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ORIGINAL RESEARCH

Scoping review of end-of-life decision-making models used in dogs, cats and equids

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Abstract

Background: End-of-life decisions for companion animals can be stressful for veterinarians and owners, and when delayed result in poor animal welfare. Delayed euthanasia has been identified as a particularly prominent issue for horses. This scoping review aimed to identify the available literature on veterinary decision-making models, which can support end-of-life planning.

Methods: A protocol was preregistered, and a structured literature search was performed on six electronic databases. Publications were reviewed against specifically developed eligibility criteria. Data from original studies and narrative-type reviews were extracted separately, and the components of each model were charted.

Results: A total of 2211 publications were identified, 23 met the inclusion criteria and were included in the final review. Eight were original research studies and 15 were narrative reviews or similar. Publications were not indexed uniformly, increasing the difficulty of discovering relevant sources. The end-of-life decision-making process comprised three stages: (1) making the decision, (2) enacting the decision and (3) aftercare. Twenty key components of decision-making models were identified, although no publication reflected all of these.

Conclusions: A lack of original research studies and equine-specific publications was identified. Shared decision-making models for euthanasia in veterinary practice should include all three stages and consider species-specific issues.

INTRODUCTION

Shared decision making (SDM) promotes a collaborative approach[1,2] and has been associated with improved patient satisfaction,[3,4] treatment adherence,[3] and potentially surgical outcomes.[4] This approach has been gaining prominence in human medicine, and several models have been proposed on how SDM should be carried out.[5] Some models have been adapted for use in a veterinary context.[2,6] However, less veterinary-specific research is available, and models have not been systematically mapped in this context as they have in human medicine.

Most veterinary research in this area focuses on dogs and cats, with research into equids particularly lacking. Delayed euthanasia in horses has been recognised by experts as a prevalent welfare issue that has the potential to cause great suffering.[7,8] A horse owner's recognition of pain or deteriorating quality of life (QOL) may be poor,[7,9] potentially contributing to euthanasia decisions being delayed. Additionally, owners find having their horse euthanased very distressing.[10] Horses have a long life span, and years of ownership contribute to a strong bond that can make the decision even more difficult.[10] Companion animal owners may feel they do not have enough knowledge to make the decision or are unable to bear the burden of the full responsibility alone.[1] Advice from a veterinarian can increase their confidence in the decision.[1] Veterinarians also experience moral distress when euthanasia is delayed and the animal is suffering[11] but may be unsure of how, or whether, they should aim to influence the owner's decision.[1] The aim of this scoping review is to identify the literature available on

veterinary end-of-life (EOL) decision-making models and use this information to inform the future development of an SDM model for companion animal euthanasia.

The objectives of the study are as follows:

- To identify published literature on decision-making models used in the context of serious veterinary illness, end-of-life (EOL) planning and euthanasia in canine, feline and equine medicine through a systematic search of the databases.
- To extract and chart relevant information from the included publications and identify the components of the different decision making models.
- To suggest key terms that could be included in future publications on companion animal EOL decision making to increase their discoverability.

METHODS

Protocol and registration

The protocol for this scoping review was drafted using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR).[12] The review followed the Joanna Briggs Institute methodology,[13] for which reviewer Sarah Freeman had completed the accredited training programme. The final protocol was registered prospectively with the Open Science Framework (https://osf.io/txqw9/?view_only=b4d2e3ee5e834b02b82d9f426bff91c7) on 11 February 2021. This project was reviewed and approved by the Ethics Committee, School of Veterinary Medicine and Science, University of Nottingham.

Eligibility criteria

The eligibility criteria are described in Table 1. A decision-making model was defined as a set of criteria, a process, steps or information that can be used to support the making of a decision about the most appropriate course of action available in specific circumstances.

A publication was included if the full text could be obtained from any of the University of Nottingham libraries or e-libraries, as well as from free online open access and legal deposit libraries. A publication was considered an opinion review where the information provided was not supported by references or sources of evidence, and instead credibility was based on the authors' expertise or experiences; these were excluded.

Information sources

To identify potentially relevant publications, the following electronic databases were searched on 15 February 2021:

- CAB Abstracts (Ovid): 1910–present.
- Ovid MEDLINE: 1946–present.
- Embase (Ovid): 1974–present.
- WEB of Science (Core Collection: Citation Indexes): 1946–present.
- Scopus: 1946–present.
- PubMed: 2020–present (to identify preprints or recent publications that may not yet be on Ovid).

The search strategy was drafted by the research team and feedback was provided by an experienced University of Nottingham librarian. Publications identified by other means, such as conference attendance and models referenced by included publications, were also included.

Search strategy

Search combinations were constructed from the following components, including synonyms, related terms, and alternative spellings:

- Veterinary OR Veterinarian

AND

- Decision Making OR Communication OR Goals of Care OR Relationship-centred OR Conversation OR Breaking Bad News

AND

- Models OR Guidelines OR Framework OR Checklists OR Plan OR Approach

AND

- Euthanasia OR End of Life OR Advanced Care Plan OR Palliation OR Critical Illness

The full search strategy used for each database can be found in Appendix 1.

Study selection

To increase consistency, the same 51 titles and abstracts from a pilot search were reviewed by Amelia Cameron and Sarah Freeman. The results were discussed to determine whether it was necessary to amend the inclusion and exclusion criteria before beginning screening for this review.

The references were downloaded into EndNote X9 (Thomson Reuters), and duplicates were removed. Titles were screened on EndNote and retained publications were then imported into Rayyan (Rayyan Systems), a collaborative systematic review tool. Abstract and full text screening took place through Rayyan. Both Amelia Cameron and Sarah Freeman independently reviewed titles and then abstracts for agreement with the eligibility criteria, with any ambiguous publications being retained for review of

TABLE 1 Inclusion and exclusion criteria

Criteria	Inclusion	Exclusion
Population	Domesticated equids: Horses/ponies (*Equus caballus*) and donkeys (*Equus asinus*) and their hybrids (mules, hinnies) Domesticated dogs (*Canis lupus familiaris*) Domesticated cats (*Felis catus*) Nonspecified companion animals, e.g., where a publication discusses companion animals without focusing on a particular species, but discussion could plausibly relate to the above-mentioned species	Wild equids and their hybrids (zebras, wild asses, their hybrids, domesticated-wild equid hybrids) Publications about horses, dogs or cats kept as farmed/production animals Publications about working horses, dogs or cats in developing countries
Population	Owners and carers of dogs, cats and domesticated equids, including breeders and owners of commercial animal premises and charities	Owners/carers of dogs, cats and equids in developing countries who use these animals for work purposes People who farm dogs, cats and equids
Population	Members of veterinary practices/hospitals who are involved in the treatment, care or giving advice for the included animal species	
Interest	Publications that describe or investigate the decision-making process Publications that describe or investigate the use of decision-making or communication models, guides or advice (including conversation guides) for use between companion animal owners/carers and veterinary staff	Publications only exploring specific factors that influence which way a decision is made and not the process by which a decision is made Publications only exploring people's opinions on or experiences of using decision-making models or guides, but where a model or guide is not described
Context	Publications involving decision making between owners/carers and veterinary staff in any situation where euthanasia is a potential option for the included animal species. Additionally, in situations where the included animal species are suffering from critical or incurable illness, which may be chronic or acute, and a decision must be made between two or several of the following options: Different treatment options, to administer, continue, or stop treatment, euthanasia, or to take no action.	Publications involving decision making for non-critical illness, or routine or elective procedures (e.g., worming, vaccination, castration) Publications only involving the decision-making process between multiple owners/carers or multiple members of veterinary staff Publications about causes and procedures for euthanasia
Study design	Qualitative, mixed methods, observational, experimental and quasi experimental studies, case series, systematic reviews, scoping reviews, narrative reviews	Opinion reviews, single case studies
Publication type	Peer-reviewed publications, continuing education journals, conference proceedings where a full report is available, textbook chapters, reports, and national guidance	Unable to obtain full text Grey literature
Language	Full text available in English	

the full text. Disagreements during screening were discussed until a consensus was reached. If a consensus had not been reached, the opinion of a third reviewer would have been enlisted.

In cases where a publication could be excluded for multiple reasons, it was listed as excluded by the first reason that became apparent. During abstract screening, decisions were based purely on the abstract and not on any additional information in the record, such as where the language or type of source was stated. This information was only considered during full text screening.

Charting process

The included publications were read in full and assessed so relevant information could be extracted and charted. This was done independently by Amelia Cameron. Two separate forms were used, one for scientific studies (Table 2) and the other for narrative review type publications (Table 3). This was due to the differing nature of the information extracted from these two publication types and the differences in the value of evidence they provide. The EOL decision-making models identified did not all focus on the same aspect of EOL decisions. Three stages of guidance were identified, with models either focusing on one, two or all of these. The first, making the decision, comprised the steps required for the veterinarian and owner to come to a decision about euthanasia or EOL care for the animal patient. The second was enacting the decision, including steps such as educating the owner about and planning for the euthanasia procedure or potentially carrying out an agreed hospice care plan and monitoring any changes in the animal. The final stage was aftercare, with steps such as explaining body disposal and memorialisation

TABLE 2 The study type, method and key findings of the original research studies included in the scoping review

Author and year	Population	Sample size	Study design	Publication type	Country took place	Species model for	Who will use model?	Stage of end-of-life care	Based on previous model?	Findings	Limitations
Stoewen et al. (2014)[40]	Owners of dogs with life-limiting cancer	43	Thirty semistructed interviews (sometimes multiple owners of one dog interviewed together)	Peer-reviewed journal article	Canada	Dogs	Veterinary practice staff and owners	Making the decision	No; steps presented from study findings	Owners wanted information in forthright manner, multiple formats, understandable language, unrushed, compassionate staff who had established relationship with, 24-hour access to ask questions.	Sample will not be representative of whole population (and other standard interview limitations).
Stoewen et al. (2014)[41]	Owners of dogs with life-limiting cancer	43	Thirty semistructed interviews (sometimes multiple owners of one dog interviewed together)	Peer-reviewed journal article	Canada	Dogs	Veterinary practice staff and owners	Making the decision	No; steps presented from study findings	Owners want information presented to be truth, information from vet generated trust and confidence to engage in treatment, make decisions, prepare for future.	Sample will not be representative of whole population (and other standard interview limitations).
Christiansen et al. (2016)[1]	Owners of chronically ill/aged dogs, considering euthanasia or treatment—dogs alive or died within last 8 months	12	In-depth qualitative interviews	Peer-reviewed journal article	Denmark	Dogs	Veterinarians and owners	Making the decision	No; general shared decision-making model steps presented from study findings and previous research	Owners often want support and input from vet in decisions, especially when unsure of best option, although not all do. Can be hard to get truly informed consent, best way forward could be knowledge exchange between vet and client.	Sample will not be representative of whole population, some interviewees' dogs already deceased—may have been impact of recall bias.
Grimm et al. (2018)[20]	An expert panel from the European College of Veterinary Anaesthesia and Analgesia, made up of veterinary diplomates and an ethicist	6	Part 1: Literature search Part 2: Expert panel to agree on framework for ethical decision making	Peer-reviewed journal article	Collaboration between authors from EU countries (Austria, Germany, Switzerland, UK)	General companion animals	Veterinary clinicians and owners	Making the decision	No; new model developed from study: The Veterinary Ethics Tool (VET)	Key stakeholders identified and consensus reached on questions that should be included in VET.	Only views from a small sample of experts included.

(Continues)

TABLE 2 (Continued)

Author and year	Population	Sample size	Study design	Publication type	Country took place	Species model for	Who will use model?	Stage of end-of-life care	Based on previous model?	Findings	Limitations
Nickels and Feeley (2018)[27]	Companion animal veterinarians	44	Semistructured interviews	Peer-reviewed journal article	USA	General companion animals	Veterinary practice staff and owners	Making the decision, enacting the decision, aftercare (mainly emotional, not decisions about body etc.)	COMFORT[42] (findings were considered in relation to SPIKES[43] and COMFORT, and latter was best fit)	Participants were following many of steps from SPIKES, but strategies fit more closely with COMFORT, although did not mention last two steps.	Primarily small animal vets in sample, did not ask other members of vet team, did not get client views.
Lehnus et al. (2019)[28]	Veterinarians, nurses and technicians specialising in veterinary anaesthesia	183	Online survey: many open questions allowing detailed narratives	Peer-reviewed journal article	UK (but using an international sample including UK, US, EU, and other respondents)	General companion animals	Veterinary clinicians and anaesthetists, and owners (and potentially other members of veterinary team)	Making the decision	Findings related to 4 ethical principles of autonomy, beneficence, non-maleficence and justice[44] (though analysis not performed with this in mind)	Anaesthetists faced regular ethical dilemmas. Questions suggested to guide discussions with owners. Suggested having anaesthetists involved in discussion with owners.	Standard online survey limitations. Importance of ethical dilemmas and decision-making thought processes not ranked – some might be more important than others.
Arora et al. (2020)[16,17]	Companion animal owners (most owned dogs or cats, but a few horses or other animals)	310	Online survey: Combination of open and closed questions	Report (non-peer reviewed)	Canada	General companion animals	Veterinary practice staff and owners	Making the decision, enacting the decision, aftercare	Steps presented from study findings. Named developed end-of-life discussion framework ExplorEEEER. However, also included SPIKES for breaking bad news[45].	Owners of cats and dogs reported better communication and compassion than owners of other animals. Nearly 95% respondents had been included in end-of-life discussions. Most able to discuss decision-making challenges with vet.	Not peer reviewed, standard online survey limitations.
Cooney et al. (2021)[29]	Owners of dogs and/or cats, who had a regular vet, and had made end-of–life decisions for a pet	2043	Online survey	Peer-reviewed journal article	USA	Dogs and cats	Veterinary practice staff and owners	Aftercare	No; steps presented from study findings	Vet main source of information for pet death and body aftercare. 73% needed 20 mins or less. Participants had several concerns about body aftercare.	Standard online survey limitations.

TABLE 3 Publication details and recommendations of narrative reviews and similar publication types included in the scoping review

Author and year	Publication type	Country authors from	Species model for	Who will use model?	Stage of end-of-life care	Based on previous model?	Recommendations
Epstein et al. (2005)[30]	Peer-reviewed journal article	USA	Senior dogs and cats	Veterinary practice staff and owners	Making the decision, enacting the decision (brief), aftercare (brief)	No; model presented from the literature, incorporating currently available resources	Have end-of-life discussion in anticipatory grief stage rather than in terminal crisis. Consider client's realistic ability to care for pet.
Brandt and Grabill (2007)[46]	Peer-reviewed journal article	USA	General companion animals	Veterinary practice staff and children; veterinary practice staff and older adults	Making the decision, enacting the decision, aftercare (brief)	No; model presented from the literature	Age and developmental stage can impact ability to understand health information, so should tailor communication style to suit clients. In all cases, honest and compassionate communication important.
Cornell and Kopcha (2007)[2]	Peer-reviewed journal article	USA	General companion animals	Veterinarians and owners	Broad general model of communication that could be applied to all 3 stages (making decision, enacting decision, and aftercare)	4E model (adapted from human medicine)[47]	View each client as individual with specific needs, and identify and adapt to these. Relationship based interaction can be facilitated by 4E model.
Shaw and Lagoni (2007)[6]	Peer-reviewed journal article	USA	General companion animals	Veterinary practice staff and owners	Making the decision	SPIKES (adapted from human medicine)[45]	Compassionate communication is core clinical skill that can be taught. This skill should be modelled to foster culture of client and pet support, and increased vet team satisfaction.
Gray and Moffett (2010)[48]	Textbook	UK; St Kitts and Nevis	General companion animals (although main focus dogs and cats, specifically mentions most recommendations relevant to horses and ponies, as well as other species)	Veterinary practice staff and owners	Making the decision, enacting the decision, aftercare (brief)	7-step communication tool (adapted from human medicine)[49]	Take a relationship-centred approach to communication. Specific advice also given (separately from actual model) on dealing with certain situations, e.g., when client does not want to euthanase, expert clients.
Parker and Yeates (2011)[14]	Peer-reviewed journal article	UK	Horses/equids	Veterinary clinicians and owners	Making the decision	No; model presented from the literature	Quality of life assessments should be used to inform decisions. In some cases, broad descriptive questions may be more useful than ones that give a numerical score. There is a lack of validated methodologies in equine veterinary practice, and these should be developed.

(Continues)

TABLE 3 (Continued)

Author and year	Publication type	Country authors from	Species model for	Who will use model?	Stage of end-of-life care	Based on previous model?	Recommendations
Hewson (2015)[50]	Peer-reviewed journal article	UK	General companion animals	Veterinary nurses and owners	Making the decision, aftercare (brief – just writing a condolence card)	SPIKES (adapted from human medicine)[51], and separate advice not following model for aftercare	Communicating with grieving clients should not just be one way delivery of information. Should be empathetic and interactive, and is a learned skill. Condolence cards should be personal rather than generic.
Bishop et al. (2016)[19]	Peer-reviewed journal article	USA	General companion animals (although examples given are of dogs and cats)	Veterinary practice staff and owners	Making the decision, enacting the decision, aftercare	No; model presented from the literature and experience of taskforce of experts	Primary care practices should have dedicated team implementing end of life palliative and hospice care. Hospice and palliative care options should be discussed with owners, as well as euthanasia vs hospice-assisted natural death. However, the animal hospice does not accept owner's decision to let pet die without euthanasia unless measures in place to alleviate discomfort and distress.
Knesl et al. (2017)[52]	Peer-reviewed journal article	USA	General companion animals	Veterinarians and owners	Making the decision	No; model presented from the literature, although other currently available resources cited	To improve end-of-life discussions and decisions, vet staff should have sufficient training in ethical approaches to determine when euthanasia is appropriate, regular training in client communication, and a standard end-of-life/euthanasia protocol. Vets can use ethical decision-making frameworks, a communication system where clients see a regular vet, and quality of life assessment tools to improve end-of-life decision making.
Pierce and Shanan (2017)[53]	Textbook	USA	General companion animals	Veterinary practice/veterinary hospice staff and owners (and owners' families)	Making the decision	Four-box method (adapted from human medicine)[54]	The fourth box, Patient Preferences, should be retained, it is responsibility of caregivers (especially) & vet/hospice team to try to discern the animal's preferences. This has been excluded when Four-box method previously adapted for veterinary use.

(Continues)

TABLE 3 (Continued)

Author and year	Publication type	Country authors from	Species model for	Who will use model?	Stage of end-of-life care	Based on previous model?	Recommendations
Van Eps et al. (2017)[15]	Textbook	Australia; USA	Horses/equids (with laminitis)	Veterinarians, farriers and owners	Making the decision	Adapted from Parker and Yeates[14] (developed for equids) to be used in specific context of equine chronic laminitis	The owner, vet and farrier will all have valuable contributions when assessing quality of life and making decisions in a chronic laminitis case. The outlined model can be used to help the different team members reach a resolution when there is a disagreement.
Bley (2018)[21]	Peer-reviewed journal article	Switzerland	General companion animals (with cancer)	Veterinarians and owners	Making the decision	Four principles of ethical decision making (beneficence, non-maleficence, autonomy, justice) (adapted from human medicine)[44]	Can integrate the four ethical principles (especially beneficence/non-maleficence) into empirical facts of what is medically possible. Guidelines from this can reduce burden of decision on owner, and ensure animal patients not enduring severe side effects from futile treatment or euthanased prematurely. Need to consider double effect – where a treatment has side effect or other impact, the benefit must outweigh this for it to be used.
Goldberg (2019)[23]	Peer-reviewed journal article	USA	General companion animals	Veterinary practice staff and owners	Making the decision	Serious Illness Conversation Guide (SICG) (adapted from human medicine to form Serious Veterinary Illness Conversation Guide [SVICG])[55]	The SVICG is a model for goals of care conversations. Ideally these conversations would take place for all geriatric, chronically or seriously ill patients, and all owners struggling to make decisions. The use of goals of care conversations in veterinary medicine have the potential to increase the quality of medical and palliative care animal patients receive.

(Continues)

TABLE 3 (Continued)

Author and year	Publication type	Country authors from	Species model for	Who will use model?	Stage of end-of-life care	Based on previous model?	Recommendations
Smith (2019)[18]	Peer-reviewed journal article	USA	General companion animals in palliative care (although examples given are of dogs and cats) (To decide whether to provide assisted nutrition)	Veterinary practice staff and owners	Making the decision	Adapted from Karlawish et al.[56] (from human medicine)	Decreased food and water consumption commonly seen towards end of life. This can be managed, including using enteral or parenteral nutritional supplementation. Carefully consider the impact assisted nutrition may have on quality as well as quantity of life, when deciding whether to use. Should not use it to prolong life if quality of life will be poor.
Lummis et al. (2020)[57]	Peer-reviewed journal article	USA	General companion animals (although examples given are of dogs and cats)	Veterinary practice staff and owners	Making the decision	Common components of SPIKES[51], ABCDE[58], BREAKS[59] and SICG[55] (all developed for human medicine) taken and adapted for veterinary use. Additional advice is based on literature.	Good communication sets foundation for providing improved care especially during stressful situations and end of life. The guidelines presented can be implemented in a range of stressful situations. Vet staff should take time to prepare themselves and the physical space before beginning an end-of-life conversation.

options and deciding on these, or signposting the owner to emotional support resources. Distinctions were made between these stages when charting to identify which aspects of EOL decision making have received the most research attention, so readers interested in just one stage can identify which publications are relevant. A third form (Table 4) charted the components of the decision-making models from each publication, so the recommended steps of each could easily be identified. Broad labels were given as components that were described slightly differently between publications. This meant some interpretation was required from Amelia Cameron as to what constituted minimising owner guilt or follow up after euthanasia, for example.

RESULTS

Selection of evidence sources

A total of 2209 publications were identified through the six database searches. After duplicates were removed, 1197 publications remained. Once the titles were screened, 264 publications were retained for abstract screening. During this stage, 111 publications were excluded because they did not cover the areas of interest identified in the inclusion and exclusion criteria (Table 1). Additionally, 12 were excluded for not being about the correct population, six for being the wrong publication type (e.g., grey literature), five for not focusing on the desired context and two for being the wrong study design (e.g., opinion reviews). After abstract screening, 128 publications were initially included for review of the full text. However, two additional publications were identified outside of the main screening process and their full text was assessed. The first[14] was identified because the model presented in Van Eps et al.[15] (included through the main screening process) was based on the model in this additional article. The second[16,17] was identified through a workshop attended by Amelia Cameron, and the report and guidelines developed are presented as two separate documents. Of the 130 full texts screened, 11 were excluded because it was not possible to obtain the full texts, while 10 were excluded because the full text was only available in a language other than English. The full list of exclusion reasons can be found in Figure 1, along with the full publication screening and selection process. There were 23 publications found to meet the final inclusion criteria, including the two publications identified outside of the main screening process. Of the publications included in the scoping review, eight were original research studies, while 15 were narrative reviews or similar.

Characteristics of evidence sources

Models most commonly focused on the first stage of the EOL decision-making process, making the decision ($n = 22$ publications), with far fewer advising on enacting the decision ($n = 7$) and aftercare ($n = 9$). Six of the original research studies presented an original model or gave advice based on their findings, although one of these incorporated an established breaking bad news model within their full model. The findings of the other two studies reflected the structure of previously established models or frameworks. In contrast, most of the models ($n = 10$) presented in the narrative review type publications had been adapted from previously published models or frameworks, mainly from human medical literature. Five were original models or advice developed based on the available literature. Of all the publications, three contained models or EOL advice intended for dogs, two for dogs and cats, two for equids and 16 for companion animals in general. However, often the recommendations in the models intended for companion animals in general appeared to relate most to dogs and cats, and would less likely be suitable for horses. Examples include advice on assisted nutrition provided by Smith[18] and on supporting animals requiring hospice care provided by Bishop et al.[19] All included sources were published between 2005 and 2021. Seventeen were published from 2014 onwards, including all eight original research studies and nine narrative reviews or similar. The other six review type sources were published between 2005 and 2011. The full data extracted about the characteristics and key findings of the eight original research studies included can be found in Table 2. The characteristics and recommendations of the 15 review publications can be found in Table 3.

Aspects of decision-making models

In some cases, publications presented decision-making steps laid out as a clear model, checklist, framework or tool. In others, authors presented recommendations from their study findings or from the literature within the publication text. Table 4 summarises the 20 key components and/or stages of the decision-making model or recommendations presented in each publication. The order in which the components are listed does not necessarily reflect the order in which the publications advise these are completed. Not all models contained all components, and different publications recommend that these are carried out in slightly different orders. It was only possible to include the main components within the table, but some publications broke down a component into several smaller steps, and in a few publications, additional components were recommended.

No publication reflected every component identified within their model or recommendations. Some publications intended their model to cover the entire decision-making process from the initial discussion up to body aftercare and emotional support, whereas others focused on a specific aspect of the EOL decision. The model presented by Arora et al.[17] covered the greatest number of identified components ($n = 18$), followed by Bishop et al.[19] ($n = 16$). In comparison, Grimm et al.[20] ($n = 3$) and Bley[21] ($n = 3$) covered

TABLE 4 Components included in end-of-life or critical illness decision-making models identified within the publications included in the scoping review

Author & Year	Start Having End of Life Conversations Early	Breaking Bad News Protocol	Knowledge Exchange Between Vet Team & Owner[a]	Elicit Owner Expectations[a]	Check Owner Understanding[a]	Present Treatment &/or End of Life Options	Ascertain Level of Involvement in Decision Desired by Owner[a]	Consider Impact of Options on Animal Patient's Quality of Life[a]	Consider Impact of Options on Owner (& Other Stakeholders)[a]	Give Information in Different Formats e.g., written, online etc	Give Information About Costs	Have Owner Sign Consent Form(s)	Make a Treatment &/or End of Life Care Plan[a]	Set Treatment Goals & End Points[a]	Minimise Owner Guilt	Explain Euthanasia Procedure & Options	Plan for Euthanasia Procedure	Explain Body Aftercare Options & Make Plan	Signpost Owner to &/or Provide Emotional Support	Follow Up e.g., Appointment, Condolence Card, Fur Clippings etc
Original Research Studies																				
Stoewen et al. (2014)[40]			■	■	■					■			■		■					
Stoewen et al. (2014)[41]			■	■	■	■		■	■	■	■		■	■						
Christiansen et al. (2016)[1]			■			■	■	■	■			■		■					■	
Grimm et al. (2018) [20]						■		■	■											
Nickels and Feeley (2018)[27]		■	■			■		■							■	■	■		■	■
Lehnus et al.(2019)[28]	■		■	■	■	■		■	■				■	■						
Arora et al. (2020)[16, 17]	■	■	■	■	■	■		■	■	■	■	b	■		■	■	■	■	■	■
Cooney et al. (2021)[29]	■		■	■						■	■	■						■	■	
Narrative Reviews & Similar																				
Epstein et al. (2005)[30]	■			■		■		■	■	■			■	■	■	■	■	■	■	■
Brandt and Grabill (2007)[46]					■	■				■			■		■	■	■	■	■	
Cornell and Kopcha (2007)[2]			■	■	■	■				■			■		■					
Shaw and Lagoni (2007) [6]		■	■	■	■	■		■		■			■			■	■	■	■	
Gray and Moffett (2010)[48]		■	■	■	■	■				■	■	■	■	■		■	■	■	■	■
Parker and Yeates (2011)[14]			■			■		■	■											
Hewson (2015)[50]		■	■	■									■			■	■	■	■	■
Bishop et al. (2016)[19]			■	■	■	■	■	■	■		■	■	■		■	■	■	■	■	■
Knesl et al. (2017)[52]	■					■		■				■	■	■		■	■		■	
Pierce and Shanan (2017)[53]			■			■		■	■		■		■		■	■	■			
Van Eps et al. (2017)[15]	■		■	■		■		■	■				■	■						
Bley (2018)[21]						■		■	■											
Goldberg (2019)[23]	■	■	■	■	■	■		■	■				■	■		■	■			
Smith (2019)[18]			■	■		■		■	■		■		■			■	■			
Lummis et al. (2020)[57]			■	■		■		■	■				■					■	■	

[a]Components most likely to contribute to shared decision making between client and veterinarian.

[b] Arora et al. (2020)[16, 17] recommend using verbal consent rather than signing a consent form when veterinarian-client relationship is good, although consent via email or similar is not adequate.

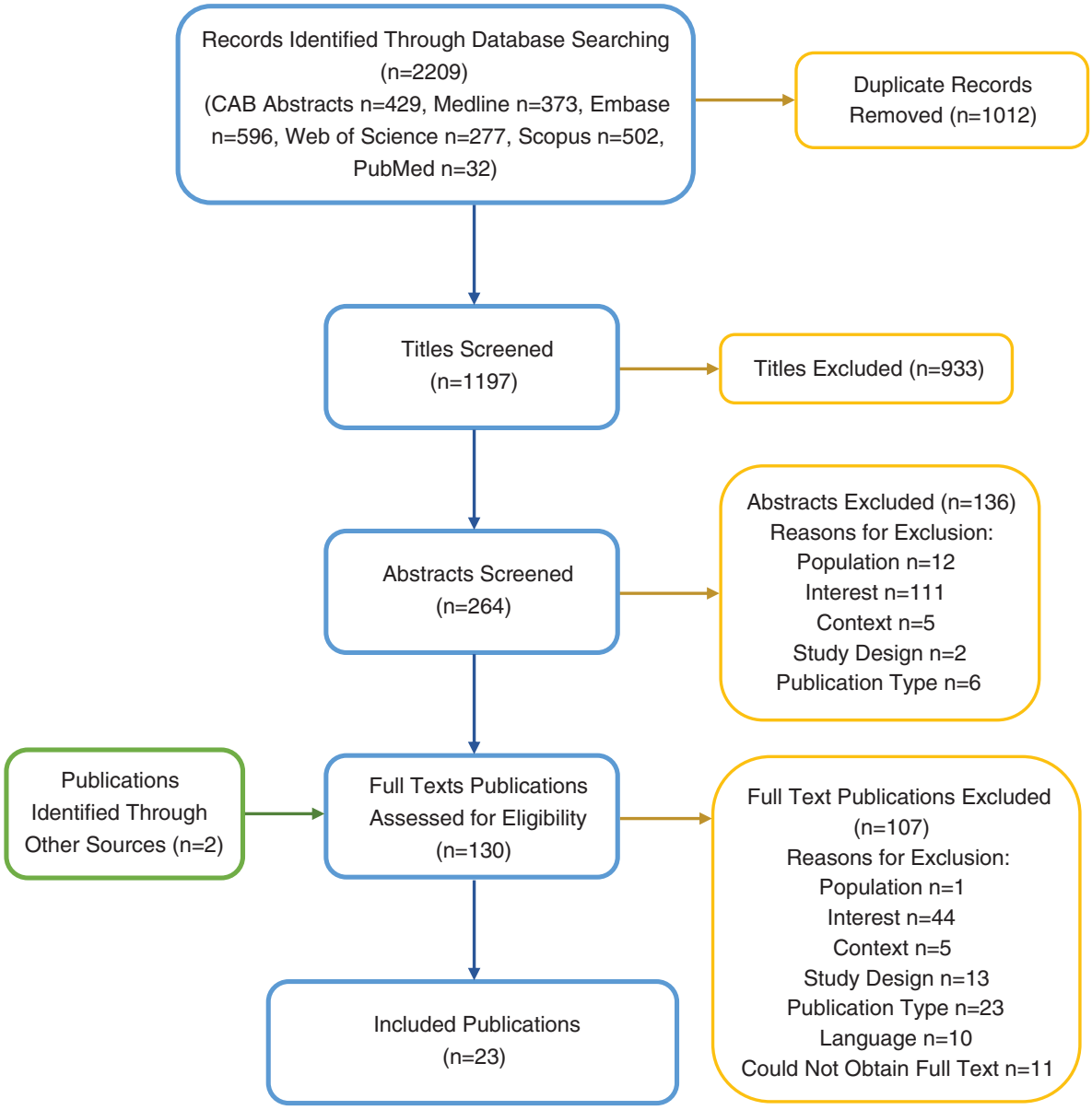

FIGURE 1 Flow diagram outlining the process used for a scoping review of the current literature on serious illness and end-of-life decision-making models in dogs, cats and equids

the fewest components. The most frequently identified component was "presentation of treatment and/or EOL options" (n = 20), followed by "knowledge exchange between veterinary team and owner" (n = 18), "consider impact of options on animal patient QOL" (n = 17), and "make a treatment and/or EOL care plan" (n = 17). Five publications recommended having the owner sign consent forms prior to enacting a decision (e.g., euthanasia, treatment, a method of body care). In contrast, Arora et al.[17] advised verbal consent over signing a form when the vet–client relationship is good, although stated consent via email or similar is not adequate. Seven publications recommended that veterinary staff begin having EOL conversations with clients early, before these decisions need to be made, and six specifically included or were made up of a breaking bad news protocol. Eight publications advocated setting treatment goals, including end points, which signify the point at which euthanasia should occur. For example, when QOL declines past a predetermined point or the animal can no longer perform certain behaviours that have been preagreed between the veterinarian and owner. The components that are most likely to contribute to SDM are presented in Table 4, as these involve direct collaboration between the owner and veterinarian.

DISCUSSION

This scoping review has identified the current literature available on critical illness and EOL decision-making models for companion animals (dogs, cats, equids), finding a varied group of publications, of which eight are original studies while 15 are narrative reviews or similar. Within these two groups are a range of study designs and publication types. Twenty key components of the presented models have been identified, which vary in how frequently they appear across these models. No model contained all components.

TABLE 5 Suggested key terms to be included in future publications on companion animal end-of-life decision making

Key terms	Notes
Veterinary	To distinguish from publications in human medicine
[Species/group of animals]	E.g., horse, equids or companion animals etc., so searches can be narrowed from other animal groups such as farmed, wild or research animals
Euthanasia OR End-of-life OR Serious Illness	Depending on which is most appropriate for the research topic
Decision making	
Model OR Plan OR Guidance OR Framework	Options to allow flexibility as researchers may wish to market their recommendations slightly differently depending on their specific goals

These components offer a basis from which EOL decision-making models specific to companion animals can be proposed. Some components are likely to promote SDM, while others may not necessitate joint engagement from veterinarians and owners. Issues, such as the lack of consistency with which these publications have been indexed, have been identified and suggestions are made for how these could be addressed. This would allow publications in this area to be more easily discoverable for researchers interested in this area.

Research protocol

Broad search terms and inclusion criteria were employed to increase the likelihood that all relevant publications would be discovered and included in this review. Titles and abstracts were often vague, meaning a greater number of sources had to be retained at each round of screening due to ambiguity. A further challenge was the lack of uniformity in indexing, requiring a wide variety of terms to be included in the search to prevent relevant publications from being excluded. One of the publications[14] discovered separately was not identified through the main screening process due to the title, abstract, and key and indexed terms not including words related to "euthanasia" or "critical illness," despite the main body of the text stating that the model presented could be used for euthanasia decisions. A more consistent approach to indexing research in this area may help facilitate the retrieval of relevant material by researchers in the future. Key terms have been suggested in Table 5 that could be included with all articles on the subject of companion animal EOL decision making to make them more easily discoverable in searches.

When conducting a scoping review, the aim is to systematically and comprehensively map the research in an identified area and not to conduct evidence synthesis and appraisal.[22] In this case, the aim was to comprehensively map veterinary decision making models, which meant that a diverse range of publication types was included, a common feature of scoping compared to systematic reviews.[22] The decision to include narrative reviews was made, as in several cases, a human model had been adapted for veterinary use based on the current literature, without a research study being carried out.[2,6,23] This decision also increased the number of publications carried through to the full text screening stage, as in the vast majority of cases, it was not possible to distinguish between narrative and opinion reviews based on the abstract.

The aim of the study was to investigate EOL decision-making models used in companion animals, including equids. This study did not investigate decision making around other companion animals, such as rabbits, rodents, and exotic species, which would require a different scoping review with a distinct set of search terms to capture the many potential terms and species involved. In addition, there is little specific research on the human-animal bond for these species, with most focusing on companion animals generally, dogs or cats,[24] and several publications are also available for horses.[25] Human–animal bond may impact EOL decision making,[10] so EOL decision-making models developed specifically for species other than dogs, cats or equids may be less comparable. However, despite human–horse relationships resembling those between owners and dogs or cats,[24] there are several equine-specific issues that may limit the applicability of models developed for other companion species. One example is that horses are often bought for a specific purpose and can be sold if this is not fulfilled, although they may also come to be thought of as a family member.[26] Other differences are the high financial commitment of equine ownership and the fact that horses live outside the household.[26] For this reason, a variation of the companion animal model may be required for equids, which can take into account the unique aspects of horse ownership and equine culture so that equine veterinary professionals and owners can better communicate about and consider options for EOL.

Characteristics of evidence sources

Companion animal EOL decision making appears to still be an emerging field, only receiving research attention in recent years, with all original research studies published from 2014 onwards and five of the eight since 2018.[16,17,20,27–29] Some of the narrative review type publications were published earlier, with the earliest identified from 2005.[30] However, nine of the 15 narrative reviews have been published since 2015. It is positive that research interest has been increasing in this important area, but the developing nature of the field means that there are still many gaps in knowledge to be filled. These include research

directed to all phases of the decision process, as these have not received equal attention, and additional articles with a specific focus on horses and other domestic equids, which were lacking. There should be further original research into EOL decision making for companion animals, as these types of publications made up the minority of those identified. Studies into the models, methods and techniques currently being used by owners and veterinarians and their impact on both these participants and animal patients' welfare would be beneficial. Additionally, studies trialling currently available and any future models would be valuable to identify potential barriers and facilitators to their use in real-life settings so that they may be improved. Furthermore, none of the original research studies carried out focused specifically on equids, so it is important for future research to address this issue due to the unique challenges that are faced by owners and veterinarians in equine practice.

The full decision-making process extends from initial conversations between veterinarian and owner about EOL up to where the decision is made, all of which is encompassed within the first stage of making the decision, and then onto the second stage of enacting this decision, and then the final stage of aftercare. Included within aftercare are decisions about body care and memorialisation, and signposting to emotional support. All but one of the included publications addressed the first stage of the EOL decision-making process, while the other two stages were addressed much less commonly. In some cases, a decision may have to be made very quickly, such as in a medical emergency where there is no hope of treatment and the animal is suffering intensely. However, in many cases, this stage of the decision-making process could be the longest, drawn out over an extended period of weeks, months or even years, for example, when there is a slow deterioration in QOL.[1] Additionally, this stage of deliberation may especially cause considerable stress for both veterinarian and owner due to uncertainty or conflicting opinions[1,31] and thus be seen as important to address. Despite the importance of this first stage, the other two should not be neglected. Explaining and planning for enacting the euthanasia decision may help reduce owner anxiety,[19] which in turn could facilitate the procedure going more smoothly. When veterinarians have successfully facilitated a "good death," they feel this supports the wellbeing of both themselves and the client.[32] Likewise, aftercare is a very important consideration. Cooney et al.[29] found that pet owners have a number of concerns regarding after death body care, including cost (61%) and the way their pet's body would be physically handled (57%). Planning for this could reduce anxiety around the process and prevent owners from making rushed decisions they may regret or finding only after euthanasia that they cannot afford their preferred option for disposal. In addition, the death of a companion animal can be immensely distressing,[10,17,33,34] but societal attitudes towards the status of animals can lead owners to experience disenfranchised grief.[17] Veterinarians are in a position to validate and normalise their clients' grief,[33] and following up after euthanasia, such as with a phone call or condolence card, can increase owner satisfaction.[34] Another consideration is that clients who are less satisfied overall with euthanasia are more likely to change veterinary practices.[35] Future published models would benefit from addressing all three stages where possible, rather than just the first.

The majority of veterinary decision-making models have focused on decisions being made for dogs and cats or general models where the species was not specified. Only two publications expressly related to horses,[14,15] neither of which were original research studies, while none focused specifically on donkeys or donkey–horse hybrids. This is consistent with other areas of companion animal welfare and veterinary practice, where horses have fallen behind dogs and cats in terms of both research and what is offered.[19,24,36] This in turn is likely to affect interactions between veterinarians and clients depending on the species owned, with Arora et al.[17] finding owners of companion animals other than dogs and cats reported less compassion from veterinary professionals. Equine decision-making models may be generally applicable to donkeys, but there are some differences that may be important to consider. For instance, donkeys tend to form very strong bonds with a particular companion.[37] This may mean that more consideration needs to be given to healthy donkeys who have a companion requiring euthanasia. At the loss of a companion, some donkeys will refuse to eat or drink, which can lead to hyperlipaemia and potentially death.[38] This could potentially involve introducing a new companion before the first is euthanased, although research is required to determine whether this would be effective. It may be possible that in some cases, it must be considered whether euthanasia for both donkeys is the best option. This is something usually considered unnecessary for horses who have lost a companion and a situation in which veterinarians may refuse to euthanase.[39]

Limitations

It is possible that some relevant publications may have been missed if they did not contain the combination of search terms used in either the title, abstract, keywords, or indexed terms. Furthermore, there is a small chance relevant publications could have been excluded during title and abstract screening if they did not appear to meet the inclusion criteria, when in fact they would have if the full text had been read. It was beyond the scope of this review to have publications written in languages other than English translated, so some potentially relevant publications may have been excluded as a result.

CONCLUSION AND RECOMMENDATIONS

The components and recommendations of currently available serious illness and EOL decision-making models for companion animals have been collated and extracted to aid owners and clinicians. Key terms (Table 5) have been suggested that future researchers can include in their keywords, to help indexers and make their publications more discoverable to others interested in this area. Companion animal EOL decision making appears to be an emerging field gaining increasing interest, and it is hoped that it will continue to receive further research attention. However, there is still a lack of published original research studies, with a complete absence of original studies specifically on equids.

Key future research recommendations include the following:

- Inclusion of the suggested key terms and use of more descriptive titles so work can be discovered.
- Clear summarisation and presentation of key components and/or recommendations of models so these can be easily identified by readers.
- Studies that investigate all three stages of EOL decision making identified in this review.
- Research that trials developed models in a practical setting.
- Research that focuses explicitly on equids due to equine-specific issues that may reduce the applicability of models developed for small companion animals.

The further investigation into the development and refinement of EOL decision-making models that can be applied in a practical setting has the potential to decrease stress and uncertainty felt by companion animal owners and veterinary staff, and support appropriately timed decisions to promote animal welfare at the EOL.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Idea conceived by Sarah Freeman, Gary England, John Burford, Eleanor Wilson, and Kristian Pollock. Study designed by Amelia Cameron, Sarah Freeman, Gary England, John Burford, Eleanor Wilson, and Kristian Pollock. Acquisition and analysis of data by Amelia Cameron and Sarah Freeman. The lead on writing the manuscript was taken by Amelia Cameron, with input and feedback from all authors.

DATA AVAILABILITY STATEMENT

Data available in the Supporting Information of the article.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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