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. Evaluating 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 tumours	mammary cancer mass	breast neoplasia lump	tumour neoplasm carcinoma

Truncation

You then need to select the key search 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 4 for more information on using truncation symbols

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*

Combining keywords

Then we need to think about how we would combine the keywords using AND, OR and NOT.
See page 3 for more information on combining keywords.

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*)

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 ovariohysterectom* or ovariectom* or gonadect*)	references containing keywords:		
		spay	spaying	spayed
		spey	speying	speyed
		ovariohysterectomy	ovariohysterectomized	ovariohysterectomised
		ovariohysterectomies	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 4	will give references containing all the listed keywords concerning 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[1] 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.

If you are carrying out a search as part of a review or critical appraisal of available literature for publication you should check if the publisher has minimum requirements for databases searched.

For example a search for a Knowledge Summary for publication in *Veterinary Evidence* must include CAB Abstracts 1973-current and PubMed as a minimum.

[1] 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), pp. 404-412. DOI: https://doi.org/10.3138/jvme.1111.109R

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 15 will show you how to appraise the evidence

Where can you find the full-text articles?

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 way of 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 online workshops on a one-to-one basis covering how to focus a search question, database searching and making the most of our resources

Learning resources: our EBVM for Practitioners, EBVM Learning course, Farm Vet Champions course and additional resources provide easily accessible guidance for those looking to apply evidence-based principles to their work.

We welcome comments and suggestions for improvement to this guide.
Please email ebvm@rcvsknowledge.org