CHAPTER 4

Portfolio assessment using a structured interview.[6]

Abstract

Introduction. Portfolios have gained considerable popularity as both learning and assessment tools in the past decade. A major limitation of portfolios, however, is the resource-intensive nature of the assessment process. Published data report examination times exceeding 90 minutes per candidate. In resource-constrained environments, typical of developing countries, this time requirement is prohibitive.

Purpose. Determine the internal consistency of a structured interview-based portfolio assessment strategy, and its impact on student learning behaviour.

Methods. Fourth year medical students (n=181) recorded 25 patient encounters during a 14-week Internal Medicine clerkship. Portfolios were examined by 30-minute single-examiner interview. Four cases, randomly selected by the examiner, were discussed using structured questions to determine candidates' ability to interpret and synthesise clinical data gathered during patient encounters. Examiners were trained to score responses using a global rating scale. Pearson's correlation co-efficient, Cronbach's alpha coefficient and the standard error of measurement (SEM) of the assessment tool were determined. The number of students completing more than the required number of portfolio entries was also recorded.

Results. The mean ($\pm$ SD, 95%CI) portfolio interview score achieved was 67.5% ($\pm$ 10.5, 66-69.1). The correlation coefficients for the portfolio interview, when compared to the multiple choice written examination and clinical case-based examination, were respectively r=0.42, and r=0.37. Cronbach's alpha coefficient was 0.88 and the SEM was 3.6. Of 181 students, 45.3% completed more than 25 portfolio entries.

Conclusion. Single-examiner portfolio interviews, based on standardised questions, scored using a global rating scale, required less examination time per candidate than published data,

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demonstrated a high measure of internal consistency and encouraged desirable student learning behaviour.

Introduction

In medical education practice the term "portfolio" has come to mean a "collection of evidence that learning has taken place."[1,2] This educational method has gained considerable popularity in health professional training programmes in the past decade,[3-8] and as a result, a wide range of portfolio formats have been described. In its simplest format, a portfolio is usually a paper-based collection of evidence reflecting learning by participation in, or completion of, a number of professionally authentic tasks.[1,2,4,9] In health sciences education, most portfolio tasks are focused on patient encounters, a key clinical learning activity.[1,4,9] Professional authenticity (task and location) is the key reason why portfolios continue to be widely incorporated into health care professional training programmes.[1,2,4,9] A number of concerns regarding portfolio assessment have, however, been expressed. These include: (1) human resource requirements, (2) limited psychometric adequacy and (3) the suitability of methods used. Each of these concerns is briefly outlined.

Portfolio assessment currently requires examination times of up to 170 minutes per candidate.[4] The human resource implications of such lengthy examination times, already a source of concern in the developed world, are prohibitive in world regions like sub-Saharan Africa where up to 50% of medical trainee teaching, supervision and assessment is done by clinicians not employed as university staff.[10] Furthermore, African clinicians – 5 doctors per 10 000 population as compared to Western Europe with 30 doctors per 10 000 population[11] – barely cope with clinical service demands, aside from the teaching and assessment needs of local medical schools.[10] The massive burden of disease present in sub-Saharan Africa further accentuates the human resource crisis.[11] It is, thus, not surprising that portfolio assessment is not commonly used in African medical schools.[12] Portfolio-based learning, including assessment, will only become feasible in developing world regions if resource-efficient assessment methods are developed.

The limited reliability of portfolio assessment methods is another source of concern. Trained raters only achieved an overall pass /fail inter-rater reliability kappa score of 0.26 which improved to 0.5 when discussion between raters was permitted.[13,14] Improving the psychometric rigour of portfolio assessment is clearly required. Suggestions include the standardisation of portfolio entries, rater training, structured assessment criteria and a clear idea of the competencies being assessed.[2,3,13]

The literature also raises concerns regarding the suitability of current portfolio assessment methods. At most institutions, examiners read student portfolios in order to provide a final score indicating their satisfaction that the submitted work adequately demonstrates achievement of the specified learning outcomes.[4,5,6,14,15] The additional use of interviews to

supplement the portfolio reading process[4-6] is not universal practice. The question has, thus, been asked: "Do portfolios provide educators with real insight into practitioners' clinical ability or simply show that they are good at writing about what they do?"[3] In other words, "Are we assessing what we want to assess, which is the capacity of the professional to integrate knowledge, values, attitudes and skills in the world of clinical practice?"[16] These observations suggest that current portfolio assessment methods may not be the most appropriate way of determining a student's ability to deal with complex professional tasks requiring integration of the "relevant cognitive, psychomotor and affective skills."[17] Challis has suggested that portfolios should offer students the opportunity to participate in a "professional conversation between learner and assessor".[18] The use of interviews as a primary method of portfolio assessment has not been further explored in the literature.

In 2002, the University of Cape Town (UCT), South Africa, launched an extensively revised MBChB programme. Despite the difficulties highlighted in the literature, learning portfolios were introduced into the new programme and an interview process was developed to assess portfolio-based learning. This paper describes the use of a structured interview technique as a primary portfolio assessment strategy. The psychometric adequacy, examination time per candidate and the impact of this assessment strategy on student learning behaviour were evaluated.

Methods

Participants

All medical students in their 4th year of study at UCT in 2004 participated in the portfolio learning and assessment project which formed part of the process of curriculum revision of the MBChB programme embarked on at the University of Cape Town in 2002. Students were, thus, informed of the introduction of the new learning and assessment method, but UCT Research Ethics Committee approval was not required.

Internal Medicine clerkship

During the 14-week Internal Medicine clerkship students were assigned to community hospital teaching units where they assisted ward staff with daily patient care activities. This included providing supervised care for a minimum of 12 in-patients admitted during their attachment. Students were responsible for assessing and admitting patients, formulating and implementing treatment plans, reviewing daily clinical progress and organizing discharge or transfer plans, as appropriate. In addition, they participated in twice weekly bedside tutorials, weekly academic seminars and a series of lectures.

Portfolio of patient encounters

At the beginning of each rotation, students were instructed to collate a written portfolio reflecting 25 patient encounters. The purpose, format and assessment of the portfolio of patient encounters were explained. Students also received a course guideline detailing the necessary information (Appendices A and B). Patient encounters to be written up included all in-patients admitted and managed under the supervision of ward staff as well as all patients clerked for personal learning or bedside tutorial teaching purposes. Reflection on each of these clinical encounters was encouraged by asking students to: (a) edit (in another colour ink) their clerking notes after presenting the case to the supervising clinician on the day of intake, (b) write a brief case note entry after presenting the case to the attending consultant on the post-intake ward round, (c) review standard reference texts relevant to the clinical problems encountered, and (d) formulate a written question and answer task (Q&A task) focusing on a specific clinical aspect of each patient encounter. These Q&A tasks were largely determined by individual student learning needs; clinical staff assisted students in the formulation of appropriate questions where necessary. Students signed and submitted a "Declaration of honest intent" with their portfolio of case notes. This was done to discourage plagiarism, a dismissible offence at the University of Cape Town.

Structured portfolio interview

At the end of each 14-week rotation students were examined by single-examiner interview. Students presented their indexed (Appendix C) portfolio of case notes to an examiner who randomly selected four patient encounters for discussion during the 30-minute interview. Using six structured questions (Appendix D), examiners explored candidates' ability to synthesise clinical assessments and formulate management plans using information gathered during bedside patient encounters. The questions specifically focused on determining whether candidates were able to (1) clearly identify patients' presenting problems, (2) provide pathophysiologically plausible explanations for presenting problems, i.e. formulate clinical diagnoses, (3) substantiate diagnoses made using available clinical and investigatory findings, (4) offer reasonable differential diagnoses and (5) select appropriate investigations, and (6) formulate appropriate treatment plans.

Scoring criteria

Examiners rated student responses to each question using a 9-point global rating scale: poor (1-3), adequate (4-6) and good (7-9). Examiners assigned a final score to each of the four cases discussed using a criterion-referenced scale (Table 1). For summative purposes, students were awarded an average score derived from the four case marks. This score formed part of a composite assessment process which also included an in-course global professional rating

provided by clinicians supervising students during the clerkship, a 150-item best-option multiple choice test (written assessment), and a clinical examination comprising four 15-minute directly observed real patient encounters, including an oral examination with a different examiner for each case seen (clinical assessment).

Table1. Criterion-referenced rating scale to determine final score for each clinical case discussed

Final score	Descriptor	Score criteria
45% or less	Fail	Three or more responses scored poor
52-58%	Unsatisfactory	Up to two responses scored poor
60-62%	Satisfactory	All responses scored adequate
65-68%	Good	Up to two responses scored good; others adequate
70-74%	Very good	At least 3 responses scored good
75% or more	Excellent	All responses scored good

Training of examiners

Twelve clinicians with at least five years clinical teaching experience participated in the portfolio interview assessment process. They were trained in the use of the scoring system by co-examining with the principal investigator prior to interviewing students on their own. This facilitated uniform implementation of the assessment method.

Data analysis

All data were entered onto Excel spreadsheets and analysed using Statistica 7 software (StatSoft Inc., Tulsa, Oklahoma, USA). The internal consistency of the assessment results was determined by calculating Cronbach's alpha coefficient. The standard error of measurement (SEM) was determined and correlation between portfolio interview scores and written and clinical assessment scores was determined by calculating Pearson's correlation coefficient. The number of students writing up more than the required number of patient encounters was recorded.

Results

Overall performance

All 4th year students (n=181) participated in the assessment process. The total examination time was 90.5 hours. The mean ($\pm$ SD, 95%CI) portfolio interview score achieved

was 67.5% ($\pm$ 10.5, 66-69.1).Almost half of students (45.3%) wrote up more than the required number of patient encounters. Six students failed to submit a portfolio containing the required number of patient entries.

Internal consistency of portfolio interview results

Cronbach's alpha coefficient for the portfolio interview results was 0.88 with an inter-item correlation of 0.66. The standard error of measurement was 3.6.

Correlation with other components of the composite assessment process

The correlation coefficients for the portfolio interview, when compared to the multiple choice written examination and case-based bedside oral examination (four patient encounters), were respectively r=0.42 and r=0.37.

Discussion

This paper documents the successful implementation of a single-examiner interview strategy as a primary method of portfolio assessment in the undergraduate medical training programme at the University of Cape Town, South Africa. The key finding of this paper is that this assessment strategy required considerably less time per candidate than currently published methods. The significance of this three-fold reduction in assessment time is readily appreciated within the extreme human resource constraints dictating medical education practices in developing world regions like sub-Saharan Africa. These constraints, outlined earlier, currently preclude the use of resource-intensive assessment strategies, such as portfolio assessment, in sub-Saharan African medical schools.[12] Even in South Africa, a well-resourced African country,[19] the use of portfolios has not found widespread acceptance within the medical education setting owing to concerns regarding human resource limitations. This paper provides the first evidence of a sustainable portfolio assessment strategy that may promote the wider use of portfolio learning in medical training programmes in developing countries, particularly in sub-Saharan Africa.

While the human resource saving of this strategy is an encouraging finding, it can only be considered useful if the assessment tool provides reliable information. A Cronbach alpha coefficient of 0.88, as demonstrated in this paper, indicates that the structured interview technique achieved an adequate internal consistency. A valid criticism of the method used, however, is that the same clinician assessed each of the four cases selected from the student portfolios. This may have contributed to a "halo" effect. Despite this limitation, the

psychometric adequacy of the current method allows it to be considered a useful addition to our current array of assessment tools. While we did not determine inter-rater reliability, the literature warns against exhaustive psychometric evaluation of individual assessment tools since any one assessment method is unlikely to adequately address all medical training programme assessment needs, regardless of its psychometric qualities.[17] Portfolio assessment, as in our case, is likely to form part of a composite assessment package. Determining the composite reliability of our assessment package would thus be of greater value and importance.[17] Work in this regard is currently in progress. Driessen and colleagues recently suggested that qualitative assessment procedures, focusing on credibility and dependability rather than reliability, may be more appropriate for the assessment of portfolio work.[6] This qualitative approach to the evaluation of portfolio assessment methods requires further work.

The correlation coefficients demonstrated in this study need to be interpreted with caution. While they suggest limited redundancy in the domains of competence being assessed in the portfolio interview, as compared to the written and clinical examinations, low correlations per se do not indicate that two tests are assessing different competencies.[20] Factors that may interfere with correlation coefficient results include content-specificity of the assessment processes, especially performance-based assessments, and a lack of correction for the unreliability of the individual measures used.

The ability to provide competent patient care, a core learning outcome of medical training programmes in South Africa,[21] is best acquired through direct patient encounters.[22] The critical importance of educational and vocational concordance, i.e. alignment between this core learning outcome, the types of learning activities students engage in during clerkships, the assessment methods used to determine clinical competence, and the vocational relevance of the learning activity was one of two key reasons for developing a portfolio learning and assessment tool based on patient encounters. [23,24] In terms of assessment, we wanted to provide students with an opportunity to demonstrate their competence using clinical information gathered during real patient encounters in a vocationally authentic "professional conversation" with an examiner colleague.[18,25] We considered assessment of the cognitive skills acquired during the process of developing a portfolio of patient case notes more informative than careful scrutiny of the product produced. This opinion, shared by others, represents a fundamental shift in the focus of portfolio assessment which specifically addresses the assessment validity concerns raised earlier in this paper.[3] While interviews do form part of the portfolio assessment process in some centres, this paper represents a first attempt at using structured interviews as the primary method of portfolio assessment. [4-6]

While experience provides the raw materials for learning, reflection offers the student an opportunity to develop conceptual frameworks for interpreting, evaluating and generalizing

from experience.[22,26-28] Indeed, reflection "is the element that turns experience into learning."[29] The portfolio entries described in this paper, required students to "reflect-in-action" during the patient encounter, and then engage in three structured "reflection-on-action" activities.[26] This model of reflection differs significantly from the reflective mechanisms used in developed countries, for example, students in the UK and the Netherlands regularly discuss their portfolios with mentors and undertake written tasks that promote reflection on portfolio learning activities.[4,5] Once again, the human resource constraint realities in sub-Saharan Africa, including South Africa, preclude the use of such methods. Our "activities of reflection" utilized human resources already available in the clinical setting without significantly adding to the workload of these already overburdened clinicians. Rather, the reflective elements we implemented articulate with reflective practice frequently engaged in by clinicians during their daily work.[30] Formally engaging students in this important aspect of clinical practice was achieved by making it an integral part of each portfolio case note.

The impact of assessment practices on student learning behaviour is well documented.[31-33] More recently it has been suggested that this phenomenon should be strategically used to steer student learning behaviour in a given (desired) direction.[5] The potential capacity for portfolio learning tasks to direct student learning behaviour was the other key reason for engaging in the use of this learning and assessment method. We wanted students to recognize the critical learning value of authentic patient encounters and engage in them as often as possible. The observation that 45% of students engaged in more than the required number of patient encounters suggests that our portfolio strategy did drive student learning in the desired direction i.e. from the library to the bedside.[32]

In closing, we have shown that single-examiner portfolio interviews, using standardised questions and a global rating scale, can be used to reliably assess core outcome competencies in an integrated, professionally authentic manner. Of critical importance is the fact that this assessment strategy required considerably less examination time per candidate than published data. This is likely to increase the utility of this educational strategy in resource-constrained environments typical of developing countries. The data also suggest that our portfolio learning and assessment process promoted desirable student learning behaviour in the clinical work environment.

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