

Knowledge Synthesis in Animal and Veterinary Research Blog #2

By Lee Wisener on March 26, 2019

Evidence-based decision making and why it matters

Knowledge synthesis is a tool for evidence-based decision making.

Evidence-based decision making is the goal

- ✚ For clinicians
- ✚ For policy makers
- ✚ For funding agencies

Evidence-based decisions rely on evidence that was:

- ✚ Obtained without bias* (e.g. in a rigorous transparent way so as to avoid 'cherry picking' the evidence to suit a decision already made)
- ✚ Compiled (i.e. synthesized) in a repeatable, transparent, rigorous way
- ✚ Assessed for bias (i.e. Were the included studies valid?)

“**Bias** is a systematic error, or deviation from the truth, in results or inferences. Biases can operate in either direction: different biases can lead to underestimation or overestimation of the true intervention effect.” Higgins JPT, Green S (editors). *Cochrane Handbook for Systematic Reviews of Interventions* Version 5.1.0 [updated March 2011]. The Cochrane Collaboration, 2011. Available from www.handbook.cochrane.org.

Evidence-based decision making results in less biased, better, and more credible decisions.

Evidence-Based Medicine [EBM]: The evidence based medicine triad aims to improve patient/client outcomes.

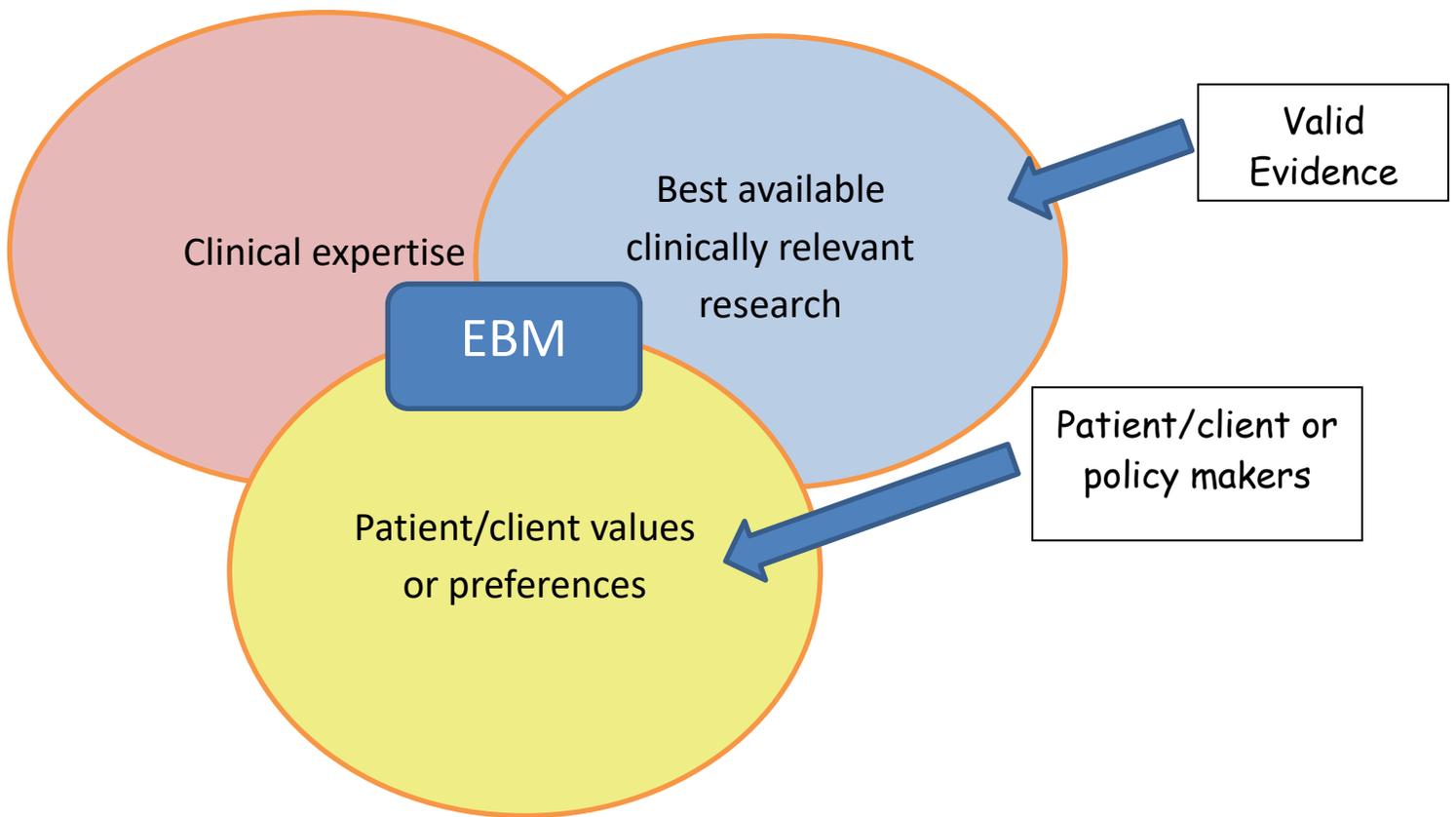
“Evidence based medicine is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research. By individual clinical expertise we mean the proficiency and judgment that individual clinicians acquire through clinical experience and clinical practice.”

Sackett D.L. et al., *BMJ* 1996 (Vol. 312):71–72

The term and concept of ‘evidence-based’ as defined by Dr. Sackett is sometimes referred to as ‘evidence-informed’ to emphasize patient or client values, circumstances, and preferences as part of the decision making process.

The concepts apply not only to the clinician but also to policy makers and other decision makers.

Evidence Based Medicine Triad



EBM triad adapted after Sackett D.L. et al., BMJ 1996 (Vol. 312):71–72

Evidence-Based Veterinary Medicine (EBVM) *"is the use of current best evidence in making clinical decisions. In EBVM reduced reliance is placed upon intuition, unsystematic clinical experience, and pathophysiological assumptions as the basis for clinical decision-making, and puts the emphasis on evidence from randomized controlled trials or accurate recording of information."*

See: https://en.wikipedia.org/wiki/Evidence-based_medicine

Evidence based/evidence-informed medicine starts with the best evidence

1. **Best available evidence:** best relevant scientific evidence
 - Absolute benefits and harms
 - Time horizon to benefit
2. **Clinical judgement**
 - Individualized risk profile / population risk profile
 - Prognosis
 - Socio-personal context
3. **Patient's / clients values and preferences**
 - Shared decision making / transparent decision making

Why use scientific literature to help answer clinical questions?

"Evidence based medicine is not "cookbook" medicine. Because it requires a bottom up approach that integrates the best external evidence with individual clinical expertise and patients' choice, it cannot result in slavish, cookbook approaches to individual patient care.

External clinical evidence can inform, but can never replace, individual clinical expertise, and it is this expertise that decides whether the external evidence applies to the individual patient at all and, if so, how it should be integrated into a clinical decision.

Similarly, any external guideline must be integrated with individual clinical expertise in deciding whether and how it matches the patient's clinical state, predicament, and preferences, and thus whether it should be applied."

Sackett D.L. et al., BMJ 1996 (Vol. 312):71–72

Observations in any biological entity are variable. However, you may want to know if the differences that you observe are a true result of the treatment or exposure of interest or just part of 'background' natural variation.

- **Animals or populations of animals are complex entities.** Unlike a chemistry or mechanical experiment, experiments and trials in animals may return different results based on numerous factors such as age, sex, breed, coexisting conditions, location, weather, management, and unknown factors. **These factors combine to create normal biological variation among** the individual animals and populations that we treat and test.
 - e.g. "two groups of growing cattle have been fed different diets. The ranges of the recorded weights at six months show some overlap in the two groups. Is there a real difference between the two groups?"
 - e.g. "You have results of an electrolyte blood test which shows that the serum potassium level is elevated. By how much must it be elevated before you regard it as abnormal?"

From Statistics for Veterinary and Animal Science. 2006. Second Ed. Petrie A. and Watson P.

- While **clinical experience** and the knowledge we gain from other clinicians or case reports can be helpful, these approaches **do not take into account the factors that make up normal biological variation.**

Controlled studies include a control group.

"In any experimental investigation, whether a clinical trial or laboratory investigation, without some basis for comparison we cannot establish with any degree of certainty that the new treatment under investigation is preferable to the standard treatment or even to no treatment at all."

From Statistics for Veterinary and Animal Science. 2006. Second Ed. Petrie A. and Watson P.

No single study can fully address most clinical problems and every study may lack some degree of validity [aka bias]. **The best use of scientific literature entails combining studies of varying strength and the critical appraisal of that literature.**

[Modified from Robert Larson, DVM, PhD, ACT, ACAN, ACVPM (Epi) presentation at the ACVIM 2017]

Knowledge synthesis is a rigorous approach to combining and assessing the evidence and knowledge from more than one study.



Knowledge synthesis....
why does it matter?

Knowledge synthesis and translation allows us to **make sense of the best existing evidence** and to communicate the findings to decision-makers.

It can help to:

- ✚ Assess bias in research
- ✚ Summarize an overall effect for a particular intervention, treatment, or program by combining the results of multiple similar studies [some of which may have been too small to detect a significant difference]
- ✚ Explain why similar studies may report different results
- ✚ Identify where there are knowledge gaps in the scientific literature/evidence
- ✚ Demonstrate when we have enough evidence to answer a particular clinical question.

Some veterinary resources:

1. **SkepVet Blog:** <http://skeptvet.com/Blog/2015/08/evidence-based-veterinary-medicine-what-is-it-why-does-it-matter-2/>
2. The **Evidence-Based Veterinary Medicine Association (EBVMA)** is an international, non-profit (501(c)3) professional organization founded with the mission of better organizing the emerging veterinary research, training, and practice of [evidence-based veterinary medicine \(EBVM\)](#) — the formal strategy to integrate the best critically designed and statistically evaluated research available combined with clinical expertise as well as the unique needs or wishes of each client in clinical practice. EBVM draws from and parallels the [evidence-based medicine](#) movement in human medicine. <https://ebvma.org/>
3. **Centre for Evidence-based Veterinary Medicine (UK)**
From the University of Nottingham, this website provides information about on-going projects and useful resources for the veterinary profession to promote the use of Evidence-based Veterinary Medicine principles. <https://www.nottingham.ac.uk/cevm/>
4. The knowledge hub for veterinary professionals **RCVS Knowledge** is the charity partner of the Royal College of Veterinary Surgeons (RCVS). Our ambition is to become a global intermediary for evidence based veterinary knowledge by providing access to information that is of immediate value to practising veterinary professionals and directly contributes to evidence based clinical decision-making. <https://knowledge.rcvs.org.uk/about-us/>
5. **BestBETS for Vets**
From the University of Nottingham, BestBETS for Vets supports veterinary clinicians in making evidence-based decisions. The database can be browsed by animal, topic and/or intervention. Each BET is a simple, unbiased review of current best evidence on a very specific clinical topic. They are designed to be a quick and achievable method of incorporating evidence into clinical practice.
6. SYREAF - <http://www.syreaf.org/>
Systemic Reviews in Animal Health and Food
7. Handbook of evidence-based veterinary medicine. 2003. Peter Cockcroft and Mark Holmes. Blackwell Publishing, Oxford England.