

Name of the initiative:	Integration of QI across undergraduate and postgraduate curricula: embedding research into practice.
Initiative start date:	May 2010
Submitted by:	School of Veterinary Medicine and Science, University of Nottingham.

Introduction

Quality Improvement (QI) is fundamental for the veterinary profession to succeed in improving animal and human health and welfare. The most effective way to embed these concepts to expedite a step-change in practice culture is via undergraduate (UG) and postgraduate (PG) education. The School of Veterinary Medicine and Science at the University of Nottingham was established in 2006. It was the first new UK vet school in 50 years and prides itself on being educationally innovative, implementing best educational practice. Our focus has always been on graduating adaptable employable professionals who deliver a high standard of care to patients and their owners.

Aims

Undergraduate teaching: The goal was to integrate QI and evidence-based veterinary medicine (EBVM) across the entire UG curriculum so that it was considered part of standard veterinary practice activities. This was achieved by creating an accumulative/additive model of topic development and skills integration across all years, incorporating a range of teaching methods.

Postgraduate teaching: Our goal was to create continuing professional development (CPD) courses related to QI and EBVM targeted towards the needs of the veterinary and nursing professions. The existing variation in knowledge and use of QI and EBVM meant that it was important that key stakeholders contributed to the development of this part of the initiative to ensure relevance for the profession.

Postgraduate research: Our ethos has always been to use an evidence-based educational approach; research about QI and EBVM directs which resources and materials are incorporated into the curriculum. Concepts, key outcomes, and existing research outputs from the (human) medical sector played an important role during the initial development of the course. Research findings generated from veterinary-related QI and EBVM research carried out at Nottingham latterly and elsewhere has informed our curriculum development, ensuring relevancy and currency.

Planning and Actions

Undergraduate education:

Planning: A range of methods and tools relating to QI and EVM were targeted for inclusion within the curriculum. Identification of modules within which to host these topics was determined across the course, and learning objectives were created based on the concepts the team felt were important. This was a dynamic and iterative process as new resources became available and new research findings were generated. Not only were specific sessions about QI and

EBVM added into the curriculum but ensuring that these concepts were embedded in other teaching was crucial for enhancing buy-in from students in relation to the importance of these concepts. Efforts were made to communicate these ideas and suggested approaches via bi-annual clinicians' meetings. Additionally, an event was held with other veterinary educators across the UK to determine what concepts were important from an EBVM perspective, which also helped to inform the spectrum of content included in the course (Dean et al. 2017).

Action: Teaching about QI and EBVM has been successfully integrated across the entirety of the undergraduate curriculum. Table 1 contains the modules within which the material appears in significant content. There are other modules containing QI and EBVM content, incorporating a variety of teaching approaches (e.g., lectures, self-directed group and individual sessions, practical's, clinical rotations). Of note is the significant QI material in the Year 4 PPS module. This carries across into formative assessments where students work together to produce clinical audits. To our knowledge, we are the only undergraduate veterinary curriculum using QI in this way.

Table 1: Years, modules and concepts embedded into the undergraduate curriculum in significant proportions

Year of course	Name of module	QI and EBVM concepts
Year 1	Veterinary Professional Skills (VPS)	Searching skills; Information sources; Critical thinking; Clinical decision-making; Communication skills
Year 2	Veterinary Professional Skills (VPS)	Searching skills; Critical appraisal; Communication skills
Year 3	Research Projects (RPro)	Study design; Critical appraisal; Evidence synthesis
	Clinical and Professional Skills	Communication skills
	Principles of Clinical Veterinary Science (PVS)	Patient safety; Guidelines; Evidence appraisal
Year 4	Personal and Professional Skills (PPS)	General Quality Improvement; RCVS practice standards scheme; Clinical governance; Clinical effectiveness; Clinical audit; Guidelines; SOPs; Protocols; Management; Leadership; Communication and patient safety
Year 5	One health: One welfare rotation (OHOW)	Searching skills; EBVM framework (5 A's); Evidence-based practice; Study design; Critical appraisal; Critically appraised topics; Clinical audit; Significant event audit
	Small Animal Practice – Pride and Shelton Lock	Communication skills
	Small Animal Practice - Out of hours rotation	Guidelines

Postgraduate education:

Planning: Our postgraduate curriculum development can be demonstrated by the following four projects:

- Funding was sought and obtained from the Biotechnology and Biological Sciences Research Council (BBSRC) to work with a panel of veterinary professionals to inform the development of a postgraduate course focused on EVM and QI. The outcomes for participants focused on taking the concepts learnt and applying them back to their specific practice or environment. A range of concepts are covered, including the five steps of EBVM, critically appraised topics, Quality Improvement generally, and more specifically clinical audit, guidelines, and leadership.

- There was a need recognised regarding the importance of clinical audit and clinical governance, and a lack of provision of published guidance available for clinicians. As a result, a course focused on these aspects was created involving several educators.
- Along similar lines for the undergraduate teaching educator event, opportunities were identified to contribute to wider initiatives focused on QI and EBVM. Along with other collaborators, funding was sought from RCVS Knowledge to create a freely accessible resource about EBVM and QI (the EBVM Learning tutorial).
- More recently, approval has been granted to develop and deliver a master's degree apprenticeship in Advanced Clinical Practice (Veterinary) with the first cohort of apprentices beginning their studies in September 2020. As part of the curriculum, there is a substantial amount of QI and EBVM teaching including checklists, significant event audit, patient safety and practice culture, clinical audit, benchmarking, searching skills, critical appraisal, and study design.

Action: The University of Nottingham was one of the first UK veterinary institutions to offer postgraduate courses focused on both QI and EBVM. Very recently, approval has been received for a range of postgraduate modules for the RCVS governed Certificate in Advanced Veterinary Practice (A, B and C modules), which cover substantial QI content. In the A module, the clinical audit is used as the primary assessment. Educators at Nottingham played a significant role in the development of the original EBVM Learning tutorial, leading much of the content development for the 'Apply' section and as one of the editors.

Postgraduate research:

Planning: To ensure that the curriculum contained the most up to date thinking on QI and EBVM, postgraduate funding was sought to carry out research in several key areas, including QI generally, clinical audit, communication, evaluating interventions and barriers to clinical decision-making, patient safety and more recently, just culture.

Action: We have collaborated with various stakeholders (charities, industry bodies, corporate veterinary groups) to develop and oversee QI and QI-related PhD studentships, as detailed below:

- 'Clinical audit in farm animal practice' (KW; funded by the Centre for Evidence-based Veterinary Medicine and the University of Nottingham (UoN)),
- 'Patient safety in veterinary practice' (CO; funded by UoN),
- 'Defining the 'good' consultation: what is it and how could we measure it?' (LC; Onswitch and UoN),
- 'Building a 'toolkit' for change: Evaluation of horse owner behaviour and knowledge transfer in response to an educational campaign' (KL; World Horse Welfare and UoN),
- 'QI in equine veterinary practice' (FR; CVS Equine and UoN), and
- 'Just culture in the veterinary profession' (JG; VDS and UoN).

Much of the research conducted has been selected via abstract and direct invitation to be presented at clinical professional conferences, and several publications have been produced as a result of the research.

Impact

The impact of the introduction of QI and EBVM into teaching is demonstrated through formal and informal feedback by students/participants and through the outputs and dissemination of research findings.

Undergraduate teaching:

Positive feedback has generally been received by the undergraduate students across the course regarding the QI and EBVM teaching:

- All students who contributed feedback on the Year 1 VPS module session relating to communication found it useful, with comments received such as ‘telephone calls happen in practice and being introduced to them is a good opportunity’.
- Feedback from the PPS module in Year 4 demonstrated that 75% of students agreed or strongly agreed that after the teaching they would feel confident to undertake a clinical audit and take on leadership or management roles.
- From the OHOW teaching in final year, 98% of students in one cohort said that it would be possible to practice evidence-based medicine after undertaking the teaching at Nottingham. Supportive comments that have been received about teaching include ‘Really good insight to EBVM and inspired me to think about the decisions I’m going to make in practice’. At the time of writing this report, two students have gone on to co-publish BestBETs for Vets (critically appraised topics; Jones and Belshaw 2017; Hyde and Brennan 2020) and one has published a structured review in the Veterinary Evidence journal (Clough et al. 2019).

Postgraduate teaching:

In relation to the BBSRC funded EBVM and QI course, 83% of attendees would recommend the course to colleagues. Many positive comments were given in relation to the course such as ‘Relevant to practice. Real-world skills to take away’. At the time of writing this report, five course attendees have gone on to publish BestBETs and one has published Knowledge Summaries and written articles about practice-based research and EBVM.

Over 90% of the clinical audit course participants giving feedback said that the course was a useful learning experience and would recommend the course to colleagues.

As of May 2019, the EBVM Learning site had been accessed by more than 24,000 people (RCVS Knowledge 2019). Feedback provided by users has indicated that more than 90% of people would recommend it to others. Members of the Nottingham team (MB) have contributed to the development of a revised version (EBVM Learning II) which was made available in February 2021, on rcvsknowledge.org/learn.

Postgraduate research:

All of the PG researchers have been able to demonstrate educational impact as a result of their research findings:

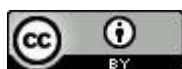
- KW was invited to be a member of the RCVS Knowledge QI board and was asked to present on their behalf at a variety of professional meetings (e.g., BSAVA Congress, BCVA Congress, RCVS Knowledge Skills Day). Additionally, findings from her work were embedded into two different RCVS Knowledge QI postgraduate modules (clinical audit, guidelines) for the profession.
- Content from KL’s project on decision-making in equine colic has been embedded into the Nottingham curriculum in Year 1 and 4 and is currently on the BEVA website. At the time of writing this report, content relating to this project was available to download from the World Horse Welfare website; since its release in October 2020, nine equine UK Higher Education Colleges/Organisations and five veterinary schools have downloaded material for use in their curriculums. A Colic Awareness Week, held in October 2020, included evidence-based webinars by KL, SF and JB and at the time of writing this report, had a social media reach of over 478,000 people.
- Outputs from CO’s research on patient safety has been embedded within the curriculum in Year 3; a significant output from her work has been the Nottingham Veterinary Safety Culture Survey (Oxtoby et al. 2017) which can be used for assessing practice safety culture and for benchmarking.
- A significant output from LC’s research was the generation of a vet and client satisfaction tool for communication that could be utilised for QI purposes (at the time of writing this report there had been over 950 downloads since August 2020; Corah et al. 2020). As a result of the research, changes have been made to the content and provision of the courses that are delivered by the industry body who funded the work.

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