

It's Evidentiary, My Dear Watson:

# SEARCHING FOR THE *Evidence* YOU NEED TO PRACTICE

*"I believe in incorporating EBVM into practice because the nursing care and medicine we practice should be based off of sound reasoning involving facts, not conjecture. Of course this is much easier said than done since anyone who delves into evidence-based medicine will find out that actual "facts" are hard to prove. With that said, in this day and age, technology connects everyone very easily, and misinformation has an edge on true evidence to the contrary. With veterinary technicians being diligent in finding, evaluating, and implementing evidence on topics of interest we can provide our patients the best possible care with the often limited knowledge we have, and the ability to tell the difference between good and poor research is important. This essential skill ultimately allows us to be better advocates for our patients and their owners. Keep asking the question "Why?" behind the "How" of "What" we do, to continue bettering yourself as a veterinary professional!"*

— Kenichiro Yagi, VTS ECC and SAIM

Heather K Moberly, MSLS, AHIP

Erik Fausak, MSLIS, MA, CVT,  
LVT, RLAT

*This program was reviewed and approved by the AAVSB RACE program for 1 hour of continuing education in jurisdictions which recognize AAVSB RACE approval. Please contact the AAVSB RACE program if you have any comments/concerns regarding this program's validity or relevancy to the veterinary profession.*

**Objective:** *After reading this article, participants will be able to define Evidence-Based Veterinary Medicine (EBVM), have the tools to develop a clinical question, and an understanding of how the type of evidence is hierarchical in clinical decision making.*

## **EBVM: An Introduction**

Although Evidence-Based Medicine (EBM) has roots in the mid-19th century it has only recently been applied in human or veterinary medical practice. A common definition for EBM is, "...integrating individual expertise with the best available external clinical evidence from systematic research."<sup>1</sup>

Three types of information come together in the practice of EBM: the best clinical evidence, best scientific evidence, and the patient's preferences and needs.

Figure 1. PICO criteria

Patient (or Population or Problem)	<i>Who are you treating and why?</i>
Intervention	<i>Is there another treatment or intervention you are considering? (If not, this could be a placebo)</i>
Comparison	<i>Is there another treatment or intervention you are considering (if not, this could be a placebo)?</i>
Outcome	<i>What is the desired outcome.</i>

The EBM and EBVM processes often follow five distinct steps:<sup>2</sup>

1. Write an answerable question about your need
2. Locate the evidence to answer the question
3. Appraise the evidence
4. Apply the result to your situation
5. Evaluate the outcome

In this article we will introduce these steps and direct the reader to resources for additional information.

## How to practice EBVM

### Ask the right questions

The first step in the EBVM process is to turn your clinical situation into an answerable question (see Figure 1).

Before forming a PICO, you must have the background knowledge of the disease or situation being examined, which may be gained from a textbook. PICOs become quicker and easier to develop with experience.<sup>3</sup>

The Centre for Evidence-Based Veterinary Medicine has a freely available PICO template to help write a PICO question as a fill-in-the-blank sentence:

In (species) does (intervention) compared to (comparison) result in (outcome).<sup>4</sup>

Example. *In adult male beagles does neutering compared to not neutering cause an increased likelihood of obesity-related diseases?*

Another freely available PICO tool is part one of the RCVS Knowledge Toolkit, *Asking an answerable question*.<sup>5</sup>

### Where and how to search

After developing a question you need to search for evidence, often published in scholarly journals.

Peer-reviewed journals differ from magazines because experts review submissions, make

recommendations for changes, and approve the articles. Journals are published more frequently than textbooks and provide more timely knowledge. There are a number of options available to find relevant articles.

### Internet Search Engines versus Indexes/Databases

Google Scholar, like Google, searches the Internet but has different criteria for searching the Internet than Google. PubMed is an index whereas Google and Google Scholar are not. Indexes are composed of records that have standardized information about each article with a database designed to search that format. Google Scholar and Google search the Internet whereas PubMed is an index or database with strict criteria of what information is being referenced or accessed. While results from Google Scholar are less reliable than PubMed, Google Scholar has a 50% overlap with PubMed and it is worth investigation for increased return of evidence.<sup>6,7</sup>

Peer-reviewed journals are often indexed in databases, making them a key resource for finding relevant articles. Most databases and Internet search engines use searches that connect search words using the terms AND, OR, and NOT. These boolean operators are typed in capital letters so the search engine recognizes a command. Use your PICO terms and boolean operators to create the search. Boolean tutorials are available from the National Library of Medicine.<sup>8</sup>

Example: *dogs AND neuters AND obesity AND complications* limits searches to articles that include all the terms *dogs, neuters, obe-*

*sity, and complications* as keywords or terms in the article.

## Resources

### Freely Available:

- PubMed (Medline)

<http://pubmed.gov>

This is a free interface to the MEDLINE index that indexes more than 5,500 biomedical journals, including a core of about 200 veterinary journals. PubMed's search is robust and flexible, allowing you to see how it interpreted your search terms in the Search Details. This allows you to identify problems with your search and correct them. PubMed matches the search words to controlled terms (Medical Subject Headings - MeSH) to provide better results. PubMed has filters that can be used to limit your search results by criteria including publication date, type of article, language, subject, etc. One of the subject filters can limit your results to veterinary science. PubMed is produced by the United States National Library of Medicine.

- VetSRev

<http://webapps.nottingham.ac.uk/refbase/>

VetSRev indexes nearly 500 systematic review articles. The search is a simple interface and does not allow boolean operators. It is produced at the Centre for Evidence-Based Veterinary Medicine (CEVM) at the University of Nottingham.

## Evidence-based Veterinary Medicine, continued

- **Best Bets for Vets**

<https://bestbetsforvets.org>

Best Bets for Vets provides brief synopses on topics of veterinary medicine covering a wide range of species. These summaries are open-access articles available in the journal, *Veterinary Record*. It is produced at the Centre for Evidence-Based Veterinary Medicine (CEVM) at the University of Nottingham.

- **Google Scholar**

<http://scholar.google.com>

Google Scholar is a better search engine than Google to locate scholarly articles because the results are citations to articles instead of a broader range of results. Both use a proprietary search and do not allow you to see how they interpreted your search. Replicating the results from previous searches is difficult because of the constantly changing content of the Internet. Search PubMed and VetSRev before searching Google Scholar.

- **International Veterinary Information Service (IVIS)**

[www.ivis.org/home.asp](http://www.ivis.org/home.asp)

The IVIS website includes full-text online textbooks, conference proceedings, and links to search PubMed by species using pre-constructed searches. This website is free for qualified registrants.

- **WikiVet**

<http://en.wikivet.net>

The wikiVet site provides many educational tools in English, French, and Spanish and is free for qualified registrants. It is produced by the Royal Veterinary College and includes VetStream for veterinary students.

- **Banfield Critically Appraised Topics (CATs) and White Papers**

[www.banfield.com/veterinary-professionals/resources/research/white-papers](http://www.banfield.com/veterinary-professionals/resources/research/white-papers)

CATs and Banfield White Papers are summaries of primary research about companion animal diseases. The most

recent publication was in 2013, making timeliness a possible concern. These are produced by Banfield.

### Subscription-only indexes and databases:

- **VetMed Resource (CABI)**

[www.cabi.org/vetmedresource](http://www.cabi.org/vetmedresource)

VetMed Resource includes the veterinary portion of CAB abstracts, which is a large life sciences database. CAB abstracts is the most comprehensive veterinary literature index and includes over 90% coverage of veterinary literature; this database is necessary for a comprehensive literature review.<sup>9</sup> VetMed Resource is produced by CABI publishing.

- **VetStream**

[www.vetstream.com](http://www.vetstream.com)

VetStream is a clinical point of care tool that includes a secondary examination of primary research for four species (canis, felis, equis, lapis). It is available by subscription or is included with student registration for WikiVet or NAVC/AAHA Vetfolio membership.

- **Veterinary Prescriber**

<http://veterinaryprescriber.org>

Veterinary Prescriber is a veterinary pharmacology resource providing secondary summaries of pharmaceuticals. This project is sponsored by a pharmacologist that has worked on similar resources in human medicine.

### Retrieving the Literature

After identifying relevant articles, the next step is obtaining the full-text of the article. An abstract alone does not identify any potential flaws or a complete understanding of the study's quality. Some articles may be freely linked through Google Scholar or PubMed. However, many articles require a subscription or locating access.

If access is not an option personally or through your hospital, there may be two op-

tions. Students can check with their college library. Talking to your local public library is another option. Many veterinary journals are in public library databases. Articles may be requested through interlibrary loan service.

### Evaluating the Literature

#### Publication type/venue

The search results should focus on articles that have a high level of evidence.

#### Timeliness

Evaluate when each of your results were published. Note if the studies reporting were conducted at some previous time. Older literature is not always undesirable, but there should be a balance between current and older information.

#### Bias

Articles and studies have biases, which are often reported in the methods, results, and at the end of the discussion sections of an article. Read the entire article—not just the abstract, introduction, and conclusion—to identify potential biases.

#### Levels of Evidence

EBVM has a hierarchy of literature called Levels of Evidence (LOE). In EBVM, clinical decisions should be based on a strong body of evidence, not anecdotes. Literature is divided into primary and secondary literature. Primary literature may be either prospective or retrospective studies. In prospective studies, the experimental design is determined prior to the research being conducted, so what is measured can be accurately examined. Retrospective trials rely on what a clinician recorded at the time, not the researcher. Prospective trials are more powerful than retrospective studies such as case studies or case series.<sup>2</sup>

Systematic reviews, a type of secondary evidence, analyze the results of primary research and are considered preferable to primary research.

### Quality of Evidence

Determining the quality of a study can be difficult, but there are many tools to assist in their evaluation. Principally, most papers have an IMRAD format: Introduction, Methods, Results, and Discussion. To identify the quality of a paper, EBVM practitioners seek out bias in methods and results as well as at the end of the discussion.

### How to incorporate EBVM into practice?

Technicians are often asked to aid veterinarians with clinical decisions by searching for information. If used correctly, EBVM is a strategy that can ensure the information is sound enough to inform veterinary practice.

Questions often occur during rounds. Recording questions about patients and their cases during rounds can guide research later in the day.

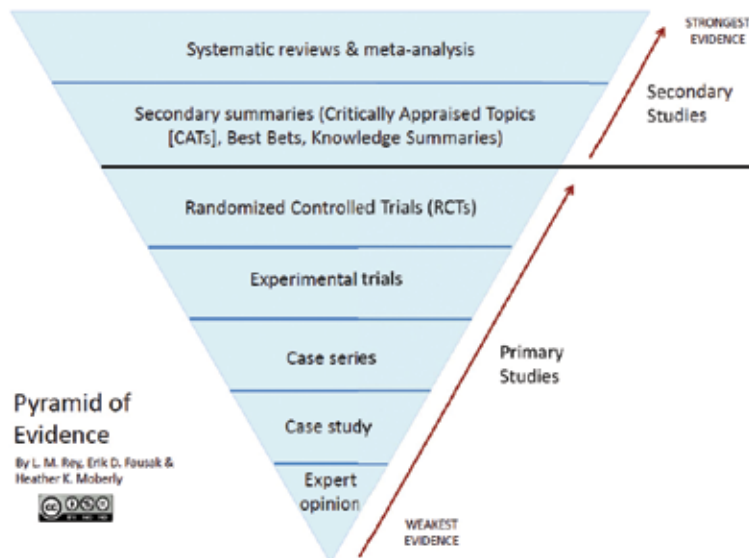
One possible strategy to incorporate EBVM into your daily practice is to develop a clinic journal club.<sup>10</sup> A journal club should gather like-minded individuals who want to practice the best medicine they can together. Examples of a EBVM journal club for veterinary technicians have been presented as a blog and conferences.<sup>12,13</sup>

To prepare for a journal club, focus on a clinical question that arose from rounds and use the PICO method to format a question. This often requires doing background research. After the PICO is developed, members of the journal club can retrieve relevant articles for the following meeting and evaluate their article using LOE. Once the evidence has been reviewed, the club can offer clinical recommendations and identify the best information currently available to make that decision.

### EBVM: An example in practice

An example of this is the Reassessment Campaign on Veterinary Resuscitation (RECOVER) where the degree of evidence and benefit versus cost were taken into consideration for all of the decisions.<sup>14</sup>

Figure 2. Levels of Evidence (LOE)



## Levels of Evidence Publication Types

### Expert opinion/Eminence-based

**medicine:** Information is from an expert instead of strong critical rigor and testing.<sup>1,2</sup> It has a risk for bias by anecdotal experience, speculation, or financial support from vested interest such as a commercial entity.

**Case Studies:** are clinical observations about patients with novel clinical circumstances.

**Case Series:** groups of related case studies providing more information about a topic. These are stronger if there is a control group.

### Experimental Laboratory Studies:

Prospective studies examining one intervention and reducing variables by testing the intervention in an artificial environment.

**Prospective trials with controls:** studies that have predetermined means to measure outcomes with an intervention and comparison or control.

**Randomized Control Trials:** The gold standard of research. The best studies have a control, randomly selected patients,

and are blinded so clinicians are unaware if the comparison or intervention is being provided.<sup>4,5</sup>

**Critically Appraised Topics(CATs), Best Bets:** brief synopses with clearly defined search strategies and summaries of primary literature.

**Systematic Reviews and Meta-analyses:** are types of research studies that examine primary literature, analyze it, and draw conclusions.

**Primary Research:** is reported in the literature as retrospective and prospective designs. Retrospective design includes case studies and case series because the author cannot control for an intervention or rigorously test an intervention. Prospective studies are developed and controlled before the research is performed allowing for rigorous testing of an idea.

**Secondary Research:** The highest level of evidence because it synthesizes primary research into meaningful summaries for clinical application.



## Evidence-based Veterinary Medicine, continued

**Aids in Assessing Quality of Literature:**

Sebastian Arlt has a checklist that can be used to assess quality of literature.<sup>9</sup>

RCVS Knowledge has the EBVM Toolkit available (Toolkits 3-11) at <http://knowledge.rcvs.org.uk/evidence-based-veterinary-medicine/ebvm-toolkit/>

Kenichiro Yagi presented at the First International EBVM Conference in 2014 and discussed the implementation of CPR guidelines that utilize EBVM, RECOVER, into his practice. Upon utilization of these Evidence-Based guidelines, the practice saw improvement in communication amongst the veterinary team and with clients, and improved outcomes with CPR. His point is that evidence-based practice can be incorporated into the daily clinical environment and improve the practice on many levels.<sup>15</sup>

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**About the Author:****Heather K Moberly, MSLS, AHIP**

*Heather, an archaeologist turned academic librarian, has been digging for answers her whole career. She spent her formative library career days in the life sciences and agricultural information searching for... something... until she discovered the wild side of libraries – veterinary information – and never looked back.*

*In addition to her master's in library science, she is a distinguished member of the Academy of Health Information Professionals. Currently her information quest is leading farther down the path of veterinary education. She is the Coordinator of Veterinary Services for the Medical Sciences Library at Texas A&M University and currently holds the Dorothy G. Whitley Professorship. Every day is a new challenge because, even under the best of circumstances, veterinary information is a bit unruly and, like her cats, needs a firm hand and a good training plan.*

**About the Author:****Erik Fausak, MSLS, MA, CVT, LVT, RLAT**

*It started with monkeys. As Erik investigated field research positions after receiving his BA in Anthropology at Beloit College, he found many positions encouraged a CVT. He graduated from Bel-Rea Institute of Animal Technology in 2000 and ended up in the clinical environments of surgery and critical care while going to graduate school. After graduating Pratt Institute Library School in 2009, Erik saw the potential for the veterinary technician as an integral aspect of the EBVM research environment and has focused on this since he became an instructor at Bel-Rea Institute in 2010. The good news is he still works with his favorite order, primates.*

# Evidence-Based Veterinary Medicine Quiz

## 1. What three principles are required for EBVM?

- a. Best evidence, clinical experience, and statistics
- b. Best evidence, expert opinion, and personal beliefs
- c. Best evidence, expert opinion, and the client's needs.
- d. Best evidence, clinical experience, and the client's needs.

## 2. Where should you search first for EBVM?

- a. PubMed
- b. VetMed Resource
- c. Google Scholar
- d. VetSRev

## 3. What database only indexes systematic reviews?

- a. PubMed
- b. Vetmed Resource
- c. Google Scholar
- d. VetSRev

## 4. What database indexes 90% of the veterinary literature and is ideal for comprehensive literature reviews?

- a. PubMed
- b. VetMed Resource
- c. Google Scholar
- d. VetSRev

## 5. What does PICO stand for?

- a. Patient, Intervention, Comparison, Outcome
- b. Patient, Investigation, Commitment, Observation
- c. Problem, Investigation, Consensus, Outcome
- d. Population, Intervention, Comparison, Observation

## 6. When is a good time to identify topics for PICO questions?

- a. As an emergency is arriving
- b. When you are about to start a procedure
- c. During rounds and discussion
- d. When looking at the daily list of appointments

## 7. What is the highest EBVM Level of Evidence (LOE)?

- a. Systematic Reviews
- b. Randomized Controlled Trials (RCTs)
- c. Case Studies
- d. Expert Opinions

## 8. Where is the first place that you look for articles that are not readily available?

- a. Clients
- b. Public Library
- c. Veterinary students
- d. Colleagues

## 9. What is the lowest Level of Evidence (LOE)?

- a. Systematic Reviews
- b. Randomized Controlled Trials (RCTs)
- c. Case Studies
- d. Expert Opinions

## 10. What freely available, current resource provides knowledge summaries?

- a. Best Bets for Vets
- b. WikiVet
- c. VetMedResource
- d. VetStream



*This article is worth one continuing education credit and will be accepted for grading until July 1, 2017. To receive credit, please complete the quiz online at [www.VetMedTeam.com](http://www.VetMedTeam.com). There will be a \$5 fee for each quiz.*

*\*Due to updates and changes authorized by NAVTA, the online quiz may not be the same as the printed exam within The NAVTA Journal. Read each question thoroughly and answer it as it appears in the online exam. Please do not simply copy your answers from the printed version.*