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Pain and analgesia in pet rabbits: a survey of the attitude of veterinary nurses

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OBJECTIVES: To gain insight into veterinary nurse knowledge of pain recognition and control in rabbits.

MATERIALS AND METHODS: We used a survey to establish current attitudes amongst veterinary nurses towards pain management in pet rabbits and factors that might shape those attitudes. The survey was advertised at national and international veterinary conferences, in veterinary publications and on social media.

RESULTS: A total of 284 questionnaires (95% from the UK) were completed and analysed. The majority of respondents (78%) nursed 1–10 rabbits per month and 5.6% of the respondents reported regularly running a rabbit clinic. The respondents were regularly involved in nursing during common procedures such as castration and ovariohysterectomy. Responsibility for post-operative pain assessment was reported to be by "nurses only" (50%), "nurses and vets" (42%) and occasionally by "vets only" (3%). The majority of respondents reported that they did not use a pain scale but often relied on behavioural indicators, while 20% used the Rabbit Grimace Scale. The majority of the respondents reported being "fairly confident" at recognising pain in rabbits.

CLINICAL SIGNIFICANCE: Veterinary nurses are involved in many aspects of rabbit care, and they are generally confident at nursing this species. This survey also suggests the need for more data on the use of pain assessment tools in rabbits and the importance of teamwork between nurses and veterinarians.

INTRODUCTION

Rabbits are the third most popular pets after cats and dogs, with 71% of the UK rabbit population being registered at a veterinary clinic (PDSA 2019). A recent survey on pet rabbits showed that surgical procedures such as coronal reduction of the cheek teeth, surgical removal of abscesses and incisors removal were commonly performed by up to 81.1% of veterinary surgeons (Benato et al. 2020). Moreover, the percentage of rabbits being neutered has increased from 37% in 2011 (PDSA 2011) to 54% in 2019 (PDSA 2019).

Adequate pain management during the perioperative period is essential. Poorly managed peri-operative pain can not only lead to stress (Goldschlager *et al.* 2013), but also can increase the risk of complications and lead to higher mortality rates (Brodbelt 2009, Wenger 2012). Veterinary staff involved in rabbit peri-operative care have a pivotal role because optimal pain recognition and management will improve welfare and facilitate better and quicker recovery to normal behaviour. Studies on cats and dogs have shown that, amongst veterinary personnel, veterinary nurses are predominantly responsible for monitoring and assessing pain during the postoperative period (Dohoo & Dohoo 1998, Kongara *et al.* 2016). Veterinary nurses appraise the animal for signs of pain, assess the level of pain, determine the efficacy of the analgesic treatment and assess if the patient shows adverse effects of analgesic drugs (Dohoo & Dohoo 1998, Shaffran 2008).

Previous surveys on the attitudes of veterinary nurses towards pain in cats and dogs showed that veterinary nurses consider their knowledge of pain management in these species to be adequate

(Dohoo & Dohoo 1998). On the other hand, more recently, respondents report that their knowledge could be enhanced (Coleman & Slingsby 2007, Kongara *et al.* 2016), and that continued education [Continuing Professional Development (CPD)] and clinical experience are required (Kongara *et al.* 2016). Moreover, pain assessment by veterinary nurses in cats and dogs using pain scoring systems is rare (Kongara *et al.* 2016), even though the majority think that they would be useful tools (Coleman & Slingsby 2007).

In contrast, little is reported on how much veterinary nurses are involved in the treatment of rabbits. Furthermore, little is known about their attitude and confidence in nursing this species or their level of knowledge of pain recognition and analgesia. This study therefore aimed to investigate the attitude of veterinary nurses towards pain in pet rabbits at the veterinary clinic.

The survey was designed in order to gather preliminary information regarding the following topics: (1) confidence in nursing rabbits and recognising post-operative pain, (2) use of pain scoring tools and factors that would improve the pain assessment in this species and (3) confidence in rabbit analgesia and factors that could contribute to improved pain management of pet rabbits. The ability and skills that a veterinary nurse needs to nurse rabbits were not investigated in this study. This study follows a similar approach to surveys of veterinary surgeons on their responses to pain and analgesia in rabbits (Benato *et al.* 2020).

MATERIALS AND METHODS

This study was approved by the Faculty of Health Sciences Research Ethics Committee (FREC) of the University of Bristol (Ref. 50001) and forms part of an ongoing PhD research project and this report reflects a subset of the results.

An online survey of 59 questions was developed using Google forms (Google LLC) (Appendix S1). The survey was divided into three sections: "Demographics", "Pain recognition" and "Pain amelioration." In the "Demographics" part, the respondents were asked about their age and if they were registered nurses. They were asked about the country where they practise, the veterinary clinic where they work, the number of rabbits they personally nurse each month and common surgical procedures with which they are involved. They were also asked to express an opinion regarding their level of knowledge of nursing rabbits (on a five-point scale: excellent, good, adequate, fair and poor).

In the second part on "Pain recognition," the respondents were asked to pain-score nine common surgical procedures in rabbits using a 0–7 scale where zero was "not painful" and 7 "very painful." Details about which personnel usually carry out pain assessments and what pain assessment tools were used, if any, were also collected. Respondents were asked further questions about their confidence at recognising pain in rabbit patients (on a four-point scale: very confident, fairly confident, not very confident and not confident at all) and what they thought would help them to improve pain assessment in the species (as an open-ended question).

In the third part, "Pain amelioration," respondents were asked how confident they were about their knowledge of rabbit analgesia (on a four-point scale: very confident, fairly confident, not

very confident and not confident at all), and how satisfied they were with the information available on this topic (on a 5-point-scale: very happy, fairly happy, not very happy, not happy at all and unsure). Using a 0–7 scale where zero was "very low impact" and 7 "very high impact," we investigated to what extent a range of factors was thought to impact on their ability to ameliorate pain in rabbits.

The survey was advertised at national and international veterinary conferences (BSAVA Congress, BVZS Conference, Rabbit Welfare Association Conference, ICARE - International conference on avian herpetological and exotic mammal medicine) in veterinary publications (The Veterinary Record, VetIndex) and on social media (such as Facebook, The Webinar Vet). To improve response rates no geographical limitations were placed. The target population of this survey was registered and non-registered veterinary nurses. The data was saved on electronic spreadsheets (Excel, Microsoft Office) and analysed using a commercial software (SPSS Statistics v23, IBM (R) SPSS(R)).

Statistical analysis

Descriptive statistical analysis was used to summarise the demographics and the results expressed as percentages (%). Open-ended questions were reported as the total number of respondents (n) giving similar answers. The surgical procedures which the respondents were personally involved with were reported as the number (n) and percentage (%) of the respondents.

RESULTS

A total of 284 questionnaires were returned and retained for analysis. All questionnaires were complete with all questions answered.

Demographics

Overall, 88% of the questionnaires were from England, 6% Scotland, 1% Wales and 5% were from outside the UK. In total, 81% of the respondents were registered nurses (RVN; 52% veterinary nursing diploma, 18% bachelor's degree – BSc, 8% foundation degree – FdSc and 3% Others) and 19% were not registered (non-RVN) (Fig 1). The latter also included 13% of student nurses training to become an RVN. The distribution of respondents based on their qualifications corresponded to the overall UK vet nursing population (The 2014 RCVS Survey 2014). Demographic details of the respondents are given in Appendix S2.
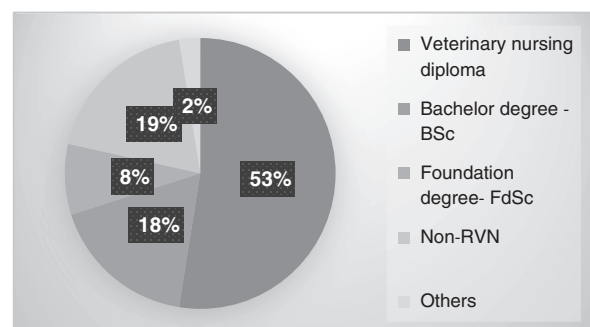

FIG 1. Nursing qualifications obtained by the respondents

When asked how they would describe their knowledge or experience in nursing rabbits, the majority of respondents reported that it was either "good" (35%) or "adequate" (33%) and 16% reported it was "excellent." The rest of the respondents stated it was either "fair" (13%) or "poor" (5%). At the time of the questionnaire, the majority of the respondents (78%) nursed 1–10 rabbits per month, and 6% of the respondents reported to regularly run a rabbit clinic, whilst 33% ran a rabbit clinic, although not regularly, and the majority (71%) did not run a rabbit clinic at all. The respondents also reported that they were regularly involved (*e.g.* preparing the patient, surgical assistant, anaesthetic monitoring, *etc*) during common procedures such as castration (n = 254; 89%), ovariohysterectomy (OVH) (n = 233; 82%) and coronal reduction of premolar and molar teeth (n = 233; 82%) (Table 1). In total, 44% of the respondents stated they had not

completed any CPD hours on rabbit topics during the previous 12 months. The rest of the respondents reported completing either 1–3 hours (29%), or more than 3 hours (27%).

Pain scores for common surgical procedures

When the respondents were asked to assign a score from 1 to 7 (1 = Not painful; 7 = Very painful) for the severity of pain caused by the most common surgical procedures performed in rabbits, castration [median = 4; 95% confidence interval (CI) = 4–5] and coronal reduction (median = 4; 95% CI = 4–4) of the cheek teeth were rated as the least painful procedures, while orthopaedic procedures (median = 7; 95% CI = 7–7) were considered the most painful (Fig 2).

Pain recognition

During the perioperative period, pain assessment was generally reported to be carried out by "nurses only" (50%), "nurses and vets" (42%) and occasionally by "vets only" (3%). The majority of respondents reported they were "fairly confident" at recognising pain in rabbits (63%). The rest of the respondents stated they were "very confident" (13%) or "not very confident" (25%).

Pain scoring systems

When asked about the use of pain scoring systems, the majority of the respondents reported that they did not use a scale (71%) when assessing pain in rabbits but often relied on physiological and behavioural indicators (23%) with "decrease food intake" (53%), "abnormal posturing" (53%) and "grinding teeth" (36%) being the ones most commonly reported (Table 2). A pain scale was used "all the time" or "sometimes" by only 12 and 17% of

Table 1. "Which of the following surgical procedures on rabbits have you personally been involved with (e.g. preparing the patient, surgical assistant, anaesthesia monitoring, etc) in the last 6 months?"

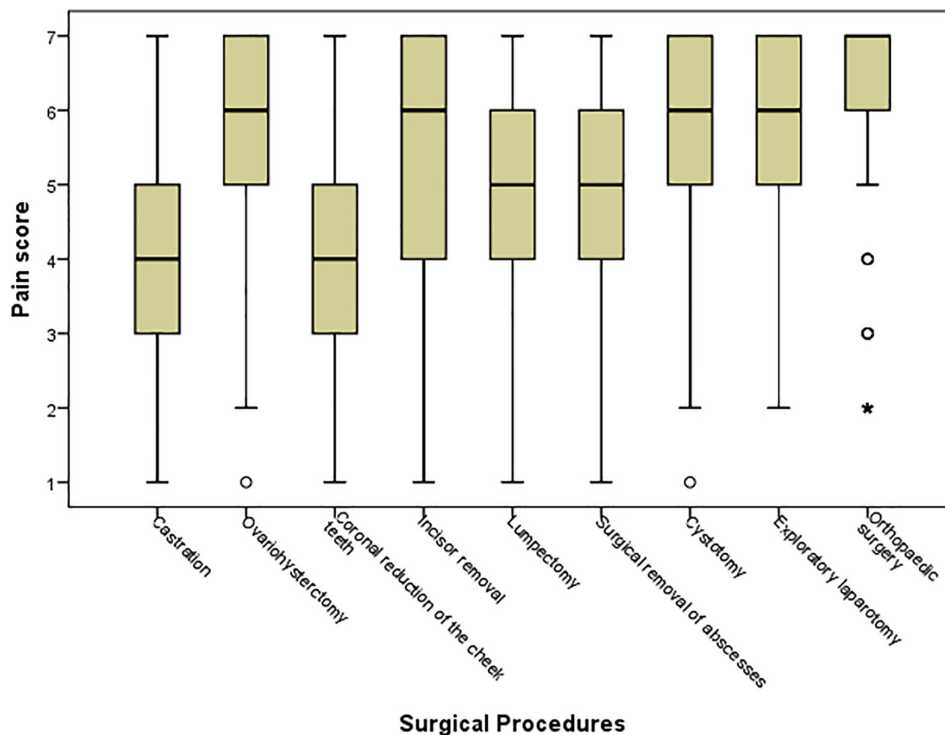| Surgical procedures reported	n
Castration	254
Coronal reduction of cheek teeth	233
Ovariohysterectomy	233
Incisor removal	101
Surgical removal of abscesses	87
Lumpectomy	61
Exploratory laparotomy	57
Cystotomy	38
Orthopaedic surgery	21

FIG 2. "Please indicate how painful you think the following procedures usually are in rabbits": Box and whisker plot of the pain score (1 = No or very little pain; 7 = The worst possible pain) of the most common surgical procedures in rabbits given by the respondents. The horizontal line denotes the median value (50th percentile), while the box contains the 25th to 75th percentiles. Whiskers mark the 5th and 95th percentiles, and values beyond are outliers, marked with circles and asterisks

Table 2. "In your opinion, what would you consider to be the most reliable indicator of pain in rabbits? What would you consider to be the second and third most reliable indicator of pain in rabbits?"

Parameters	Frequency (n)	First (%)	Second (%)	Third (%)
Decreased food intake	150	26.8	16.5	9.5
Abnormal posturing	149	19	18.7	14.8
Grinding teeth	103	12.3	12.7	11.3
Reluctance to move	102	11.3	9.9	14.8
Increased heart rate	55	7.4	6	6
Closed or semi-closed eyes	50	4.6	6.7	6.3
Hunched back	42	3.5	6.3	4.2
Holding the ears flat against the head	40	4.2	4.2	5.6
Decreased faecal output	39	1.4	6.3	6
Increased respiratory rate	39	3.2	5.3	5.3
Hiding behaviour	19	1.1	1.1	4.6
Loss of body weight	19	1.1	1.8	3.9
Aggression towards a handler	9	0.4	0.7	2.1
Running away when approached	4	–	0.7	0.7
Increased body temperature	3	–	–	1.1
Increased grooming	2	–	–	0.7
Thumping the hind feet	2	0.4	–	–
Increased blood pressure	2	–	–	0.7
Other[†]	1	3.5	2.8	2.5
Total		100	100	100

[†]Response provided by the respondents, abnormal behaviour, self-mutilation, vocalisation, twitching, shuffling, loss of nose twitching.

Table 3. "What would help you to better assess pain in rabbits in your care?"

Answers	n
A validated pain scale specific for rabbits	143
More experience in treating rabbits	38
More available CPD on rabbits	34
Better information on how to treat rabbits	33
More training on how to treat rabbits	27
A more adequate environment/kennels for rabbits	19
Better owner understanding of pain in rabbits	12
Others† (more time per case, better history taking, cameras in the wards, better vet-owner relationship)	21

†Responses provided by the respondents.

the respondents, respectively. The Rabbit Grimace Scale (RbtGS) was used by 21% of the respondents while 6% used other pain scales such as the Glasgow composite pain scale for cats or dogs (n = 7), a numeric rating scale (n = 4), a simple descriptive scale (n = 3) and other scales (n = 4). When stating their opinion on what would improve pain assessment in rabbits, a validated composite pain scale specific for this species was mentioned by half of the respondents (n = 143; 50%) (Table 3).

Pain amelioration

When asked about their knowledge of rabbit analgesia, the majority of respondents reported they were "fairly confident" (50%). Only 9% reported themselves to be "very confident" and the rest reported either being "not so confident" (35%) or "not confident at all" (6%). Overall, about half of the respondents were "fairly happy" (49%) with the information available on rabbit analgesia with a small percentage being "very happy" (4%). The remaining respondents were "not very happy" (37%), "not happy at all" (5%) or "unsure" (6%). When asked which factors impacted their ability to ameliorate pain in pet rabbits, "rabbits hiding pain" and "veterinary surgeons' lack of knowledge in treating rabbits'" were considered the most important ones while "no available information on either a drugs benefit or a drug side effects" were considered the least important (Fig 3).

DISCUSSION

The results of this survey provide information on the attitudes, and the clinical role, of veterinary nurses towards rabbit management. They demonstrate that veterinary nurses are involved in many aspects of rabbit care and that they are generally confident at nursing this species especially for peri-operative pain management. However, some reported very low confidence (5%). Given that this is a self-selected sample of nurses choosing to fill in a survey on rabbit pain, it is likely that in the whole population this percentage experiencing low confidence is even higher. It is also important to consider that confidence does not necessarily reflect skills and abilities, and that this study examined the respondents' *self-reported* confidence but not their objectively assessed performance.

In this study, when the respondents were asked to pain score nine common surgical procedures performed in rabbits, castration was considered less painful than ovariohysterectomy, while orthopaedic surgeries were considered the most painful procedures. It is important to take in consideration that the score attributed to each condition is the reflection of the level of pain perceived by the respondents, which could also be influenced by general perceptions within the veterinary care team. In fact, these results are similar to those previously reported by veterinary surgeons for rabbits (Benato *et al.* 2020) and cats and dogs by both veterinary nurses (Dohoo & Dohoo 1998, Coleman & Slingsby 2007) and veterinary surgeons (Lascelles *et al.* 1995. Hunt *et al.* 2015). In the present study, coronal reduction of the cheek teeth was rated as painful as was castration. A similar finding was noted in two previous studies on the attitudes of veterinary nurses towards pain in cats, in which a similar pain score was assigned to castration and dental treatment without extraction (Coleman & Slingsby 2007, Kongara *et al.* 2016). In contrast, in a study on the attitudes of veterinary surgeons towards pain, coronal reduction in rabbits was considered less painful than castration (Benato *et al.* 2020), while dental treatment in cats was rated as more painful than castration (Hunt *et al.* 2015). In cats and rabbits, castration can stimulate both somatic and visceral pain as the abdominal cavity is entered. In rabbits, coronal reduction without extraction consists of reducing the length of the affected teeth and should have minimal impact on pain unless there is buccal or lingual ulceration. In cats, dental treatment without extraction consists of scaling and polishing of the teeth. However, it is often carried out due to periodontal disease with severe gingivitis. It is possible that veterinary nurses hold a misconception of the degree of pain caused by these two surgical procedures because veterinary surgeons generally carry them out. However, it could also be argued that since veterinary nurses spend more time with the animals during the perioperative period, they have a greater awareness of the degree of pain that the animal may feel and may notice more subtle changes than do veterinary surgeons.
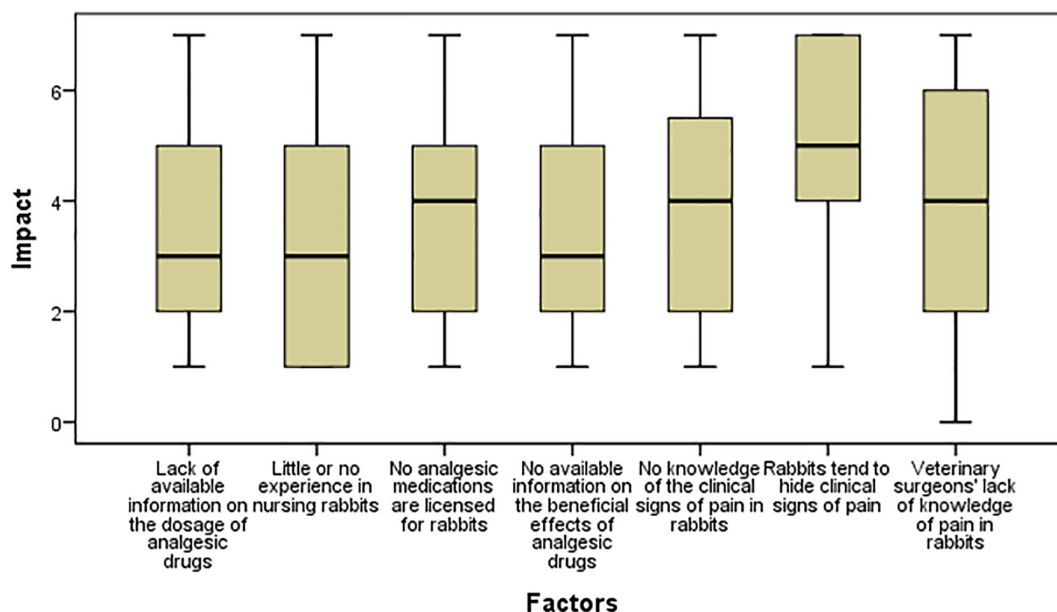
FIG 3. "In your opinion, how much do these factors impact on your ability to reduce pain in pet rabbits?": Box and whisker plot of the factors impacting on the respondent's ability to reduce pain in rabbits while at the veterinary clinic. (Impact: 0 = No impact; 7 = Very high impact). The horizontal line denotes the median value (50th percentile), while the box contains the 25th to 75th percentiles. Whiskers mark the 5th and 95th percentiles, and values beyond are outliers, marked with circles and asterisks

In this survey, the majority of respondents stated that pain assessment in rabbits during the postoperative period was mainly the responsibility of the veterinary nurses (50%) or veterinary nurses and surgeons together (42%). Similarly, in previous studies on cats and dogs, veterinary nurses were predominantly responsible for the monitoring and assessment of pain during the postoperative time (Williams *et al.* 2005, Kongara *et al.* 2016). However, they also stated that this role should be shared between veterinary nurses and surgeons (Coleman & Slingsby 2007). A study from 1998 on the attitudes of Animal Health Technologists towards post-operative pain in cats and dogs describes the actual role of the veterinary nurses during postoperative pain management (Dohoo & Dohoo 1998). In that survey, the majority of respondents (95%) reported that they were not only in charge of monitoring the animal, but that they also had to inform the veterinary surgeon of signs of pain and to administer analgesic drugs under the veterinarian's instructions reflecting that they were part of a team when providing analgesia (Dohoo & Dohoo 1998). This demonstrates that pain assessment is not just limited to simply observing the animal, but that is a complex role where a close relationship and optimal communication between veterinary nurses and surgeons is necessary to carry out an adequate assessment. The results of the present survey suggest that the role in pain management during the peri-operative time could be better shared between veterinary nurses and surgeons. In a previous survey, most veterinary surgeons reported being confident in this role when treating rabbits (Benato *et al.* 2020). The present survey demonstrated also that the majority of vet nurse respondents were "fairly confident" in recognising pain in rabbits. In cats and dogs, CPD was considered an important source of information (Dohoo & Dohoo 1998) second only to the experience gained in practice (Coleman & Slingsby 2007, O'Connor 2011, Kongara *et al.* 2016). This could be an argument

for increasing resources on this topic for those veterinary nurses that are less confident in order to optimise patient care.

In the present survey, the majority of the respondents (71%) reported they did not use a pain scale during rabbit pain assessment. Likewise, veterinary surgeons rarely used a pain scale when assessing rabbits (Benato *et al.* 2020), cats and dogs (Coleman & Slingsby 2007, Weber *et al.* 2012, Hunt *et al.* 2015, Kongara *et al.* 2016). Of the small percentage of respondents using a pain assessment tool, the Rabbit Grimace Scale (RbtGS) was the most commonly used, followed by the Glasgow composite pain scale for cats and dogs and the numeric rating scale. These scales can be highly subjective and are also unreliable if not validated to assess rabbits, especially in a clinical setting. The risk is that many subtle signs of pain specific to rabbits may remain undetected leading to poor analgesia. Some of the respondents reported using behavioural indicators to assess pain during the perioperative period, with teeth grinding, abnormal postures and decreased food intake being amongst the most common ones. These indicators have previously been described in both pet rabbits (Benato *et al.* 2020) and laboratory rabbits (Leach *et al.* 2009, Farnworth *et al.* 2011) and they can overall be considered reliable. However, individual changes to housing and surgical procedures should be taken into consideration during assessment (Farnworth *et al.* 2011). It appears that overall pain scoring in rabbits is still considered challenging. This was also highlighted by the respondents during this study; when asked what, in their opinion, would improve pain assessment in rabbits, about half of the respondents (50%) reported that a validated pain scale specific for this species would be a useful tool.

Knowledge of analgesic drugs available for the species and the ability to assess not only the benefits, but also the potential side effects

from analgesic drugs, is an important aspect of the care of the rabbit as a patient. In this study, 50% of the respondents were "fairly confident" with their knowledge of rabbit analgesia. In comparison, 68% of veterinary nurses were "confident" in their knowledge at treating pain in cats and dogs (Dohoo & Dohoo 1998) suggesting that there is scope for improvement for rabbits. In Dohoo and Dohoo's survey, attitudes towards controlling pain in cats and dogs were associated with accessing continuing education. This could suggest that providing more information and access to education on rabbit analgesia for veterinary nurses might be beneficial.

When asked what impacted respondent ability to ameliorate pain in rabbits, the rabbit's ability to hide signs of pain was considered the most important factor while lack of information on the benefits of different drugs and side effects were considered less important factors (Fig 3). "Veterinary surgeon's lack of knowledge of pain in rabbits" was also described as an important factor alongside the absence of licensed analgesic medications for rabbits and the lack of knowledge of signs of pain in this species. This is an interesting finding, as in a previous survey on veterinary surgeons' attitude towards pain in rabbits, the majority of participants described their knowledge as either "good" (42%) or "adequate" (32%) (Benato *et al.* 2020). This mismatch could reflect either poor trust by the veterinary nurses, or over-confidence amongst veterinary surgeons. An interesting study on cancer pain management in people compared to the attitudes and knowledge of physicians and nurses (Darawad *et al.* 2017). The study showed how the two groups were knowledgeable in different areas of this discipline but that overall, they both agreed on many aspects of cancer pain management. This could suggest that further research is necessary to better understand the attitude and knowledge of pain management in rabbits in both veterinary nurses and surgeons, and a multi-faceted team-based approach to improvement is needed.

This study found that the attitudes of veterinary nurses towards pain assessment and management in rabbits are not dissimilar to those in cats and dogs: veterinary nurses are involved in many aspects of rabbit care and generally they feel "fairly confident" in nursing this species. Continuing education programmes could provide an important source of information for veterinary nurses regarding improved pain recognition and knowledge of rabbit analgesia. However, courses available for this species are still limited, and the clinical experience gained within practice may be the main source of information for pain management in rabbits.

Proper validation and dissemination of pain scales specific for pet rabbits is key at this moment, because subtle changes related to pain may go undetected, leading to poor analgesia and overall poor animal welfare.

Moreover, this survey highlights the importance of teamwork between veterinary nurses and surgeons. However, it also suggests that the different roles of veterinary nurses and surgeons may not be clear when treating pain in rabbits and more research is necessary to optimise patient care.

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Author contribution

Livia Benato: Conceptualization, Investigation, Data curation, Writing; Jo Murrell: Conceptualization, Supervision, Reviewing and Editing, Emily Blackwell: Conceptualization, Reviewing and Editing; Richard Saunders: Conceptualization, Reviewing and Editing; Nicola Rooney: Conceptualization, Supervision, Reviewing and Editing.

Conflict of interest

None of the authors of this article has a financial or personal relationship with other people or organisations that could inappropriately influence or bias the content of the paper.

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Supporting Information

The following supporting information is available for this article:

Appendix S1. Recognition and amelioration of pain in pet rabbits. Questionnaire for veterinary nurses.

Appendix S2. Demographic details of the respondents.