

Evaluation of Radiology Teachers' Performance and Identification of the "Best Teachers" in a Residency Program: Mixed Methodology and Pilot Study of the MEDUC-RX32 Questionnaire

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Rationale and Objectives: Radiology teachers are well trained in their specialty; however, when working in academic institutions, faculty development and promotion through the education pathway tends to be based on their teaching knowledge and skills. The aim of this study is to assess psychometric properties of the Medicina Universidad Católica—Radiology 32 items (MEDUC-RX32), an instrument designed to evaluate the performance of postgraduate radiology teachers and to identify the best teachers.

Materials and Methods: Mixed methodology was used, including qualitative and quantitative phases. The psychometric properties of the MEDUC-RX32 survey were performed by factor analysis (validity), Cronbach alpha coefficient, and G coefficient (reliability). The residents assessed their teachers and simultaneously voted for the "best teacher," which was used as a gold standard for the receiver operating characteristic curves construction comparing their votes with the global score.

Results: A total of 28 residents answered 164 surveys. The global score was 6.23 ± 0.8 (scale from 1 to 7). The factor analysis showed six domains of the resident's perception: (1) tutorial teaching, feedback, and independent learning; (2) communication and teamwork; (3) learning objectives; (4) respectful behavior; (5) radiological report; and (6) teaching and care support. The tutor's strengths were related with respectful behavior and teamwork. The instrument is highly reliable with a Cronbach alpha of 0.937 and a G coefficient of 0.831 (with a minimum of 8 residents). The MEDUC-RX32 instrument has a sensitivity of 91.7% and specificity of 83.3% to identify tutors as best teachers with at least one vote with an area under the receiver operating characteristic curve of 0.931 with a cutoff of 5.94.

Conclusions: The MEDUC-RX32 instrument is a multidimensional, valid, and highly reliable method to evaluate radiology teachers, identifying teachers with excellence in tutorial teaching in a postgraduate radiology program.

Key Words: Medical education; postgraduate; feedback; teacher assessment.

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INTRODUCTION

Performance assessment of medical teachers constitutes an important tool in medical education. There are several instruments for clinical teacher evaluation, which includes the assessment of skills as curriculum planner, facilitator, and resource developer (1–6). The *Maastricht Clinical Teaching Questionnaire* is considered the most methodologically rigorous questionnaire in terms of its development and psychometric validation, and it is oriented to in-hospital teaching (1). Other tools include the *Student Evaluation of Teaching in Outpatient Clinics* (2), focused on postgraduate ambulatory teaching, the *Stanford Faculty Development Program* questionnaire (3), and the *University of Michigan Global Rating Scale* (4). There are also two questionnaires developed in our institution: *Medicina Universidad Católica—30 items* (MEDUC-30) and *Medicina Universidad Católica—Postgraduate 14* (MEDUC-PG14) for assessment of undergraduate and postgraduate clinical teachers, respectively (6,7).

Despite the quality of work being performed in the setting of faculty evaluation in postgraduate specialties, as far as we know, there is no valid instrument available with this objective in the radiology field. In fact, the attributes related to “best teachers” are not established in radiology education yet. Therefore, a multidisciplinary working group was established to design and test an instrument (*Medicina Universidad Católica—Radiology 32 items* [MEDUC-RX32]) to assess radiology faculty teaching performance in the postgraduate setting (8).

In order to have good medical teachers able to meet the current demands of patients, students, and those of the system, a faculty development program is imperative (9). Teaching is not just providing information, it involves a process that requires support (10). In the same context, it has been proved that feedback is probably the most powerful tool to improve teaching and learning (11–13). Therefore, residency programs should include different strategies to obtain the benefits from feedback. Hence, the MEDUC-RX32 questionnaire could be useful to improve residency programs in radiology.

The MEDUC-RX32 instrument reflects some features of radiology teaching that make it unique in the context of medical teaching. In this speciality, the clinical encounter between teacher and student mainly occurs during the film reading and reporting sessions and, to a lesser degree, during the performance of image-guided procedures or examinations (ie, fluoroscopy or ultrasound) on patients. There are also other instances of the teaching process as on-call duties, clinical cases rounds, and interdisciplinary collaborative meetings with other departments. Therefore, this questionnaire collects students’ opinions and perceptions about their teachers’ performance, which constitutes valid and reliable information, allowing teachers or the institution to improve teaching quality through faculty development (1,4,14–17).

The aim of this study is to assess psychometric properties of the MEDUC-RX32 questionnaire, including validity and reliability, and if this tool has the capability to identify the best teachers of radiology.

METHODS

Qualitative and Quantitative (Mixed) Research Methodology

The MEDUC-RX32 questionnaire was developed in a four-stage process that included grounded theory, educational research panel analysis, Delphi technique radiology expert panel to identify consensus, and a pilot study.

Stage 1: Two focus groups were organized including residents and teachers of radiology (Latin-American Spanish speakers) from Pontificia Universidad Católica Medical School. The information obtained from teachers and residents was analyzed with ATLAS.ti software in order to (1) identify aspects related to Postgraduate Radiology Teachers (grounded theory) which was used to generate a list of items to create the questionnaire (8) and (2) identify the “best radiology teachers’ attributes” from the perspective of teachers and residents (data triangulation) (18).

Stage 2: The results were analyzed by a panel of medical educators, the Radiology Residency Program Director and experts in qualitative and quantitative research. Fifty-seven items were considered important by the panel (>3 points in a 0–4 Likert scale) and then were offered in the first round to a National Delphi panel of 34 radiology experts. They were experts in their field at the national level, including program directors of residency radiology programs in Chile. We also included an expert from Canada (pediatric interventional radiologist), and two of them had a diploma or master’s degree in medical education. In the second round, the Delphi panel reduced the number of important items to 32 items.

Stage 3: The 32-item questionnaire was then piloted with 28 residents in a total of 55 surveys. The refined version of the MEDUC-RX32 consists of 32 items with each one of them scored on a five-point Likert scale, where 4 = Strongly agree, 3 = Agree, 2 = Unsure, 1 = Disagree, and 0 = Strongly disagree (Fig 1). Hence, higher scores correspond to more positive result. The details of the stages related to the development of the MEDUC-RX32 questionnaire are published elsewhere (8).

Stage 4: The questionnaire was applied to radiology residents (students) to evaluate their teachers in a scale from 1 to 7, where 1 = Very poor; 2 = Poor; 3 = Below average; 4 = Average; 5 = Above Average; 6 = Good; and 7 = Very good/Outstanding. The final analysis was made with the information given by the residents (Table 1).

Subjects and Procedure

This study was approved by the Research Ethics Board of our institution. Answering the questionnaire was considered as giving consent to participate and the results were anonymous. The questionnaire was applied to residents of the radiology postgraduate program at the Pontificia Universidad

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