Measuring the success of canine and feline preventative healthcare

consultations: a systematic review

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Abstract

Preventative healthcare consultations account for a large proportion of the veterinary caseload. This novel study is the first to methodically review all literature on canine and feline preventative healthcare consultations. Previous research has found these consultations to be different from health problem consultations in terms of communication style and content. Identifying relevant evidence and previously validated methods of measuring the success of these consultations will be useful when implementing strategies for optimisation. The aim of this study was to identify and assess the quality of existing literature which describes and/or measures the success of preventative healthcare consultations.

Database searches of CAB Abstracts and Medline were conducted to identify published literature. Google searches were then conducted to identify any additional published or grey literature. Results were systematically screened to determine whether the returned sources were about cats and/or dogs, whether they related to preventative healthcare, and whether they described and/or measured the success of preventative healthcare
consultations. For primary research citations which only described preventative healthcare consultations, data were extracted on the aspects of the consultations described. For citations which additionally measured the success of the consultations, the measures used, sampling technique, key results and key weaknesses were also extracted.

Of 17538 citations identified in total during the database searches, a total of seven relevant primary research citations were identified. All of these citations described aspects of the preventative healthcare consultation, such as consultation length, health problems discussed, actions taken and communication style. Only one primary research citation measured success of the consultation, using veterinarian satisfaction to determine success. In addition, 30 narrative citations, including expert opinion pieces, textbooks, guidelines without transparent methodology and conference presentations were identified. Google searches identified 224 relevant narrative citations, and five of the seven primary research citations identified by the database searches, but did not identify any additional relevant primary research citations.

The results suggest that, despite accounting for around a third of all consultations, there is relatively little evidence describing preventative healthcare consultations and only one measure of success has been described for these consultations. This presents potential challenges when implementing strategies to optimise these consultations, as measures which are useful and relevant to veterinary practice should first be identified. Identifying useful measures of success will allow future strategies designed to maximise the benefits of these consultations to be meaningfully assessed for efficacy.

Keywords: vaccination; preventative healthcare; preventive; consultations; evidence synthesis; veterinary satisfaction; client satisfaction
Consultations are the cornerstone of small animal veterinary practice, and previous research has suggested that consultations are highly complex with multiple problems frequently discussed (Robinson et al., 2015). In order to maximise the benefits of veterinary consultations, it is vital to understand how best to measure the success of a consultation, so that any strategies developed to optimise the consultation can be fully assessed for effectiveness. Success of the consultation could potentially be measured in a number of ways, including; by examining client satisfaction, veterinarian satisfaction, prescribing practices, financial implications for the practice and impact upon patient health and/or welfare. The Centre for Evidence-based Veterinary Medicine (CEVM) are currently conducting research to identify appropriate measures of success for 'health problem' consultations (Corah et al., 2018). However, previous research has suggested that preventative healthcare consultations differ considerably from health problem consultations in terms of communication style (Shaw et al., 2008) and content (Robinson et al., 2016), and so appropriate measures of success may also be different for these consultations. In addition, recent research has found that owner and veterinary surgeon expectations of these consultations differs widely between individuals, and so different measures of success may be important to different people (Belshaw et al., 2018b).

Systematic reviews can facilitate the practice of evidence-based veterinary medicine, particularly for busy practitioners with limited time and resources to search for and appraise existing evidence. Systematic reviews are viewed as less prone to bias than narrative reviews, because their search strategies are comprehensive, transparent and repeatable and a more rigorous degree of critical appraisal is usually involved (Cook et al., 1997). Systematic reviews are a valuable way of identifying, evaluating and summarising the current evidence base on a topic, making the available evidence more accessible to those making healthcare decisions (Gopalakrishnan and Ganeshkumar, 2013). A growing database of veterinary systematic reviews exists (VetSRev, 2018),
however to date there have been no systematic reviews collating the evidence base on small animal preventative healthcare consultations.

The aim of this study was to describe the existing published evidence base which reported and/or measured the success of veterinary preventative healthcare consultations involving dogs and/or cats. A secondary aim of this study was to assess the quality of the existing published literature which measured the success of veterinary preventative healthcare consultations involving dogs and/or cats, in order to identify any useful measures on consultation success which could be used in future research.

Methods

Defining preventative healthcare

Prior to conducting the literature search, a definition of preventative healthcare was developed to assist in identifying citations of interest, and to help develop inclusion and exclusion criteria. Preventative healthcare was defined as:

‘Any consultation where the main reason for presentation relates to the prevention of health problems, and where a clinical examination and/or assessment of the patient’s general health would usually be expected to take place. This includes all consultations where the primary reason for presentation is one of the following, regardless of whether the owner was prompted to present the animal via a vaccination/other reminder, or un-prompted: vaccination; parasite prevention; prevention of season (oestrus); any other routine health check, for example routine new animal or puppy/kitten checks.’

Consultations involving the ‘well’ patient, in addition to patients with ongoing health problems (provided these health problems were not the primary reason for presentation), were included. Consultations primarily for procedures such as nail clipping, microchipping or any other procedure which may be prophylactic, but where a clinical examination/health check may not routinely be expected, were excluded.
Eligibility criteria

Any published research or grey literature which examined canine and/or feline preventative healthcare consultations performed by a veterinary surgeon were included, regardless of study type or type of information source. Published research or grey literature examining consultations not performed by a veterinary surgeon, not involving canine and/or feline patients, or which did not fit the definition of a preventative healthcare consultation, were excluded. Further information can be found in the full study protocol (see supplementary material).

Database searches

Search strategy

Searches were conducted in two databases using the OVID interface, CAB Abstracts (1910 to 2017) and Medline (including In-Process and Other Non-indexed Citations; 1946 to Present) in April 2016 and updated in January 2018. These databases were chosen as CAB Abstracts has previously been shown to have the widest cover of veterinary journals, while Medline incorporates newer papers; these two databases in combination cover the majority of the veterinary literature (Grindlay et al., 2012). A single search strategy was developed encompassing keywords covering three separate components: species terms (canine, feline and small animal); preventative healthcare terms (as covered by the definition above e.g. ‘parasite prevention’); and consultation terms (including terms suggesting a regular schedule of appointments e.g. annual). Appropriate subject headings unique to each database were then identified and added to the search terms (see full study protocol in supplementary material for search terms used for each database).

Screening search results

Searches were initially conducted by one author (NR) on 26th April 2016, and the results downloaded into an Endnote Version 16 library. Duplicates were removed (Figure 1) firstly using the automatic function in the Endnote program, and then any additional
duplicates were identified and removed manually. The remaining citations were screened by examining the citation title to determine whether the inclusion criteria were met. For citations which could not be included or excluded on the basis of title alone, the abstract, and occasionally the full text where necessary, were examined to determine whether the citation should be included. Citations were initially screened to determine whether they were about dogs and/or cats with citations not about these species excluded for that reason. Where dogs or cats were being used as a model for disease in other species, the citation was excluded at this point if it appeared to be primarily about disease in another species. Citations which were about dogs and/or cats were then examined to determine whether they related to preventative healthcare or not (as defined above). Those which described a disease preventable by vaccination but did not mention vaccination or prevention in the title or abstract (e.g. describing the prevalence of dog rabies) were excluded at this stage. Citations relating to types of preventative care not covered by the definition (e.g. neutering) were also removed at this stage. Those which did describe preventative healthcare in dogs and/or cats were then examined to determine whether or not they described a veterinary consultation. Citations which described the preventative treatment only (e.g. vaccination), and did not discuss this in the context of a consultation, were excluded, as were citations which described nurse consultations only. The search was updated on 24th January 2018, downloaded into a new Endnote version 16 library and duplicates removed. This library was then merged with the Endnote version 16 library from the original search, and new search results were identified and screened using the same criteria as during the initial search.

Included citations were categorised as either ‘primary research citations’ or ‘narrative citations’. Primary research citations needed to have a transparent methodology for the derivation of the data to be included. Textbooks, narrative reviews, editorials, conference presentations which did not describe research and letters were categorised as narrative citations. Guidelines without a detailed methods section and research conference presentations with insufficient methods available were also categorised with narrative.
Papers describing primary research (e.g. clinical trials, cohort studies and cross-sectional studies) or evidence synthesis (e.g. systematic reviews or meta-analyses), conference presentations describing research where additional detailed information on methods were available and evidence-based guidelines with a transparent methodology were all categorised as primary research citations. Any primary research citations which only contained results presented in greater depth in other primary research citations (e.g. a pilot study or conference presentation presenting data from a published research paper) were then excluded. It was planned that any primary research citations identified which were not in the English language would be translated, but narrative citations would not.

Inter-rater reliability
Categorisation of all citations was conducted by one author (NR). To determine the inter-rater reliability of NR’s categorisation of citations, a second author (RD) checked a sample of 10% of all citations (after removal of duplicates). This sample was taken by sorting the Endnote database in alphabetical order and selecting every 10th citation to be reviewed. The second reviewer examined title, plus abstract and full text where necessary, to determine the relevance of each citation. As the full categorisation process was time consuming, the second author simply coded citations as relevant (i.e. a primary research citation or narrative citation which was about veterinary preventative healthcare consultations involving dogs and/or cats) or not relevant.

Google searches
Google searches (as opposed to Google Scholar) were conducted in May 2016 to look for any grey literature not identified in the databased searches. Searches were conducted on a PC with cookies disabled and previous search history cleared, to avoid previous Google searches influencing the Google search results. Due to the Google search function limit of 32 words per search, four separate searches were conducted to cover all aspects of preventative healthcare as defined for the purposes of this review: a general search
(covering 'routine health checks'); a 'vaccination' search; a 'parasite prevention' search; and a 'prevention of season' search (full search terms used for each search are given in the study protocol in supplementary material).

For each of the four searches, the first 500 results were downloaded into a Microsoft Excel V.14.0.6 (2010 Microsoft Corporation) spreadsheet for data management, giving a total of 2000 results examined from the four searches. Each link was examined to see if they fit the population inclusion and exclusion criteria (Table 1). Links which only briefly mentioned preventative healthcare consultations (e.g. veterinary practice webpages listing that they offer vaccination consultations among a list of other services, with no further detail) were excluded. Links which did meet the inclusion criteria were further classified as either primary research citations or narrative citations (including: blog/article; veterinary practice website; academic/research institution website; pharmaceutical or other corporate website). The decision was taken not to update the Google searches in January 2018 alongside updating the database searches, as the initial Google searches had not yielded any additional primary research citations which had not been identified by the database searches.

Data extraction was conducted by the first author. For narrative citations, data were extracted on the type of evidence source only e.g. book, research conference abstract, guideline etc. For all primary research citations identified, data extracted from the citation consisted of journal of publication, study design and aspects of the consultation described (e.g. consultation length, content, communication etc.). For primary research citations measuring success of the consultation, sampling technique, methods used to measure success, key results and key weaknesses were also identified.

Critical Appraisal
Primary research citations which measured the success of preventative healthcare consultations were critically appraised using the AXIS critical appraisal tool for cross-sectional studies (Downes et al., 2016). The AXIS tool assesses quality and identifies potential sources of bias in cross-sectional studies through a series of questions relating to common issues in this study type. For each question the user can answer ‘yes’, ‘no’ or ‘don’t know’ and there is additional space for comments. Critical appraisal was conducted separately by two authors (NR and RD) then compared for agreement. It was planned that a third author (ZB) would be consulted, however as no disagreement occurred this was unnecessary.

Results

Database searches

A total of 11358 results were found in CAB Abstracts and 6180 in Medline. Once duplicates had been removed there were a total of 14098 unique citations. Figure 1 shows the final search results. After removing citations which were not about dogs and/or cats, not about preventative healthcare and not about consultations conducted by a veterinary surgeon, there were 39 relevant citations remaining. After excluding 2 pilot studies there were 6 primary research citations which described consultations only and 1 which described the consultation and also measured the success of the consultation through veterinary surgeon satisfaction. Of the 30 citations classed as narrative, there was a mix of opinion pieces (n=8), conferences presentations (n=6) and guidelines (n=5) among other information sources.

There was complete inter-rater agreement in the citations categorised as relevant and not relevant in the 10% random sample of citations examined by two authors (NR and RD). Several foreign language citations were identified, but all could be categorised as narrative citations based on title and abstract, and so these were not translated.
A wide range of narrative citations were identified in the existing literature (Table 1).

Many of these were published opinion articles or book chapters, though several of these were not available in the English language. There had also been five non-research based conference presentations about preventative healthcare consultations over the past decade or so, in particular at conferences in the United States aimed at veterinary practitioners. Three different guidelines included guidance around preventative healthcare consultations, and had supporting material to assist in implementation of the methodologies, so it is unclear how they were developed. One Critically Appraised Topic (CAT) had been published on improving veterinary preventative healthcare, however the papers identified by this CAT were all from human rather than veterinary healthcare.

Table 1. Summary of the 30 narrative citations describing veterinary preventative healthcare consultations which were identified during the systematic review. This included guidelines and research conference abstracts which did not have a detailed methods section and so were not included as primary research citations.

<table>
<thead>
<tr>
<th>Type of evidence</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guidelines</td>
<td>• AAHA canine life stage guidelines (Bartges et al., 2012)</td>
</tr>
<tr>
<td></td>
<td>• AAFP-AAHA feline life stage guidelines (Hoyumpa Vogt et al., 2010)</td>
</tr>
<tr>
<td></td>
<td>• WSAVA guidelines for the vaccination of dogs and cats (Day et al., 2007)</td>
</tr>
<tr>
<td>Guidelines (supporting material)</td>
<td>• Development of new canine and feline preventive healthcare guidelines designed to improve pet health (AAHA Task Force, 2011)</td>
</tr>
<tr>
<td></td>
<td>• Have you implemented the AAFP-AAHA feline life stage guidelines? (Buffington, 2011)</td>
</tr>
<tr>
<td>Non-research conference abstracts</td>
<td>• Remaking the annual visit (Anon, 2005)</td>
</tr>
<tr>
<td></td>
<td>• The first pediatric visit (Davis and Pritchard, 2011)</td>
</tr>
<tr>
<td></td>
<td>• Feline preventive care review (Faunt, 2007)</td>
</tr>
<tr>
<td></td>
<td>• Best practices: how to implement twice-a-year wellness exams (Myers, 2005)</td>
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<tr>
<td></td>
<td>• First puppy/kitten visit: starting off on the right paw (Sharp and Voglewede, 2010)</td>
</tr>
<tr>
<td>Research conference abstracts</td>
<td>• Abnormalities detected during routine examination at annual vaccination in dogs (Williams and Grudzien, 2015)</td>
</tr>
<tr>
<td>Critically appraised topics (CATs)</td>
<td>• Critically Appraised Topics: Improving preventive pet care (LeFebvre, 2012)</td>
</tr>
<tr>
<td>Books</td>
<td>• Veterinary paediatrics: dogs and cats from kitten to six months (Anon, 1990)</td>
</tr>
<tr>
<td></td>
<td>• Top 100 consultations in small animal general practice (Hill et al., 2011)</td>
</tr>
<tr>
<td>Narrative reviews (English)</td>
<td>• Wellness examination 101 (Anon, 2011)</td>
</tr>
<tr>
<td></td>
<td>• Small animal vaccination: a practical guide for vets in the UK (Day, 2017)</td>
</tr>
<tr>
<td></td>
<td>• Vaccine use and disease prevalence in dogs and cats (Horzinek, 2006)</td>
</tr>
<tr>
<td></td>
<td>• Preventive health program for dogs (Hoskins, 1988)</td>
</tr>
<tr>
<td></td>
<td>• The puppy’s first veterinary examination: physical examination and preventive health program (Hoskins, 1991)</td>
</tr>
</tbody>
</table>
- Comprehensive preventive care and early disease detection: Taking preventive care to the next level (Miller, 2011)
- Another perspective on the vaccination controversy: redefining the annual visit (Norsworthy, 1999)
- DOI and booster vaccination - dealing with the issue at practice level in France (Poubanne, 2006)

Foreign language (narrative reviews or book sections)
- The large health check (Anon, 2014a)
- The great health check: the nuts and bolts for dogs and cats (Anon, 2014b)
- Prevention is better than cure (Anon, 2014c)
- Dogs and cats as patients (Anon, 2014d)
- The puppy’s first veterinary visit: clinical examination and preventative medicine programme (Scotti, 1993)
- The work required of veterinarians in small animal practice (health checks) (Svendsen, 1992)

Letters
- Survey on booster vaccination consultations (Robinson et al., 2016)
- Annual examination may serve many purposes (Walshaw, 1998)

Google searches
A total of 2000 Google search results, 500 from each of the four searches conducted, were examined (Table 2). While five primary research citations were identified in two of the Google searches, all of these had already been identified during the database searches. All remaining relevant webpages were classified as narrative citations, with a total of 224 relevant narrative citations identified. The majority of these (n=195/224; 87.1%) were veterinary practice webpages describing the purpose or content of their own preventative healthcare consultations. An additional 22 narrative citations were online articles, ebooks or blogs, four were webpages from academic institutions and three were webpages from corporate sources.

Table 2. Summary of the findings from the four Google searches conducted to identify grey literature on various aspects of preventative healthcare consultations. The number of results excluded because they did not discuss dogs/cats, were not about preventative healthcare, or were not about preventative healthcare consultations conducted by a veterinary surgeon, are given for each search. For relevant results, the type of grey literature identified is given.

<table>
<thead>
<tr>
<th>Search</th>
<th>Excluded</th>
<th>General</th>
<th>Vaccination</th>
<th>Parasite prevention</th>
<th>Prevention of season</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dogs/cats</td>
<td></td>
<td>59</td>
<td>29</td>
<td>83</td>
<td>219</td>
<td>390</td>
</tr>
<tr>
<td>Preventative healthcare</td>
<td></td>
<td>231</td>
<td>108</td>
<td>89</td>
<td>239</td>
<td>667</td>
</tr>
<tr>
<td>Consultations</td>
<td></td>
<td>97</td>
<td>287</td>
<td>295</td>
<td>35</td>
<td>714</td>
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The seven primary research citations describing aspects of canine and feline preventative healthcare consultations (Table 3) covered consultation length, problems discussed during the consultation, actions taken during or following the consultation and/or communication styles during the consultation. All seven papers described a cross-sectional study.

Table 3. Summary of the aspects of the preventative healthcare consultations described by each of the seven cross sectional studies identified in the systematic review.

<table>
<thead>
<tr>
<th>Research citation</th>
<th>Country</th>
<th>Consultation length</th>
<th>Problems discussed</th>
<th>Actions taken</th>
<th>Communication style</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banyard (1998)</td>
<td>Australia</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Robinson et al. (2014)</td>
<td>UK</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Robinson et al. (2016)</td>
<td>UK</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Roshier and McBride (2013)</td>
<td>UK</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Shaw et al. (2006)</td>
<td>Canada</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Shaw et al. (2008)</td>
<td>Canada</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Shaw et al. (2012)</td>
<td>Canada</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

1Australian Veterinary Journal
2Veterinary Record
3Journal of the American Veterinary Medical Association
Only one of these seven (Shaw et al., 2012) measured the success of the consultation, and did so using measures of veterinary satisfaction. In this study, a previously developed 20-item physician satisfaction scale (Suchman et al., 1993) which had been validated for use in human healthcare research (construct validity measured by examining predictors which paralleled the basic meaning of each subscale for significant associations with that subscale) was used to measure veterinary surgeon visit-specific satisfaction. The results of the critical appraisal of this study are shown in Table 4.

Table 4. Critical appraisal of the paper (Shaw et al. 2012) which measured the success of veterinary preventative healthcare consultations conducted and reported according to the AXIS guideline

<table>
<thead>
<tr>
<th>Title</th>
<th>Veterinarian satisfaction with companion animal visits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journal</td>
<td>Journal of the American Veterinary Medical Association</td>
</tr>
<tr>
<td>Sampling strategy</td>
<td>Random sample of companion animal veterinarians in Southern Ontario, Canada. Veterinarians were contacted until 50 agreed to take part in the study. All clients presenting to each veterinarian were invited to take part until at least 3 health problem and 3 preventative healthcare consultations were included.</td>
</tr>
</tbody>
</table>
| Key findings                                                          | • Veterinarian satisfaction scores were higher for preventative healthcare compared with health problem consultations (p<0.01)  
• Veterinarians felt more confident in discussing preventative healthcare compared with health problem consultations (p<0.01)  
• Higher global veterinarian satisfaction was positively associated with proportionately more client (positive and negative) talk compared to veterinarian talk and a higher veterinarian self-esteem score  
• Various other measures were found to be associated with different individual aspects of veterinarian satisfaction (which had four subcomponents of: veterinarian-client-patient relationship; data-gathering process; effective use of time during the visit; cooperative nature of client)  
• The measure most consistently associated with higher veterinary satisfaction during preventative healthcare consultations was veterinarian self-esteem (which was positively associated with global veterinarian satisfaction as well as all four subcomponents of veterinarian satisfaction) |
| Key weaknesses                                                        | • No justification for the sample size used, therefore the study may be underpowered  
• No information about ‘non-responders’/those who declined to take part  
• Measures used were validated in the medical but not veterinary literature  
• Full range of statistical analyses conducted, and cut-offs used for interpretation, is unclear |
This is the first time globally that literature relating to preventative healthcare consultations have been reviewed. Preventative healthcare consultations account for a large proportion of the daily caseload of veterinary surgeons in the UK (Robinson et al., 2015), yet the evidence base describing these consultations is very limited and of poor quality and low strength. The evidence found in this review was dominated by expert opinion as opposed to primary research, yet many guidelines have been written in this area. In order to maximise the benefits of preventative healthcare consultations, additional useful measures of consultation success need to be identified and validated.

Only seven primary research citations describing preventative healthcare consultations were found, with all studies identified being cross-sectional studies. While this study design was appropriate to address the aims of these studies, which often focused on describing preventative healthcare consultations, no higher levels of evidence examining preventative healthcare consultations through clinical trials or cohort studies were identified. The large number of narrative citations and guidelines identified suggest that veterinary surgeons do have some information available to guide them in their decision-making during these consultations. However, proponents of evidence-based medicine have previously highlighted that while expert opinion can be useful in the absence of other forms of evidence, it is also potentially more prone to bias and so considered a weaker form of evidence both when looking at ‘levels of evidence’ (Howick et al., 2011) and the more recently developed ‘evidence staircase’ (Arlt and Heuwieser, 2016). Where primary research is limited, expert opinion can still be harnessed in an evidence-based way, using methods such as Delphi consensus panels (Powell, 2002). Such methods have been used with increasing frequency to develop veterinary guidelines in other areas of veterinary medicine, such as behavioural signs of pain in cats (Merola and Mills, 2016), cardiovascular-renal axis disorders (Pouchelon et al., 2015) and neurology learning objectives for veterinary undergraduates (Lin et al., 2015). Until new primary research can be conducted focusing on preventative healthcare consultations, harnessing
expert opinion in a more systematic and evidence-based way to develop guidance could prove to be a useful resource for veterinary surgeons conducting these consultations. The CEVM are currently using consensus methods to develop evidence-based guidance and practical recommendations to optimise canine and feline preventative healthcare consultations (Belshaw, pers comms).

A large proportion of the literature identified in the database and Google searches described preventative healthcare in dogs and/or cats but were excluded as they did not discuss the consultation itself. This suggests that while there may be a considerable amount of evidence available to veterinary surgeons on the preventative medicines themselves, and also to pet owners via Google searches, the evidence on the consultations themselves is disproportionately limited. This is supported by recent work which involved in-depth interviews of veterinary surgeons and pet owners around their experiences and expectations of preventative healthcare consultations. While interviewees were predominantly asked about the consultations rather than the preventative medicines, many of the interviewee responses focused on the discussion of preventative medicines themselves (Belshaw et al., 2018a). Where the consultation was discussed, experiences and expectations of the consultation appeared to vary widely, both between owners and veterinary surgeons, and between individuals within these subgroups (Belshaw et al., 2018b). There has been some controversy in recent years around pet vaccination, with some describing ‘vaccinophobia’ amongst pet owners (Day, 2017). It may be that a focus on the risks and benefits of vaccination, and of other preventative medicines, has drawn focus away from thinking about other important aspects of the preventative healthcare consultation.

Only one research citation measured the success of the consultation, and this focused solely on veterinarian satisfaction and did not consider any other measures of success (Shaw et al., 2012). This study was generally of good quality, though the success measure used had primarily been validated in medical and not veterinary consultations,
and so ideally additional validation should be conducted to establish the usefulness of this measure. Satisfaction is not the only measure which needs to be considered when determining the success of the consultation, as the impact on clinical outcomes, wellbeing of all parties involved and financial implications also needs to be considered (Corah et al., 2018). No studies were identified which measured the success of the consultation in terms of owner satisfaction, short and long term outcomes for pet health and welfare, and other potential measures of success such as dispensing behaviour and compliance. Future work should focus on identifying and validating other measures of success for preventative healthcare consultations. This will allow future strategies designed to maximise the benefits of these consultations to be meaningfully assessed for efficacy.

There are various limitations of this study, including that relevant evidence was potentially missed as only two databases were searched. However, the databases used were picked for their comprehensive coverage of the veterinary literature (Grindlay et al., 2013) and so the risk of missing relevant literature was minimised. In addition, Google searches were not updated when updating of the database searches were performed. While it is possible that this may have resulted in relevant literature being missed, this seems unlikely given that no useful additional primary research citations were identified in the initial Google searches. In addition, only 2000 results in total were examined across the four Google searches, so it is possible that some relevant results were missed, however the decision to examine this number of results was based on previous work within the CEVM utilising Google searches (Downes et al., 2013). Citations covering consultations conducted by veterinary nurses or veterinary paraprofessionals, and consultations involving species other than dogs and/or cats were excluded, as were citations about human healthcare consultations. This could mean some useful measures of success which could be applied to canine and feline preventative healthcare consultations were missed. However, given the large number of search results identified, widening the search terms further would have resulted in an unmanageable number of
citations to categorise. Additional work found that validated measures of success were similarly limited for canine and feline 'health problem' consultations (Corah et al., 2018). Further research is currently underway to develop more useful measures of success for these consultations (Corah, pers comms), the results of which may have some applicability to preventative healthcare consultations also.

This novel study has identified an important gap in the existing veterinary literature surrounding preventative healthcare consultations. While the existing evidence base is currently dominated by expert opinion, this expert opinion along with the existing primary research, could be harnessed in an evidence-based way to provide useful guidance for veterinary surgeons conducting these consultations.

Ethical approval

Ethical approval was obtained from the ethics committee at the School of Veterinary Medicine and Science, The University of Nottingham. The study complied with The University of Nottingham (2016) Code of Research Conduct and Research Ethics.

Acknowledgements

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