# Videoconferencing of a National Program for Residents on Evidence-Based Practice: Early Performance Evaluation

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**Purpose:** The aim of this study was to evaluate the effectiveness of the medium of videoconferencing for the delivery of a course for radiology residents in practice-based learning (PBL), including evidence-based practice, at centers geographically separated from the principal teaching site.

**Materials and Methods:** Twenty-one participants (second-year radiology residents) at 8 centers in a radiology training program were included. The course in PBL was delivered over 16 weekly 1-hour sessions. There were 8 local education site coordinators (staff radiologists), who had completed an intensive 1-day course at the principal teaching site. The host site was linked to the participant sites using videoconferencing technology. Course evaluation included 1) a 5-point Likert-type scale and an open-ended evaluation questionnaire midway through the course (week 8) and a summation questionnaire after its completion (week 16) and 2) a consultation forum held during the penultimate session. The data responses to the questionnaires were entered in a spreadsheet, and the data were analyzed. Qualitative data were manually coded and analyzed for common themes. Descriptive statistical analyses were performed.

**Results:** Eighty-five percent of evaluation questionnaires and 53% of summation questionnaires were returned. The overall satisfaction of the participants with course content was high, with median rating of 4 on the 5-point scale. All participants agreed that videoconferencing as a medium did not hinder adequate discussion among centers and worked well as an interactive teaching method (median, 4). Local coordinators were satisfied with local technical support and training (median, 4), and overall, the module was rated highly, with ratings of 4 from both residents and local coordinators. Seventy-one percent of residents and 86% of local coordinators reported that they would have been unable to participate in the course without videoconferencing. All participants completed the course requirements satisfactorily. The overall rating of audio quality was good (median, 4), but there was dissatisfaction with the quality of the visual aids used. Comments reflected a desire for a shorter, more condensed course; improvement of the quality of visual aids; and more emphasis on research appraisal.

**Conclusion:** Although videoconferencing is a valuable educational tool and works well as a didactic teaching method, challenges with interactive discussion between centers require further exploration. This technology allows the inclusion of trainers and trainees who may otherwise be unable to participate. In multicenter programs, this can be fundamental to the feasibility and sustainability of educational programs in newer competencies, for which a lack of a critical mass of educators and students can be problematic for individual centers.

**Key Words:** Videoconferencing, education, resident training, practice-based learning, evidence-based practice

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## INTRODUCTION

Medical education, including continuing medical education, consists of educational activities that develop, maintain, or increase the knowledge and skills of a medical student or physician in an effort to ensure excellence in health care delivery [1]. Small-group practice-based learning (PBL) is an effective and well-accepted method

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of delivering medical education [2]. In Canada, the Foundation for Medical Practice Education recommends that a minimum of 4 participants are required to constitute an effective learning group [2]. However, a limitation is that many medical practitioners work in areas with fewer than the recommended minimum number of participants for an effective learning group. Frequently, there is also a shortage of teachers who are appropriately trained to deliver all the components of a successful medical educational program. As a result, care providers in rural communities frequently travel long distances for educational meetings, spending time away from their day-to-day activities and incurring travel costs. Videoconferencing is a potential solution to this problem.

Significant growth in videoconferencing has occurred in recent years because of reduced costs and improved speed and quality of transmission. Such improvements have facilitated a two-way interaction between instructors and participants located at sites remote from teaching centers [3]. Successful educational programs have been delivered by videoconferencing to a variety of groups, including physicians, medical students, veterinary students, emergency medical technicians, and radiology residents [2,4-11].

The Accreditation Council for Graduate Medical Education requires that the education of residents comprise both interpretative and noninterpretative skills [10]. In 1999, it defined 6 core competencies that must be incorporated into every residency program [12]: patient care, medical knowledge, PBL and improvement, interpersonal and communication skills, systems-based practice, and professionalism.

Evidence-based practice (EBP) is assuming increasing importance in all aspects of clinical medicine, including the specialty of radiology. There is an immediate requirement for education in evidence-based techniques in educational programs for radiology techniques. In response to this and to the Accreditation Council for Graduate Medical Education's recommendations regarding the core competencies, specifically the importance of PBL, our residency training program in radiology decided to introduce a PBL module with heavy emphasis on EBP, adult learning theory, and small-group function. Because EBP is a relatively new concept, there is commonly a shortage of tutors with expertise to deliver a program in EBP at most radiology training programs. Our radiology program had one radiologist willing to undertake the training of facilitators and residents. Unfortunately, the individual hospitals affiliated with the training program are located up to 160 miles from the teaching site. In the initial planning of the PBL program, its feasibility was threatened by the potential for poor attendance by residents and teachers because of clinical commitments as well as time and financial considerations with regard to travel and accommodation. These problems would have the greatest impact at sites remote from the main teaching site. We therefore decided to use videoconferencing to tackle these problems.

The aim of this study was to evaluate the experience of radiology residents and local coordinators of an evidence-based PBL course delivered by videoconferencing to centers geographically separated from the principal teaching site.

## METHODS

The PBL course was designed for radiology residents with little prior knowledge of EBP concepts or principles or experience with how EBP can be applied by radiologists to the everyday practice of clinical radiology and in clinical research. The course was designed to focus on basic principles of EBP, including the identification of problem, the formulation of questions, critical appraisal, and the consideration of clinical decision options. It also included more advanced concepts, such as the appropriate use of appraised evidence (eg, the use of quantitative estimates of risk, benefit, and harm in assessing the interventional radiology literature). The lecture schedule is shown in Table 1.

We decided to deliver the course through videoconferencing because it allowed a standardized educational program of didactic lectures and small-group interactive sessions to be delivered from one site to all residents simultaneously, regardless of their geographic location, thereby eliminating the requirement for travel.

The program was delivered to second-year radiology residents. There was an initial one-day "train the trainers" program, in which staff radiologists at each participating site ($n = 8$) completed an intensive course in EBP, adult learning theory, and small-group learning, including PBL, which prepared them to act as local course coordinators or facilitators. The local course coordinators attended each videoconferenced EBP session, facilitated local discussion, and contributed to teaching the local resident groups by critically appraising residents' personal learning projects, which were presented in a small, local group setting before presentation to the entire group at the conclusion of the course. The role of the local coordinators was especially important during the workshop components of the course, when the EBP paradigm was applied to local questions or research topics. EBP lectures were followed by two lectures on research and one on clinical auditing. Some "troubleshooting" sessions were then available. The presentation of a personal learning project completed by each resident using EBP methodology was essential to receiving credit for the course. The course finished with an afternoon of presen-