

Assessing Competence in Veterinary Medical Education: Where's the Evidence?

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ABSTRACT

A systematic review of the literature was carried out to determine the evidence for the reliability and validity of the assessment methods used in veterinary medical education. The review followed the approach used by the Best Evidence Medical Education (BEME) group. This process has established baseline data on published evidence and found that a relatively small number of articles exist relating to assessment specific to veterinary medical education. These articles include a number of general discussion papers, employer observations on graduate competence, and descriptions of methods to assess particular attributes—in particular, clinical skills. However, only five of the papers retrieved in this comprehensive search provide evidence relating to evaluation of the assessment method itself. There is a need for more research on assessment of clinical competence in veterinary medical education.

Key words: clinical competence, assessment, evidence, veterinary education, review

INTRODUCTION

Assessment is increasingly being highlighted as a crucially important topic within veterinary medical education and higher education in general.^{1,2} It is recognized that there is a need for more research in this area and to ensure that this research “reaches those doing the assessing.”¹ Much recent debate has centered around the specific issue of clinical competency assessment and the need for veterinary schools to provide defensible evidence that core competencies are addressed and assessed. The American Veterinary Medical Association's Council on Education requires that schools provide “evidence of student learning outcomes for clinical competencies...[which]...should be obtained by direct measures.”³ In medical education, recognition of the importance of this area has led to a large volume of literature on the subject. In general, over the last 20 years, there has been a move away from observed interactions between student and patient involving history taking, clinical examination, and final decision making (often called “the long case”⁴) and toward more standardized and objective methods, typified by the objective structured clinical examination (OSCE).⁵ Although these highly structured assessment methods have proved more reliable, their validity has been questioned,⁶ and it has been suggested that consideration of “assessment programs” in their entirety is more important than simply focusing on individual methods out of context.⁷

The aim of the work reported here was to use an approach informed by the Best Evidence Medical Education (BEME) Collaboration (as described by Hammick⁸) to identify published evidence relating to veterinary assessment and use this information to make recommendations about future directions in veterinary medical education assessment research. The BEME Collaboration promotes the publication of systematic reviews in areas relevant to medical education. Disseminating this information helps to create a culture where practice is informed by the best available evidence.⁹

A SYSTEMATIC APPROACH

The first BEME review was published in 2005, and the approach involved a rigorous qualitative data synthesis across the chosen area of study. Examples of recently published BEME reviews are available on the group's Web site.⁹ As part of a wider research project on final-year assessment within the United Kingdom, we sought to review the evidence already available in the literature to facilitate discussion on future assessment developments, particularly in the area of clinical competency assessment. Further, we were interested in establishing published clinical competency methods and, more importantly, in recording any instances of attempts to assess the validity and reliability of the assessment method being used (i.e., instances of “assessing the assessment”).

METHODS

A systematic review of the published literature and synthesis of the evidence base around veterinary medical assessment was undertaken. The approach used was based on a standardized BEME protocol. A set of search terms was established that included the skills or competencies to be assessed, as defined for or expected of veterinary graduates, and a list of assessment methods.

Table 1 summarizes the databases and other sources searched (full search histories are available from the project Web site).¹⁰

Article Selection

The following inclusion criteria were applied to the database search results:

- veterinary medical education context (stage 1)
- assessment appropriate to veterinary students (stage 2)
- evaluation of validity or reliability of the assessment (stage 3)

Table 1: Databases and other sources searched for the review

Databases	Other Sources	Search Strategies	
Australian Education Index (1979–March 2007)	Electronic search of specific journals: <i>Journal of Veterinary Medical Education, JAVMA, Veterinary Record, Australian Veterinary Journal, Canadian Veterinary Journal</i>	Assessment-related terms as key words, concepts, and Boolean combinations AND veterinar\$ (i.e., veterinary context required)	
Biosis Previews (1926–March 2007)			
British Education Index (1975–March 2007)			
CAB Abstracts (1910–March 2007)			
Digital Dissertations (1861–March 2007)			
ERIC (1966–December 2006)			
Global Health (1973–February 2007)			
Google (particularly for gray literature; whole resource as of December 2006)			Consultation with experts in the field
Index to Theses (1970–December 2006)			Cited reference searches for each publication meeting inclusion criteria
ISI Proceedings (1990–March 2007)			Hand search of <i>JVME</i> , vol.1 (1974) through vol. 34 (2007)
IVIS (whole resource as of December 2006)			
Medline (1950–March 2007)			
PsycInfo (1806–December 2006)			
Research and Development Resource Base (whole database as of December 2006)			
TimeLIT (whole database as of December 2006)			
Web of Science (1900–December 2006)			
WorldCat Dissertations and Theses (whole database as of December 2006)			

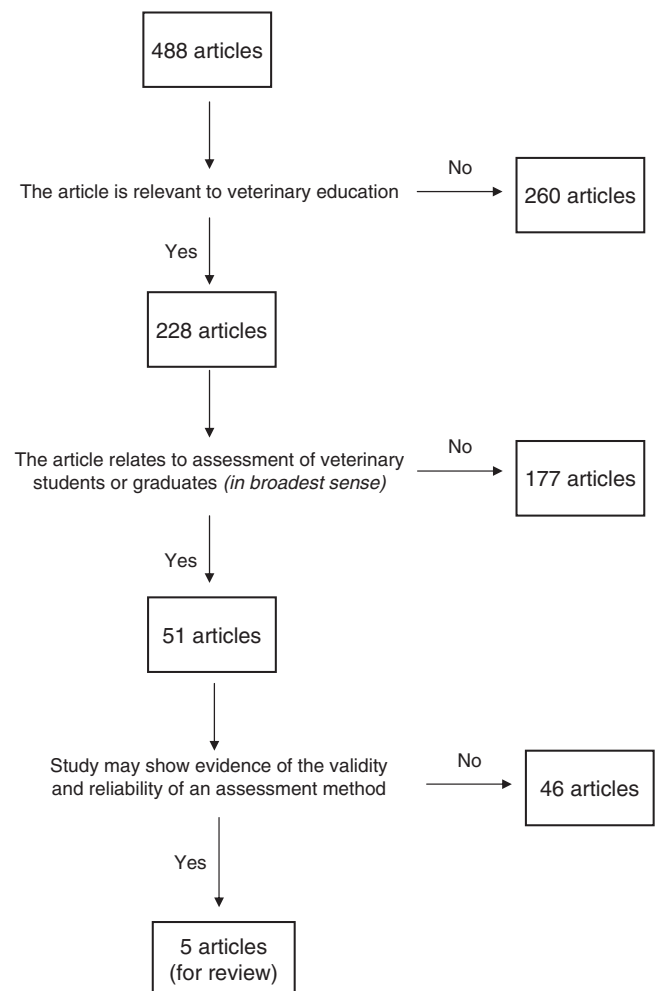
Selection of articles in stage 1 was undertaken by one reviewer (SB). Selection in stage 2 was undertaken by the same reviewer; the results were matched against a second reviewer's (VD) screening of the first 50 articles, by article record number, from stage 1. In stage 3, both reviewers independently examined all the articles remaining after stage 2, and discrepancies were resolved by consensus. All the articles selected in stage 2 were classified in terms of their contribution to the field of veterinary medical assessment, as a means of gaining a better understanding of wider work in the area.

Data Extraction

The papers selected in the final phase were subjected to a process of data extraction and coding. The coding sheet used was developed for the specific context of the review by the study group and was based on the original BEME prototype.¹¹ The coding sheet used is available on the project Web site.¹⁰ The papers from the final phase of selection were coded by a group of five reviewers, and the classifications were discussed and discrepancies resolved by consensus.

RESULTS

The results of the review process are summarized in Figure 1. The aggregate and de-duplicated database search results yielded a total of 488 articles. After exclusion of articles that did not relate to veterinary education, a pool of 228 articles remained. Further refinement by including only articles of relevance to assessment reduced the results to 51 articles. All articles selected by the second reviewer were also selected by the first reviewer; however, the first reviewer was more inclusive. After discussion, the selections of the first reviewer were carried forward, since both reviewers were involved in the final screening phase.

**Figure 1: Overview of stages in the review process**

Final screening by limiting results to articles that evaluated the assessment method reduced this number to five.

Publication dates of the 51 articles relating to assessment are shown in Figure 2a. The context of the papers or the particular method being described is shown in Figure 2b. Opinions, reflections, or general discussions related to assessment are included in the General Discussion category. The Workplace Training category includes articles specific to evaluations of students on placements or “extramural studies.” The Practitioner category covers articles for which practitioners were surveyed or otherwise involved in assessing either their own or graduates’ abilities or were asked for their opinions on the curriculum itself. Articles in the Post-graduate category relate to methods described for use in the context of continuing professional development after graduation from veterinary school. A summary list of all 51 articles is available on the project Web site.¹⁰

A summary of the five articles identified by the final stage 3 screening process is shown in Table 2.

DISCUSSION

Although there has clearly been an increase in the number of assessment-related articles being published in recent years, given the current focus on assessment as a “hot topic,” it is perhaps surprising that more articles have not been published on this topic. The analysis of the 51 articles relating in the broadest sense to assessment in veterinary education shows an absolute increase in number from 2001 onward. Whether this reflects a general trend in increasing publications in veterinary education from this time was not investigated in this study. Figure 2b shows a breakdown of the topic areas within each of these 51 articles. This breakdown was done to provide an overview “mapping” of the discipline and indicate which areas are more frequently written about, even when the study is not evaluating an assessment method per se. The largest article category was that of general discussions, including reflections on challenges in assessment and curriculum and descriptions of curriculum and assessment approaches. This category also includes more generic articles on aspects of

assessment practice such as standard setting. Among studies of specific skills assessed, clinical skills were the most frequent, which is perhaps not surprising given the recognized challenges in assessing clinical competence.

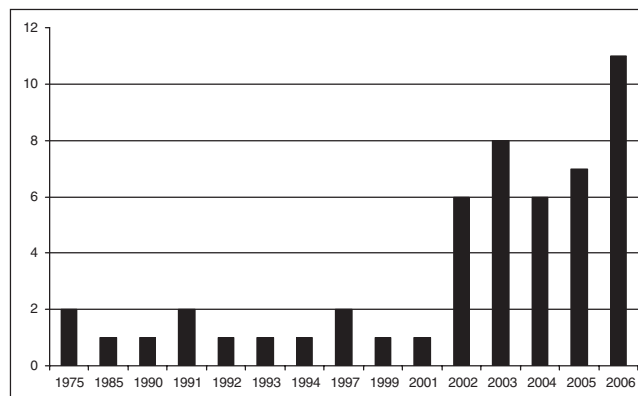


Figure 2a: Number of articles by year relating to veterinary assessment

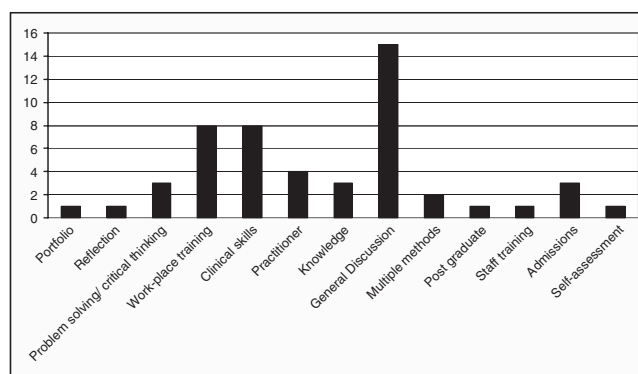


Figure 2b: Method or context for the assessment methods described

Table 2: Summary of content of the final five selected papers

Year	Reference	Skill Assessed	Brief Summary
1994	Sprecher et al. ¹²	Rectal palpation	Uses a palpation skills index to assess students’ ability and shows that score is a predictor of experience and amount of teaching.
2002	Bark and Cohen ¹³	Various clinical skills	Describes logistics of running OSCEs. Uses statistics to assess reliability and validity. Includes student and faculty evaluation.
2003	Hardin ¹⁴	Problem solving	Analysis of an audio-taped “think-aloud” of students resolving a clinical case in order to evaluate problem-solving abilities.
2004	Van Hoeij et al. ¹⁵	Problem solving	Evaluates an assessment before use by applying a classification tool based on Bloom’s taxonomy to classify cognitive level of short essay questions and compares subject-matter experts’ rating with that of non-experts. Shows some evidence that short essay questions could be written and used to assess at different cognitive levels.
2006	Adams et al. ¹⁶	Reflection	Faculty evaluation of students’ ability to reflect on their communication skills by reviewing student reflections on video produced during interview with a simulated client.

Those articles that also include an element of evaluation of the assessment method are discussed below in more detail.

Sprecher et al. used a palpation skills index to assess bovine rectal palpation.¹³ The authors establish that the score is a predictor of the student's experience of and amount of teaching in the subject area. Although no statistical tests specific to validity or reliability were applied to the data, there was an improvement in student performance after teaching of the skills as determined by the skills index, indicating that the method shows validity in terms of its ability to distinguish more experienced students.

Bark and Cohen describe the practicalities of the use of OSCEs and address the reliability of this method in differentiating between students based on their performance.¹³ Cronbach's alpha was used to evaluate the reliability of the assessment, and validity was calculated using Pearson product-moment correlation. It is generally accepted that a reliability of > 0.7 using such statistical tests is desirable for an assessment method.¹⁴ Hence, the authors comment that the reliability of 0.7 calculated for this OSCE warrants further analysis to identify both those stations that had an excessive effect on the reliability score and those identified with low validity. This type of study demonstrates the use of basic statistical data to examine the performance of the assessment and use the data for future refinement.

Hardin¹⁵ analyzed the problem-solving abilities and related characteristics of veterinary students. Her study also includes the development of case scenarios based on a clinical competency test in which information about a specific clinical case was progressively disclosed and students were asked to verbalize their thought processes. The recorded thought processes were subsequently analyzed using a specifically designed taxonomic code. No statistical data are presented regarding the reliability or validity of the assessment method. However, through the use of a method for evaluating the complex processes of problem solving, the author determined that "students exhibit characteristics consistent with novice problem solvers."¹⁴ We consider that this establishes an element of validity, given that inexperienced students (e.g., as compared to experienced clinicians) would be expected to be identified in this category.

Van Hoej et al.¹⁶ use a taxonomy-based classification tool to classify the cognitive level of short-answer questions (SAQs). Although this study did not assess student performance on a specific test, it addresses the issue of inter-rater perceptions of cognitive levels of test items and illustrates items capable of assessing at higher cognitive levels, such as problem-based clinical scenarios. Although the study does not provide evidence on the performance of the assessment itself, it is an example of evaluation of an assessment prior to its use with students. Furthermore, the data demonstrate the need for appropriate staff development when designing assessments.

Adams et al. address the assessment of reflection.¹⁷ The case studies they describe involved faculty evaluation of students' ability to reflect on their own communication skills. The method involves student reflection against predefined items followed by faculty evaluation of this reflection. Although no statistical analysis of results is presented, the

authors report an apparent increase in reflective ability as students proceed through the curriculum. Again, this indicates an element of validity for the method.

CONCLUSIONS

We have shown that there is currently little published evidence evaluating assessment practices in veterinary medical education. However, there is clearly much we can learn from medical education. Other relevant BEME reviews include "Predictive Values of Assessment Measurements Obtained in Medical Schools and Future Performance in Medical Practice"¹⁸ and "A Systematic Review of the Literature on the Effectiveness of Self-Assessment in Clinical Education."¹⁹ In addition to these comprehensive meta-analyses, there is also a large number of published research papers on assessment in the medical education literature. Despite this body of work, however, even in medical education there are still ongoing calls for further research in this area.²⁰

The paucity of equivalent evidence in the veterinary literature supports previous calls² for further evidence-based studies to help the veterinary medical education community learn more about the use of appropriate methods for different contexts. Linked to this is the need for our community to consider the development of specific educational research units embedded within veterinary schools, following the model now in place in many medical schools. As Hammick observes, "faculties of the future need educational researchers as much as they need teaching staff; indeed, the future is assured only if teachers are also researchers."⁸ A related and equally important aspect is that of faculty development, which is vital if major progress is to be made in this important area. Such development will promote the understanding of the fundamentals of "assessment as a science" and ensure that assessment practice is based on best evidence rather than on traditional practice.

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