Building an Online Repository of Teaching Resources to Facilitate Consistent and Good Quality Teaching of Postgraduates and Undergraduates in Medicine—A Preliminary Report

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EXTENDED ABSTRACT

Introduction

One of the greatest challenges facing medical educators, in both undergraduate and postgraduate education, is ensuring consistency of clinical experience. It could also be argued that clinical expertise is based on a foundation of clinical patient (case) experience—both the variety and range of cases, and depth of case experience. The challenge for curriculum planners is ensuring the availability of a wide enough range of cases to be linked to, and embody the undergraduate medical and postgraduate training curricula. Developing an online repository of these cases is an obvious solution to this educational challenge. Efforts in this area to date over the last 10 years internationally in educational practice, highlighted in conference presentations, and in the published literature have shown that digital repository initiatives have met with varying degrees of success, with unfulfilled potential of many of these initiatives, and major obstacles encountered in both the solicitation of case contributions, curating these cases, as well as utilizing these repositories as a core feature of medical education in individual institutions. Examples of these initiatives will be described in the oral paper presentation at the symposium, and some of these are listed online (digital repository initiatives).

What is the role of radiology in these education efforts? Radiology encompasses the whole range of clinical imaging techniques, and provides in-vivo images of both normal, and disease states. Radiology images are currently used as a key clinical problem solving and educational resource in undergraduate and postgraduate medical education, to provide a strong visual demonstration not only of normal form and function (anatomy, physiology and biochemistry), but also disease states (pathology and pathophysiology). Radiology images provide a central visual focus, and important investigative technique in the evaluation of clinical cases, and are used routinely in clinical problem solving. Radiology images can therefore be used not only in the training of specialist radiologists, but have a wider role in supporting medical education across the continuum of undergraduate, postgraduate and continuing medical education. This paper, and symposium presentation, will describe our experience over the last 2 years, building up and using a repository of over 2000 online radiology cases, focused initially on neuroradiology and chest radiology; and will show how this has now led to the genesis of a new institution-wide initiative.
Goals
The key objective of medical education is to develop increasing and progressively higher levels of expertise in clinical problem solving. Training in clinical problem solving traditionally centres around the review and evaluation of clinical scenarios, or clinical patient cases. In undergraduate medical education, the use of typical examples, or exemplar cases is emphasized. Moving along the continuum of medical education, in postgraduate and continuing medical education, there is increasing emphasis and focus on training for competency and proficiency, with the ultimate goal that of high levels of expertise and mastery. The challenge of providing consistency of clinical case experience can be met by systematically building up a digital repository of clinical cases, which reflect the breadth and depth of actual clinical experience. This idea would address one of the major weaknesses of previous efforts in building online case repositories to support medical education.

Our initial goal was to build an online case repository to support undergraduate medical education, facilitate postgraduate training in radiology, the evaluation of education theory, and investigate its potential to shorten duration of postgraduate training, and aid mastery training.

Background Information
The focus in undergraduate education is to build a foundation of basic knowledge, anchored by exemplar cases, which are easily provided via an online repository. Postgraduate education builds on this foundation, with a focus on developing clinical competency and proficiency, and the ultimate aim of developing expertise and mastery. One of the key methods of training for mastery is the use of deliberate practice (Anders Ericsson, Krampe, & Tesch-Romer, 1993). The educational literature also supports the use of compare and contrast case reviews to facilitate mastery training and potentially shorten the duration of learning or training; with the idea of using paired and mixed practice involving the use of a series of similar and contrasting examples of imaging abnormalities, with an attempt to describe and reflect on the similarities, and differences between the similar and contrasting examples (Anders-Ericsson, 2004; Hatala, Brooks & Norman, 2003; Norman, 2008; Norman, Young & Brooks, 2007).

Brief Description of Methodology
Digital case repositories have a role in facilitating training by providing an accessible, reusable, hyperlinked collection of clinical cases that mirror the full spectrum of clinical experience—from typical to atypical presentations, with confounding features, and multiple pathologies. Our initial focus was on Chest Radiology and Neuroradiology, exemplified by clinical cases illustrated with Chest Radiographs, and CT scans of the head; as the Chest Radiograph is the most common (over 20% of a typical radiology department workload) requested radiology investigation, and CT scans of the head one of the most common radiology examinations with high immediate impact in clinical practice; with the use and interpretation of these images forming part of the core clinical skills required of a competent, safe medical practitioner. For postgraduate education, we have organized our neuroradiology residency curriculum into thematic experiences, which are reflected in a defined collection of illustrative cases systematically collected and made available online over the last 2 years. These cases have multiple uses, including being presented via an online blog thematically, as unknown cases for quiz and drill exercises, and as a hyperlinked index (with links to additional recommended online resources) for self-study (Figure 2).

Main Findings
Our online neuroradiology case repository (presented via a neuroradiology and companion head and neck radiology blog) currently contains over 2000 cases for review (neuroradiology blog), which reflects the breadth and depth of clinical experience for the most common, and less common but important conditions. This has been viewed over 36000 times in the last 2 years, with positive qualitative feedback using focused group medical student and postgraduate resident questionnaires.
and interviews. Quantitative testing using compare and contrast drills and practice sessions has shown the potential of using this online case repository to reduce residency duration (master thesis abstract). Evaluation of educational theory, and its application to improve the efficiency and effectiveness of training; and mastery training is facilitated by the availability of this online case repository. Our experience in the use of technology enhanced learning has been systematically presented for peer review and feedback both locally and internationally over the last 10 years (technology enhanced learning conference papers), and has formed the basis for the design and presentation of eLearning symposia and workshops over the last 3 years (technology enhanced learning workshops and symposia). One of the local eLearning workshops, presented in November 2012, at the request of the Chairman of our Medical Board for departmental postgraduate training directors at NUH, has led directly to a new initiative to create an institution-wide online case repository over the next three years.

Conclusions
An online case repository of teaching resources supports undergraduate and postgraduate teaching and learning in radiology. A new initiative to build an institution wide case repository has the potential to have a wider significant impact in medical education.

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Figures

Figure 1(two part image): Hyperlinked text index from our neuradiology case repository (by both unknown case number, and diagnosis), with visual index also shown alongside.

Figure 2(two part image): Use of case images from the digital repository in multiple formats, from hyperlinked index, through sequential case review, to side by side compare and contrast exercises, and online thematic “textbook-like” collections.

References