Teaching Resident Self-Assessment Through Triangulation of Faculty and Patient Feedback

Drew Keister MD
Lehigh Valley Health Network, Drew_M.Keister@lvhn.org

Susan E. Hansen MA
Lehigh Valley Health Network, Susan_E.Hansen@lvhn.org

Julie Dostal MD
Lehigh Valley Health Network, Julie.Dostal@lvhn.org

Published In/Presented At

Keister, D. Hansen, S. Dostal, J. (2016, Dec). Teaching Resident Self-Assessment Through Triangulation of Faculty and Patient Feedback. *Teaching and Learning Medicine. An International Journal. 29(1), 25-30.*

Teaching Resident Self-Assessment through Triangulation of Faculty and Patient Feedback

Drew M. Keister [a], Susan E. Hansen [a], Julie Dostal [a]

[a] Department of Family Medicine, Lehigh Valley Health Network, Allentown, Pennsylvania, USA.

KEY WORDS: post-graduate medical education, self-assessment, clinical competency, evaluation/assessment, instructional materials/methods

Contact: Drew M. Keister, MD, drew_m.keister@lvhn.org Department of Family Medicine, Lehigh Valley Health Network, 707 Hamilton St., P.O. Box 1806, Allentown, PA 18105

ABSTRACT

Problem: To accurately determine one's ability in any clinical competency, an individual must be able to self-assess performance and identify personal limitations. Existing research demonstrates that physicians of all levels are unreliable self-assessors. This poses a concern in medical practice, which requires continuous updates to clinical competencies and awareness of personal limitations. Few published studies examine graduate medical education curricula designed to develop self-assessment skills.

Intervention: Conceptual models, such as self-determination theory, suggest that self-assessment is most effectively learned through reflective processes. The Family Medicine Residency Program at Lehigh Valley Health Network developed a learner-centered competency assessment process that integrates advising and performance review. The multisource, observable behavior-based process encourages conversation between resident and advisor. Utilizing feedback from clinical preceptors and patient surveys, advisors guide residents in determining individual learning needs in core competency areas, including relationship-centered care. Development of medical learners' capacity to form relationships is one means to improving the patient experience.

Context: This retrospective case study evaluates the accuracy of senior residents' self-assessment in relationship-centered care compared with that of junior residents. The study population includes the 34 residents enrolled from AY 2009-2012. Data sets represent specific 6-month periods and have 3 component scores—Self, Faculty, and Patient –which were triangulated to determine concordance rates by post-graduate year level.

Outcomes: The concordance rate among first-years was 26.7%, while third-years saw 60.0% concordance. A discordance analysis found the Patient score most often deviated from the other 2 scores, while the Faculty score was never the sole dissenter. When all 3 scores differed, the Self score frequently fell between the other 2 scores.

Lessons Learned: The principles of self-determination theory provide a valuable framework for understanding the development of residents' intrinsic motivation to become lifelong learners. The trend in

improved concordance rates among senior residents suggests that prompting learners to triangulate feedback from multiple sources can lead to a shift in perspective about competency. Further study is needed to determine whether our results are generalizable to other competencies and educational settings.

BACKGROUND

The Institute of Medicine, in its 2001 seminal report,[1] recognized the importance of defining the quality of medical care in terms of those receiving it, rather than those delivering it. Similarly, through the Triple Aim, [2] the concept of patient experience is driving a re-imagination of the U.S. health care system. Thus, relationship building is a necessary component of clinical competency to develop during medical education and maintain throughout one's professional career. "Health enhancing" (Beach et al., 2006, page S7)[3] relationships occur when physicians focus on the content of their interactions with patients, rather than the desired clinical outcomes. In practice, this is termed relationship-centered care (RCC).[4] To create these relationships, physicians must expand their focus outward to consider the patient's viewpoint as well as explore their own capacity for self-awareness. As Tresolini states, "Without self-knowledge, a practitioner's own emotional responses to patient needs may act as a barrier to effective care and can result in harm to the patient." [5 (p 29)]

Self-assessment is a deliberate and pointed activity informed by both direct and indirect feedback from one's environment.[6,7] Triangulating feedback from multiple sources (e.g., colleagues, supervisors, patients, and self) provides the most accurate picture of one's own performance.[8] This process is not intuitive[9], and prior research demonstrates that physicians at all stages of their careers are unreliable self-assessors.[10,11] Too often, however, medical learners are left to perform this activity without guidance.[6,12] Applying self-determination theory (SDT) to medical education[13,14] underscores the importance of mentors engaging with learners in self-assessment to nurture their desire to excel. According to the 3-pronged SDT, intrinsic motivation emerges when learners recognize their ability to master the material (competence), accept some degree of ownership of the educational process (autonomy), and experience a connection to the academic community and a sense they are valued by faculty and peers (relatedness).[15] Because many post-graduate learners enter residency relying on external forces (e.g., proscribed curricula, faculty interventions, defined schedules, and deadlines) to inform their educational progression, self-assessment requires a shift in expectations. Through mentored self-assessment,[6,10,16] educators can help

develop residents' competence, relatedness, and autonomy within the "complex social contexts of clinical training."[12 (pp 71, 78)]

While knowledge about self-assessment has been gleaned from focus groups, surveys of expert educators, [6,17] and other controlled settings (e.g., multiple-choice tests, simulated patient encounters, and single episodes of care),[10,18,19] we found no evidence about how this ability changes in a real-world educational setting among learners at different stages. This information gap poses a concern in a field that expects clinicians to maintain professional accountability through continuous updates to clinical competencies and accurate assessment of their personal limitations during patient care.[9,20] Our research, therefore, answers the "urgent need"[21 (p 1139)] for deeper investigation on this topic by asking: Can senior residents self-assess their clinical competency more accurately than junior residents within a residency that applies the principles of SDT? To answer this question, we propose a method for measuring competence in self-assessment by triangulating multiple sources of feedback, including the subject's own appraisal.

PROGRAM OVERVIEW

Based in an academic community hospital in eastern Pennsylvania, the Lehigh Valley Health Network Family Medicine Residency Program (hereafter referred to as "the Residency") trains an average of 6 residents per graduating class. In 2007, the Residency began a transformative journey as one of 14 U.S. family medicine residencies in the Preparing the Personal Physician for Practice (p^4) project.[22] Key elements of the Residency's innovation relevant to this study include developing an observable behavior-based competency assessment system[23,24] and creating a learner-centered Resident Assessment Facilitation Team (RAFT) to assist in educational planning and assessment.[25]

In our program, residents exercise autonomy by selecting their own advisors and participating in the assessment process. During one-on-one meetings, the advisor encourages the resident to reflect on faculty and patient feedback in determining competence in a variety of clinical and relational skills. Together, the advisor and resident create an educational SOAP (subjective, objective, assessment, plan)

note, based on the commonly used structure for clinical note-writing. This document – which contains the resident's self-assessments, feedback from faculty and patients, a summary of completed assignments, and a schedule of planned educational activities – serves as the agenda for the resident's individual assessment meeting. Including the resident in the RAFT conversation gives the resident a voice in the assessment process, enhances their sense of relatedness to the residency community and ensures that ownership of the educational journey remains with the individual.

The population of interest in this retrospective case study was 126 resident-semester data sets representing 34 residents enrolled from academic year 2009-10 through academic year 2011-12. We separated each academic year into 6-month periods, July through December (Fall semester) and January through June (Spring semester). Each resident-semester data set contained 3 component scores collected during the same 6-month period (see Table 1). Any resident-semesters for which we did not have all 3 component scores were excluded. Of the 126 possible data sets, 20 were excluded due to missing self-assessments and an additional 65 were excluded due to missing patient assessments. Thus, the sample analyzed in this study comprised 41 (32.5%) resident-semester data sets representing 19 (55.9% of population) unique residents from PGY1 (post-graduate year 1), PGY2 and PGY3 educational levels. Both the p^4 innovations project and the protocol for this targeted analysis of the data were approved by the LVHN institutional review board.

PROGRAM ASSESSMENT

Competency Assessment Criteria

The 3 component scores in each resident-semester unit included what we have named the Self score, the Faculty score, and the Patient score. The Residency's aforementioned observable behavior-based competency assessment system, from which the Faculty and Self scores were derived, were situated within a modified version of the Dreyfus model of skill acquisition.[26] The Dreyfus model labels learners' progression along a 5-level continuum – *Novice, Advanced Beginner, Competent, Proficient,* and *Expert*.

By 2008, the Dreyfus model was widely discussed as a useful model for resident education.[27] In addition, the Residency's application of this model was among the examples examined by the Accreditation Council for Graduate Medical Education and the American Board of Internal Medicine prior to the adoption of the Dreyfus framework for measuring internal medicine competency requirements.[28]

The Self score is the self-perceived RCC competency level the resident recorded on the SOAP note. In some instances, the SOAP note entry of the Self score was not clearly demarcated (e.g., notations of "Novice to Advanced Beginner" were common). In these cases, 2 of the authors (DK, SH) individually reviewed the narrative sections of the SOAP notes and determined the implicit score based on context. The infrequent disagreements were resolved through discussion.

The Faculty score was compiled from standardized assessment forms completed by clinical preceptors at inpatient and outpatient care sites where residents practiced. We have described our resident summative competency assessment system previously.[23,24] Faculty members assess whether site-specific (e.g., continuity care site or in-patient family medicine service) observable behaviors are present in resident interactions with patients during a defined period of observation. The observable behaviors correlate with family medicine competencies[23] at specific skill levels defined by the Dreyfus scale.[26] The Residency's system electronically compiled the frequency of these observations into a graphic tool (radar graph) usable for both formative and summative assessment.[24] A resident is considered to achieve competency at a particular Dreyfus level once the radar graph indicates he or she has been observed performing the related behaviors at least 80% of the times a faculty member has entered a score. The highest consecutive Dreyfus level for which a score of at least 80% is reached is the competency level at which a resident is categorized. (For example, if a resident is observed to perform *Novice* and *Advanced Beginner* behaviors >80% of the time, but *Competent* behaviors 78% of the time, she is categorized as *Advanced Beginner*.) It is important to note that a resident's PGY does not preclude him or her from achieving any level of competency, insofar as they meet the aforementioned criteria.

The Patient score comes from individuals who had clinical visits with residents at outpatient practice sites and completed the Consultation and Relational Empathy (CARE) instrument,[30] a validated tool that measures patient perceptions of how much a clinician understands the patient's health concerns and provides responsive care. Using the published normative values of the CARE instrument (See Table 1), the authors assigned Dreyfus scale levels to the established score ranges. The Dreyfus score assigned to the score range in which a resident's score fell became the Patient score for the analysis.

Operationalization of Self-Assessment Accuracy

Accurate self-assessment by the resident was operationalized as the alignment of the resident's determination of competency in RCC (Self score) with the perceptions of preceptors (Faculty score) and patients (Patient score). The Self, Faculty, and Patient scores for each data set were triangulated to determine whether they were "Concordant" or "Discordant" assessments of the resident's competency level for a specified period of time. When all 3 component sources agreed on a single Dreyfus level, the set was deemed "Concordant." Similarly, sets in which two sources aligned and the third was higher or lower by no more than 1 Dreyfus level were labeled "Concordant." All other combinations of scores were labeled "Discordant." Of particular interest was whether there was a pattern to the agreement or disagreement of the scores.

An analysis of the "Discordant" sets provided insight into this question. These cases were analyzed to determine which assessor (Self, Faculty, or Patient) deviated from the other two. Further context was added by indicating in which direction variation occurred (higher or lower on the Dreyfus scale) and which sources assigned the highest and lowest scores.

Findings

The results of the 40 resident-data sets were analyzed by educational level of the resident for whom the score set was collected. This yielded 3 comparable size groups (13 PGY1s, 12 PGY2s and 15 PGY3s). While 23.1% of the PGY1 subsample were "Concordant," 60.0% of the PGY3 data sets were

"Concordant." A much larger difference in Concordance rates existed between the PGY2 and PGY3 subgroups (33.3% vs. 60.0%) than between the PGY1 and PGY2 subgroups (23.1% vs. 33.3%).

In 62.5% of the "Discordant" data sets (see Table 2), all 3 sources placed the resident at different competency levels. (We labeled these cases as "Discordant-NA," or no agreement). In the remaining 37.5% of "Discordant" resident-semester cases, 2 sources agreed on a competency rating, but the third agreement between 2 sources with drastic disagreement from the third – the Patient score was most often disparate (77.8%) and the Self score accounted for the remaining discordance (22.2%). The Faculty score was never the standalone dissenter. A look at the direction of discordance revealed that in about half the "Discordant" cases (55.6%) the dissenting source rated the resident higher than the other 2, while in the remainder of cases (44.4%) the disparate source gave the resident a lower competency score. An even closer look at the pattern of discordance (see Table 3) revealed that the Self score fell in the middle of the other 2 scores in the majority (66.7%) of "Discordant-NA" data sets. There were no instances in which the Patient score fell between the other 2.

DISCUSSION

Our study used scores from multiple perspectives to quantify the ability of graduate medical learners at various stages of residency to assess their own competence in RCC. Using feedback from clinical preceptors, patients, and the residents themselves, our sample revealed a 61.5% higher concordance among PGY3s than among PGY1s. Even among the data sets whose component scores did not qualify them to be designated as "Concordant," an interesting pattern emerged. The majority of score sets categorized as "Discordant" saw all 3 assessment sources in disagreement (labeled as "Discordant-NA"). One interpretation of the large proportion of "Discordant-NA" results relates to the frequency with which the Self scores fell between the other 2 scores (66.7%). This might suggest that residents are internalizing the regular feedback they receive from preceptors and patients and developing the habit of triangulation as part of the self-assessment learning process.

Employing triangulation harkens to Schneider et al. who note that an "expert" [11 (p 18)] rater (in our case, a faculty member) provides a valuable measuring stick for accuracy of self-assessment. We added a third component—the perspective of the individuals most affected by the competency being evaluated (i.e., the patients). It is worth noting that the Patient score was the reason behind a vast majority of the "Discordant" categorizations, either because the Patient was the sole dissenter (29.17%) or all 3 assessment sources disagreed ("Discordant-NA," 62.5%). Mattheos et al.[31] underscores that the method of delivering assessment results largely determines the effectiveness of the feedback process. In our program, therefore, the residents' scores serve as conversation starters, as opposed to absolutes. The faculty and patient assessments provide the resident with reasonable expectations about their RCC performance. Our Residency emphasizes the dialogic nature of assessment by engaging learners in their own competency assessment process. High-trust advising relationships provide time and space for residents to reflect on the feedback and create meaning. However, the nature of residency as a high-stakes training experience necessary for board certification puts residents in a position of dependence upon the program and faculty members. This foundational hierarchy can lead to residents feeling minimal autonomy and relatedness, unintentionally impeding their desire and ability to become self-directed learners. Therefore, we intentionally designed and implemented a resident assessment system grounded in guided reflection within a longitudinal advisor structure to support the development[16] of intrinsic motivation, the capstone of a self-determined learner.[12] In addition, the Residency's culture of continuous improvement provides a model for intentional change that complements the process proposed by Sargeant et al.[9] for practicing physicians to engage in continuing professional development within the context of their daily practice.

Limitations

We recognize that measuring self-assessment is a complex task and that our study has limitations. Although the Residency gathers and reports faculty and patient feedback at standard intervals, the reality is that self-monitoring physicians gather feedback constantly through both formal and informal means.[18]

The sample size was restricted by the robust eligibility criteria for the resident-semester data sets, and therefore our results were not statistically significant. In addition, while the design and utilization of the Residency's competency-based assessment tool that the Faculty and Self scores are rooted in has been locally validated and published,[23,24] it has not been validated for generalizability outside the Residency.

This analysis focused on a single competency—relationship-centered care. It is unclear whether findings would be similar across other clinical competencies. As noted by Lipsett et al.,[20] contextual factors such as the specific skills assessed and learner ability level are likely to affect outcomes. Therefore, widening the scope to investigate resident self-assessment in other facets of clinical competency would help determine the generalizability of these results.

The Patient scores also have several inherent limitations: (1) the number of scores aggregated is inconsistent between residents, in particular because PGY1s have fewer patient encounters than later-year residents; (2) this data set assesses residents only in the outpatient setting, while the Self and Faculty scores also consider performance during inpatient care sessions; and (3) the CARE survey assesses a specific set of interactions that might occur during an office visit, while faculty and residents are likely to consider relationships on a more global scale and include higher-level interpersonal concepts, such as nonverbal signals or bidirectional communication, in their assessment of resident competency in RCC. And, as noted before, this group of scores tended to rate residents at the top or bottom of the competency scale, which meant more data sets were categorized as "Discordant." This might be attributed to patient ambivalence about taking surveys or variables in the patient experience (e.g., practices running behind schedule or distraction caused by illness symptoms) that confound the perception of resident empathy.

Finally, our analysis does not conclusively prove that the difference in self-assessment we report is a direct result of the interventions we describe to enact the principles of self-determination theory. This case report suggests better accuracy in self-assessment among senior residents than interns. Further

research is needed to demonstrate whether this occurred as a direct result of the SDT-based features of our program.

CONCLUSION

Mentoring learners to consider various perspectives by triangulating feedback from multiple sources will result in a deeper understanding of academic progress and help them create a more effective strategy for addressing learning needs. We suggest that the activated medical learner who hones self-assessment skills is essentially learning to take a holistic view of oneself (e.g., self-reflexivity), which is similar to the perspective shift required to achieve a therapeutic connection, or "health enhancing relationship,"[3 (p S7)] with patients. To illustrate this parallel for learners, the Residency utilizes multisource feedback process that adds the patient's voice to the self-assessment conversation. This case study is a first step toward a real-world method for measuring self-assessment longitudinally among those learning how to perform it. In addition, this study adds depth to the limited data pool and expands conceptual models about self-assessment by elucidating the value of guided reflection in developing self-directed learning competency.

ACKNOWLEDGMENTS

The authors thank Nyann Biery, MS, Beth Careyva, MD, Nicole Defenbaugh, PhD, Katarzyna Jabbour, PharmD, BCPS, Susan Mathieu, MD, Robert Motley, MD, and Jacqueline Grove for their insights and editorial assistance in creating this manuscript

REFERENCES

1. Institute of Medicine. *Crossing the Quality Chasm: A New Health System for the Twenty-first Century*. Washington DC: National Academies Press; 2001.
2. Berwick DM, Nolan TW, Whittington J. The triple aim: care, health, and cost. *Health Affairs* 2008;27:759-69.
3. Beach MC, Inui T, Relationship-Centered Care Research Network. Relationship-centered care: A constructive reframing. *Journal of General Internal Medicine* 2006;21:S3-8.
4. Suchman AL. A new theoretical foundation for relationship-centered care. Complex responsive processes of relating. *Journal of General Internal Medicine* 2006;21:S40-4.
5. Tresolini CP; Pew-Fetzer Task Force. *Health Professions Education and Relationship-centered Care*. San Francisco, CA: Pew Health Professions Commission, 1994.
6. Sargeant J, Armson H, Chesluk B, Dornan T, Eva K, Holmboe E, et al. The processes and dimensions of informed self-assessment: a conceptual model. *Academic Medicine* 2010;85:1212-20.
7. Schön DA. *The Reflective Practitioner, How Professionals Think in Action*. New York, NY: Basic Books, 1983.
8. Nicol DJ, Macfarlane-Dick D. Formative assessment and self-regulated learning: a model and seven principles of good feedback practice. *Studies in Higher Education* 2006;31:199-218.
9. Sargeant J, Bruce D, Campbell CM. Practicing physicians' needs for assessment and feedback as part of professional development. *The Journal of Continuing Education in the Health Professions* 2013;33: S54-62.
10. Davis DA, Mazmanian PE, Fordis M, Van Harrison R, Thorpe KE, Perrier L. Accuracy of physician self-assessment compared with observed measures of competence: a systematic review. *JAMA* 2006;296:1094-1102.

11. Schneider JR, Verta MJ Jr, Ryan ER, Corcoran JF, DaRosa DA. Patient assessment and management examination: lack of correlation between faculty assessment and resident self-assessment. *American Journal of Surgery* 2008;195:16-9.
12. Brydges R, Butler D. A reflective analysis of medical education research on self-regulation in learning and practice. *Medical Education* 2012;46:71-9.
13. Kursurkar R, ten Cate O. Education is not filling a bucket, but lighting a fire: self-determination theory and motivation in medical students. *Academic Medicine* 2013;88:904.
14. Schumacher DJ, Englander R, Carraccio C. Developing the master learner: Applying learning theory to the learner, the teacher and the learning environment. *Academic Medicine* 2013;88:1635-45.
15. Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development and well-being. *American Psychologist* 2000;55:68-78.
16. Nothnagle NM, Anandarajah G, Goldman RE, Reis S. Struggling to be self-directed: residents' paradoxical beliefs about learning. *Academic Medicine* 2011;86:1539-44.
17. Sargeant J, Eva KW, Armson H, Chesluk B, Dornan T, Holmboe E, et al. Features of assessment learners use to make informed self-assessments of clinical performance. *Medical Education* 2011;45:636-47.
18. Eva KW, Regehr G. Exploring the divergence between self-assessment and self-monitoring. *Advances in Health Sciences Education* 2011;16:311-29.
19. Perera J, Mohamadou G, Kaur S. The use of objective structured self-assessment and peer-feedback (OSSP) for learning communication skills: evaluation using a controlled trial. *Advances in Health Sciences Education* 2010;15:185-93.
20. Lipsett PA, Harris I, Downing S. Resident self-other assessor agreement: influence of assessor, competency, and performance level. *Archives of Surgery* 2011;146:901-6.

21. Duffy F, Holmboe ES. Self-assessment in Lifelong Learning and Improving Performance in Practice: Physician Know Thyself. *JAMA.* 2006;296(9):1137-1139. doi:10.1001/jama.296.9.1137.
22. Green LA, Jones SM, Fetter G Jr, Pugno PA. Preparing the personal physician for practice: changing family medicine residency training to enable new model practice. *Academic Medicine* 2007;82:1220-7.
23. Baglia J, Foster E, Dostal J, Keister D, Biery N, Larson D. Generating developmentally appropriate competency assessment at a family medicine residency. *Family Medicine* 2011;43:90-8.
24. Keister DM, Larson D, Dostal J, Baglia J. The radar graph: the development of an educational tool to demonstrate resident competency. *Journal of Graduate Medical Education* 2012;4:220-6.
25. Foster E, Biery N, Dostal J, Larson D. RAFT (Resident Assessment Facilitation Team): supporting resident well-being through an integrated advising and assessment process. *Family Medicine* 2012;44:731-4.
26. Dreyfus HL, Dreyfus SE, Athanasiou T. *Mind Over Machine: The Power of Human Intuition and Expertise in the Era of the Computer*. New York, NY: Free Press, 1986.
27. Carraccio CL, Benson BJ, Nixon LJ, Derstine PL. From the educational bench to the clinical bedside: translating the Dreyfus developmental model to the learning of clinical skills. *Academic Medicine* 2008;83:761-7.
28. Green ML, Aagaard EM, Caverzagie KJ, Chick DA, Holmboe E, Kane G, et al. Charting the road to competence: developmental milestones for internal medicine residency training. *Journal of Graduate Medical Education* 2009;1:5-20.

29. University of Glasgow Institute of Health and Wellbeing website, 2006. www.gla.ac.uk/researchinstitutes/healthwellbeing/research/generalpractice/caremeasure/values/. Accessed April 23, 2015.
30. Mercer SW, McConnachie A, Maxwell M, Heaney D, Watt GC. Relevance and practical use of the Consultation and Relational Empathy (CARE) Measure in general practice. *Family Practice* 2005;22:328-34.
31. Mattheos N, Nattestad A, Falk-Nilsson E, Attstrom R. The interactive examination: assessing students' self-assessment ability. *Medical Education* 2004;38:378-89.

TABLE 1
Components of triangulated data set per resident-semester[a]

Assessor	Data Source	Inclusion/ Exclusion Criteria	Operationalization process
Resident (Self score)	Standardized educational SOAP note completed by residents before RAFT meetings	Explicitly or implicitly stated Dreyfus level[b] included for RCC competency	Resident assigns self a Dreyfus level score using a table attached to the standardized SOAP note form as a reference.
Faculty (Faculty score)	Residency's competency-based assessment forms	Faculty assessment data for RCC competency available at every Dreyfus level.	Clinical preceptor records whether resident was "observed" or "not observed" performing each behavior on assessment form. Each behavior is associated with a specific Dreyfus level of RCC competency. Researchers aggregated "observed" scores at each Dreyfus level. Threshold percentages of "observed" behaviors at each Dreyfus level were calculated based on the entire population of residents. The highest Dreyfus level achieved by a resident was used as the Faculty score for that time period.
Patient (Patient score)	Consultation and Relational Empathy instrument (CARE)[d]	Minimum of 5 completed CARE surveys	Using the published normative values of the validated CARE instrument, researchers correlated Dreyfus levels to each score range (0-41.6 *Novice*; 41.7-42.8 *Advanced Beginner*; 42.9-44.9 *Competent*; 45.0-50.0 *Proficient*). Researchers calculated resident's average CARE score and assigned correlating Dreyfus level as the Patient score.

[a] "Semesters" for this study are Fall (July-December) and Spring (January-June) of a given academic year. All criteria for each data source had to be met for resident data set in a particular Semester to be included in the study sample.
[b] (Dreyfus et al. 1986) Dreyfus levels are considered to be along a continuum, so a subsequent level may not be achieved until threshold of previous level is met.
[d] (Mercer et al. 2005)

TABLE 2
Discordance analysis

Determining Factor	Frequency (N=24)	Occurrence Rate
Self Higher	1	4.17%
Self Lower	1	4.17%
Total Self	**2**	**8.33%**
Faculty Higher	0	0.00%
Faculty Lower	0	0.00%
Total Faculty	**0**	**0.00%**
Patient Higher	4	16.67%
Patient Lower	3	12.50%
Total Patient	**7**	**29.17%**
NA*	**15**	**62.50%**

*NA: None of the 3 assessment sources placed resident at same competency level

TABLE 3
Discordant-NA*—which data source is in the middle?

Source	N	%
Self	10	66.67%
Faculty	5	33.33%
Patient	0	0.00%
Total NA	**15**	**100.0%**

* "Discordant-NA" indicates that there was no agreement among the 3 data sources.