

ResEval: A Web-based Evaluation System for Internal Medicine House Staff

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ABSTRACT

The evaluation and assessment of physicians-in-training (house staff) is a complex task. Residency training programs are under increasing pressure [1] to provide accurate and comprehensive evaluations of performance of resident physicians [2,3]. For many years, the Internal Medicine training program at NYU School of Medicine used a single standardized paper form for all evaluation scenarios. This strategy was inadequate as physicians train in multiple diverse settings; evaluation of physicians in the intensive care unit is quite different from those in the general clinics. The paper system resulted in poor compliance by house staff and faculty in the completion of evaluations. In addition, the data being collected from the paper forms was of poor quality due to the non-specific nature of the questions. A committee was formed in 2001, which created a new strategy for evaluating the core competencies of house staff. Given the ubiquity of web accessible computers in the clinical and non-clinical areas of hospitals and the flexibility a computerized system would provide, a web-based evaluation system was designed and implemented. This system allows for on-the-spot evaluations tailored to the evaluator, evaluatee and the venue of the evaluation. During the 2002 residency year, data was collected on satisfaction and use of the system and compared with the previous paper evaluations.

Categories and Subject Descriptors

J.1 [Administrative Data Processing]: Education – *Python, Oracle, Web, HTML, measurement.*

General Terms

Management, Measurement, Documentation, Performance, Standardization, Verification.

Keywords

Education, Medicine, Evaluations, Web, HTML, Python, Oracle, Assessment, house staff

1. Introduction

Internal Medicine residency training programs, which are governed by the Accreditation Council for Graduate Medical Education (ACGME) and the Residency Review Committees (RRC), have been charged with improving the methods used to assess skills in core competency areas and the analysis and reporting of these evaluations [1,2,3]. For many years, our

training program at NYU School of Medicine has used a generic paper form to evaluate resident physicians-in-training (house staff). This single form was used for all evaluations regardless of the diverse settings in which assessments took place (such as the intensive care unit, inpatient wards, and outpatient clinics). The paper forms were inflexible and often failed to match the specific skills being observed. The paper system was also difficult to administer to physicians working in our hospitals throughout midtown Manhattan.

A committee that represented the leadership and key stakeholders of the training program formed in 2001 to review the core areas of assessment for the house staff. These areas included Clinical Interviewing, Physical Examination, Oral Case Presentations, Differential Diagnosis, Interpretation of Data, Diagnostic Plans, Therapeutic Plans, Teaching Skills, Procedures, and Professionalism. For each area, new competencies and evaluation measures were drafted and combined into a new, significantly more complex evaluation system. This system was focused on providing more formative feedback to house staff and the training program. In order to implement this complex, decentralized system, a new web-based evaluation application was created.

2. Design Objectives

The complexities of the evaluation process represented a significant challenge when designing the interface and architecture of this system. The initial efforts at developing this solution focused on the user interface. Given our training program's lack of experience with implementing systems such as this, a high-degree of modularity and flexibility was needed in the initial design. Many of the computers throughout the hospital are extremely old and we aimed to design a system that has very low system requirements for end user's. The evaluation application was also required to work with existing systems in place at our hospitals.

Like many large applications, it was assumed that future features would need to be added later, so a highly modular approach was used. This approach focused on the core areas of assessment as listed above. Each of these core areas would represent a module of questions, any of which could be applied to a specific venue's evaluations as appropriate. Key design criteria for the system, were easy access to perform and view evaluation data, cross-campus access to all data (across firewalls), ease of support of end users, low requirements for technically trained staff for creating and editing new modules and low end user system requirements. Computers with web access are ubiquitous across all locations of the medical center as well as at home for the staff, so a web-based interface was designed, and built into the system. The resulting application is called ResEval (Resident Evaluation).

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2.1 System Description

For maximum flexibility, a hierarchical design was implemented for evaluations. The primary unit of an evaluation is a question, which could be asked differently for different training levels automatically, as well as be of various types of questions (multiple-choice, Below/Meets/Exceed/NA, numeric range, free text, object lists). These questions are added into reusable modules, which are added to any observation setting (venue) where they apply.

These modules were built into an adaptive web-based system designed by the authors. The system was constructed using the Python programming language [4] and an Oracle database [5]. All development uses an open source approach. Making this system efficient is the use of a simple rules-based user model to automatically build an appropriate evaluation form from the available modules, on-the-fly, based on the level of training of the evaluator and evaluatee and the type of assessment. After logging into the system, an evaluator selects a house staff to evaluate. The system is aware of the training level of both of these individuals and presents the evaluator a filtered list of evaluation forms that are appropriate to their relationship. Though the resulting forms vary significantly, the data collected is module based and easily pooled for analysis and summary. The flexibility of this new approach allows for the easy addition of new modules, venues, or evaluators (i.e. patients, nurses, students) as the need arises.

Clinical skills assessment reports are generated, and analysis can be done, for all users of the system including the evaluators, evaluatees, and program directors. The system is designed to protect the confidentiality of all users where appropriate. The reports are customizable and we have chosen three levels of decreasing granularity: module based review, question based review, and individual evaluation based review. The program directors are presented with the coarse summary first (module based review) and have the ability to 'drill down' to more detailed results. Not only does this allow for more efficient assessment, but also for trends over time and comparison to peer performance [6]. The new data gives us a much better sense of whether a house officer is meeting or exceeding the expected level of performance for their degree of training and how they compare to their peers.

3. Status Report

During the first year of use, 731 evaluations were performed using the ResEval system. Yearly satisfaction surveys of house staff reveal that their subjective rating of the overall evaluation system increased significantly on a scale of one to seven from 2.49 in 2001 (using the paper system) to 4.02 in 2002 (using ResEval, $p < 0.001$).

The culture of evaluation on the medicine wards proved to be perhaps the single largest barrier to the deployment of ResEval. Our previous system of evaluations consisted of comprehensive summative evaluations usually performed on the last day of the rotation rather than more frequent focused evaluations. Despite repeated reinforcement, we found that all evaluators (house staff, chief residents, and faculty) continued to complete only the end of the rotation evaluation when using the ResEval system.

We are increasing the number of non-clinical workstations available to house staff and faculty and are developing a handheld version of ResEval. We hope that this will allow faculty and house staff to enter evaluations at the moment of observation, minimize the impact on work flow, and capture impressions that don't rely on recall. We are also developing an application that will automatically send email reminders to house staff and faculty to prompt them to complete evaluations. This approach has proven successful in other similar projects [7,8].

Changing the culture of evaluation and observation is a challenging task. Additional large-scale faculty development is planned to encourage faculty to use all opportunities to make accurate observations and provide effective feedback to trainees. Faculty and house staff that use this system as it is intended will have to devote more time to evaluation completion during routine daily activities. The power of this system currently lies in its potential. The ability of house staff and program directors to capitalize on real-time formative feedback, track changes over time, and view performance relative to a peer group is extremely powerful. This system provides rich data for analysis by the program on both evaluation content but also compliance data and the results of formative feedback. Ultimately this system will be made available to all GME and UME programs at our institution and elsewhere.

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