

Development of a Tool to Assess the Team Leadership Skills of Medical Residents

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Abstract

Purpose: To develop a tool to assess the team leadership skills of internal medicine residents.

Method: A 27-item pilot instrument developed by two authors was distributed to interns on ward and intensive care unit teams at the end of rotations from a single institution's internal medicine residency program. These items were factor analyzed and reduced to a seven-item resident leadership scale (RLS). Validity of the instrument was assessed by comparing the rating on the RLS to scores on a validated measure of teaching skills provided at the same time and by the program director's global rating of team leadership skill for each resident at the completion of data collection.

Results: The three principal components from the factor analysis explained 82 percent of the variance. By introspection we reduced the scale to the final 7-item RLS that had a Cronbach alpha reliability estimate of 0.95. 490 ratings on 134 individual residents were available for analysis. The RLS scores correlated highly with both the validated measure of teaching skill and the program director's ratings.

Conclusion: The RLS has robust psychometric properties. It may provide a useful tool for a broader assessment of trainee skill if validated in other settings.

Keywords: graduate medical education, management, leadership, assessment

The organizational structure of most internal medicine training programs places PGY2 and PGY3 medical residents in the position of leading a team of junior trainees during their ward and intensive care unit rotations. Many programs have incorporated teacher training into their curriculum.¹ These programs have demonstrated effectiveness through improved teaching evaluations by more junior trainees²⁻⁵ or assessment of teaching skills through objective structured teaching exercises (OSTEs).⁶ Some training programs, including those at Boston University and the University of Washington, have incorporated some aspect of team leadership / management training into the curriculum for their housestaff.

The skills necessary to be an effective team leader on a medical ward or intensive care unit medicine team fall more aptly into a construct of team management, but we retain the term team leader because it is common within the training environment. In fact, the Accreditation Council for Graduate Medical Education (ACGME) mandates programs to increase residents' leadership and administrative roles with each successive year of training.⁷

During the 1995-1996 academic year, a 7-session 10 hour curriculum called the Resident Teaching and Leadership Curriculum was developed for the Boston University residency in medicine program. This curriculum

uses short didactics, group discussion, trigger tapes and role-play to introduce and work with material related to team organization, team management, one-on-one interactions, and small group teaching. The curriculum was based upon one developed at the University of Washington² that was modified by a group of 18 Boston University faculty in the Department of Medicine over the year. The faculty developed the material through a process of Task Analysis⁸ of the PGY-2 and PGY-3 residents during ward and intensive care units in our program. This curriculum was then implemented during the 1996-1997 academic year.

We have not been able to identify an instrument in the literature that assesses the team management skills of residents. Hence our objective was to develop a tool to assess the skills of residents as they pertain to running an in-patient team. Our goal was to create a form that was simple and easily transportable to other postgraduate medical education environments while demonstrating its reliability and validity in our program.

Methods

Two of us (JDO, JEW) have administrative roles in our respective residency programs and helped develop our institutions' Teaching and Leadership curricula. Through open discussion and review of our curricula we generated an initial list of items by which a medical intern could assess the leadership skill of his/her resident. The Resident Leadership Scale (RLS) is focused on those issues directly related to managing a ward or intensive care unit team, such as time management, setting expectations, organization of work rounds, communication among team members, etc. We consulted with fellow program directors and key teaching faculty for their expert opinion in an iterative process before agreeing on a 27-item pilot questionnaire. Interns were asked to rate their resident on each item using a 6-point Likert scale, from 6= Excellent, to 1= Very Poor. Our *a priori* goal was to reduce the number of questions to 10 or fewer items so that the final instrument would have an acceptable subject burden. Since we could not determine in advance if the interns would interpret the questions as the faculty did, we built redundancy into the pilot instrument by purposefully including multiple questions that addressed similar skills. We then used factor analysis to identify redundant questions while assuring that key constructs were included in the final instrument.

Medical chief residents in the Boston University Residency Program in Medicine were asked to distribute evaluation forms to medical interns at the end of each ward and unit rotation. Housestaff were informed that the

evaluation was part of a study to assess our own Teaching and Leadership Curriculum and was not to be used as part of the program's evaluation of resident performance. Data collection occurred from May of 1995 through June of 1998.

We assessed several aspects of validity. We measured the correlation between teaching skills and team leadership using a validated measure of teaching assessment, the Clinical Teaching Assessment Form (CTAF), a 10 item instrument developed by Irby.^{9,10} Also, the Residency Program Director rated all PGY-2 and -3 residents in the training program during the period of study for leadership skill on a single global item taken from the RLS. We then compared the RLS results with the Program Director's ratings.

A principal components factor analysis with varimax rotation using the mineigen criterion and internal reliability testing were conducted on the pilot data using SAS statistical software. The first 81 forms collected were analyzed in order to reduce the number of questions. Items loading on the same factor with similar eigenvalues were considered potentially interchangeable. The authors selected among these psychometrically similar questions by identifying those that used the clearest wording. The resulting version of the RLS had 7 items. The RLS and the 10-item CTAF fit together on one side of a page, illustrating their minimal subject burden. Final analyses were completed using SPSS.

Validity was assessed in two ways. We correlated the residency program director's leadership rating of each resident with the RLS scores. We also compared scores on the RLS with the CTAF. For the latter we hypothesized that effective teachers and team leaders would share skill in organization and elocution and that, even though teaching and management skills do differ, there would be a high correlation of ratings of successful teachers and effective team leaders. We also performed correlations between our various scales and global items from the RLS and the CTAF.

At the time these data were collected, the project was considered a training program evaluation / management project and IRB approval was not sought.

Results

The results of the factor analysis of the pilot questionnaires identified three factors that we labeled Supervisory/Task Manager, Advocacy/Interpersonal, and Attending Interactions. The first three principal components had respective eigenvalues of 18.6, 2.2, and 1.3 accounting

Table 1 Factor loadings after varimax rotation and means of the 27 item pilot questions used in the Resident Leadership Scale.

Question	Item	Factors			Mean* (SD)
		Supervisory/ Task Manager	Advocacy/ Interpersonal	Attending Interaction	
1.	Adequately oriented me to the rotation	0.49324	0.42557	0.59144	4.57 (1.17)
2.	Clarified roles and expectations	0.49976	0.41852	0.55189	4.61 (1.20)
3.	Effectively ran work rounds	0.78283	0.07264	0.48591	4.87 (1.19)
4.	Managed time well on work rounds	0.84756	0.25436	0.29420	4.70 (1.29)
5.	Developed a clear plan for each patient on work rounds	0.86326	0.19092	0.27264	5.00 (1.15)
6.	Team members knew what was expected of them on work rounds	0.69445	0.35613	0.25325	5.01 (1.06)
7.	Appropriately supervised patient care	0.81229	0.45208	0.10552	4.99 (1.15)
8.	Delegated patient care tasks with follow-up	0.80818	0.38618	0.11582	4.99 (1.01)
9.	Invited ideas and opinions of team members	-0.05583	0.66363	0.62937	4.87 (1.19)
10.	Determined my understanding about each case	0.58249	0.70463	0.08251	4.65 (1.34)
11.	Gave me adequate independence and level of responsibility	0.14104	0.88385	0.08160	5.13 (1.07)
12.	Actively sought participation of team members	0.26633	0.75702	0.48207	5.00 (1.17)
13.	Able to get the team to work well together throughout the day	0.55965	0.57788	0.36377	4.86 (1.17)
14.	Created a good sense of open communication on our team	0.24169	0.84281	0.36125	4.86 (1.24)
15.	Created positive team morale	0.47881	0.72177	0.20101	4.76 (1.34)
16.	made the work enjoyable	0.55390	0.71210	0.19800	4.78 (1.32)
17.	helped me to “learn the system” on this rotation	0.60306	0.59200	0.36096	4.60 (1.26)
18.	Helped me to cope with my frustrations on this rotation	0.44989	0.76537	0.20983	4.46 (1.51)
19.	Effectively resolved team conflicts	0.41970	0.69456	0.43573	4.57 (1.37)
20.	Directed the attending physician regarding which patients to discuss and visit as a team	0.68404	0.25259	0.60257	4.90 (1.16)
21.	Focused the attending on relevant issues	0.59085	0.14763	0.71158	5.01 (1.04)
22.	Discussed mundane follow-up items with the attending outside of rounds	0.69000	0.33737	0.37638	4.91 (1.08)
23.	Worked with the attending to make rounds a valuable learning experience	0.30976	0.24429	0.73348	4.79 (1.21)
24.	Advocated for the team effectively with consultants, nurses, and others	0.66233	0.32788	0.44954	4.86 (1.24)
25.	Provided me with ongoing feedback about my performance	0.48653	0.54522	0.52959	4.38 (1.44)
26.	Summarized my performance at the end of the rotation.	0.65922	0.45264	0.42445	4.69 (1.35)
27.	Overall Leadership effectiveness	0.81745	0.35440	0.28729	4.86 (1.31)

All questions were answered on a six point Likert scale: 6= Excellent, 5= Very Good, 4=Good, 3= Fair, 2= Poor, 1= Very Poor
Bolded loadings indicate the question that was used in the factor.

for 82% of the total variation. The remaining eigenvalues were less than 0.8. Table 1 lists all initial question and factor loadings with means and standard deviations for each question in the pilot. Of the three factors listed above, Supervisory/Task Manager explained the largest variance in scores with Attending Interactions the least. We selected two questions from each factor based on our perception of the clarity of wording and included a single global rating question for a final 7-item RLS. Cronbach's alpha for the entire 27-item scale was 0.98, which was reduced to 0.94 in the final 7-item version.

An additional 409 evaluations were completed that included both the 7-item RLS and the CTAF. These represented the evaluation of 134 individual residents. There were from 1 to 7 separate evaluations per resident from trainees, plus the program director's evaluation.

Mean RLS scores were 5.12 +/- 0.717. The RLS mean score had a Pearson correlation coefficient of 0.90 with the single global item in the scale, "overall leadership effectiveness". The RLS mean score had a Pearson correlation coefficient of 0.87 with the CTAF mean score.

The interns' rating of resident team leadership was higher

based on an RLS mean (5.12 +/- 0.717) than the program director's rating (4.29 +/- 1.06). As evidenced by the smaller standard deviation, trainees tended to utilize the higher ratings almost exclusively, whereas the program director used a wider distribution of scores in his assessment. For the RLS mean score and the program director's rating, the Pearson correlation coefficient was 0.45.

When individual items on the RLS and CTAF were correlated with total scores for these scales, all correlation coefficients were greater than 0.80. Cronbach's alpha for the RLS was 0.95 and 0.97 for the CTAF.

Discussion

The RLS appears to be reliable for use by medical interns to assess the ability of their ward or unit resident to manage and lead the team. We consider the RLS to be valid because it correlated strongly, albeit not perfectly, with both a validated teaching skill assessment made by the same evaluators and with an independent measure provided by the residency program director. Both teaching and team leadership and management require skills in elocution and organization of thought, hence we predicted a strong correlation between these factors. The RLS

Table 2
Evaluation of Resident Leadership Skills

1. Clarified roles and expectations
2. Effectively ran works rounds
3. Created a good sense of open communication on our team
4. Directed the attending physician regarding which patients to discuss and visit as a team
5. Focused the attending on relevant issues
6. Advocated for the team effectively with consultants, nurses, and others
7. Overall leadership effectiveness

Clinical Teaching Assessment Form

1. Knowledgeable and analytical
2. Clear and organized
3. Enthusiastic and stimulating
4. Established rapport
5. Actively involved me in the learning process
6. Provide feedback and direction
7. Demonstrated clinical skills and procedures
8. Was accessible
9. Overall teaching effectiveness
10. Your involvement with the instructor

All questions were answered on a six point Likert scale: 6= Excellent, 5= Very Good, 4=Good, 3= Fair, 2= Poor, 1= Very Poor except #10 on the CTAF, Involvement, which used four categories: Extensive, Considerable, Moderate, Slight

is short, simply stated, and has face validity. Therefore it should be easily transportable to other environments and institutions.

Effective and efficient team management by a resident enhances the supervision of clinicians at the start of their post-graduate training. Assessment of such skill in residents can provide rapid and useful feedback which can then, in turn, be used to improve training. It may help program directors provide appropriate career guidance and/or select graduates for post-residency positions. The RLS would also provide training programs with an additional assessment related to two core competencies required to be taught and assessed by ACGME (Accreditation Council of Graduate Medical Education): Interpersonal and Communication Skills and Systems Based Care. Effective team management relates to each of these competencies and, when the evaluation is completed by a student or intern, it aspires towards the 360° multi-rater system the ACGME recommends for resident evaluation systems.¹¹

Given its use in only one institution and only on one medical service, the generalizability of the results may be limited. Ward and unit team leadership skills might only reflect organizational and management skills in these settings and not translate to other managerial situations. Inexperienced trainees such as interns and students, who are not trained evaluators, might be unable to discriminate team management skills from any other resident characteristic in the evaluation process. The fact that interns used a narrower spectrum of scores in the scale when assessing the skills of their residents compared to the program director likely reflects lack of experience, breadth of exposure to the spectrum of skills, and/or need for training in evaluation. The ratio of items to sample size of our pilot analysis was suboptimal, potentially impacting the reliability of the instrument. However, the similarity of factor loadings and face validity of question wording led us to decide we could adequately reduce the number of questions in the instrument at that time. Lastly, our data collection began over 10 years ago. However, we do not believe that the nature of training, resident responsibilities or the constructs we are measuring have changed in the intervening time period. In fact, while we annually assess our resident teaching and leadership curriculum, we have not changed the content of any of the sessions addressing the management issues that the RLS assesses.

Despite these potential concerns, the psychometric properties of the RLS and its validity warrant further consideration of the scale's utility. We offer the RLS for use with other groups of trainees in various disciplines.

Further validation of its utility may prove it to be a useful tool for program directors and section heads looking for a broader assessment of trainee skill.

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