

## A novel approach to epidemiological and evidence-based medicine studies in equine practice

Effective veterinary clinical practice has always drawn upon both science and art. Many of the decisions that a clinician makes about the diagnosis or treatment of an individual animal (or group of animals) is based on a combination of the information gained from clinical experience, under- and post graduate training, reading of textbooks and professional journals. In this way, the clinician aims to base his or her decisions and actions on the best available evidence at the time. The practice of evidence-based medicine aims to integrate individual clinical expertise with best available external clinical evidence from systematic research (Sackett *et al.* 1997; Marr 2003; Muir 2003). Individual clinical expertise comprises the proficiency and judgement that individual clinicians acquire through clinical experience and practice. Best available external clinical evidence consists of clinically relevant research, which may arise from the basic sciences or using research animals, but especially from patient-centred clinical research (Sackett *et al.* 1997).

Not all evidence is equal in quality. Patient-based research is especially important because the results are derived from, and therefore directly relevant to, similar patients in the clinical setting; this is not always the case for data extrapolated from experimental studies, particularly using other species. Any serious movement towards evidence-based veterinary medicine requires that a large body of high quality patient-centred research be made available to veterinarians willing and able to access and critically appraise the quality and applicability of such patient-based studies. These studies may include clinical trials and controlled observational epidemiological studies (i.e. case-control and prospective [cohort] studies) (Keene 2000). In equine medicine, well-controlled clinical trials are unusual; an example of a double-blind placebo-controlled trial is published in this issue (Denoix *et al.* 2003). One major reason for the lack of published clinical trials is the high costs commonly involved in performing them. The veterinary pharmaceutical market represents only a tiny fraction of the entire pharmaceutical industry, and the industry is therefore unlikely to conduct studies whose costs could exceed potential returns. Moreover, there are nonpharmacological modalities that are of interest and importance to equine medicine and surgery (such as new surgical techniques, management and preventive medical practices) that would not attract funding from the pharmaceutical industry.

Despite these problems, useful and relevant studies in equine medicine can be achieved on relatively small budgets; case-control studies are generally less expensive to conduct than double-blind controlled clinical trials. It is essential that clinicians reading the published study are able to recognise and appreciate both the advantages and limitations inherent in the evidence generated by a variety of clinical trial and observational epidemiological study designs. Sample size is an important issue with patient-based research studies. Studies involving small numbers of animals run the risk that, even though a particular treatment may appear to be safe, adverse effects will eventually be detected when the treatment is applied to a larger, more heterogeneous population of horses. Similarly, effectiveness of treatment may appear good in a small study of homogeneous patients or in an experimental model of disease, but performance can subsequently be shown to be lower when applied to a larger population. The critical appraisal of external evidence has 2 steps; deciding whether it is valid (close to the truth) and deciding whether it is clinically meaningful and therefore potentially important to you as the clinician (Mair 2001).

In view of the difficulties in performing meaningful controlled clinical trials in equine medicine, assessment of evidence from other sources is important. There is a form of hierarchy of evidence among clinical studies, with case reports and case series at the lower end and randomised, controlled trials at the top. Although the randomised, controlled trial may be considered the 'gold standard', evidence from other sources may also be very important and should not be ignored. There are numerous examples in which observational epidemiological studies, for example, have provided essential, critical and solid evidence (e.g. case-control studies showing an association between smoking and lung cancer). Moreover, there are examples in the epidemiological literature in which cohort studies have provided estimates equivalent to those obtained by controlled trials (at significantly less cost to perform compared to controlled trials). Given that randomised, controlled trials in horses are rare and difficult to perform, observational studies are likely to remain important and attainable sources of evidence in equine medicine. Patient-based studies are forms of epidemiological studies, and the involvement of epidemiologists in designing these studies is essential. There are a number of possible biases and limitations (some of which are ineluctable) associated with the design and conduct of epidemiological studies. Those

wishing to practice evidence-based medicine must be able to recognise these limitations by careful reading and interpretation of study findings. Examples are given in the article by Cohen (2003) p 343 in this issue.

Achieving effective clinical research on the predisposing factors, diagnosis, treatment and prognosis of equine diseases is hampered by the relatively small equine population and limited access to clinical cases 'in the field'. The use of equine practitioners as the source of relevant data on equine disease is an approach that could potentially yield substantial amounts of information; to date, this source of data has remained relatively untapped. The American Association of Equine Practitioners (AAEP) and British Equine Veterinary Association (BEVA) are organisations that between them comprise some 10,000 veterinary surgeons, most of whom are employed in general practice. Members of these associations represent an enormous resource and source of information that could be used to improve our understanding of the health and welfare of horses, as well as providing robust and reliable data contributing towards an evidence-based approach to equine medicine.

The idea of acquiring data for prospective studies from the membership has recently been applied to AAEP and a similar approach is being developed within BEVA. Ultimately, studies embracing the membership of both organisations might be possible. Practitioner-based studies have been successfully performed in limited areas, including epidemiological studies on colic undertaken in Texas; some of these studies are summarised by Cohen (2003). Such practice-based research enables the capture and analysis of information that is directly relevant to the needs and interests of the members of the associations, their clients and patients. The quality of the results of such studies will depend upon the quality of their design, conduct and analysis. The power of practice-based studies must be coupled with sound study methodology. Ultimately, it may be possible to conduct blinded, placebo-controlled, randomised clinical trials that provide the most reliable

(Class A) evidence of efficacy (Yusef *et al.* 1998). Up until now, published individual blinded, placebo-controlled, randomised trials are very few and far between in equine medicine, and there is a paucity of controlled observational epidemiological studies of equine populations. This scarcity of controlled patient-based studies seriously limits the applicability of an evidence-based approach to equine clinical science.

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