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Evidence-Based Healthcare: The Importance of Effective Interprofessional Working for High Quality Veterinary Services, a UK Example

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ABSTRACT

Objective: To highlight the importance of evidence-based research, not only for the consideration of clinical diseases and individual patient treatment, but also for investigating complex healthcare systems, as demonstrated through a focus on veterinary interprofessional working.

Background: Evidence-Based Veterinary Medicine (EBVM) was developed due to concerns over inconsistent approaches to therapy being delivered by individuals. However, a focus purely on diagnosis and treatment will miss other potential causes of substandard care including the holistic system. Veterinary services are provided by interprofessional teams; research on these teams is growing.

Evidentiary value: This paper outlines results from four articles, written by the current authors, which are unique in their focus on interprofessional practice teams in the UK. Through mixed methods, the articles demonstrate an evidence base of the effects of interprofessional working on the quality of service delivery.

Results: The articles explored demonstrate facilitators and challenges of the practice system on interprofessional working and the outcomes, including errors. The results encourage consideration of interprofessional relationships and activities in veterinary organisations. Interprofessional working is an example of one area which can affect the quality of veterinary services.

Conclusion: The papers presented on veterinary interprofessional working are an example of the opportunities for future research on various topics within evidence-based healthcare.

Application: The results are pertinent to members of veterinary teams seeking to improve their service delivery, to educators looking to enhance their students' understanding of interprofessional working, and to researchers, who will hopefully be encouraged to consider evidence-based healthcare more holistically.

INTRODUCTION

Within this article, the authors seek to highlight the importance of evidence-based research, not only for the consideration of clinical diseases and individual patient treatment, but also for investigating complex healthcare systems. After an exploration of this idea, primarily through human healthcare literature, the article will use the example of veterinary interprofessional working, to explore how evidence can be gained to support the development of high quality veterinary services.

Evidence-Based Medicine

Evidence-Based Medicine (EBM) emerged as a concept in human healthcare literature in the 1990s, and was defined as:

the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research (Sackett et al. 1996).

In their article, Sackett et al. (1996) were keen to convince their readers that EBM is more than randomised clinical trials and meta-analysis. It involves the integration of best available scientific evidence, with patient needs and individual clinician expertise. However, a systematic review of numerous randomised trials remains their "gold standard" for evaluating the benefits and potential harm of a treatment.

Literature regarding Evidence-Based Veterinary Medicine (EBVM) is a slightly more recent advancement. One of the first instances is an Editorial in the Journal of Veterinary Internal Medicine in 2000 (Keene, 2000). Three years afterwards, a 'Handbook of Evidence-Based Veterinary Medicine' was published (Cockcroft & Holmes, 2003). Utilising the same definition of EBM, drivers of EBVM have called for increased patient research utilising individual, randomised, placebo-controlled clinical trials for treatments (Keene, 2000). Educators have begun to incorporate EBVM into veterinary curricula, and have described teaching EBVM skills utilising critically appraised topics (Arlt, Haimerl, & Heuwieser, 2012) including in the context of online learning (Steele et al., 2013).

A critique of the definition of EBM/EBVM

The definition of EBM/EBVM, and the methodological gold standard to which it is linked, are focused on the care of individual patients. The attention is, therefore, on the diagnosis and treatment of the individual patient's disease or ailment within the context of the patient's other needs. The best way to research treatment options, which are often drug trials, is therefore the systematic review of research reports which use randomised patients.

In this paper, we argue for consideration of a more holistic view of veterinary services that incorporates the systems involved in their delivery as well as the EBM/EBVM focus on individual patients. This holistic view takes into consideration the healthcare system in which doctors, nurses, veterinarians and other healthcare professions work. Successful healthcare depends not just on rational therapy, but also factors such as the skills of those involved in its delivery and client compliance. Many veterinarians might go to the literature and say a horse undergoing surgery for a small intestinal strangulation has an 80% chance of success (Proudman, et al. 2002). However, that is relevant only to the surgical team who published that article and their practice team. The success rate of any other veterinarian and their team might be much less. In the following paragraphs, several prominent authors who use scientific research to generate and deploy an evidence base for healthcare systems will be introduced. Much of the focus of these authors relates to the prevention of medical error, and therefore the development of an evidence base for high quality medical services, which could be translated to veterinary services.

A Systems Approach to Medical Error

James Reason has been one of the most influential authors on human error in complex organisations (Reason, 2000, 2004). Reason is a psychology graduate who worked as a research psychologist at the Royal Air Force (RAF), a field closely linked to interprofessional working and education, a topic explored later in this article. Reason suggests that there are two approaches to the issue of human fallibility – the person and the system. The person approach is historically more prominent. It looks for individuals to blame for their mistake. The system approach on the other hand, recognises that many lapses are actually 'blameless' – no one person is wholly responsible for an error. This is explained through the existence of latent conditions ('organisational' such as management policies and 'system' such as stress in the work environment) added to active failures (during direct contact with a patient) and local triggers (such as time) to create an 'accident opportunity' (Reason, 2000). Therefore, medical errors are not only caused by isolated human incompetence or acts of negligence (Kalra, 2004). Instead, the Swiss cheese model of accident causation (Reason, 2004) explains how errors can penetrate several lines of defences, akin to travelling through the holes of Swiss cheese, without it

being any particular person's fault. Mistakes therefore occur due to the fallibility of humans. It is noted that reporting these mistakes is a contentious issue in healthcare, with fear of litigation following admissions of being sorry. However, this denial has the potential to harm the organisation's chances of preventing the same mistake from happening again through making changes to the system. A culture which does not seek individuals with whom to find fault, and instead maintains a no-blame, or 'just' culture (Wachter & Pronovost, 2009), is more aligned to honest reporting and a positive and progressive team. Research regarding error disclosure has indeed suggested that patients desire an apology as well as information on the cause of the error, and how the hospital will seek to prevent similar errors (Gallagher et al. 2003).

In order to establish suitable means to prevent future errors, there is therefore little sense in focusing solely on an individual; whether an individual client or an individual doctor, nurse or any healthcare professional. Instead, the use of a systems approach to medical error offers opportunities to actually create solutions that address healthcare delivery holistically.

System and Cultural Effects on the Implementation of EBM

While the systems approach to medical error can aid in identifying latent conditions and local triggers, and therefore aid development of solutions, it is another thing to implement these solutions in an organisation which has its own historical culture.

Atul Gawande is a surgeon who has written extensively on his experiences of the imperfect science that is medicine. In his books, he explores several low cost methods which have been identified as reducing error, including various protocols, checklists and other systematic methods (Gawande, 2007). However, he also describes in detail the difficulty of implementing even simple solutions to improving the care of patients. Handwashing is one such example. Gawande considers that there would be a greater impact on healthcare if we ensured that services were well delivered, such as the requirement of a physician to wash their hands, rather than spending vast amounts of money on disease-specific research. However, the problem with implementing handwashing in one hospital was that of physician compliance; an obstinacy, blindness and resistance to change. Changing the whole culture, through support from traditional leaders and managerial staff for nurses to speak up to physicians, proved significant in increasing compliance.

In the definition of EBM, the idea of context, in terms of the patient's situation and personal choices is considered paramount, alongside the clinician's own expertise and practice situation. The work highlighted by Gawande (2007), as well as Syed (2015), helps clarify the full meaning of these other dimensions, in particular the importance of considering the wider situation in which the patient sits – the hospital or veterinary practice – when we consider means to maximise the benefits of EBM and EBVM.

Systems research on veterinary interprofessional working

The term interprofessional is used in a variety of contexts, for example, it is often used in the context of "One Health", where veterinarians work alongside healthcare professionals and environmental professionals. The term could relate to any occupation or profession working together within the veterinary field for the advancement of animal health and welfare, for example, veterinarians working with pharmaceutical companies or pet behaviour councillors. In the current paper, the term is used to relate to the typical UK veterinary practice team. Patient care no longer tends to rest solely with one veterinarian. Veterinary teams in the current era frequently consist of multiple veterinary surgeons, veterinary nurses, other paraprofessionals,

receptionists and administrators in either small animal, equine or mixed practices. All of these professions and organisations have an impact on the care received by the patient and the client; therefore, through researching the veterinary interprofessional team and its culture, it is possible to identify areas of potentially substandard service delivery which could be developed in order to improve the quality of care provided.

In the following section, research papers which focus on the systems nature and the culture of veterinary interprofessional working in the UK will be explored. All papers were written by the current author team and their colleagues, and are unique in their empirical focus on interprofessional working within the practice setting. This provides an important first step in the investigation of the systems nature of veterinary service delivery in its entirety.

RESULTS

The Culture of Knowledge Exchange within Veterinary Teams and its Impact on Care Provision

Social Network Analysis (SNA), a methodological approach to analysing interactions within a specified network, such as a veterinary practice, was utilised in two recently published papers (Kinnison et al. 2015b; Kinnison et al. 2015c). It has previously been suggested that the free flow of relevant knowledge around any team creates a pool of shared meaning (Patterson, Grenny, McMillan, & Switzler, 2001), allowing decisions to be made which are better than any one individual (or individual profession) could have made alone. The two SNA papers researched factors which might restrict knowledge exchange interactions within veterinary practices, and therefore impact on service delivery. 'Knowledge interactions' were defined as: receiving information, receiving advice, problem solving with another and being influenced by another's work.

The two papers identified four key restrictors to the flow of knowledge around a veterinary team. The key restrictors were: the size of the team, the spatial nature of veterinary practices as separate branches (Kinnison et al 2015c), the hierarchical nature of veterinary practices, and a link between social and work interactions (Kinnison et al. 2015b).

As reported in Kinnison et al. (2015c), smaller teams were more cohesive for all interaction types. This has implications for practices aiming to expand their team in one location, as protocols may be useful in maintaining levels of interactions. It was noted, however, that individuals still did not interact with all colleagues for all interactions, and were therefore making choices, as explored below. The nature of the distributed veterinary team across branches, especially those where staff did not rotate across branches, also influenced interactions and created silos of sub-teams within branches. This has implications for practices aiming to expand via incorporating a new branch, and for those corporate practices who claim a benefit of their corporation is sharing best practices across veterinary practices/branches.

Kinnison et al. (2015b) explored the effect of personal factors on interactions. They identified that for more complex knowledge interactions, like problem solving, individuals more frequently went to their intraprofessional peers, rather than to an interprofessional colleague. A hierarchical nature of interactions was seen between veterinary surgeons and veterinary nurses, whereby veterinary nurses were more likely to ask specific veterinary surgeons for knowledge (information, advice and problem solving) than vice versa. This has implications for creating expert teams, whereby, in an ideal world, knowledge should be sought based on

experience and understanding rather than professional status. However, a number of 'key people' were identified who were frequently involved in interactions, and these key people did include some veterinary nurses and administrators (such as practice managers), suggesting some evidence of an experienced-based hierarchy in addition to the profession specific hierarchy. Additionally, this paper identified a link between the existence of social interactions between a pair of colleagues and work interactions between the same pair. This has implications for practices to actively promote the opportunity for social events between work colleagues to subsequently increase relevant work interactions.

Veterinary Systems' Facilitation and Challenge to Interprofessional Working

Kinnison et al. (2016) describes the results of two case studies, conducted within veterinary practices which were contrasting in their size, species treated and location. The case studies aimed to explore the systems within veterinary practices which facilitated and challenged interprofessional working.

In total, 220 hours of observations were conducted and 12 interviews were held with veterinary surgeons, veterinary nurses, receptionists and administrators (totalling eight hours). Analysis of the case study field notes utilised a Cultural Historical Activity Theory framework (Engeström, 2008) and analysis of interview transcripts followed a thematic analysis (Braun & Clarke, 2006). This study formed part of a larger study including the aforementioned SNA research (Kinnison et al. 2015b; Kinnison et al. 2015c), and triangulation of the SNA results and case study results identified various factors of veterinary practice systems which were facilitators or challenges to interprofessional working.

Facilitators to veterinary interprofessional working included: trust and value, hierarchy, professionalisation and accountability, different perspectives and formal infrastructure. Challenges to interprofessional working included: temporal and spatial nature of work, hierarchy, professional motivation, and error and blame.

An interesting dimension exists between utilising different perspectives of professional groups to make decisions that any one profession could not have made on their own, and the contrasting motivation of each of the professions in their daily work. Utilising different professions' perspectives involves having an understanding of their role and their background; however, having different motivations may diminish the understanding that professions have about each other. The veterinary surgeon's novel perspective and motivation aligned primarily with diagnosing and curing the patient. The veterinary nurse's perspective and motivation was more focussed on the patient's welfare. The receptionist's perspective and motivation was mainly for the client. Finally, the administrator's perspective and motivation was linked to the practice and the practice team. These primary contributions and motivations are not exclusive to any one profession, and all professions expressed contributions and motivations towards all factors. However, making use of the naturally differing foci of the occupational groups within a veterinary practice is a potential way to produce an expert team with distributed cognition (Hutchins, 1995) rather than an unintegrated 'team of experts' (Collin, Paloniemi, & Mecklin, 2010).

System Errors in Veterinary Practices have Implications for Patients, Clients, the Practice and the Team

An unexpected finding from the case studies outlined in the section above was an observation of errors within veterinary practices (Kinnison et al. 2015a). Once errors were identified as an outcome of the study, a detailed investigation of all field notes was undertaken to identify all errors. The definition of error used in this instance was based on that from Mellanby and Herrtage (2004), but was more inclusive: an erroneous act or omission

resulting in a less than optimal or potentially adverse outcome of any severity for a patient, client or the practice. Forty instances were identified as errors and these were categorised as clinical errors (Dosing/Drugs, Surgical Preparation and Lack of Follow-Up), team communication errors (Records, Procedures, Missing Face-to-Face Communication and Mistakes within Face-to-Face Communication) and a minor group of lost item errors. Through the case study observations and interviews, several latent conditions contributing to these errors were identified. These included: a lack of time; frequent handovers between receptionists or between veterinary nurses, with a potential for communication failure; issues with booking in consultations; and branch or veterinary surgeons' differences, requiring veterinary nurses or receptionists to behave in different ways depending on their context. Solutions were often identified by the practices themselves, including encouraging receptionists to go on visits with veterinary surgeons to improve understanding of booking consultations. Additional protocols or checklists, as promoted by Atul Gawande (Gawande, 2011), in this case relating to change overs and a reduction of branch differences, could also reduce errors.

Kinnison et al. (2015a) is the first published report of real-time observed errors within veterinary practices. It follows Mellanby & Herbage's (2004) investigation of recent graduates reporting of errors in practice, and sits well alongside Oxtoby et al.'s (2015) investigation of the causes and types of errors through a review of insurance claims with focus groups for in-depth investigation of the identified issues. Together, these results call for increased research, at both individual and practice team levels, regarding identification of errors, error reporting, identification of solutions and the results of error management initiatives.

DISCUSSION

EBVM developed due to inconsistent and old-fashioned approaches to therapy being delivered by individuals. However, a focus purely on diagnosis and treatment will miss many other potential causes of substandard care. Particularly where a patient is handled by multiple people (as is frequent in modern veterinary practices), all participants need to work as an effective interprofessional team. This involves individuals being aware of their own role, the roles of others, the desires of the client and developments in the case. This is in addition to being respectful and supportive of colleagues. These factors may be influenced by the culture of the veterinary practice in which the team works.

This paper does not dispute that research on better diagnostic tools and treatments for specific diseases is important. However, hand-in-hand with these advances, progress must be made on health service delivery as it has been argued that attention to service delivery is likely to be a far more cost-effective way of improving healthcare than further research on individual diseases (Gawande, 2007). This paper, therefore, seeks to highlight the potential of evidence-based healthcare for considering veterinary practices as complex systems in order to create an evidence base for high quality veterinary services.

The results that are summarised here are intended as an illustration of interprofessional working – one focus for researching of the systems and cultures encompassing the art of veterinary practice. The interprofessional research was initially conducted to develop an evidence base for current interprofessional activities and potential interprofessional issues in practice, which could be used to drive Interprofessional Education (IPE) initiatives for future veterinary undergraduate curricula. A recent IPE Best Evidence Medical Education (BEME) review (Reeves et al. 2016) identified a total of 46 IPE studies in human healthcare, which suggested that IPE influences learning of knowledge and skills, although it is less influential on changing attitudes or perceptions to interprofessional colleagues. The review also provided evidence that IPE can affect a positive change at different outcome levels, including behavioural, organisational and patient/client outcomes. As highlighted in the results, the focus on IPE is essential as much professional communication in veterinary practice, as in

human healthcare systems (Zwarenstein et al. 2013), is interprofessional. So achieving the full potential in terms of accessing summaries of “best practice” and support of their adoption will depend on effective interprofessional dialogues.

The research summarised here has not looked at implications of increased specialisation in the veterinary professions and both referral in and between practices. However, the danger with specialisation is that it leads to greater barriers to interprofessional (Irvine et al. 2002; Widmark et al. 2011) and intraprofessional (de Buck et al. 2002) working, with less attention to “the patient who has the disease(s)” than “the disease(s) that the patient has” (Sweeney et al. 1998). In addition, this work has demonstrated the barriers to communication caused by geographical and temporal divisions that would apply equally to referral and other centres. Therefore, these trends only emphasise the need to pay attention to interprofessional working and communication.

The limitations of the depicted articles and therefore this summary, are that the results were based on relatively few veterinary practices in England. Eleven practices took part in the SNA, and though they cannot represent all of England, or international practices, they did cover a wide range of practice types including independent/corporate, small/large, first opinion/referral, small animal/mixed/equine, and were from across the whole of England. In addition, the SNA results were self-reported via a questionnaire, however, observational SNA was conducted in two practices and demonstrated a good correlation between reported and observed interactions. The errors reported through the case studies may have underestimated individual cognitive errors; however, they have the previously unseen advantage of an independent observer reporting team-based errors as they occur.

The main argument of this paper is that if EBVM is to be true to the definition provided by the founders of EBM, it must look beyond just an emphasis on randomised drug trials and best treatment evidence to a more holistic evidence-based healthcare approach. As research on veterinary interprofessional working demonstrates, methods to investigate the issues of service delivery will rarely, if ever, include randomised control trials. Qualitative methods and mixed methods are far more common and it is a requirement of veterinary practices in the modern era to be able to understand and critique these types of data. This involves an evaluation of their confirmability instead of objectivity, credibility rather than internal validity, transferability instead of external validity and dependability rather than reliability (Wigren, 2007). Otherwise the danger is that service delivery will be determined by “how to” manuals based on anecdote.

In conclusion, this paper aims to encourage the widespread recognition that EBVM, correctly interpreted, embraces evidence-based veterinary healthcare in its broadest sense. This means that EBVM should include the development of an evidence base for high quality veterinary services via researching veterinary practice and identifying areas of substandard service delivery. The papers presented on veterinary interprofessional working are an example of the opportunities for future research on various topics within this valuable area.

CONFLICT OF INTEREST

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