each year, the Department of Veterans Affairs Office of Academic Affiliations (OAA) administers a web-based LPS survey to all resident trainees who rotated through a VA medical center. Due to survey confidentiality, these responses are not available. Furthermore, the OAA-administered LPS survey asks respondents about their total year experiences. The LPS survey administered for the RSI Study (RSI-administered LPS survey) focuses only on the experiences the responding resident had during his or her VA rotations (*A*) in the RSI designated study outpatient care clinics and (*B*) for the time between when he or she signed consent and entered the study till he or she took the RSI-administered LPS survey for purposes of this study.

f.4. *Reminder Cards*: This can be accomplished by providing the participating resident physician a reminder card containing: study title, date signed informed consent, date anticipated to complete the LPS survey, the web address for the survey, and the resident physician's study identification number [pres_id].

f.5. *Reminder Calls*: Each participating resident should be called to remind them to complete the LPS survey for the RSI Study.

(II). **Patient-Cohort list**.

a. Patients whose care is being monitored as part of this study are to be identified from the Patient-Cohort List. This list is updated weekly throughout the RSI study data collection period.

b. *Selected outpatient clinics*: Study outpatient clinics are selected from the Loma Linda VA Healthcare System where study patients are to be identified. The size and scope of the Patient-Cohort list can be expanded or contracted depending on the selection of outpatient care clinics for study.

c. *Clinical Reminder Report*: On the first Monday of the first data collection week, the research assistant will run a computer program (clinical reminder "Due" report) that will identify all qualifying patients who are scheduled to be seen in one of the selected outpatient clinics during the first data collection week. A patient qualifies if they have a diagnosis of major depression disorder or diabetes.

d. *Sample*: The number of patients on the Patient-Cohort list may be limited to reduce the burden the study may impose on participating physicians and study staff. To accomplish this, study staff will sample patients listed on the Clinical Reminder Report.

d.1. *Sampled List*: To reduce the size of the Patient-Cohort list and thus reduce study burden on study participants, patients listed on the Clinical Reminder Report are sampled to create a Sampled List.

d.2. *Assign Random Number*: Sampling is accomplished by first assigning a random number to each named patient on the Clinical Reminder Report. The random number is obtained from the random number table provided for this study.

d.3. *Random number table*:

d.3.1. *Selection*: Random numbers are selected from the random number table. Selection begins with row #1 and column #1 and continues down the column till row #50 and column #1, then proceeding to the next column at row #1 and column #2 and continues down the column till row #50 and column #2, and so forth.

d.3.2. *Assignment*: The number appearing in row #1 and column #1 should be assigned to the first patient listed in the Clinical Reminder Report. The number appearing in row #2 and column #1 should be assigned to the second patient listed in the Clinical Reminder Report., and so forth.

d.3.3. *Used numbers*: Once a number has been assigned to a patient, it cannot be re-assigned to another patient. That is, all numbers listed on the Random Number Table that has been assigned should be "killed" for future use.

d.4. *Selecting sampled elements*: Select the name corresponding to the lowest random number that was assigned to each qualifying patient listed on the Clinical Reminder Report. Select the second named patient by identifying the listing with the lowest random number among the remaining listings. Proceed in this manner until the desired number of patients have been selected for the sample.

d.5. *All or none sampled selection.* If more than one patient listing on the Clinical Reminder Report were assigned to the same "lowest" random number (2-digit), select all such commonly numbered patients for the Sampled List. If the maximum number to sample is exceeded by selecting all such patients, select none of these patients and stop further sampling from the Clinical Reminder Report generated for the given data collection week. This will close the Sampled List for this data collection week.

e. *Patient-Cohort list for week 1*: Enter the Sampled List for week 1 onto the Patient-Cohort list form by writing on the first available row the name of the patient [ppat_nam], record the patient's VA identifying number, and write the listing week ("1") and date the list was prepared. The number appearing in column marked [ppat_id] for the corresponding unique patient becomes that patients unique study identifying number.

f. *Updating Cohort-Patient Lists:* The Patient-Cohort list is updated on the Monday of each data collection week during the study. For the first Monday of each data collection week, run the clinical reminder program, identify all qualifying patients who are scheduled to be seen in one of the selected outpatient clinics during the given data collection week, remove any name from the Clinical Reminder Report that also appears on the current Patient-Cohort list, sample the remaining patients on the Clinical Reminder Report list, enter sampled patients to the Cohort-Patient list by writing on the first available row the selected patient's name, VA identifying number, listing week, and listing date.

(III). Reduced Patient-Cohort List

a. *Purpose*: To limit the size of the Patient-Cohort list, and thus reduce burden on participants and research staff, participating resident and attending physicians will be presented a "reduced Patient-Cohort list" during RSI interviews.

b. *Reduced Patient-Cohort list*: The Reduced Patient-Cohort list is create from the Updated Patient-Cohort list generated each Monday during study data collection weeks. The reduced list is created by removing all patients who have remained on the Cohort-Patient list for five or more weeks. That is, a study patient cannot remain on the list for more than four weeks. Length of time on the study is based on the "week entered study" column on the Patient-Cohort List form. For example, on week 5 all patients entering the Patient-Cohort list during week 1 would be excluded from the Reduced Patient-Cohort List that will be presented with the RSI form to participating resident and attending physicians during that data collection week.

c. *Procedure*: On the Monday of any given data collection week, study staff updates the Patient-Cohort List, creates a Reduced Patient-Cohort List by excluding patients who have been listed 5 weeks or longer, and uses the resulting Reduced Patient-Cohort List to administer RSI's to participating resident and attending physicians during the given data collection week. This process is repeated each Monday, creating newly updated Patient-Cohort Lists.

(IV). **Administering RSI Form to Resident Physicians**.

a. After the initial contact, administer the RSI Form to all participating resident physician as specified in the *RSI Instructions*. The "Patient-Cohort" mentioned in the *RSI Instructions* is, for purposes of this study, is the most currently updated, reduced Patient-Cohort list.

(V). **Re-testing the RSI Form to the Resident Physician**.

a. RSI forms may be re-tested on the same resident physician to compare how responses change with time when respondents are asked to describe the same supervision encounter.

b. To accomplish this, initiate a new RSI form within approximately 24 hours after the initial RSI form was completed by the given resident physician covering the same supervision encounter. Pre-specify on the re-test RSI form information contained on the initial RSI Form: the given resident physician [pres_nam], attending physician [pphy_nam], named patient [ppat_nam], type of supervision encounter (resident-attending supervision encounter [0b] or a resident-attending-patient supervision encounter [0c]), and for [0b] the type of discussion [1(A)(*i*)-(*vi*)]. The purpose is to compare responses pertaining to the same supervision encounter. Thus, both initial RSI and re-test RSI forms should point to the same supervision encounter.

c. Indicate the observation period applicable for the initial RSI form on the re-test RSI form. This is achieved by the following. First, write at [Date Beg] on the re-test RSI form the date when the resident physician's duty shift began (recorded at [Date Beg] on the initial RSI Form). Next, write at [Date End] on the re-test RSI form the date when the observation period for the initial RSI interview ended, determined as the earlier of when the initial interview was conducted (recorded at [DATE / TIIME] on the initial RSI form), or when the resident physician's duty shift ended (recorded at [Date End] on the initial RSI form).

d. Enter the actual date and time of the re-test interview at [DATE / TIME] on the re-test RSI form.

(VI). **Re-Administering the RSI Form to an Attending Physician**.

a. RSI forms may be re-administered to the attending physician to compare how attending physicians and resident physicians view the same supervision encounter.

b. To accomplish this, initiate a new RSI form within approximately 24 hours after the initial form was completed by the given resident physician covering the same supervision encounter. Pre-specify on the re-administered RSI form information contained on the initial RSI Form: the given resident physician [pres_nam], attending physician [pphy_nam], named patient [ppat_nam], type of supervision encounter (resident-attending supervision encounter [0b] or a resident-attending-patient supervision encounter [0c]), and for [0b] the type of discussion [1(A)(*i*)-(*vi*)]. The purpose is to compare responses pertaining to the same supervision encounter. Thus, both initial RSI and re-administered RSI forms should point to the same supervision encounter.

c. Indicate the observation period applicable for the initial RSI form on the re-administered RSI form. This is achieved by the following. First, write at [Date Beg] on the re-administered RSI form the date when the resident physician's duty shift began (recorded at [Date Beg] on the initial RSI Form). Next, write at [Date End] on the re-administered RSI form the date when the observation period for the initial RSI interview ended, determined as the earlier of when the initial interview was conducted (recorded at [DATE / TIIME] on the initial RSI form), or when the resident physician's duty shift ended (recorded at [Date End] on the initial RSI form).

d. Enter the actual date and time of the re-administered interview at [DATE / TIME] on the re-administered RSI form.

APPENDIX VII

RSI – Baseline Questionnaire

RESIDENT SUPERVISION INDEX (RSI)

BASELINE QUESTIONNAIRE

[pres_nam] Resident: _____ [pres_id] _____

[pphy_nam] Attending Physician: _____ [pphy_id] _____

1. What is your date of birth? __ __/ __ __/ __ __ __ __
   mm dd yyyy

2. What is your gender?
   0 -Male
   1 -Female

3. What is your race / ethnicity?
   1 -African American
   2 -Asian
   3 -Native American
   4 -Native Hawaiian /Pacific Islander
   5 -Hispanic – White
   6 -Hispanic – Other
   7 -White
   8 -Other:_____

4. What year did you graduate from college?
   yyyy

5. What year did you graduate from medical school?
   yyyy

6. At the time you graduated from medical school, indicate if you were:
   1 -US citizen, US medical graduate
   2 -US citizen, international medical graduate
   3 -Non-US citizen, international medical graduate

7. Indicate all of your earned education degrees?
   01 -MD
   02 -DO
   03 -DDS/DMD
   04 -PhD
   05 -DC
   06 -OD
   07 -DSW
   08 -MSW
   09 -PharmD
   10 -Bpharm
   11 -BSN / BS in nursing
   12 -MSN
   13 -DSN
   14 -JD
   15 -DrPH
   16 -MPH
   17 -DPA
   18 -MPA
   19 -DSc
   20 -DBA
   21 -MBA
   22 -DPM
   23 -MS/MSc
   24 -MA
   25 -BS/BSC
   26 -BA / BS non-professional
   27 -Other:_____

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#1: Interviewer: _____ DATE: mm_____/dd_____/yy_____ TIME: ____:____ am / pm.
#2. Interviewer: _____ DATE: mm_____/dd_____/yy_____ TIME: ____:____ am / pm.
#3. Interviewer: _____ DATE: mm_____/dd_____/yy_____ TIME: ____:____ am / pm.

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8. Please indicate the specialty of your current residency program by selecting from the list below:

01 -Addiction psychiatry
02 -Allergy and immunology
03 -Anesthesiology
04 -Cardiovascular disease
05 -Clinical neurophysiology
06 -Colon and rectal surgery
07 -Critical care medicine - Anesthesiology
08 -Critical care medicine – Internal medicine
09 -Dermatology
10 -Emergency medicine
11 -Endocrinology, diabetes, metabolism
12 -Family practice
13 -Gastroenterology
14 -Geriatric medicine
15 -Geriatric psychiatry
16 -Hematology
17 -Hematology and oncology
18 -Infectious disease
19 -Internal medicine
20 -Medical genetics
21 -Medical toxicology – Emergency med (ETX)
22 -Medical toxicology – Preventive med (PTX)
23 -Nephrology
24 -Neurological surgery
25 -Neurology
26 -Nuclear medicine
27 -Obstetrics and gynecology
28 -Oncology
29 -Ophthalmology
30 -Othopaedic surgery
31 -Otolaryngology
32 -Pain medicine – Anesthesiology (APM)
33 -Pain medicine – Neurology (PMN)
34 -Pain medicine – PM&R (PPN)
35 -Pain medicine – psychiatry (PPN)
36 -Pathology-anatomic and clinical
37 -Physical medicine & rehabilitation
38 -Plastic surgery
39 -Preventive medicine
40 -Psychiatry
41 -Psychosomatic medicine-Psychiatry (PYM)
42 -Pulmonary disease
43 -Pulmonary disease & critical care medicine
44 -Radiation oncology
45 -Radiology – diagnostic
46 -Rheumatology
47 -Sleep medicine
48 -Spinal cord injury medicine
49 -Surgery – general
50 -Surgical critical care
51 -Thoracic surgery
52 -Urology
53 -Vascular & interventional radiology
54 -Vascular surgery
55 -Other:___

9 I would now like to understand the experience that you have had with residency programs in the United States. For each residency or fellowship program, please indicate the specialty, enrollment level (PGY), and the dates for each year of training.

Note: last date recorded should be current date.
Note: List of specialties are provided under Question #8.

	(A) Specialty	(B) DATES OF TRAINING		(C) PGY-level
(01)	_____	*from*: __ __/__ __/__ __ __ __	*to*: __ __/__ __/__ __ __ __	_____
(02)	_____	*from*: __ __/__ __/__ __ __ __	*to*: __ __/__ __/__ __ __ __	_____
(03)	_____	*from*: __ __/__ __/__ __ __ __	*to*: __ __/__ __/__ __ __ __	_____
(04)	_____	*from*: __ __/__ __/__ __ __ __	*to*: __ __/__ __/__ __ __ __	_____
(05)	_____	*from*: __ __/__ __/__ __ __ __	*to*: __ __/__ __/__ __ __ __	_____
(06)	_____	*from*: __ __/__ __/__ __ __ __	*to*: __ __/__ __/__ __ __ __	_____
(07)	_____	*from*: __ __/__ __/__ __ __ __	*to*: __ __/__ __/__ __ __ __	_____
(08)	_____	*from*: __ __/__ __/__ __ __ __	*to*: __ __/__ __/__ __ __ __	_____
(09)	_____	*from*: __ __/__ __/__ __ __ __	*to*: __ __/__ __/__ __ __ __	_____
(10)	_____	*from*: __ __/__ __/__ __ __ __	*to*: __ __/__ __/__ __ __ __	_____
(11)	_____	*from*: __ __/__ __/__ __ __ __	*to*: __ __/__ __/__ __ __ __	_____
(12)	_____	*from*: __ __/__ __/__ __ __ __	*to*: __ __/__ __/__ __ __ __	_____
(13)	_____	*from*: __ __/__ __/__ __ __ __	*to*: __ __/__ __/__ __ __ __	_____
(14)	_____	*from*: __ __/__ __/__ __ __ __	*to*: __ __/__ __/__ __ __ __	_____
(15)	_____	*from*: __ __/__ __/__ __ __ __	*to*: __ __/__ __/__ __ __ __	_____
(16)	_____	*from*: __ __/__ __/__ __ __ __	*to*: __ __/__ __/__ __ __ __	_____
(17)	_____	*from*: __ __/__ __/__ __ __ __	*to*: __ __/__ __/__ __ __ __	_____
(18)	_____	*from*: __ __/__ __/__ __ __ __	*to*: __ __/__ __/__ __ __ __	_____
(19)	_____	*from*: __ __/__ __/__ __ __ __	*to*: __ __/__ __/__ __ __ __	_____
(20)	_____	*from*: __ __/__ __/__ __ __ __	*to*: __ __/__ __/__ __ __ __	_____

10 Now I would like to understand the experience that you have had with residency programs in countries other than the United States. Were you ever enrolled in a residency program outside the United States?

1 -yes ☐ 0 -no ☐

If yes, for each period when you were in a residency or fellowship program(s), please indicate the specialty, enrollment level (PGY), and dates of period of training.
Note: List of specialties are provided under Question #8.

(1) *(A) Country:*_____. *(B) Specialty:* _____.

from: __ __/__ __/__ __ __ __ *to*: __ __/__ __/__ __ __ __ at PGY:_____

(2) *(A) Country:*_____. *(B) Specialty:* _____.

from: __ __/__ __/__ __ __ __ *to*: __ __/__ __/__ __ __ __ at PGY:_____

(3) *(A) Country:*_____. *(B) Specialty:* _____.

from: __ __/__ __/__ __ __ __ *to*: __ __/__ __/__ __ __ __ at PGY:_____

(4) *(A) Country:*_____. *(B) Specialty:* _____.

from: __ __/__ __/__ __ __ __ *to*: __ __/__ __/__ __ __ __ at PGY:_____

(5) *(A) Country:*_____. *(B) Specialty:* _____.

from: __ __/__ __/__ __ __ __ *to*: __ __/__ __/__ __ __ __ at PGY:_____

(6) *(A) Country:*_____. *(B) Specialty:* _____.

from: __ __/__ __/__ __ __ __ *to*: __ __/__ __/__ __ __ __ at PGY:_____

(7) *(A) Country:*_____. *(B) Specialty:* _____.

from: __ __/__ __/__ __ __ __ *to*: __ __/__ __/__ __ __ __ at PGY:_____

(8) *(A) Country:*_____. *(B) Specialty:* _____.

from: __ __/__ __/__ __ __ __ *to*: __ __/__ __/__ __ __ __ at PGY:_____

(9) *(A) Country:*_____. *(B) Specialty:* _____.

from: __ __/__ __/__ __ __ __ *to*: __ __/__ __/__ __ __ __ at PGY:_____

(10) *(A) Country:*_____. *(B) Specialty:* _____.

from: __ __/__ __/__ __ __ __ *to*: __ __/__ __/__ __ __ __ at PGY:_____

(11) *(A) Country:*_____. *(B) Specialty:* _____.

from: __ __/__ __/__ __ __ __ *to*: __ __/__ __/__ __ __ __ at PGY:_____

(12) *(A) Country:*_____. *(B) Specialty:* _____.

from: __ __/__ __/__ __ __ __ *to*: __ __/__ __/__ __ __ __ at PGY:_____

APPENDIX VIII

RSI - Codebook

RESIDENT SUPERVISION INDEX (RSI)

DATA DICTIONARY

DATABASES

PPHY_LIST: Data come from the Participating Attending Physicians List and contain attending physician's identification number, attending physician's name, date entered study and date exited study. A record issues for each participating attending physician.

PRES_LIST: Data come from the Participating Resident Physicians List and contain resident physician's identification number, resident physician's name, date entered study and date exited study. A record issues for each participating resident physician.

PPAT_LIST: Data come from the Patient Cohort List and contain patient's identification number, patient's name, VA identifying number, week entered study, and date entered study for those patients whose care is being monitored as part of this study. Reason for patient not being entered into study was added to the data file. A record issues for each identified patient.

BSLN_1-8: Data come from the RSI Baseline Questionnaire. Data contain resident name and identification number or attending physician name and identification number, date of birth, gender, race/ethnicity, year graduated from college, year graduated from medical school, US citizenship at time of medical school graduation, earned education degrees and specialty of current residency program. Also contains the interviewer's initials, date of interview and time of interview. A record issues for each participating resident and each participating attending.

BSLN_9: Data come from the RSI Baseline Questionnaire. Data contain resident name and identification number or attending physician name and identification number, residency specialty, post-graduate year (PGY) enrollment level, date from and date to, for each year of residency training in the United States. A record issues for each resident or attending, per period of residency training in the United States.

BSLN_10: Data come from the RSI Baseline Questionnaire. Data contain resident name and identification number or attending physician name and identification number, country of residency program experience, specialty, date from and date to, and PGY enrollment level for period of residency training in other countries other than the United States. A record issues for each resident or attending, per period of residency training in other countries.

RSI-ID: Data come from the Resident Supervision Index form. Data contain the beginning date and time and the ending date and time when the participating resident's shift began, resident physician's name and identification number, attending physician's name and identification number and patient name and identification number. A record issues for each combination of resident physician, attending physician and patient identification numbers.

RSI: Data come from the Resident Supervision Index form. Data contain the responder, resident physician, attending physician and patient identification numbers, type of resident supervision encounter, interviewer initials, date and time of interview. If encounter was a resident-attending encounter, data contains number of minutes case was discussed with attending, how case was discussed and purpose case was discussed. If encounter was a resident-attending-patient encounter, data contains number of minutes case was discussed with the attending outside the presence of the patient. Also contains the number of minutes the resident spent in direct contact with the patient while the attending was in the room, in the clinic area, available by phone/pager or not available. Also, the number of minutes attending spent with the patient when the resident was not present. For all encounters, the data contains if discussion contributed to case understanding, and describes the supervision encounter (patient's history, examination findings, interpretation of diagnostic testing, diagnosis, assessment, plan) with the attending physician as having confirmed, changed, having neither confirmed nor changed, or was not discussed.

MISSING VALUE CODES

Unless otherwise specified, the following codes shall be used for all responses on all questionnaires and forms.

Explanation	Variable Field
Inapplicable	-2
Missing	-1
Month/Date Unknown	-9

(I) PPHY_LIST

(1) PPHY_ID Attending physician study identification number.

(2) PPHY_NAM Attending physician name.

(3) DAT_ENT Date entered study.

(4) DAT_EXT Date exited study.

(5) REA_EXT Reason exited study.
1 - Completed study
2 - Refused consent
3 - Withdrew from study

(II) PRES_LIST

(1) PRES_ID Resident physician study identification number.

(2) PRES_NAM Resident physician name.

(3) DAT_ENT Date entered study.

(4) DAT_EXT Date exited study.

(5) REA_EXT Reason exited study.
1 - Completed study
2 - Refused consent
3 - Withdrew from study

(III) PPAT_LIST

(1) PPAT_ID Patient study identification number.

(2) PPAT_NAM Patient name.

(3) VA_ID VA identifying number.

(4) WEEK_ENT Week entered study.

(5) DAT_ENT Date entered study.

(6) REA_EXT Reason exited study.
1 - No show
2 - Appointment canceled/rescheduled
3 - Not seen by resident
4 - Resident refused to participate
5 - Timed out/too late to collect
6 - Resident at maximum number of 5
7 - Attending at maximum number of 5
8 - No data collected/resident too busy

(IV) BSLN_1-8

(1) PRES_ID Resident physician study identification number.

(2) PPHY_ID Attending physician study identification number.

(3) V1 Date of birth.

(4) V2 Gender.
0 - Male
1 - Female

(5) V3 Race/ethnicity.
1 - African American
2 - Asian
3 - Native American
4 - Native Hawaiian/Pacific Islander
5 - Hispanic-White
6 - Hispanic-Other
7 - White
8 - Other

(6) V3_OTH Other race/ethnicity, specified.

(7) V4 Year graduated college.

(8) V5 Year graduated medical school.

(9) V6 Citizenship status at time graduated from medical school.
1 - US citizen, US medical graduate
2 - US citizen, international medical graduate
3 - Non-US citizen, international medical graduate

(10) V7 Earned education degrees.
1 - MD
2 - DO
3 - DDS/DMD
4 - PhD
5 - DC
6 - OD
7 - DSW
8 - MSW
9 - PharmD
10 - Bpharm
11 - BSN / BS in nursing
12 - MSN
13 - DSN
14 - JD
15 - DrPH
16 - MPH
17 - DPA
18 - MPA
19 - DSc
20 - DBA
21 - MBA
22 - DPM
23 - MS/MSc
24 - MA
25 - BS/BSC
26 - BA / BS non-professional
27 - Other

(A) V7_1 Earned education degree 1.
(B) V7_2 Earned education degree 2.
(C) V7_3 Earned education degree 3.
(D) V7_4 Earned education degree 4.
(E) V7_5 Earned education degree 5.

(11) V7_OTH Other earned education degree, specified.

(12) INT1 Interviewer 1.

(13) DAT1 Date of interview 1.

(14) TIM1 Time of interview 1.

(15) TIM1AP Time of day of interview 1.
0 - AM
1 - PM

(16) INT2 Interviewer 2.

(17) DAT2 Date of interview 2.

(18) TIM2 Time of interview 2.

(19) TIM2AP Time of day of interview 2.
0 - AM
1 - PM

(20) INT3 Interviewer 3.

(21) DAT3 Date of interview 3.

(22) TIM3 Time of interview 3.

(23) TIM3AP Time of day of interview 3.
0 - AM
1 - PM

(24) V8 Specialty of current residency program.
1 - Addiction psychiatry
2 - Allergy and immunology
3 - Anesthesiology
4 - Cardiovascular disease
5 - Clinical neurophysiology
6 - Colon and rectal surgery
7 - Critical care medicine-Anesthesiology
8 - Critical care medicine-Internal medicine
9 - Dermatology
10 - Emergency medicine
11 - Endocrinology, diabetes, metabolism
12 - Family practice
13 - Gastroenterology
14 - Geriatric medicine
15 - Geriatric psychiatry
16 - Hematology
17 - Hematology and oncology
18 - Infectious disease
19 - Internal medicine
20 - Medical genetics
21 - Medical toxicology-Emergency med (ETX)
22 - Medical toxicology-Preventive med (PTX)
23 - Nephrology
24 - Neurological surgery
25 - Neurology
26 - Nuclear medicine
27 - Obstetrics and gynecology
28 - Oncology
29 - Ophthalmology
30 - Orthopaedic surgery
31 - Otolaryngology
32 - Pain medicine-Anesthesiology (APM)
33 - Pain medicine-Neurology (PMN)
34 - Pain medicine-PM&R (PPN)
35 - Pain medicine-Psychiatry (PPN)
36 - Pathology-anatomic and clinical
37 - Physical medicine & rehabilitation
38 - Plastic surgery
39 - Preventive medicine
40 - Psychiatry
41 - Psychosomatic medicine-Psychiatry (PYM)
42 - Pulmonary disease
43 - Pulmonary disease & critical care medicine
44 - Radiation oncology
45 - Radiology-diagnostic
46 - Rheumatology
47 - Sleep medicine
48 - Spinal cord injury medicine
49 - Surgery-general
50 - Surgical critical care
51 - Thoracic surgery
52 - Urology
53 - Vascular & interventional radiology
54 - Vascular surgery
55 - Other

(A) V8_1 Specialty 1 of current residency program.
(B) V8_2 Specialty 2 of current residency program.
(C) V8_3 Specialty 3 of current residency program.

(25) V8_OTH Other specialty, specified.

(V) BSLN_9

(1) PRES_ID Resident physician study identification number.

(2) PPHY_ID Attending physician study identification number.

(3) V9A Specialty experience in the United States.

1 - Addiction psychiatry
2 - Allergy and immunology
3 - Anesthesiology
4 - Cardiovascular disease
5 - Clinical neurophysiology
6 - Colon and rectal surgery
7 - Critical care medicine-Anesthesiology
8 - Critical care medicine-Internal medicine
9 - Dermatology
10 - Emergency medicine
11 - Endocrinology, diabetes, metabolism
12 - Family practice
13 - Gastroenterology
14 - Geriatric medicine
15 - Geriatric psychiatry
16 - Hematology
17 - Hematology and oncology
18 - Infectious disease
19 - Internal medicine
20 - Medical genetics
21 - Medical toxicology-Emergency med (ETX)
22 - Medical toxicology-Preventive med (PTX)
23 - Nephrology
24 - Neurological surgery
25 - Neurology
26 - Nuclear medicine
27 - Obstetrics and gynecology
28 - Oncology
29 - Ophthalmology
30 - Orthopaedic surgery
31 - Otolaryngology
32 - Pain medicine-Anesthesiology (APM)
33 - Pain medicine-Neurology (PMN)
34 - Pain medicine-PM&R (PPN)
35 - Pain medicine-Psychiatry (PPN)
36 - Pathology-anatomic and clinical
37 - Physical medicine & rehabilitation
38 - Plastic surgery
39 - Preventive medicine
40 - Psychiatry
41 - Psychosomatic medicine-Psychiatry (PYM)
42 - Pulmonary disease
43 - Pulmonary disease & critical care medicine
44 - Radiation oncology
45 - Radiology-diagnostic
46 - Rheumatology
47 - Sleep medicine
48 - Spinal cord injury medicine
49 - Surgery-general
50 - Surgical critical care
51 - Thoracic surgery
52 - Urology
53 - Vascular & interventional radiology
54 - Vascular surgery
55 - Other

(4) V9MOFR Month of training from.

(5) V9DYFR Day of training from.

(6) V9YRFR Year of training from.

(7) V9MOTO Month of training to.

(8) V9DYTO Day of training to.

(9) V9YRTO Year of training to.

(10) V9PGY PGY-level of training.

(VI) BSLN_10

(1) PRES_ID Resident physician study identification number.

(2) PPHY_ID Attending physician study identification number.

(3) V10 Enrolled in residency program outside the United States (US).
0 - No
1 - Yes

(4) V10A Country of enrollment outside the US.

(5) V10B Specialty of enrollment outside the US.
1 - Addiction psychiatry
2 - Allergy and immunology
3 - Anesthesiology
4 - Cardiovascular disease
5 - Clinical neurophysiology
6 - Colon and rectal surgery
7 - Critical care medicine-Anesthesiology
8 - Critical care medicine-Internal medicine
9 - Dermatology
10 - Emergency medicine
11 - Endocrinology, diabetes, metabolism
12 - Family practice
13 - Gastroenterology
14 - Geriatric medicine
15 - Geriatric psychiatry
16 - Hematology
17 - Hematology and oncology
18 - Infectious disease
19 - Internal medicine
20 - Medical genetics
21 - Medical toxicology-Emergency med (ETX)
22 - Medical toxicology-Preventive med (PTX)
23 - Nephrology
24 - Neurological surgery
25 - Neurology
26 - Nuclear medicine
27 - Obstetrics and gynecology
28 - Oncology
29 - Ophthalmology
30 - Orthopaedic surgery
31 - Otolaryngology
32 - Pain medicine-Anesthesiology (APM)
33 - Pain medicine-Neurology (PMN)
34 - Pain medicine-PM&R (PPN)
35 - Pain medicine-Psychiatry (PPN)
36 - Pathology-anatomic and clinical
37 - Physical medicine & rehabilitation
38 - Plastic surgery
39 - Preventive medicine
40 - Psychiatry
41 - Psychosomatic medicine-Psychiatry (PYM)
42 - Pulmonary disease
43 - Pulmonary disease & critical care medicine
44 - Radiation oncology
45 - Radiology-diagnostic
46 - Rheumatology
47 - Sleep medicine
48 - Spinal cord injury medicine
49 - Surgery-general

50 - Surgical critical care
51 - Thoracic surgery
52 - Urology
53 - Vascular & interventional radiology
54 - Vascular surgery
55 - Other

(6) V10MOFR Month of training from.

(7) V10DYFR Day of training from.

(8) V10YRFR Year of training from.

(9) V10MOTO Month of training to.

(10) V10DYTO Day of training to.

(11) V10YRTO Year of training to.

(12) V10PGY PGY-level of training.

(VII) RSI-ID

(1) DATBEG Date interview began.

(2) TIMBEG Time interview began.

(3) TIMBEG1 Time of day interview began.
0 - AM
1 - PM

(4) DATEND Date interview ended.

(5) TIMEND Time interview ended.

(6) TIMEND1 Time of day interview ended.
0 - AM
1 - PM

(7) PRES_NAM Resident physician name.

(8) PRES_ID Resident physician study identification number.

(9) PPHY_NAM Attending physician name.

(10) PPHY_ID Attending physician study identification number.

(11) PPAT_NAM Patient name.

(12) PPAT_ID Patient identification number.

(VIII) RSI

(1) RESP Responder.
1 - Resident
2 - Attending Physician
3 - Other

(2) RESP_OTH Other responder, specified.

(3) PRES_ID Resident physician study identification number.

(4) PPHY_ID Attending physician study identification number.

(5) V_0A No supervision encounter.
0 - No
1 - Yes

(6) PPAT_ID Patient identification number.

(7) V_0B Resident-attending encounter.
0 - No
1 - Yes

(8) V_0B1 Minutes case discussed with attending.

(9) V_0B1A How case was discussed.
1 - Face-to-face/group

2 - Face-to-face/individual
3 - Telemedicine/video conference
4 - Telephone
5 - Patient's chart
6 - E-mail/letter/text message

(10) V_0B1B Purpose case was discussed:
0 - No
1 - Yes

- **(A)** V_0B1B1 generally discussed.
- **(B)** V_0B1B2 patient call/e-mail/letter.
- **(C)** V_0B1B3 chart review or test result.
- **(D)** V_0B1B4 prior patient encounter.

(11) V_0C Resident-attending-patient encounter.
0 - No
1 - Yes

(12) V_0C2A Minutes resident discussed case with attending.

(13) V_0C2BA Minutes resident spent observing only.

(14) V_0C2BB Minutes resident spent while in direct contact with patient while attending was:

- **(A)** V_0C2BB1 in the room and participating in care.
- **(B)** V_0C2BB2 in the room but not participating in care.
- **(C)** V_0C2BB3 in the clinic area.
- **(D)** V_0C2BB4 not in the clinic area but available by phone/pager.
- **(E)** V_0C2BB5 not available.

(15) V_0C2C Minutes attending spent time with patient when resident was not present.

(16) V_0D All encounters.
0 - No
1 - Yes

(17) V_0D3A Discussion with attending contributed to resident's case understanding.
0 - No
1 - Yes

(18) V_0D3B Interaction with attending.
1 - Confirmed
2 - Changed
3 - Neither
4 - Not discussed

- **(A)** V_0D3B1 patient's history.
- **(B)** V_0D3B2 examination findings.
- **(C)** V_0D3B3 interpretation of diagnostic testing.
- **(D)** V_0D3B4 diagnosis.
- **(E)** V_0D3B5 assessment.
- **(F)** V_0D3B6 plan.

(19) INT Interviewer.

(20) DAT Date of interview.

(21) TIM Time of interview.

(22) TIM1 Time of day of interview.
0 - AM
1 - PM

(23) FSTAT Followup interview status.
1 - Interview completed
2 - Refused
3 - Resident did not see patient
4 - Attending reached maximum number
5 - Unable to reach