Evaluating Treatment Options for Common Bovine Diseases Using Published Data and Clinical Experience

Annette O'Connor, MVSc, DVSc, FANZCVSc[a], Virginia Fajt, DVM, PhD[b],*

KEYWORDS

KEY POINTS

- Not all sources of information provide unbiased estimates of treatment effects, and transparent sources that enable the assessment of biases are important when assessing treatments.
- Well-executed randomized controlled trials and systematic reviews of well-executed randomized controlled trials provide transparent unbiased comparison of treatment effects.
- Confounding by indication is a major source of bias in cohort studies and clinical experience.
- Case series and case reports provide no comparative assessment, and bias cannot be assessed, so provide little information for assessing the effect of treatments.
- Reports of comparative efficacy should provide an estimate of the magnitude of the effect size, including the precision of the effect size given by the 95% confidence interval; such information enables clinicians to better assess interventions than P values.

INTRODUCTION

This issue of *Veterinary Clinics of North America: Food Animal Practice* includes discussions and recommendations for the treatment of common bovine diseases, such as how to evaluate and diagnose each condition, select treatment options, and assess the outcome. Veterinarians have an obligation to provide treatment options based on the most recent research evidence tempered by clinical experience and the clinical setting (ie, the unique needs of the patients and client). In this article, the authors

provide guidelines for evaluating sources of information, such as summaries of research, published primary research, and clinical experience. External sources of data should be used as sources of (1) estimates of treatment effect (in numerical form) and (2) precision of the treatment effect estimate, although the value of this information should be assessed in light of the risk of bias.

In addition to discussing how the magnitude and precision of the treatment effect are calculated, the authors discuss the risk of bias for all these sources. The authors use a framework that focuses on applicability and validity. Their basic approach is to introduce the external information sources available to veterinarians and how to evaluate them, and then to discuss how clinical experience should be evaluated. The discussion is limited to information that clinicians might use in the decision-making process about selecting treatment options. The approaches to assessing relevance and validity may not always directly apply to other clinical decisions, such as selecting preventive interventions or diagnostic tests for disease detection.

TREATMENT EFFICACY VERSUS CLINICAL DECISION MAKING

Here the authors draw the clear, but often ignored, distinction between deciding the effect of the treatment and deciding which treatment to use. To discuss this issue, the authors consider the situation when a clinician is faced with 3 treatment options: treatment A, treatment B, and the placebo group (no treatment). The clinician may find that treatment A reduced retreatments by 60%, whereas treatment B reduced retreatments by only 40%, when both are compared with a placebo. Clearly, treatment A is more effective. However, knowledge of the magnitude of effect does not mean the clinician will use treatment A. As frequently discussed, the setting must be considered. There is always an upper limit to the amount a producer can spend on treatments. If treatment A is 10 times more expensive than treatment B, in the face of an outbreak, the clinician might use the magnitude of the effect of treatment A and treatment B combined with the setting information (resources) to decide to treat 10 times as many animals with treatment B. Alternatively, if the same clinician is faced with treating just one animal that is a prized stud animal, the decision reached will likely be in favor of treatment A. These examples illustrate that the clinical setting combined with efficiency determine the treatment decisions, not solely the magnitude of the treatment effect.

WHAT INFORMATION IS NEEDED TO DETERMINE COMPARATIVE EFFICACY?

All decisions about treatments are comparative. If there is no comparison or alternatives to choose between, then there is no decision to make. When deciding on treatments, it is usual that a comparison is being made between treatment A and treatment B or even treatment C. Sometimes one of the treatments is to do nothing, which, in research, is often represented by the placebo group. Some studies will not include a placebo if it is considered unethical to leave animals untreated. Given this setting of a comparison, to make judgments about which treatment is most effective, 3 pieces of information are needed.

The Magnitude of the Effect Size

The magnitude of the effect size refers to how big the difference in the treatments is. Frequently, studies compare treatments on 2 effect size scales: the *mean difference* and the *risk ratio*.

The *mean difference* is used to describe the difference in means for continuous outcomes compared across treatments, such as weight gain or milk production. As this is a subtraction, mean differences can be negative or positive. If the treatments do not