About RCVS Knowledge

RCVS Knowledge is the independent charity associated with the UK's Royal College of Veterinary Surgeons (RCVS). Its 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.

By working with a wide network of interested people, the International Evidence-based Veterinary Medicine Network, RCVS Knowledge is seeking and assembling new knowledge, packaged as Knowledge Summaries and other resources, to provide a must-have resource for the veterinary profession, built on the principles of "Evidence-Based" theory – the Evidence- Based Veterinary Medicine (EBVM) project.

This knowledge is available through *Veterinary Evidence.*

Preface

The Veterinary Evidence Handbook for Publishing Knowledge Summaries gives guidance to authors researching and writing knowledge summaries. It is a living document that is updated regularly with feedback from users, reflecting advances in methodology and the application of evidence-based practice.

All members of the veterinary community – whether veterinarians or nurses, farriers or orthodontists, students or certificated experts – are invited to share their knowledge and experience so that, together, we can achieve what we entered the veterinary professions for: animal health globally based on the highest standards of evidence-based care, so that animal owners and users at home, in the fields, and in the food chain, can be assured that animals are healthy, happy and well cared for.

This Handbook was produced with the aim of assisting contributors to *Veterinary Evidence* to ensure that the Knowledge Summaries they write are of a good standard and as near ready for publication as possible. At the same time, it has a wider purpose in raising standards of critical appraisal and the understanding and use of veterinary evidence that might be of utility to a wider audience, and it is particularly commended for use as a course textbook.

Acknowledgements

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Key points

- Knowledge summaries are short critical appraisals of the literature
- They address specific clinical scenarios
- There are seven steps to publishing a knowledge summary
- RCVS Knowledge worksheets, called toolkits, provide a structured approach to writing knowledge summaries

Introduction

What is a Knowledge Summary?

Knowledge summaries, sometimes called critically appraised topics, are short narrative reports summarizing the evidence for a clinical question. The evidence usually comes from articles published in veterinary journals.

Knowledge summaries differ from systematic reviews in several ways:

	Systematic Review	Knowledge Summary
Scope	Wide; Provides a rigorous overview of a larger body of evidence	Narrow; Focused on a specific clinical question
Objective	Critical appraisal and synthesis of the body of research	Critical appraisal of the best evidence for an answerable clinical question, with a recommendation
Search strategy	Comprehensive	Narrowed to current, best evidence
Timeline	Months	Days
Design	Narrative, but possibly a meta-analysis	Short, narrative, and descriptive
Team members	Content experts and statisticians	Practitioners, nurses, technicians and allied professionals
Chance for bias	Low	Higher than for systematic reviews
Audience	Practitioners, policy makers, researchers	Practitioners, nurses, technicians and allied professionals

Knowledge Summary to-do checklist

This section summarizes the steps detailed in later chapters. RCVS Knowledge has some of the same information in online toolkits (under the evidence menu at www.rcvsknowledge.org/toolkits). Those EBVM toolkits are also in this handbook's appendix.

The to-do checklist for researching and publishing a Knowledge Summary:

1. Get a head start: Familiarize yourself with the *Knowledge Summary Template* and the *Knowledge Summary Example* (see *EBVM Toolkit No. 13*).

   The template is a blank knowledge summary in the correct format and style. Reading it and the example knowledge summary will give a sense of the direction of the research process.

2. Ask an answerable clinical question.

   Real cases often spur clinical questions, but search engines need certain specifics in order to find evidence. Read EBVM *Toolkit No. 1*. It shows how to frame a clinical question in a focused, searchable way.

3. Double check.

   Search *Veterinary Evidence* to check that the question hasn't already been answered. If the question is only slightly different from a previously published question, write it!

4. Find the best available evidence for the question.

   EBVM Toolkit No. 2 and chapter 2 in this handbook describe how to breakdown the clinical question into component parts, identify similar terms, and then combine them with "and" and "or" statements for database searches. Get your search strategy checked before running it.

5. Critically appraise the evidence.

   The final search and article evaluation process should have returned a few articles. The next step is to appraise each one using the methods described in EBVM Toolkits No. 3 and No. 4.

6. Write the Knowledge Summary.

   Use the Knowledge Summary Template and EBVM Toolkit No. 12 (No. 12 is a guide in template format) to structure the summary's narrative.

7. Determine the Evidence Action Rating.

   The Evidence Action Rating (EAR) is a two digit (e.g. A2) rating system that summarizes the evidentiary value and clinical significance of the knowledge summary so that readers can quickly assess the scope of the Knowledge Summary see chapter 6).

8. Publish the Knowledge Summary

   Submit the knowledge summary for publication through the *Veterinary Evidence* website (www.veterinaryevidence.org). First-time authors will need to create a user ID.

Toolkit

EBVM Toolkit No. 12 and No. 13

Chapter citation

Evans R. (2015) Introduction to knowledge summaries. In: Evans R (ed), *The Veterinary Evidence Handbook for Publishing Knowledge Summaries*. London: RCVS Knowledge.

Chapter references

Home [RCVS Knowledge [online] Available from http://knowledge.rcvs.org.uk/. [Accessed 4 October 2015].

Green S, et al. (2008) In: Higgins JPT. & Green S. (eds), *Cochrane Handbook for Systematic Reviews of Interventions.* Chichester (UK): John Wiley & Sons.

Key points

- Use the four-part PICO method to frame an answerable question.
- EBVM Toolkit No. 1 gives a template to construct the question.
- Start with a narrow, clinically important question, and modify it if necessary.

Introduction

Why is the question important?

Clinical scenarios often generate clinical questions about best treatment, optimal imaging, best diagnostics, and so on. Those questions, like "What is the best way to treat a canine knee with a torn cruciate ligament?" are often too general for the literature to answer because researchers ask—and answer—questions about specific treatments, imaging modalities, and diagnostics tests.

So, authors need to focus general questions down to answerable questions with specifics. That's where the **PICO** method comes in.

Framing the question

One way of identifying the key concepts is to use the PICO method

Patient or **P**opulation	Who is the relevant patient or population? Be as specific as possible (e.g., puppies, geriatric patients, pregnant bitches, spaniels)
Intervention	How? What intervention are you interested in? For example, what is the management strategy, diagnostic test or type of food, drug or surgical procedure that you are testing?
Comparison or **C**ontrol	What is the main alternative? E.g., is there a control or alternative management strategy or intervention that you are particularly interested to compare? Sometimes, when you want to know if the intervention above is better than doing nothing, the comparator will be "no intervention".
Outcome	What are you trying to achieve, measure, improve, affect? E.g. what are the patient-relevant consequences of the intervention? Be as clear as you can here.

Note you may not need to use all of PICO - it depends on what you want to find out.

Example

A 4-year-old, 40 kg male Labrador retriever presents with hind limb lameness, and is diagnosed with unilateral cranial cruciate rupture. The owner read about TPLO and Tightrope on the Internet and asks which one is better.

P	Patient or population	= Large breed dogs
I	Intervention	= TPLO
C	Comparison	= Tightrope
O	Outcome	= Lameness score one year postoperatively

Narrowing the scope of the question

Sometimes, after a quick review of the literature, the PICO-generated question needs modification because there are too many or too few articles.

For example, there may be a lack of breed-specific literature, so instead of asking a question about Labrador retrievers, it may be necessary to ask about large breed dogs.

Sometimes the literature for a question simply does not exist. In that case it may be reasonable to write and publish a knowledge summary that notes that fact.

Toolkit

EBVM Toolkit No. 1 has more detail and gives examples of framing answerable questions.

Chapter citation

Evans R. (2015) Answerable clinical questions. In: Evans R (ed), *The Veterinary Evidence Handbook for Publishing Knowledge Summaries*. London: RCVS Knowledge.

Chapter references

Home [RCVS Knowledge [online] Available from http://knowledge.rcvs.org.uk/. [Accessed 4 October 2015].

Key points

- Identify important terms, their synonyms, and alternative spellings
- Searching for articles is a trial-and-error process
- Use English language articles

Introduction

The important words in PICO questions have related words that are synonyms, initialisms, and truncations. Article authors might have used those alternative words, so the literature search needs to include them.

Structuring the Search

1. **Identify synonyms of important terms**

   Once you have used PICO to identify the key concepts you are searching for, the next step is to identify synonyms and other related terms. Different authors may use different words to refer to the same concept so it is important to search for a variety of terms in order to reduce the chance of missing important research.

   For example, one author might refer to **bitches** but another might refer to **female dogs.** Thinking about the example in *EBVM* *Toolkit 1*:

   In **adult bitches** does **neutering** versus **non-neutering** reduce the risk of mammary tumours?

		Synonyms and other relevant keywords		
Patient or **P**opulation	adult bitches	dog bitches	dogs canine	bitch
Intervention	neutering	spaying ovariectomy	neutering gonadectomy	ovariohysterectomy
Comparison/ **C**ontrol	"no intervention"	not applicable		
Outcome	mammary tumors	mammary cancer mass	breast neoplasia lump	tumour neoplasm carcinoma

2. Truncation and alternative spellings

Consider alternative spellings (American English: orthopedic, British English: orthopaedic) and the different endings to words. For example, plurals spellings or initialisms (e.g., CCL for cranial cruciate ligament).

Search engines use wildcard or truncation symbols, usually an asterisk, to search on the the letters preceding or following the asterisk. So, neuter* covers neutered, neutering, neuters, and so on. *glycemia covers hypoglycaemia and hyperglycaemia.

Wildcard is usually a **?**, and useful for retrieving American and British spellings, for example, orthop?edic retrieves orthopaedic & orthopedic. Each database uses different search syntax. Use **#** to denote 1 missing character and **?** to denote 0-1 character. So if I only wanted American publications I would search for orthop#dic for orthopaedic. If the results are not what you expected, check the database for any updates on their advanced search techniques or contact RCVS Knowledge Library staff (library@rcvsknowledge.org).

For example

Patient or **P**opulation	dog	dogs	bitch*	canine
Intervention	spay* ovariectom*	spey* gonadect*	neuter*	ovariohysterectom*
Comparison/ **C**ontrol				
Outcome	mammar* cancer masses	breast* cancers lump	tumour* neoplas* lumps	tumor* mass carcinom*

3. Combining keywords with *AND, OR* and *NOT*.

Dog* AND Cat* includes all articles about dogs and cats together, but not dog only or cat only articles. It may also bring in dogs, dogma, cats, catalyst, cataract, and so on, hence the example in box shown states terms dog or dogs.

Dog* OR Cat* includes all articles about dogs, all articles about cats, and all articles about dogs and cats together.

Dog* NOT Cat* is all articles with just dogs.

For example

Patient or **P**opulation	(dog OR dogs OR bitch* OR canine)
Intervention	(spay* OR spey* OR neuter* OR ovariohysterectom* OR ovariectom* OR gonadect*)
Comparison/ **C**ontrol	
Outcome	(mammar* OR breast*) AND (tumour* OR tumor* OR cancer OR cancers OR neoplas* OR mass OR masses OR lump OR lumps OR carcinom*)

Some databases have advanced search options that save searches and combine searches to construct more complicated searches a term at a time. It's common, at the beginning, to get hundreds of articles or none at all in this trial-and-error process. Contact library@rcvsknowledge.org for help.

Information Sources

The key here is to search a database that includes as many veterinary journals as possible

Grindlay (2012) showed that the coverage by bibliographic databases of veterinary journals and journals that regularly have veterinary content varies greatly. CAB Abstracts has the highest coverage (90.2%) whilst Medline (PubMed) only has 36.5%.

Therefore, to ensure that you retrieve as much of the published evidence on your topic as possible you should use CAB Abstracts and then at least one other database of your choosing. If you only use Medline (PubMed) you risk ignoring 64.5% of all journals with veterinary content. If you only use Google or Google Scholar, you will probably get thousands of hits of very little relevance to you.

We ask authors of knowledge summaries to search CAB Abstracts 1973-current and PubMed as a minimum

Databases with veterinary coverage

Name of database	Publisher	Description
CAB Abstracts	CABI	Applied life sciences database covering veterinary sciences, agriculture, environment, applied economics, food science and nutrition

Name of database	Publisher	Description
Medline (PubMed)	US National Library of Medicine	Life Sciences database covering biomedicine. Often referred to as PubMed as freely available via the PubMed website. Includes links to full text content from PubMed Central where available.
Scopus	Elsevier	Multidisciplinary bibliographic and citation database
VetMed Resource	CABI	Veterinary Sciences database containing the bibliographic records from CAB Abstracts, full text documents, specially written reviews etc
Web of Science	Thomson Reuters	Multidisciplinary bibliographic and citation database including Science Citation Index, and other content

You may have access to databases through your institution or company. If not, RCVS Knowledge Library provides access to relevant databases to library members and authors researching Knowledge Summaries and systematic reviews

But there is no reason to reinvent the wheel. The best information resources are the RCVS Knowledge Library and staff (library@rcvsknowledge.org) and the *Veterinary Evidence* staff (editor@veterinaryevidence.org)

What are acceptable articles?

Write clear criteria for rejecting articles that were found in the search. It's OK to use only English language articles, or only recently published articles.

Too many articles

There a good chance that the search will have found some articles that don't answer the PICO question directly, these should be excluded. Write the exclusion criteria in the knowledge summary.

No acceptable articles

If a solid search returns no acceptable articles then knowledge summary authors have two choices, write the knowledge summary using no articles (i.e., showing no evidence).

Changing the question

A search can show that the PICO question is too broad (too many articles) or too narrow (too few articles). Refining the scope of the question is a way to keep it relevant and get a manageable number of articles. For a broad question, it may be possible to write several knowledge summaries. But have your search strategy reviewed by RCVS Knowledge library staff before writing your knowledge summary.

Timing searches, and free access to the RCVS Knowledge Library

Don't run your final search until you are ready to start critically appraising the evidence you will find. That way, your knowledge summary will be most up to date. If you are intending to submit your knowledge summary to *Veterinary Evidence* – and why wouldn't you! – please contact the RCVS Knowledge staff (library@rcvsknowledge.org) to have your search strategy checked. This is a free service, and it would be very frustrating to submit your knowledge summary only to have it returned to be re-done.

If you are submitting to *Veterinary Evidence*, you also qualify for one month's free membership to the Library, to ensure that you have access to the information sources you need. Again, don't start our free membership until you have a search strategy checked and are ready to get your articles.

Toolkit

EBVM Toolkit No. 2

Chapter citation

Evans R. (2015) Finding the evidence. In: Evans, R. (ed), *The Veterinary Evidence Handbook for Publishing Knowledge Summaries*. London: RCVS Knowledge.

Chapter references

Cockcroft, P. D. & Holmes, M. A. (2003) *Handbook of Evidence-Based Veterinary Medicine*. Oxford: Blackwell Publishing.

Grindlay, D.et al (2012) Searching the veterinary literature: a comparison of the coverage of veterinary journals by nine bibliographic databases *Journal of Veterinary Medical Education* 39 (4) pp404-412)

Key points

- Don't rely on P values.
- Focus on the primary outcome.
- Sample size matters
- Your role as a journalist: finding information

Introduction

Until this point, researching the knowledge summary has been a fairly mechanical process. Generating the PICO question and constructing the search terms are mostly revisable, objective processes.

Critically appraising articles is different. It requires teasing out the clinical value of results from articles that authors may have written with the goal of publication—not clinical import—in mind.

In a sense, knowledge summary authors are journalists researching and reporting information, while trying to limit editorializing.

The steps to critically appraising an article

The steps to critically appraising an intervention article are:

1. Determine the study type (EBVM Toolkit No. 4):
    a. Systematic review
    b. Randomized trial
    c. Prospective study
    d. Retrospective study
    e. Case study or series, opinion

2. Rank the study's evidentiary value:
    a. Systematic review (strongly convincing)
    b. Randomized trial (convincing)
    c. Prospective nonrandomized study with control (suggestive)
    d. Retrospective study with control (weakly suggestive)
    e. Case study or series, opinion (weak)

3. Sample size plays a role in evidentiary value.
    a. A randomized controlled trial (RCT) loses some value if its sample size is small.
    b. A sample size is large if, in a RCT with a large clinical effect, a practitioner would change his or her practice. For example, few practitioners would change their practice for any RCT with n=10 per group. But they might for n=100 per group.
4. Determine the clinical effect of the intervention.

There is a clinical effect if

a. The intervention moved patients into a range of values of the normal- patient population of the primary outcome.
b. The intervention moved patients outside the range of values of the comparison group.

5. Caveats
    a. KS authors may calculate the effect size for a primary variable but it is acceptable to use experience.
    b. Article authors tend to be overly optimistic about research, so take their conclusions with caution.
    c. Use the outcomes that you think are important and were stated in the PICO question.
    d. Don't use P values to assess clinical improvement.

Identifying the study types

EBVM Toolkit No. 4

P values and their role in evaluating articles

P values play no role in critically assessing articles because they do not address evidentiary value, which depends on study design, or clinical effect, which should be independent of sample size (P values depend on sample size). Instead, use confidence intervals and effect sizes. Confidence intervals can be approximated by plus or minus two standard errors.

P values are a "surprise index" with small values suggesting the result is real, not due to chance. However, metadata studies have shown that P values in articles are often calculated incorrectly, that variables are often cherry picked so that small P values are discovered and reported, and that different but valid statistical approaches give very different P values.

Toolkit

EBVM Toolkits No. 4 to No. 11

Chapter citation

Evans, R. (2015) Critically appraising manuscripts. In: Evans, R. (ed), *The Veterinary Evidence Handbook for Publishing Knowledge Summaries*. London: RCVS Knowledge.

Chapter references

Aschwanden, Christie (2015*) Science Isn't Broken*. [FiveThirtyEight] [online] 19 August 19 [Accessed 4 October 2015]. http://fivethirtyeight.com/features/science-isnt-broken/.

Key points

- Summarize findings succinctly
- Use the evidence pyramid to weight a study's importance
- Avoid doing meta-analyses
- Your role as a journalist: making a whole from the parts

Introduction

KS authors are medical journalists. They find sometimes conflicting information from different sources and then combine all the information into an understandable whole. Just like a newspaper journalist, knowledge summary authors summarize their findings succinctly and let readers make their own decisions about the intervention's efficacy.

That said, it's important to give readers clues about the strength or weakness of the information. If knowledge summary research shows a systematic review with large clinical effect, say so. If the literature search returns a single case series in favor of the intervention, then it's correct to say that the evidence is weak.

Conflicting information is common and should be noted, but systematic reviews and blinded randomized trials trump other study designs. For example, one RCT showing little clinical effect is much more meaningful than several retrospective studies showing a large clinical effect.

Example

EBVM Toolkit No. 13 is an example knowledge summary addressing the question: In cats with nasal discharge and ocular signs where herpes virus has been identified, is treatment with interferon beneficial?

Eight articles were reviewed. The study designs included randomized controlled trials, retrospective case series and in vitro studies.
The results from those eight articles were summarized as **Clinical bottom line:**

- There is currently insufficient evidence to support the use of topical or systemic interferon in the treatment of FHV-1 infection.
- There is some evidence that pre-treatment with interferon prior to exposure to FHV-1 may be beneficial at reducing the severity of clinical disease but this does not prevent infection or viral shedding

Chapter citation

Evans, R. (2015) Amalgamating the results from different articles. In: Evans, R. (ed), *The Veterinary Evidence Handbook for Publishing Knowledge Summaries*. London: RCVS Knowledge.

Chapter references

Lang TA, Secic M. (2006) *How to report statistics in medicine*. Philadelphia: American College of Physicians.

Key points

- The Evidence Action Rating (EAR) scores the evidentiary value and clinical significance of a study
- EAR should be assessed by the authors and reviewers

Introduction

Evidence action rating (EAR) is a two-digit score (e.g., C3) for intervention studies. It classifies the evidentiary value of the study (A to F) and the clinical significance of the study (1 to 4). EAR helps readers prioritize knowledge summaries.

Knowledge summaries, systematic reviews, and primary research of interventions can all be assigned EARs. In particular, knowledge summary authors should assign an EAR to their manuscript, and reviewers should verify the EAR.

Assigning a rating

The first digit

The first digit is fairly clear: Give the letter corresponding to the study design. Yes, not all study designs within a letter category are created equal, but the simplicity of EAR makes it a feasible tool.

Letter	Information source
A	Systematic review
B	Randomized, controlled trial
C	Prospective study
D	Retrospective study
E	Case study, opinion, etc.
U	Unclassified, No information is available, or other source

If the literature search for a knowledge summary turns up nothing, then that knowledge summary is still important—it lets readers know that no information exits for the question— and it is assigned a U.

Suppose a knowledge summary search finds five useable articles: two clinical trials and three observational studies. Each article is then scored, say B, B, for the trials, and C, C, D for the observational studies. The knowledge summary itself would get a B score matching the best- ranked study, with evidentiary value taking the priority. That is, B beats C.

The second digit

Clinical significance is the noticeable effect of the intervention on at patient. For (SOMETHING MISSING HERE)

Number	Clinical significance
1	Recovered
2	Improved but not recovered
3	Not reliably changed
4	Deteriorated

How to determine the second digit

Imagine that the study you are looking at has great evidentiary value (even if it doesn't). Did most of the patients recover enough to warrant a change in practice? Should veterinarians buy new equipment, charge for expensive new medication, or learn new skills to perform the intervention?

In many cases, the clinical significance of the intervention is obvious. If the effect is large enough to change practice, then it gets a 1.

EAR examples

1. A retrospective study showing patients making a full recovery but the control group is unchanged, is assigned D1. That's a study with low evidentiary value but strong clinical effect.

2. A RCT (N=60) with a binary outcome (e.g., life or death) shows that in the placebo group 56.6% (17 out of 30) of subjects survive, but 83.3% (25 out of 30) survive with the intervention.

   But is the 26.7% difference a 1,2, or 3? Graphpad's (www.graphpad.com/quickcalcs/NNT1/) calculator gives the 95% confidence interval for the difference as 4.48% to 48.85%.[1] While large, that difference excludes zero, so the study would be assigned a 1 (an B1, in fact.)

[1] A confidence interval is a set of plausible values for a parameter. A 95% confidence interval means that if 100 samples were drawn from a population, the true value of the parameter would be in 95 of them. Any parameter can have a confidence interval, and confidence intervals are often reported for means, with the sample mean preceding the interval in the form, mean (lower bound, upper bound), (e.g., 47.3 (42.2, 53.1)).

Caveats

1. As with all summaries, EAR paints a broad brush, and readers should use the EAR as a guide only. For example, randomized, controlled trials get a B rating, but not all clinical trials have equal evidentiary

value. A double-blinded, randomized, controlled trial for an intervention with objective outcomes may have more evidentiary value than an unblinded randomized, controlled trial with subjective outcomes, for the same intervention. However, both studies get the same B rating.

2. Studies often measure many outcomes, and those outcomes will have different clinical significance. Use the primary outcomes from the PICO question.

    i. Sometimes only a few of the outcomes get a 1 or 2 rating, and the majority get a 3. Authors and reviewers should decide if that is because the intervention really has little clinical effect or if some of the outcomes measures are known to be inaccurate.
    ii. The clinical significance rating should reflect the outcome generally accepted as the best one (measuring in the study) for assessing a particular condition. For example, if a canine orthopedic study reports ground reaction forces and owner assessment, then the EAR should reflect peak vertical impulse of the ground reaction forces.

3. The definition of "recovered" should be considered carefully but not harshly, and in the light of the variations of the normal and diseased populations. Subjects can be considered recovered if their primary outcome falls within the normal range. (For example, if a continuous outcome falls within the 2.5 and 97.5 percentiles of the distribution of the normal population.)

4. The danger of assessing clinical significance is that an intervention may not be different from the control (especially a standard-of-care control), but may get a 1 rating because both the intervention and the control recover the subjects into the normal range. Better to assign that study a 3.

5. An intervention may do much better than the control, but the subjects are still not reliably changed. That might happen if an intervention stops a degenerative process but does not heal the condition. In that case, the author and reviewers should consider giving the study a 1 or 2 clinical significance score, which truly reflects the spirit of clinical significance.

Chapter citation

Evans, R. (2015) Scoring your knowledge summary. In: Evans R (ed), *The Veterinary Evidence Handbook for Publishing Knowledge Summaries*. London: RCVS Knowledge.

Chapter references

Jacobson, N, & Truax, P. (1991). Clinical significance: A statistical approach to defining meaningful change in psychotherapy research. *Journal of Consulting and Clinical Psychology,* 59(1) pp. 12-19.

Samet, M. (1975) *Subjective interpretation of reliability and accuracy scales for evaluating military intelligence*. Army Research Institute for the Behavioral and Social Sciences.
National Technical Information Service, U.S. Dept. of Commerce.

Key points

- Write the knowledge summary using the knowledge summary template, available at www.veterinaryevidence.org or in the appendix.
- Create a user id on www.veterinaryevidence.org
- Submit the knowledge summary using the submission page on www.veterinaryevidence.org.
- Knowledge summaries are peer reviewed. Address any questions from reviewers
- Your role as a journalist: telling the story

Introduction

Knowledge summaries follow the same publishing process as primary research manuscripts. They are submitted for open peer review on www.veterinaryevidence.org. An RCVS Knowledge librarian should have checked your search strategy before writing the knowledge summary, but if not, one will check the search strategy and two peer reviewers will read the knowledge summary and double check the conclusions.

Peer review

Veterinary Evidence uses an open peer review model, so the reviewers and the authors are unblinded and know each others' names. Studies in other journals have shown that the open peer review model gives rigorous but considerate reviews. Reviewers names will be published alongside the KS.

Writing style

If the reader has to struggle through the language to get to the information, then the knowledge summary authors have placed obstructions in their article. Obstructions are a common problem in medical writing. Michael Crichton, the author of "Jurassic Park," was a medical doctor and wrote a scathing but illuminating review of medical writing in "Medical Obfuscation: Structure and Function." That short article is available on the Web, and authors are invited to read it before writing knowledge summaries.

Veterinary Evidence communicates information in a serious but natural style. Feel free to use contractions and the first-person voice. For example, "**We** designed the experiment to eliminate bias"; "One subject **didn't** return for follow up."

Avoid the passive voice, where the subject gets moved into the object's position in the sentence. "Bob hit Sam" is better than the passive "Sam was hit by Bob." Or, "a boarded radiologist read the radiographs" is better than "the radiographs were read by a boarded radiologist."

Style guide

Veterinary Evidence uses the Cochrane Style Guide, 4.1 edition, available at http://community.cochrane.org/sites/default/files/uploads/Cochrane-Style-Guide_4-1- edition.pdf.

Chapter citation

Evans, R. (2015) Publishing knowledge summaries. In: Evans, R (ed), *The Veterinary Evidence Handbook for Publishing Knowledge Summaries*. London: RCVS Knowledge.

Chapter references

Crichton, M. (1975) Medical Obfuscation: Structure and Function *New England Journal of Medicine*; 293 pp1257-1259. DOI: 10.1056/NEJM197512112932413

Key points

- Some Knowledge summaries should be updated every two years
- Incorporate feedback
- Note the revision date and summarize the changes in the new knowledge summary

Introduction

As new research develops or as readers comment on a knowledge summary that summary should be updated to reflect new or revised information. There is no limit to the number of times a knowledge summary can be updated. Updates should include the results of new searches or new conclusions based on feedback.

Not all knowledge summaries need updating

Outdated or obvious summaries do not need updating, but that conclusion (outdated or obvious) should be noted and explained in the knowledge summary.

The timeframe for revisiting the summaries

Knowledge summaries should be revised at least every two years. If there are no changes, that should be noted in the revision.

The criteria for updating summaries before two years

New evidence for a knowledge summary is more than a new study of the same intervention under review. New evidence includes: new treatments, population subgroups, different outcome measures, and data from ongoing studies.

Updating a knowledge summary

Submit the revised knowledge summaries just like the original knowledge summary, but it will get an expedited review.

Chapter citation

Evans, R. (2015) Maintaining knowledge summaries. In: Evans, R (ed), *Veterinary Evidence Handbook for Publishing Knowledge Summaries*. London: RCVS Knowledge.

Chapter references

Higgins, JPT, Green S, & Scholten, RJPM. (2008) Maintaining reviews: updates, amendments and feedback. In: Higgins JPT, & Green S (eds). *Cochrane Handbook for Systematic Reviews of Interventions*. Chichester (UK): John Wiley & Sons.

Hopewell, S. (2007) *A Decision Tool for Updating Cochrane Reviews.* [online] [accessed 19 October 2015]. http://bmg.cochrane.org/sites/bmg.cochrane.org/files/uploads/HopewellDecisionTool.pdf.

Resources

Covdience is a free website used for organizing systematic reviews, www.covidence.org.

The RCVS Knowledge website, www.rcvsknowledge.org.

The EBVM Network's learning website, http://www.ebvmlearning.org/.

Appendices

Appendix One. Finding information toolkits

Toolkit No. 1

EBVM Toolkit

Asking an answerable clinical question

There are five key steps to follow in Evidence-based Veterinary Medicine (EBVM). This handout offers advice on how to carry out the first step.

1. Asking an answerable clinical question
2. Finding the best available evidence to answer the question
3. Critically appraising the evidence for validity
4. Applying the results to clinical practice
5. Evaluate performance

The first step in searching for literature is to define your question, phrasing it in a way that it will help you find all relevant articles and reduce the chance of you leaving anything important out.

A well formed answerable question will also make it relatively straightforward to identify appropriate search terms and to combine them in the search strategy.

One way of identifying the key concepts is to use **The PICO Method**

Patient or **P**opulation	Who is the relevant patient or population? Be as specific as possible e.g. puppies, geriatric patients, pregnant bitches, spaniels?
Intervention	How? What intervention are you interested in? E.g. what is the management strategy, diagnostic test or type of food, drug or surgical procedure that you are testing?
Comparison/**C**ontrol	What is the main alternative? E.g. is there a control or alternative management strategy or intervention that you are particularly interested to compare? Sometimes, when you want to know if the intervention above is better than doing nothing, the comparator will be "no intervention".
Outcome	What are you trying to achieve, measure, improve, effect? E.g. what are the patient-relevant consequences of the intervention? Be as clear as you can here.

Note you may not need to use all of PICO - it depends on what you want to findout.

How does PICO work?

You can see how this works in the following example[2]:

Scenario: A client says they have heard that neutering bitches reduces the risk of mammary tumours and asks you if there is any evidence to back up this claim.

Turning that into an answerable question could look like this:

> In adult bitches does neutering versus non neutering reduce the risk of mammary tumours?

Taking the key concepts from the question and transforming the question into PICO format would look like this:

Patient or **P**opulation	adult bitches
Intervention	neutering
Comparison/**C**ontrol	"no intervention"
Outcome	mammary tumours

[2] Adapted from Beauvais, W., Cardwell, J.M. and Brodbelt, D.C. (2012) The effect of neutering on the risk of mammary tumours in dogs – a systematic review. *Journal of Small Animal Practice* 53(6) pp314-322

See *EBVM Toolkit 2: Finding the best available evidence* for information on how to search for literature.

Toolkit No. 2

EBVM Toolkit 2

Finding the best available evidence

There are five key steps to follow in Evidence-based Veterinary Medicine (EBVM). This handout offers advice on how to carry out the second step.

1. Asking an answerable clinical question
2. Finding the best available evidence to answer the question
3. Critically appraising the evidence for validity
4. Applying the results to clinical practice
5. Evaluate performance

Identifying synonyms

Once you have used PICO to identify the key concepts you are searching for, the next step is to identify synonyms and other related terms. Different authors may use different words to refer to the same concept so it is important to search for a variety of terms in order to reduce the chance of missing important research.

e.g. One piece of research might refer to bitches but another might refer to dogs.

Thinking about example in **EBVM Toolkit 1**: Asking an answerable clinical question an extended PICO could include the following keywords:

		Synonyms and other relevant keywords		
Patient or **P**opulation	adult bitches	dog bitches	dogs canine	bitch
Intervention	neutering	spaying ovariectomy	neutering gonadectomy	ovariohysterectomy
Comparison/ **C**ontrol	"no intervention"	not applicable		
Outcome	mammary tumors	mammary cancer mass	breast neoplasia lump	tumour neoplasm carcinoma

Truncation

You then need to select the keysearch terms, remembering to think of alternative spellings and the different endings to words e.g. plurals that may have been used. See below where an asterisk indicates truncation.

See page 6 for more information on using truncation symbols

For example

Patient or Population	dog	dogs	bitch*	canine
Intervention	spay* ovariectom*	spey* gonadect*	neuter*	ovariohysterectom*
Comparison/Control				
Outcome	mammar* cancer masses	breast* cancers lump	tumour* neoplas* lumps	tumor* mass carcinom*

Combining keywords

Then we need to think about how we would combine the keywords using AND, OR and NOT.
See page 6 for more information on combining keywords.
For example

Patient or Population	(dog OR dogs OR bitch* OR canine)
Intervention	(spay* OR spey* OR neuter* OR ovariohysterectom* OR ovariectom* OR gonadect*)
Comparison/Control	
Outcome	(mammar* OR breast*) AND (tumour* OR tumor* OR cancer OR cancers OR neoplas* OR mass OR masses OR lump OR lumps OR carcinom*)

You need to be careful how you combine the keywords as different combinations will produce different results.

Some databases have an advanced search option which allows you to save searches and combine them to construct more complicated searches line by line.

Building the search line by line helps you to minimise errors and capture the thought process. The table below shows how to do this

Search Line	Search Strategy	Result will retrieve		
1	(dog or dogs or bitch* or canine)	references containing keywords:		
		dog	dogs	bitch
		bitches	canine	
2	(spay* or spey* or neuter* or ovariohysterecto m * or ovariectom* or gonadect*)	references containing keywords		
		spay	spaying	spayed
		spey	speying	speyed
		ovariohysterectomy	ovariohysterectomize d	ovariohysterectomise d
		ovariohysterectomie s	gonadectomy	gonadectomized
		gonadectomize	gonadectomised	gonadectomise
3	(mammar* or breast*)	references containing keywords		
		mammary	mammaries	breast
		breasts		
4	(tumour*or tumor* or cancer or cancers or neoplas* or mass or masses or lump or lumps or carcinom*)	references containing keywords		
		tumour	tumours	tumor
		tumors	cancer	cancers
		neoplasm	neoplasms	neoplasia
		mass	masses	lump
		lumps	carcinoma	carcinomas
Combining the search lines will give you different sets of results		**Result will retrieve**		
	1 and 2 and 3 and	will give references containing all the listed keywords concerning		

Search Line	Search Strategy	Result will retrieve
	4	neutered dogs with mammary tumours
	1 and 2 and 4	will give references containing all the listed keywords concerning neutered dogs with tumours but not necessarily mammary
	1 and 3 and 4	will give references containing all the listed keywords concerning dogs with mammary tumours but not necessarily those that have been neutered
	1 and 2	will give references containing all the listed keywords concerning neutering and dogs
	(1 and 2) or (1 and 3 and 4)	will give references on neutering and dogs or dogs with mammary tumours

Search Tools

Boolean operators

Boolean operators allow you to combine or exclude terms in a search. This will save time and effort by eliminating unsuitable or inappropriate hits from the results

AND	both terms need to be in the record before it is returned, it therefore **narrows** a search	animal **AND** cruelty
OR	either (or both) terms will be in the record, it therefore **broadens** a search	kidney **OR** renal
NOT	the first term is searched and then any records containing the term after the NOT are excluded, it therefore **narrows** a search. Care should be taken as it is easy to exclude good records	horse* **NOT** horseradish
Parenthesis	use brackets **( )** to group order of search	dialysis **AND (**kidney **OR** renal**)**

Other search tools

Most databases and search engines offer other tools that allow you to search more effectively, for example: truncation symbols, wildcards, etc.

The following is a selection of commonly used tools. If they do not work as expected you should check the "help" or "search tips" of the database you are using.

Phrase Searching	use quote marks " " to find exact phrases	"foot and mouth" will return results containing the exact phrase "foot and mouth" but not those just containing "foot" or "mouth"
Truncation	using an asterisk * at the end of a word will return all words that start with the stem	transplant* will return transplant, transplantation, transplanted, transplanting etc
	using an asterisk * at the beginning of a word will return all words that end with the stem	*glycemia will return hyperglycemia, hypoglycemia
Wildcard	use ? in place of a single unknown character use ?? in place of 2 characters	leuk?mia will return leukemia leuk??mia will return leukaemia

Choosing which databases to search

Once you have defined your search strategy you then need to decide which databases to search. Research[3] shows that the coverage by bibliographic databases of veterinary journals and journals that regularly have veterinary content varies greatly. CAB Abstracts has the highest coverage (90.2%) whilst Medline (PubMed) only has 36.5%.

Therefore to ensure that you retrieve as much of the published evidence on your topic as possible you should use CAB Abstracts and then at least one other database of your choosing. If you only use Medline (PubMed) you risk ignoring 64.5% of all journals with veterinary content. If you only use Google or Google Scholar you will probably get thousands of hits of very little relevance to you.

[3] Grindlay, D.et al (2012) Searching the veterinary literature: a comparison of the coverage of veterinary journals by nine bibliographic databases *Journal of Veterinary Medical Education* 39 (4) pp404-412)

Databases with veterinary coverage

Name of database	Publisher	Description
CAB Abstracts	CABI	Applied life sciences database covering veterinary sciences, agriculture, environment, applied economics, food science and nutrition
Medline (PubMed)	US National Library of Medicine	Life Sciences database covering biomedicine. Often referred to as PubMed as freely available via the PubMed website. Includes links to full text content from PubMed Central where available.
Scopus	Elsevier	Multidisciplinary bibliographic and citation database
VetMed Resource	CABI	Veterinary Sciences database containing the bibliographic records from CAB Abstracts, full text documents, specially written reviews etc
Web of Science	Thomson Reuters	Multidisciplinary bibliographic and citation database including Science Citation Index, and other content

Locating full-text articles

In order to critically appraise the evidence for validity (step 3 of EBVM), you should examine the full- text article rather than relying on the abstract. Reading the abstract may tell you whether an article is relevant but it will not tell you whether the methodology and conclusions are reliable. *EBVM Toolkit Numbers 3 through to 11* will show you how to appraise the evidence

Where can you find the full-text article? Is it free?
Some articles can be found **free on the web** e.g. by searching Pubmed or Google Scholar. Some full- text articles are also available from publishers' websites and Open Access repositories. However, the majority of veterinary articles are behind paywalls and cannot be accessed without a subscription.

Does your institution or employer provide access?
If you are a member of an academic institution or professional association, you may be able to access full-text articles using their library resources. Additionally, some employers will subscribe to journals on their employees' behalves.

Do you have an individual subscription?

In some cases you may have a personal subscription to the journal. However, personally subscribing to all relevant journals is costly and likely to be an uneconomical wayof practicing EBVM.

Have you tried the RCVS Knowledge Library and Information Service?
Members of RCVS Knowledge Library have access to most veterinary journals, including *Veterinary Clinics of North America, JAVMA* and *Veterinary Surgery*, Membership of RCVS Knowledge Library gives you an economical and efficient way of accessing the evidence you need.

If we do not provide access to the article you need, we can usually get it from another library (your academic institution may also provide this service). Even if you're not a member, RCVS Knowledge Library can provide you with copies of articles at a cheaper rate than most pay-per-article options on publisher websites.

Further assistance

If you need further help then contact RCVS Knowledge Information Specialists on library@rcvsknowledge.org or 020 7202 0752.

Literature searching workshops

We offer workshops (on-site or online) on a one-to-one basis covering how to focus a search question, database searching and making the most of our resources

If you are interested, please contact us at library@rcvsknowledge.org to arrange a time suitable to you.

Toolkit No. 3

EBVM Toolkit 3

Introduction to "Levels of evidence" and study design

There are five key steps to follow in Evidence-based Veterinary Medicine (EBVM).

1. Asking an answerable clinical question
2. Finding the best available evidence to answer the question
3. Critically appraising the evidence for validity
4. Applying the results to clinical practice
5. Evaluate performance

This handout explains how different types of study design can affect the "levels of evidence" a study provides.

Introduction

Critical appraisal is a process which is used to help you identify the strengths and weakness of a research paper and how likely the results of the paper are to be biased, how appropriate the study design is for the answer we seek, how well the methods were carried out and how good the reporting in the paper is.

Levels of evidence

Research studies in veterinary science can be designed in a variety of ways, depending on the type of question they are trying to answer. These different study designs are often arranged into a hierarchy known as the 'levels of evidence' with practitioners encouraged to find the highest level of evidence possible to answer their clinical question.

Whilst the idea of 'levels of evidence' suggests that there is a hierarchy of quality between the different types of studies it should be noted that each type of study has its own strengths and limitations. For example, a case-control study is a perfectly appropriate way to study the aetiology of a disease and a qualitative study would appropriately address questions regarding the quality of life of a patient after an intervention. Randomised controlled trials are often celebrated as high quality evidence because their methodological design inherently reduces bias, but you should remember that their strength lies in their ability to address the efficacy of a given intervention.

The table on page 2 shows a broad categorisation of studies arranged according to the level of evidence. As you move up the table the study design corresponds to increasing quality and reliability of the evidence. The higher the level the more confident you can be in the accuracy of the results with less chance of statistical error or bias.

"Stronger" evidence

Systematic review
Meta analysis
Randomised Controlled Trial
Cohort study
Case control study
Case series
Case report
Opinion

This evidence hierarchy is designed to help you to concentrate your efforts on sources that are most likely to provide a reliable answer. It is important to remember though that the hierarchy is based on study design and you should always critically appraise the individual studies. A poorly designed Randomised Controlled Trial (RCT) may provide lower level evidence than a good cohort study.

Types of study design

Experimental

Experimental studies are those where there is an intervention (e.g. treatment, drug therapy, surgical method, exposure to a chemical etc) and a researcher responsible for designing the intervention and deciding which animals are exposed to the intervention.

Experimental studies include:

- **Randomised controlled trials** (RCTs) can either be experimental laboratory studies or clinical trials. RCTs have two important features:
    - there are at least two groups - a treatment group and a control group
    - patients are randomly assigned into the two groups.

  Randomised control trials are considered the 'gold standard' when assessing the efficacy of a treatment because they minimise the chance of bias.

- **Non-randomised controlled trials.** Not every intervention can, or should, be randomised. Non-randomised controlled trials can detect associations between an intervention and an outcome but they cannot rule out the possibility that the association was caused by a third factor linked to both intervention and outcome.

- **Cross over trials** comprise the administration of two or more interventions one after the other in a specified or random order to the same group of patients.

Observational

Observational studies are those where the researcher examines the outcomes of an intervention within two groups without having any influence on which animals get the intervention. They "only" observe. e.g.: a researcher could consider the rate of complication following different types of surgery by looking back at all the surgical cases and analysing those that resulted in complications.

Observational studies include:

- **Case-control studies** are where animals which have a disease condition are identified and any causal or risk factors are compared to a control group. Information regarding the exposure is historical. The study starts with groups that already have the outcome (e.g. diabetes) and it looks back to examine what might have been the exposure factors (e.g. obesity).

- **Cohort studies** identify a group of animals and follows them over a period of time to see how their exposures affect their outcomes compared to another group (either the general population or another cohort of animals) that were not exposed to that factor. A cohort study can be prospective (looking forward) or retrospective (looking backwards)

- **Cross-sectional studies** are studies that describe the characteristics of sample groups of animals. Data is collected at one point in time and two groups are identified – usually animals with a specified disease and those without. The relationships within the groups to given parameters are then considered. The relationships are usually expressed as an odds ratio. As the data is taken at one point in time causal links cannot be established.

- **Controlled Before-and-After/Interrupted Time Series** are studies that measure the characteristics of a group of animals before and after an event or intervention. The two sets of data are then compared to judge the effect of the event or intervention.

Descriptive studies

Descriptive or non-comparative studies are designed to record what is seen – they give a picture of what is happening in a population but do not attempt any comparison to a control group: These studies have value if the aim of the paper is to highlight a dramatic finding, or report a rare occurrence. Descriptive studies will not be able to prove causation, so when using this type of study care should be taken to avoid over-interpreting the findings by making conclusions regarding causal links.

Descriptive studies include:

- **Case reports** which are reports on a single patient. They describe the presentation and/or course of a disease.

- **Case series** which are collections of case reports and can provide descriptive quantitative data.

Reviews

These are studies which review the literature or accepted practice and include:

Systematic reviews are comprehensive surveys of a topic in which all the primary studies of the highest level evidence have been systematically identified, selected, appraised and summarised according to explicit, and reproducible, methodologies.

- **Meta analyses** are surveys in which the designs of all the included studies are similar enough statistically that the results can be combined and analysed as if they were a single study. Analyses of this type are normally accompanied by some sort of graphical representation e.g. a forest plot

- **Narrative reviews** lack specific search protocols or explicit criteria for which papers are included or excluded. They may mention a generic search but they rely on experts to draw conclusions based on the papers *they* find more relevant or interesting

- **Opinion pieces** are not based on a literature search. Instead the authors give their opinions without any explicit appraisal of existing literature though they may mention a couple of journal articles to substantiate their claims.

Toolkit No. 4

EBVM Toolkit 4

What type of study is it?

There are five key steps to follow in Evidence-based Veterinary Medicine (EBVM).

1. Asking an answerable clinical question
2. Finding the best available evidence to answer the question
3. Critically appraising the evidence for validity
4. Applying the results to clinical practice
5. Evaluate performance

This handout offers advice on how to identify the design of a study.

Identifying study design

The information needed to identify the type of study design is normally found in the methodology (i.e. in the methods section of the paper). It is good practice not to rely solely on the abstract when identifying study design as it rarely gives sufficient information for you to be sure that the description is accurate. For example, the abstract may say the study was 'a randomised controlled trial' but you would need to read the methodology to see how the randomisation was achieved in order to confirm if this was indeed the case.

The following questions, which are presented both diagrammatically as an algorithm and in a table with accompanying notes, will help you identify the type of study design in the paper you are reading and the relevant critical appraisal checklist.

You should work your way through the questions until you are satisfied with the answer and that you have identified a study design. If you reach the end and are still unsure please contact us at ebvm@rcvsknowledge.org and we will try and help you

	Question	Answer
1	**Does the researcher have control over which animals are exposed to the intervention from the start?**	This question divides studies into experimental and observational. **YES:** This is an **experimental study** where there is an intervention and a researcher responsible for designing the intervention and deciding which animals are exposed/not exposed to the intervention. Go to **question 1a** **NO:** This is an **observational study** where the researcher examines the outcomes of an intervention within two groups without having any influence over which animals get the intervention. Go to **question 2**. **Tip:** Does the methodology say anything about the researchers determining which groups of animals got the intervention (e.g. drug treatment, clinical therapy, lifestyle change etc) and which did not? Or does it refer to the researchers looking backward (or forward) following a particular group of animals and observing what happens.
1a	**Is there a comparison or control between interventions?**	**YES**: This means that there was an alternative to the intervention, i.e. there was a control group that received no treatment or other intervention. The researchers made their conclusions by comparing two (or more) different scenarios. Go to **question 1b**. **NO**: If there was no comparison or control group then the study is a **Descriptive or non-comparative study**. Case studies and case series are examples of non- comparative studies.
1b	**Were the interventions randomly allocated?**	**YES:** This is a **Randomised Controlled Trial** where the animals were assigned to different groups by an explicit random process. Use **EBVM Toolkit 6** : **Controlled trial checklist** **NO:** This is a **Non-randomised Controlled Trial** where the allocation of interventions was not a randomised process. Use **EBVM Toolkit 6** : **Controlled trial checklist** **Tip:** The method of randomisation should be described in the methodology (computer randomisation, pot luck, etc.)
2	**Is the researcher looking for an association between variables by observing the situation, or the animals, without directly intervening?**	This question establishes if the study is observational, or if you are dealing with a diagnostic validity study or a review. **YES:** This is an **Observational study** where the researchers do not manipulate the group or provide an intervention but they do have hypotheses about the relationship between two variables. Go to **question 2a** **NO:** The study does not address an intervention observed by researchers. Go to **Question 3**.

	Question	Answer
2a	**Is there a comparison or control between interventions?**	**YES:** If there was a control group that received no treatment or other intervention then the researchers made their conclusions by comparing different scenarios. **Go to question 2b** **NO**: This is a **Controlled Before-and-After (CBA) study** or **an Interrupted Time Series (ITS).** Both can be useful to study changes in a major service delivery.
2b	**Are exposure and outcome measured at the same time?**	**YES**: This is a **cross sectional study**. This means that the study is like a snapshot in time of a defined situation. In this case, the researchers go to the subjects only once to collect data. For example, if the researchers collected information on the exposure (diet intake) and the outcome (weight) at the same time. Use **EBVM Toolkit 7**: **Cross sectional study checklist** **NO:** If the researchers collected information more than once, at different points in time, Go to **question 2c**
2c	**Are the groups defined by outcome?**	This question separates a Cohort study from a Case control study. Consider whether the comparison groups are based on the outcome (e.g. weight) or the exposure (e.g. diet intake). **YES**: **This is a Case control study**. This means that the study starts with groups that already have the outcome (e,g,diabetes) and it looks back to examine what might have been the exposure factors (obesity). Use **EBVM Toolkit 8: Case control checklist** **NO**: **This is a Cohort study**. This means that the study starts with groups that have been exposed to the same risk factor (e.g. obesity) and then considers if there is any association between that exposure and the outcome (e.g. diabetes). Cohort studies can be prospective (looking forward) or retrospective (looking backwards) Use **EBVM Toolkit 9: Cohort study checklist** **Tip:** The rule of thumb is if the researcher starts with a group of "sick" animals and then examines the risks they have been exposed to, then it is a case control study. If the researcher follows a group of animals that have been exposed to a risk to see if they got "sick" then it is a cohort study.
3	**Is the aim of the study to validate a test, tool or diagnostic method?**	**YES:** This is a **Diagnostic Validity Study.** This study evaluates the "performance" of a diagnostic test. It might look at how well the test identifies "sick" animals, how reliable the test is or how well it compares with the existing "gold standard". **NO:** Go to **Question 4**.

	Question	Answer
4	**Is the aim of the study to review the literature or to give advice?**	**YES:** This is likely to be a review paper. A review paper analyses published literature rather than attempting to test a hypothesis. Its aim is to analyse the current state of knowledge. This can be done by seeking the views of experts or by interrogating the available literature (or both). Go to **question 4a** **NO** Begin again with Question 1 or ask us for help ebvm@rcvsknowledge.org
4a	**Was there an explicit mention of a literature search?**	Some reviews analyse the issue at stake through a narrative that references other work that the authors consider to be important. Other reviews set out to analyse all the published references that are found by using specific keywords to search one or more databases. This question separates the two types of search. **YES:** In the methodology the author stated the databases searched and the keywords used. Go to **question 4b** **NO:** This is an **opinion article**. This means that the authors have not carried out a thorough search of the literature, though they may mention a couple of journal articles to substantiate their claims. Opinion, by definition is subject to bias – therefore an opinion article is the lowest level of
4b	**Is the search comprehensive and explicit?**	**YES:** The authors clearly stated which keywords were used and the databases searched. This is provided in a way that means others could perform the same search and obtain the same results. The papers selected for review were based on a set of inclusion/exclusion criteria which are clearly identified. **Go to question 4c** **NO:** This is a **narrative review**. The authors mention a generic search and then proceed to draw conclusions based on the papers *they* find more relevant or interesting.
4c	**Is the data from different papers combined statistically?**	**YES**: This is a **Meta-analysis** which is a statistical technique for combining the findings from two or more studies. Use **EBVM Toolkit 10 :Systematic review checklist** **NO:** This is a **Systematic Review** which s a literature review that tries to identify, appraise and synthesise all high quality papers relevant to a research question according to an explicit and reproducible methodology. Use **EBVM Toolkit 10:Systematic review checklist** **Tip:** A meta-analysis is not necessarily part of a systematic review. It may be part of a smaller review of a few studies that were not chosen systematically as part of a thorough literature

If you get to the end of the questions and are still unsure about the type of study design please email ebvm@rcvsknowledge.org and we will try to help you identify the study design and find that will allow you to appraise the paper.

Clinical Trial Toolkit

EBVM Toolkit 6

Controlled trial checklist

There are five key steps to follow in Evidence-based Veterinary Medicine (EBVM).

1. Asking an answerable clinical question
2. Finding the best available evidence to answer the question
3. Critically appraising the evidence for validity
4. Applying the results to clinical practice
5. Evaluate performance

This handout is designed to help you appraise the report of a controlled trial. Answering the questions will help you to reflect on how valid the results might be, how well reported they are and whether they are applicable to your local circumstances.

	Yes	No	Not sure	Reason
Did the trial address a clearly focused issue? Is there a clear question, can the PICO be identified?				
Was the assignment of animals to treatments randomised? Look for the term randomised and for details of how the randomisation was achieved (Controlled trials will not all be randomised)				
Were all of the animals who entered the trial properly accounted for at its conclusion? Was follow up complete? Were animals analysed in the groups to which they were allocated?				

	Yes	No	Not sure	Reason
Were animals and study personnel 'blind' to treatment including any study personnel who assessed outcomes? Look for the terms blinding, double blind, or masking. For animal studies this may be less important for the animals but could be significant when for example an injection is compared to an oral product. In this case a so-called double-dummy design is ideal where animals receive both an injection and an oral product, one being active and the other placebo.				
Were the groups similar at the start of the trial? Important issues include age, severity of the condition, species, breed, possibly gender.				
Aside from the experimental intervention, were the groups treated equally?				
How large was the treatment effect? What outcomes were measured?				
How precise was the estimate of the treatment effect? Look for confidence intervals				
Can the results be applied to your practice? Are the animals similar to your population? Does your setting differ significantly?				
Were all clinically important outcomes considered? Were the outcomes the ones you would choose? If not the trial may be less valuable				

	Yes	No	Not sure	Reason
Are the benefits worth the harms and costs? This probably won't be in the trial but a rough evaluation should be done to help you decide if you want to use this intervention in practice				

Want to try it out?

You could use the following paper to try out the questions:

Suputtamongkol, Y, et al. (2011) Efficacy and safety of single and double doses of ivermectin versus 7- day high dose albendazole for chronic strongyloidiasis. PLoS Neglected *Tropical Diseases*, 5(5):e1044.

Cross Sectional Study Toolkit

EBVM Toolkit 7

Cross sectional study checklist

There are five key steps to follow in Evidence-based Veterinary Medicine (EBVM).

1. Asking an answerable clinical question
2. Finding the best available evidence to answer the question
3. Critically appraising the evidence for validity
4. Applying the results to clinical practice
5. Evaluate performance

This handout is designed to help you appraise the report of a cross sectional study. Answering the questions will help you to reflect on how valid the results might be, how well reported they are and whether they are applicable to your local circumstances.

	Yes	No	Not sure	Reason
Did the study address a clearly focused issue? Is there a clear question, can the PICO be identified?				
Was an appropriate method used to answer the question? Is the use of a cross sectional study method appropriate?				
Were the subjects recruited in an appropriate way? Did the subjects represent a defined population? Was there a reliable system for selecting the subjects? Was the sample representative of a defined population?				
Were outcomes accurately measured to reduce bias? Were the measures objective or subjective? Does it matter? Were the measures appropriate and validated?				

	Yes	No	Not sure	Reason
Was the data collected in a way that addresses the research issue? Can you tell how the data were collected e.g use of interviews, questionnaire, and professional diagnosis? Were the methods explicit?				
Was the study large enough to be sure of a reliable result? Look for confidence intervals, very wide confidence intervals should raise concern. Was a power calculation carried out to estimate how many subjects would be needed?				
How are the results presented and what are the main results? Are results presented as a proportion or relative risk or are they mean or median differences? How large is it? What is the bottom line result?				
Was the data analysis rigorous? Is there a description of what was done? Is there enough data to support the bottom line?				
Is there a clear statement of findings? Is there a discussion on the meaning and credibility of the findings? Are the findings put into the context of the original research question?				
Can the results be applied to your local population? Are the subjects similar to your population? Does your setting differ significantly? Can you gauge benefit and harm for your local situation?				

	Yes	No	Not sure	Reason
Do the results fit with other available evidence? Consider evidence from other study designs for consistency.				

Want to try it out?

You could use the following paper to try out the questions:

Wylie, C.E. et al (2013) Demographics and management practices of horses and ponies in Great Britain: a cross-sectional study *Research in Veterinary Science,* 95 (2) pp410-417.

Case Control Study Toolkit

EBVM Toolkit 8

Case Control study checklist

There are five key steps to follow in Evidence-based Veterinary Medicine (EBVM).

1. Asking an answerable clinical question
2. Finding the best available evidence to answer the question
3. Critically appraising the evidence for validity
4. Applying the results to clinical practice
5. Evaluate performance

This handout is designed to help you appraise the report of a case control study. Answering the questions will help you to reflect on how valid the results might be, how well reported theyare and whether they are applicable to your local circumstances.

	Yes	No	Not sure	Reason
Did the study address a clearly focused question? Are the patient/population and risk factors clearly stated? Is the study looking for a beneficial or harmful effect?				
Was an appropriate method used to answer the question? Is the use of a case control method, which is usually only used for rare conditions or harmful outcomes, appropriate?				
Were the cases recruited in an appropriate way? Is there a clear definition of the cases? Did the cases represent a defined population? Was there a reliable system for selecting cases? Was the timescale relevant? Was there a sufficient number of cases. Was there a power calculation?				

	Yes	No	Not sure	Reason
Were controls selected in an appropriate way? Look for any bias in the selection which could compromise the results. Were the controls representative of the defined population? Were the controls matched or randomly selected? Were there a sufficient number of controls?				
Was the exposure accurately measured to minimise bias? Was the exposure clearly defined and accurately measured? Have the measures been validated? Were the measurements used the same for both the cases and controls?				
What confounding factors have the authors accounted for? List the ones you think are important. Can you think of any that have been missed? Confounding occurs when the link between exposure and outcome is distorted by another factor				
Have potential confounding factors been taken into account in the design and or analysis?				
What are the results of the study? What outcomes were measured? How strong is the association between exposure and outcome? Is the analysis appropriate?				
How precise was the estimate of risk? Look for confidence intervals				
Do you believe the results? A large effect has to be taken seriously. Can the result be due to chance? Have you spotted flaws that make the results unreliable?				

	Yes	No	Not sure	Reason
Can the results be applied to your practice? Are the subjects similar to your population? Does your setting differ significantly? Can you gauge benefit and harm for your local situation?				
Do the results fit with other available evidence? Consider evidence from other study designs for consistency.				

Want to try it out?

You could use the following paper to try out the questions:

Hayes, H. et al (1991) Case control study of canine malignant lymphoma. *Journal of the NationalCancer Institute*, 83 (17) pp 1226-31

Cohort Study Toolkit

EBVM Toolkit 9

Cohort study checklist

There are five key steps to follow in Evidence-based Veterinary Medicine (EBVM).

1. Asking an answerable clinical question
2. Finding the best available evidence to answer the question
3. Critically appraising the evidence for validity
4. Applying the results to clinical practice
5. Evaluate performance

This handout is designed to help you appraise the report of a cohort study. Answering the questions will help you to reflect on how valid the results might be, how well reported they are and whether they are applicable to your local circumstances.

	Yes	No	Not sure	Reason
Did the study address a clearly focused issue? Are the patient/population and risk factors clearly stated? Is the study looking for a beneficial or harmful effect?				
Was the cohort recruited in an appropriate way? Was the cohort representative of a defined population**?** Was there anything special about the cohort? Were all animals included who should have been?				
Was the exposure accurately measured to minimise bias? Were the measurements objective or subjective? Were the measurements able to detect what was expected? Have the measurements been validated? Were the subjects classified into exposure groups using the same procedure?				

	Yes	No	Not sure	Reason
Was the outcome accurately measured to minimise bias? Were the measurements objective or subjective? Were the measurements able to detect what was expected? Have the measurements been validated? Was there a reliable system for detecting all the cases? Were the measurement methods similar in the different groups? Were the subjects and/or outcome assessors blinded to the exposure? Is this important?				
What confounding factors have the authors accounted for? List any that you think important				
Have confounding factors been taken into account in the design and or analysis Confounding occurs when the link between exposure and outcome is distorted by another factor. These should be in the methods section. Look for factors that were not considered according to your clinical judgment. A study that does not address confounding should be rejected.				
How adequate was the follow up of the subjects? Was it complete enough? Long enough? Were all the subjects accounted for at the end? Do you think that those lost to follow up may have had different outcomes?				

	Yes	No	Not sure	Reason
What are the results of the study? What are the bottom line results? How strong is the association between exposure and outcome? Is there a relative risk? What is the absolute risk reduction? If not presented can you calculate it from the results presented**?**				
How precise was the estimate of risk? Look for confidence intervals				
Do you believe the results? A large effect has to be taken seriously. Can the result be due to chance? Have you spotted flaws that make the results unreliable? Was a cohort study the best method to answer the question?				
Can the results be applied to your practice? Are the subjects similar to your population? Does your setting differ significantly? Can you gauge benefit and harm for your local situation?				
Do the results fit with other available evidence? Consider evidence from other study designs for consistency				
What are the implications of this study for your practice? Is the evidence from this study robust enough to make a decision? Recommendations from observational studies are stronger when supported by other evidence.				

Want to try it out?

You could use the following paper to try out the questions:

Krontveit, R.I. et al (2012) Risk factors for hip-related clinical signs in a prospective co large dog breeds in Norway. *Preventative Veterinary Medicine*, 103 (2-3) pp219-27

Systematic Review Toolkit

EBVM Toolkit 10

Systematic Review checklist

There are five key steps to follow in Evidence-based Veterinary Medicine (EBVM).

1. Asking an answerable clinical question
2. Finding the best available evidence to answer the question
3. Critically appraising the evidence for validity
4. Applying the results to clinical practice
5. Evaluate performance

This handout is designed to help you appraise a systematic review. Answering the questions will help you to reflect on how valid the results might be, how well reported they are and whether they are applicable to your local circumstances.

	Yes	No	Not sure	Reason
Did the review address a clearly focused question? Is there a clear question, can the PICO be identified?				
Did the authors select the right papers? Did the papers address the question and have an appropriate study design?				
Do you think the search would have found all the relevant important papers? Look for search methods, databases used, reference list use, inclusion of unpublished studies etc				
Did the authors do enough to assess the quality of included studies? Is there evidence of an assessment of potential bias? Is the process of assessment described?				

	Yes	No	Not sure	Reason
If the results of the studies have been combined was it reasonable to do so? Were the results sufficiently similar in design to combine? Are the results of the included studies clear? Are the reasons for any variations discussed?				
What are the overall results of the review? Are you clear about the 'bottom line' results? How are the results expressed (odds ratios, relative risk etc)?				
How precise are the results? Have confidence intervals been presented?				
Can the results be applied to your practice? Is the review relevant to your patient population? Can you gauge benefit and harm for your local situation?				
Were all the important outcomes considered? Are there any questions that you would consider important that were not addressed in the review?				
Are the benefits described worth the harms and costs? What are the possible adverse effects of the intervention? What are the costs?				

Want to try it out?

You could use the following paper to try out the questions:

Nuttall, T. and Cole, L. (2007) Evidence based veterinary dermatology: a systematic r interventions for the treatment of Pseudomonas otitis in dogs, *Veterinary Dermatology,*

Qualitative Study Toolkit

EBVM Toolkit 11

Qualitative Study checklist

There are five key steps to follow in Evidence-based Veterinary Medicine (EBVM).

1. Asking an answerable clinical question
2. Finding the best available evidence to answer the question
3. Critically appraising the evidence for validity
4. Applying the results to clinical practice
5. Evaluate performance

This handout is designed to help you appraise the report of a qualitative study. Answering the questions will help you to reflect on how valid the results might be, how well reported they are and whether they are applicable to your local circumstances.

Introduction

Few papers overtly use qualitative methods in veterinary medicine. While some see qualitative methods to be inferior to quantitative research, the two can happily co-exist and answer different questions. Qualitative research is particularly concerned with making sense of phenomena in terms of the meanings that people bring to them. As qualitative research frequently involves interview techniques it will have limited application in veterinary medicine. An example is a study by Litva (2010) investigating owners' perceptions of the causes of crib biting or wind sucking behaviour in their horses[1]

[1] Litva, A., Robinson C.S. and Archer D.C. .(2010) Exploring lay perceptions of the causes of crib-biting/windsucking behaviour in horses, *Equine Veterinary Journal*,42 (4) pp 288-293

	Yes	No	Not sure	Reason
Was the sample used in the study appropriate to its research question? Have the right animals been included in the study? Sample size may not be as important as in quantitative research but sufficient participants should have been included in order to gain an understanding of the issues.				

	Yes	No	Not sure	Reason
Was the data collected appropriately? The methods of data collection should be described with some justification of the methods used.				
Was the data analysed appropriately? There should be a description of the methods. Did participants have an opportunity to check the findings?				
Can the results of the study be applied to your own setting? Are the subjects similar to your population? Does your setting differ significantly? Can you gauge benefit and harm for your local situation?				
Does the study adequately address any potential ethical issues, including reflexivity? Was the study ethical? Were potential issues if reflexivity considered? Reflexivity is about the influence a researcher can have on the data collected and should be addressed.				
Overall: is what the researchers did clear? Does what was done make sense?				

Want to try it out?

You could use the following paper to try out the questions:

Lastein, D., Vaarst, M. and Enevoldsen, C. (2009) Veterinary decision making in relation to metritis – a qualitative approach to understand the background for variation and bias in veterinary medical records. *Acta Veterinaria Scandinavica* 51: 36

Appendix Four. Knowledge Summary Example

There are plenty of peer reviewed examples of **Knowledge Summaries in *Veterinary Evidence*** .

You can also view the **Knowledge Summary submission form**.

Veterinary Evidence and EBVM Network are RCVS Knowledge initiatives. For more information please contact us at editor@veterinaryevidence.org.

RCVS Knowledge is the independent charity associated with 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 practicing veterinary professionals and directly contributes to evidence based clinical decision-making.

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