Portfolios: The Next Assessment Tool in Medical Education?

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Introduction
Medical education is undergoing significant change at all levels. Self-directed learning and reflection are becoming essential ingredients of both graduate medical training and postgraduate professional development. Recognition is growing for the need to incorporate the concepts of andragogy into physician education, concepts emphasizing that adult learners are self-directed and take responsibility for their own educational choices. The demonstration of competency for assessment of the individual and the educational program has received increased attention in the Accreditation Council for Graduate Medical Education (ACGME) Outcome Project. (1) Assessment and documentation of self-directed learning, reflection, and competency are more difficult than traditional methods that have included standardized testing and conference attendance. The portfolio has been advocated as a tool for collecting and presenting these elements of learning at all levels of medical training.

What is a Portfolio?
Butler (2) succinctly defines a portfolio as “a collection of evidence that is gathered together to show a person’s learning journey over time and to demonstrate their abilities.” Missing from this definition is self-reflection, a component that several authors, including Rees, (3) believe is essential to a portfolio. A portfolio may be paper-based or electronic and serves as a coherent collection of documents chosen by the individual learner to fit the specific purpose of the portfolio.

Several authors have attempted to describe different types of portfolios. Smith and Tillema (4) describe four different portfolio types that are defined according to purpose and setting of use. The purpose of a portfolio may be to assist with promotion or with learning. The background may be to fulfill external requirements or for self-learning. The dossier portfolio is a collection of mandated works that is required for entry into a profession, while a training portfolio is a set of mandatory works assembled for learning during training. The reflective portfolio is a personal selection of works that reflects an individual’s progress to assist with promotion, contrasting with the developmental portfolio, which features a selection of works to allow reflection and self-learning.

Another description of portfolios in educational training is provided by Zeichner and Wray. (5) In the education field, teachers in training use portfolios to “make the activity of learning visible.” A learning portfolio begins as a collection of educational products, including personal learning philosophies, learning theories, sample curricula, evaluative tools, and individual assessment that reflects the progress of the learner during training. When the learner needs to demonstrate proficiency to obtain an initial teaching license, a credentialing portfolio is created that includes works that demonstrate profi-
ciency of the teaching standards defined by the state. Some educators may develop a showcase portfolio to contain evidence of their best works for recruitment and promotion.

**Portfolios in Medicine**

As the focus in medical education shifts to the demonstration of competence and lifelong learning, portfolios are being piloted as an assessment tool in a manner analogous to the education field. (6)(7)(8) The power of the portfolio lies in its emphasis on reflection, which distinguishes it from a simple “dossier of evidence.” (3) Reflection allows physicians at all stages of training to learn from their actions and promotes continued review of the literature to keep up to date.

Individual graduate medical education programs have incorporated either traditional paper-based portfolios or e-portfolios as assessment tools. The psychiatry program within the University of Arkansas for Medical Sciences introduced a case-based portfolio as an additional approach to assess residents. (9) The paper-based showcase portfolio contained cases and documentation selected by the resident that best represented 13 skills believed to be essential for a competent psychiatrist. These skills were derived from the Residency Review Committee’s objectives. The Royal College of Paediatrics and Child Health introduced a paper-based learning or training portfolio as a method of assessing six domains of competence, including clinical, communication, teaching and learning, ethics and attitudes, management and evaluation, and creation of evidence. (10) Clinic letters, handouts, and ethical submissions as well as evaluations, letters, and attendance certificates were included for assessment of learning and progress in specific domains to allow improved feedback. In 2001, the Department of Surgery at the Medical College of Wisconsin developed a case-based learning portfolio to allow resident documentation of cases representing various disease states and encourage reflection on practice. (11) A template was completed monthly that included the case history, diagnosis, management, treatment, reflections on lessons learned from the case, and review of two articles. Although diverse, all three portfolios have been used as educational tools for assessment and feedback.

The content presently found in the learning or training portfolio of graduate medical learners varies from institution to institution. Examples of potential evidence that may be included in portfolio used for resident learner assessment are outlined in the Table. Carraccio and Englander (6) describe an evaluation portfolio that is broken down further into the assessment of the six ACGME core competencies.

**The Effectiveness of Portfolios in Medicine**

Limited data are available on the validity and reliability of portfolios as assessment tools in postgraduate medical education. Portfolios are assigned high face validity because the tool appears appropriate to the test situation of the resident learners. However, reliability remains an area of weakness for a tool that is proposed for summative evaluation and high-stakes decision making. In separate small studies, examination of inter-rater reliability revealed inter-rater correlation coefficients to be below the accepted value of 0.8. (10)(12) Interassessment correlation also was found to be weak in two small studies. (10)(13) It has been proposed that reliability could be improved if portfolios were standard-ized, the residents educated about the use of the portfolio, criteria for scoring the portfolio were developed, and the evaluators were trained. Driessen and associates (14)

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**Table. Sample Content for Portfolios in Graduate Medical Training**

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<thead>
<tr>
<th>Evaluations</th>
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<tr>
<td>Rotation-specific evaluations</td>
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<td>360-degree evaluations</td>
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<td>Peer evaluations</td>
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<td>Self-assessment</td>
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**Patient and Procedure Logs**

**Procedural Competency Documentation**

**Certificates**

- Neonatal Resuscitation Program
- Pediatric Advanced Life Support

**Examination Scores**

- Inservice board examination
- Step Exam scores

**Conference Attendance**

**Presentations**

- Case presentations
- Journal club
- Institutional conferences
- National conferences

**Projects**

- QA project
- Senior research project

**Individual Learning Plan**

**Reflections**

- Individual patient
- Critical event
- Ethical challenge
- Learning and growth

**Sample Evidence Selected by Medical Learner**
have suggested that use of strategies from qualitative research, including triangulation, prolonged engagement, and member checking, would allow credibility and dependability of portfolio assessment.

Portfolios are believed to be effective tools for evaluating skills and attitudes, areas that traditionally have been difficult to evaluate. Examining the ability of the portfolio to measure the six ACGME core competencies, Jarvis and colleagues (12) found evidence of patient care, professionalism, interpersonal and communication skills, medical knowledge, and system-based practice. The lack of evidence of practice-based learning was attributed to the development of the portfolio prior to the introduction of the core competencies.

The Evolution of the Electronic Portfolio

The structure of the portfolios and the role of reflection within them are not consistent due to the present paucity of standardized tools. Existing computer-based platforms, such as Trivantis® Lectora and TaskStream, allow individuals and programs to create portfolios by providing templates, but they do not contain standardized content specific to established guidelines. PediaLink® was established by the American Academy of Pediatrics (AAP) as an online learning center to promote and document self-learning for both pediatric residents and pediatricians and functions perhaps as a developmental portfolio. (15) The structure of PediaLink® is adapted from Schon’s model of reflection-in-action and reflection-on-action, wherein a “surprise” causes the practitioner to reflect and seek additional information to assist with self-learning. (16) The Individualized Learning Plan found within PediaLink® offers a structured system for documenting learning efforts in residency and practice. The PediaLink® site can be accessed at https://www.pedialink.org/index.cfm.

In 2006, the ACGME began the development of an electronic web-based resident portfolio. Their mission to “improve health care by assessing and advancing the quality of residents’ education through accreditation” has led to the ACGME Outcome Project, which includes the need to improve the effectiveness of the evaluation of the six core competencies. (1) Further, it has been recognized that domain-based evaluation rather than norm-based evaluation is necessary to assess the achievement of competency of medical learners. The ACGME learning portfolio is built on the ideas of experience, reflection, learning, and assessment.

A news release from the ACGME in May 2007 outlines the proposed learning portfolio:

“The ACGME Learning Portfolio is an interactive, web-based development tool that residents can use through out their residencies to record and organize their learning, track their progress against defined learning objectives, reflect on their learning experiences, and receive feedback on their skills as physicians. Used throughout residency education, the portfolio will provide residents with a collection of evidence about their professional competence and support their transition into private practice.” (17)

A broad vision is outlined for the ACGME learning portfolio. (18) It is described not only as a learning tool for residents, but as a storehouse for documentation needed by licensing groups and certification boards, fitting the definition of both a learning portfolio and a credentialing portfolio. The portfolio is envisioned to assist the program director both with improved assessment of the resident and enhanced data collection for residency review committees. Issues of connectivity between existing ACGME systems are being addressed early in the design process. Alpha testing of the ACGME learning portfolio began in July 2007, with the goal of broad-based utilization in 2010. Beta testing is planned to begin in 2008, using specialty groups to develop tools and content that fit their specific needs.

The electronic format used by the AAP and the ACGME portends the future of assessment tools. Electronic portfolios (ePortfolios) do not differ in concept from paper-based portfolios, but reflect practical improvements, including ease of standardization. Although requiring technologic skills for their initial development, ePortfolios allow easier access and maintenance by the learner. ePortfolios can contain many pieces that serve as evidence of learning, including audio, video, and works in electronic format. Self-reflection is an ongoing process as the ePortfolio is developed and revised. The electronic format allows greater portability and sharing than traditional paper-based tools.

Both the AAP and ACGME have incorporated the potential role of the ePortfolio beyond graduate medical education into its underlying design. The emphasis on lifelong learning and reflection throughout a medical career poses assessment challenges for recertification and promotion. The United Kingdom already requires its consultants to develop a portfolio to assist in the recertification process. (19) PediaLink® represents an existing repository for practicing pediatricians to collect continuing medical education information, professional data, individualized learning plans, and reflection-
on-action practice changes to address this new evaluative approach. Academic medical centers are beginning to use portfolios in both the paper and electronic forms for promotion, although the portfolios may be more “dossiers of evidence,” lacking in reflection. The ACGME is working with other agencies to extend the use of the proposed electronic learning portfolio beyond medical training.

Conclusion
Quality health care relies on medical professionals who have a solid educational cornerstone that is maintained through lifelong learning and reflection. The public demands competency of those who provide health care. The assessment of such characteristics through all stages of medical training and practice is essential but difficult. The portfolio offers one potential tool to help with this process.

References
5. Zeichner K, Wray S. The teaching portfolio in US teacher education programs: what we know and what we need to know. Teaching and Teacher Education. 2001;17:613–621