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1 **Understanding the barriers to blood pressure assessment in cats**

2 Sarah MA Caney BVSc, PhD, DSAM(feline), MRCVS<sup>1</sup>; Su Page BVSc, MRCVS<sup>2</sup>, Danièle A

3 Gunn-Moore BSc (Hon), BVM&S, PhD, MANZCVS (Feline), FHEA, FRSB, FRCVS<sup>3</sup>

4 **Affiliations:**

5 <sup>1</sup>Vet Professionals Ltd, Midlothian Innovation Centre, Pentlandsfield, The Bush, Roslin,

6 EH25 9RE

7 <sup>2</sup>Ceva Animal Health, Unit 3, Anglo Office Park, White Lion Rd, Amersham HP7 9FB

8 <sup>3</sup>The Royal (Dick) School of Veterinary Studies and The Roslin Institute, the University of

9 Edinburgh, Easter Bush Campus, Midlothian, EH25 9RG

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11 Correspondence:

12 Sarah Caney

13

14 **Keywords:** hypertension; blood pressure; Doppler; oscillometric; multiparameter

15

16 **Abstract**

17 Objectives: A questionnaire was designed to survey veterinarians and  
18 nurses/technicians on current methodology, indications, uptake and barriers to blood  
19 pressure (BP) assessment in cats, including ocular examination.

20 Methods: An online questionnaire was produced and promoted to more than 2000  
21 participants, 545 answered all questions, and 85 answered most questions.

22 Results: 572 (90.8%) participants were based in the United Kingdom and almost all (613,  
23 97.3%) had access to a BP monitor. Most (550, 88.4%) participants had access to a  
24 Doppler monitor; 367 (59.0%) participants had access to multiparameter monitors,  
25 fewer (202, 32.5%) had access to oscillometric BP monitors. Where applicable, Doppler  
26 monitors were most commonly chosen for conscious cat measurements (337, 72.2%)  
27 due to the greater 'trust' and 'reliability' of these compared to oscillometric machines.  
28 Conscious BP measurement typically involved two members of staff (391, 62.9%). Only  
29 156 (29.1%) participants recommended BP assessment at least several times a week. BP  
30 assessment was routinely recommended in cats with ocular target organ damage (365,  
31 87.7%), chronic kidney disease (346, 78.6%) proteinuria (255, 63.0%) and  
32 hyperthyroidism (266, 60.9%). Common equipment related barriers included 'cuff  
33 frustration' and difficulties hearing the pulse signal for Doppler users (72.2%, 71.6%),  
34 and oscillometric machines failing to give a reading at least some of the time (52.8%).

35 Situational hypertension concerns affected many (507, 92.0%) as did lack of time to do  
36 the procedure (402, 73.0%). Significant owner barriers included difficulties persuading  
37 the owner to bring their cat in for BP checks (475, 86.2%) and concerns over costs (445,  
38 80.8%). Most participants had access to a direct ophthalmoscope (527, 96.5%) however  
39 399 (73.1%) reported that they struggled to interpret ocular findings.

40 Conclusions and relevance: Significant barriers exist to successful BP assessment in  
41 cats. Education and support of clinics should focus on improving confidence with  
42 equipment and eye examination.

43 .

44

45 **Introduction**

46 Systemic arterial hypertension is considered a common condition of the older cat but is  
47 thought to be significantly under-diagnosed in clinical practice.<sup>1</sup> Assessment of blood  
48 pressure (BP) is considered an essential component of the physical examination,  
49 especially for cats older than ten years<sup>2</sup> since the risk of hypertension is known to rise  
50 with increasing age.<sup>3,4</sup> Hypertension can cause a variety of serious, potentially life  
51 threatening, consequences associated with target organ damage (TOD), including  
52 hypertensive injury to the brain, kidneys, eyes, heart and blood vessels. Clinical  
53 consequences of TOD include hypertensive chorioretinopathy (presenting as  
54 blindness/visual deficits), left ventricular hypertrophy (presenting as heart murmurs,  
55 arrhythmias, gallop sounds), progressive renal injury (manifesting as proteinuria and  
56 worsening of serum creatinine elevations), and encephalopathy and stroke (presenting  
57 as neurological and/or behavioural signs).<sup>5</sup> When diagnosed, hypertension is often  
58 straightforward to manage with a choice of veterinary authorised medications available  
59 in most countries.<sup>5</sup>

60 Current published studies indicate that BP assessment is under-performed in clinical  
61 practice. One recent study estimated that just 1.34% of cats presenting at UK primary  
62 care clinics over a two year period received BP assessment<sup>1</sup>. In that study, 61% of cats  
63 diagnosed with hypertension had their BP assessed due to presenting with clinical signs

64 of TOD, 31% were assessed due to monitoring of concurrent diseases associated with  
65 hypertension and just 4% were diagnosed via a 'geriatric health check'. Many of the cats  
66 diagnosed with hypertension were classified with Severe Hypertension (systolic BP 180  
67 mmHg or higher) and the authors of that study highlighted a lack of early diagnosis  
68 through more routine BP assessment of cats aged ten and over and those with illnesses  
69 known to increase the risk of hypertension. The authors also recommended more  
70 research on barriers to successful BP assessment in clinics in order to design educational  
71 programs to support clinical practice. A separate questionnaire based survey of  
72 veterinarians predominantly based in North America similarly indicated that BP  
73 assessment was more likely to be recommended in cats with TOD or concurrent diseases  
74 predisposing to hypertension, rather than in healthy older cats.<sup>6</sup>

75 Very little data exists relating to current knowledge of barriers to performing BP  
76 assessment although concerns over the reliability of equipment and impact of stress and  
77 anxiety on conscious cat BP readings have been reported in one study.<sup>6</sup>

78 The aims of the current study were to determine current practise including equipment  
79 and protocols, barriers to BP assessment and whether these related to equipment, time,  
80 space, the cat, the owner or other factors. This was achieved by designing a  
81 questionnaire circulated to veterinary professionals working in small animal clinics.

## 82 **Materials and Methods**

83 **Population of interest**

84 The target population for the questionnaire was veterinarians and veterinary  
85 nurses/technicians working in clinical practice with feline patients globally.

86 **Questionnaire design**

87 The questionnaire was made up of 30 core questions with the option to complete an  
88 additional four questions if participants were happy to share solutions they had found  
89 to commonly encountered challenges to BP assessment. Participants were asked if they  
90 were a veterinarian or veterinary nurse/technician, the country they were working in,  
91 and further information on their clinic such as whether it was feline only, primary care  
92 or referral. Subsequent questions asked whether BP measurement was performed in  
93 the clinic or in patients' homes, what sort of monitor was used, how many staff were  
94 required for the assessment, and whether owners were typically present. Participants  
95 were asked how often they were usually recommending BP assessment, the indications  
96 for recommending BP assessment and what proportion of owners allowed them to  
97 perform this procedure. Several questions asked about participants experience of  
98 barriers to BP assessment relating to the equipment, time, procedure, patients, owners  
99 and whether the COVID-19 pandemic had impacted on BP assessment in their clinic. Pre-  
100 visit and in-clinic sedation protocols were also asked about, as was ocular examination  
101 to look for TOD due to systemic hypertension.

102 The initial draft of the questionnaire was piloted with a small group of colleagues who  
103 suggested amendments prior to launch of the final questionnaire. The final  
104 questionnaire was hosted on the Vet Professionals website in full compliance with  
105 General Data Protection Regulation (GDPR) (EU) 109 2016/679 and is available as a  
106 Supplementary File word document.

### 107 **Questionnaire distribution**

108 The questionnaire was launched on 16<sup>th</sup> May 2022. An invitation to complete the survey  
109 was emailed to veterinarians and vet nurses/technicians on the Vet Professionals  
110 database, consisting of 1223 UK based and 840 non-UK individuals. Snowball sampling,  
111 where existing respondents help to recruit further respondents by sharing the  
112 questionnaire with their acquaintances, was also conducted. The questionnaire was  
113 promoted on social media platforms (*e.g.*, Facebook and Twitter) alongside promotion  
114 by International Cat Care, Cats Protection and Vet Times. The questionnaire was closed  
115 to all respondents on 30<sup>th</sup> July 2022. Data collected from the survey were collated and  
116 stored using FormSite (Vroman Systems).

### 117 **Data management and analysis**

118 Data processing and descriptive statistics were carried out in Microsoft Excel.

### 119 **Ethical approval**



120 Approval was obtained from the Human Ethical Review Committee (HERC) at the Royal  
121 (Dick) School of Veterinary Studies, The University of Edinburgh for the collection of data  
122 through an online questionnaire, and subsequent analysis of this data (approved  
123 07/04/2022, reference: HERC\_2022\_28).

## 124 **Results**

125 In total, 545 completed questionnaires and an additional 85 partially completed  
126 questionnaires were received during the study period.

## 127 **Demographics**

128 Participants were primarily veterinary nurses/technicians (340, 54.0%) or veterinarians  
129 (270, 42.9%) with a small number of student nurses, animal care assistants and clinic  
130 support staff comprising the remainder (20, 3.2%). The majority of participants were  
131 based in England (497, 78.9%), followed by Scotland (48, 7.6%), Wales (20, 3.2%), and  
132 Northern Ireland (7, 1.1%). A range of countries outside the United Kingdom (UK)  
133 accounted for the remainder (58, 9.2%). Most participants (552, 87.6%) were based in  
134 small animal primary care clinics, with a few (26, 4.1%) working in small animal referral  
135 clinics or feline only primary care clinics (19, 3.0%). The remaining participants were  
136 working in other roles including emergency only, shelter only, small animal and exotics  
137 and peripatetic services. Almost two thirds of participants (333, 62.4%) were working in  
138 a corporate owned clinic, a third (216, 34.3%) were working in independent clinics. The

139 remainder were working in University, Charity or employee owned clinics. Most  
140 participants (557, 88.4%) shared their clinic postcode district (Figure 1).

#### 141 **Blood pressure equipment**

142 Almost all (613, 97.3%) participants worked in a clinic with access to a BP monitor with  
143 nine (1.4%) participants reporting they only 'sometimes' had access to a monitor and  
144 the remaining eight (1.3%) reporting that they did not have access to a monitor.

145 Multiparameter monitors were available to 367 (59.0%) participants and where people  
146 knew the brand name or type of their monitor it was possible to determine that 550  
147 participants (88.4%) had access to a Doppler monitor and 202 (32.5%) participants had  
148 access to an oscillometric BP monitor. A small number of participants (55, 8.8%) had at  
149 least one monitor but did not know the name/type of their equipment. The most  
150 frequently cited Doppler monitor was the Thames Medical Cat or Cat+ Doppler (272,  
151 43.7%); the most frequently cited oscillometric BP monitor was the Suntech series (84,  
152 13.5%).

153 Around a fifth of participants (133, 21.4%) only had one monitor available to use. For  
154 the remainder, where they knew what type of monitor they had, a Doppler monitor was  
155 most commonly chosen for conscious cat BP measurements (337, 72.2%) versus  
156 oscillometric or multiparameter monitors (130, 27.8%). The reasons for selecting one  
157 monitor as their 'default' option for conscious cats are shown in Figure 2. Participants

158 were able to select multiple reasons if they wished. For those choosing to use a Doppler  
159 monitor, 66.8% of participants said this was because 'I trust the results the most with  
160 this monitor' and 58.1% said the Doppler unit was 'more reliable in getting readings than  
161 alternatives'. For those selecting an oscillometric monitor as their default machine, the  
162 modal reason was 'easier to use than alternatives' (65.2%) with being able to take  
163 readings on my own, speed of obtaining a reading and cats preference also commonly  
164 cited (Figure 2). Results were very similar for the two most frequently used Doppler  
165 monitors (Thames Medical, n=139; Vet BP, n=94). More variability was observed  
166 between the oscillometric monitors; however, the small numbers (12 to 33 participants  
167 for each type of monitor) prevented meaningful comparison.

#### 168 **Blood pressure measurement procedure**

169 Conscious BP measurement was reported to most commonly involve two members of  
170 clinic staff (391, 62.9%) versus one (220, 35.4%). When asked whether owners were  
171 typically present for assessments, there was an even split between those answering no  
172 (187, 30.1%) and yes (195, 31.4%) with the remainder reporting that this varied. Where  
173 owners were present, they were involved in restraint of the cat some or all of the time  
174 (381, 87.6%). Free text comments relating to the presence of the owner typically  
175 reported the owner as a soothing presence, 'just stroking/talking to and fussing', 'hands  
176 off' rather than actively restraining the cat.

177 Only 47 (7.6%) of participants were currently offering 'at home' BP assessments to their  
178 clients. Optional free text comments received from 154 participants indicated that cost,  
179 lack of clinic staff and Covid-19 had reduced their ability to offer this service or said that  
180 this had never been offered.

181 **Frequency of BP assessment recommendations and success of follow through**

182 Participants were asked, where applicable, how frequently they recommended BP  
183 assessment in any of their feline patients and what proportion of cases went on to have  
184 a BP assessment. Respondents were asked to answer the question as if working full time  
185 at their current clinic. Eighty four participants (13.5%) excluded themselves from  
186 answering this question by selecting 'other' with most commenting that as vet  
187 nurses/technicians they were not responsible for recommending BP checks, as this was  
188 the remit of the vet; or that as a nurse they were not seeing clients themselves.

189 For the remainder, almost forty percent (211, 39.4%) reported that they recommended  
190 BP assessment to cat owners attending the clinic once a month or less, 31.5% (169)  
191 participants recommended it several times a month and 156 (29.1%) recommended it  
192 least several times a week. Less than ten percent (53, 9.9%) participants were reported  
193 to be recommending BP assessment at least once a day to owners bringing in their cats.

194 Overall, around a third of participants (182, 31.8%) reported that 76-100% of owners  
195 recommended BP assessment for their cat went on to allow this procedure. A similar

196 proportion of participants (186, 32.5%) reported that 51-75% of owners recommended  
197 BP assessment for their cat went on to allow this procedure. In total, 68 respondents  
198 (11.9%) reported that 25% or fewer of owners recommended BP assessment for their  
199 cat went on to allow this procedure. Participants recommending BP assessment at least  
200 once a day had the highest 'success' in converting a recommendation to an assessment  
201 with 45.3% of these respondents stating that 76-100% of owners who were  
202 recommended BP assessment for their cat went on to allow this procedure to be  
203 performed.

#### 204 **When is BP assessment recommended?**

205 The most common potential TOD indication for recommending BP assessment was  
206 ocular pathology and/or visual deficits whilst the presence of behavioural or  
207 neurological signs consistent with TOD were least likely to result in a recommendation  
208 for BP assessment (Figure 3). Chronic kidney disease (CKD) was the concurrent disease  
209 diagnosis with the highest level of routine BP assessment recommendations made  
210 (Figure 4) with 78.6% participants routinely recommending BP assessment in these  
211 patients compared to 25.5% of patients receiving erythrocyte stimulating agent therapy.  
212 Age-related BP assessment screening of older cats was evident with 44.0% of  
213 participants routinely recommending BP assessment in healthy cats aged 15 years and  
214 over (Figure 5). Pre-anaesthetic BP screening of apparently healthy cats was routinely

215 recommended by 18.6% participants. More than 100 participants added further free  
216 text comments in which many stated that BP was routinely monitored in sedated and  
217 anaesthetised patients.

### 218 **Barriers to blood pressure measurement**

219 Equipment related barriers to BP measurement are shown in Figure 6. Availability of  
220 equipment was not a problem for most participants but 'cuff frustration' (cuffs pinging  
221 off) and difficulties hearing the pulse were experienced at least sometimes by 72.2% and  
222 71.6% participants, respectively, when using Doppler machines. Failure of the  
223 oscillometric machine to give a reading at least sometimes was reported in 52.8% people  
224 using these machines. Around half of respondents (261, 47.4%) found BP measurement  
225 a hassle or stressful and/or did not trust the equipment or result obtained. When asked  
226 which of these barriers had the biggest impact on them, struggling to hear the pulse  
227 using the Doppler method had the highest response (152, 27.6%) although 116  
228 participants (21.1%) reported 'none' for this question. Participants were asked about  
229 barriers relating to the procedure such as space, time and access to help from colleagues  
230 (Figure 7). Lack of time was most problematic with only 150 (27.2%) participants stating  
231 that this was not a problem for them. When asked which of the barriers had the biggest  
232 impact on them, 245 (44.5%) participants selected 'I don't have enough time', and 20.0%  
233 said 'none'.

234 Participants were asked about practical barriers relating to the patient including  
235 concerns over situational hypertension and stress (Figure 8). Situational hypertension  
236 was a concern, 'even in cats that appear calm', for 507 (92.0%) participants and 478  
237 (86.8%) stated their 'patients don't tolerate BP measurement' at least some of the time.  
238 When asked which of the patient-related barriers had the biggest impact, 206 (37.4%)  
239 participants stated concerns over situational hypertension causing false high readings  
240 whilst 158 (28.7%) selected 'if I see the cat is stressed, I don't check BP as I assume the  
241 readings may be affected'.

242 Owner-related barriers to BP assessment were also raised (Figure 9). When asked which  
243 of these had the biggest impact on the participants, concerns over cost (168, 30.5%)  
244 followed by difficulties persuading owners to bring their cats in for BP checks (140,  
245 25.4%) and persuading clients to book a separate appointment for a BP check (104,  
246 18.9%) were reported. Longer consultations were least problematic; 48.8% (269)  
247 participants reported that longer consultations were not a problem for their clients  
248 (Figure 9). Optional free text comments included concerns from respondents regarding  
249 'excessive fees', owners not understanding the need for BP assessment and reiteration  
250 of previously discussed barriers such as time, stress in the cat and concerns over  
251 reliability of the technology.

252 The Covid-19 pandemic was cited by some participants as having had a negative impact  
253 on the number of BP assessments performed (211, 37.1%) primarily due to staff and  
254 time constraints, clients unlikely to bring in their cat 'just for a BP assessment' and fewer  
255 senior clinics.

#### 256 **Pre-visit and in-clinic sedation**

257 Pre-visit gabapentin was being used by 305 (56.6%) respondents, and pre-visit  
258 trazodone was used by 57 (10.6%) participants. In-clinic gabapentin and/or butorphanol  
259 were used sometimes by 69 (12.8%) participants.

#### 260 **Eye examination**

261 Most participants (395, 72.4%) perform an ocular examination at least sometimes  
262 (always in 11.0%) as part of the BP assessment in feline patients. Respondents typically  
263 had access to a direct ophthalmoscope alone (527, 96.5%) with fewer having access to  
264 a tonometer (294, 53.9%), hand lens and light source (134, 24.5%), slit lamp (53, 9.7%)  
265 or PanOptic (27, 5.0%). Access to equipment was not a common barrier with only 17  
266 (3.1%) participants reporting this as a consistent issue. However, a lack of confidence  
267 and/or ability to interpret ocular findings, at least some of the time, was reported in 340  
268 (62.3%) and 399 (73.1%) participants respectively (Figure 10). When asked which of the  
269 barriers had the biggest impact, 'I struggle to interpret ocular findings' was reported by  
270 139 (25.8%) participants. Lack of time was cited by 104 (19.3%) participants.



271 **Solutions identified by participants**

272 A total of 289 participants contributed their tips and solutions for commonly  
273 encountered challenges. Frequent suggestions included performing BP assessment as  
274 part of the consultation and not charging extra for this; when short of time to admit the  
275 cat to a quiet and calm ward so that measurements could be taken later in the day;  
276 empowering nurses/technicians to get involved with BP assessment checks through  
277 nurse clinics or by working alongside vets in their clinics. Client education about  
278 hypertension and marketing of senior care packages that included BP assessment were  
279 also included. A selection of representative comments are included in Table 1. Utilising  
280 nurses/technicians was mentioned by 49 participants and admitting patients to facilitate  
281 calm BP assessment at a later time was mentioned by 24 participants. Participants were  
282 also asked what support they would appreciate in their clinics: 52 participants requested  
283 CPD/training on the use of equipment, general education on hypertension, tuition on  
284 performing eye examination and interpretation of ocular findings. When asked about  
285 joining a Task Force to collaborate on finding solutions for commonly encountered  
286 problems, 99 participants indicated they would be interested in doing this.

287 **Discussion**

288 This study set out to investigate what, if anything, was stopping veterinarians and vet  
289 nurses/technicians from assessing the BP in their feline patients. Sadly, we found that

290 BP was not being assessed nearly as frequently as needed with 40% of participants  
291 currently only recommending BP checks for any of the cats that they saw in their clinic  
292 up to once a month.

293 BP assessment recommendations have not been unanimously agreed. The International  
294 Society of Feline Medicine recommends BP assessment at least every 12 months in cats  
295 aged seven years and over,<sup>7</sup> the ACVIM Consensus panel considers annual BP screening  
296 of all animals aged nine years and over to be reasonable<sup>5</sup> and the American Association  
297 of Feline Practitioners guidelines consider BP assessment an essential component of  
298 consultations for cats older than 10 years<sup>2</sup>.

299 Participants in this study are likely to be seeing at least several cats in the above age  
300 groups each week as, for example, 30-50% of feline patients in the United States are  
301 believed to be seven years of age or older.<sup>8</sup> Medical conditions such as CKD, known to  
302 increase the risk of systemic hypertension, are common in clinical practice, especially in  
303 older cats and should also prompt a recommendation for BP assessment.<sup>9-13</sup> This study  
304 primarily targeted members of the Vet Professionals database to complete this  
305 questionnaire, and therefore was biased towards individuals with a particular interest  
306 in feline medicine (see below). Although it is not possible to confirm how many of the  
307 participants derived from the Vet Professionals database and therefore a response rate  
308 cannot be reported, the authors consider it likely that the majority of participants did

309 come from this source since more than half of the responses were received within two  
310 weeks of the survey's launch. Participants recruited via snowballing sampling will likely  
311 have shared the same interest in feline medicine. Therefore the authors acknowledge  
312 bias in the respondents towards vets and nurses enthusiastic in feline clinical work.  
313 Nonetheless, overall the authors were disappointed with many of the findings which  
314 raises the possibility of even more concerning findings for BP assessment as a whole in  
315 clinical practice. For example, whilst 'routine' BP screening of apparently healthy cats  
316 aged 15 years and over was evident, fewer cats aged 7-14 years received 'routine' BP  
317 assessment and less than half of participants recommended pre anaesthetic BP  
318 screening for example prior to dental surgery.

319 Lack of equipment is not a barrier to BP assessment - less than 3% participants indicated  
320 that they only sometimes or never had access to a monitor. Whilst the majority of  
321 participants had multiparameter monitors available to them, Doppler devices were  
322 most commonly selected for conscious cat BP assessment and the prime reasons for this  
323 were greater perceived trust and reliability of this equipment compared to alternatives.  
324 Where an oscillometric machine was preferred, this was mainly due to this being easier  
325 to use. The current study found the preference and reasoning for use of Doppler  
326 methodology similar to that reported in a recent survey of US veterinarians.<sup>6</sup> However  
327 a recent European survey indicated a more even split between Doppler and oscillometric

328 monitors in conscious cats.<sup>14</sup> Whilst current scientific consensus is that no methodology  
329 has been validated for measuring BP in conscious small animals,<sup>5</sup> for many years,  
330 Doppler methodology has been the preferred technique, especially for conscious cats.<sup>15-</sup>  
331 <sup>18</sup>

332 Opportunities exist for improved early diagnosis of systemic hypertension by increasing  
333 awareness of situations where BP assessment is indicated; primarily in patients  
334 presenting with signs consistent with TOD and in patients with underlying  
335 diseases/medications/toxicities associated with an increased risk of systemic  
336 hypertension.<sup>5</sup> As with other recent studies,<sup>1</sup> the current study indicated that BP  
337 assessment is not being recommended or performed as frequently as the authors would  
338 wish. Less than ten percent of participants were recommending BP assessment to any  
339 cat owners they saw within the course of one day, 156 (29.1%) participants  
340 recommended BP assessment at least several times a week. This compares negatively  
341 with a recent US survey where 49.5% veterinarians surveyed were recommending BP  
342 assessment at least once a week.<sup>6</sup> The current survey found that participants prioritised  
343 recommendations for BP assessment for certain situations, most commonly ocular TOD  
344 where almost 90% of participants reported they routinely recommended BP  
345 assessment. However, it was much less 'routine' to recommend assessment in cats with  
346 proteinuria (63.0%), new heart murmurs or arrhythmias (56.1%) or

347 behavioural/neurological signs (42.7%). Similarly, BP assessment was only routinely  
348 recommended in 78.6% cats with chronic kidney disease, 60.9% of cats with  
349 hyperthyroidism and 40.3% of cats with primary hyperaldosteronism.

350 Much of this study focussed on identifying potential barriers to BP assessment and their  
351 relative importance. Whilst access to equipment was not a barrier to participants,  
352 technical challenges such as being able to hear a good pulse signal and 'cuff frustration'  
353 were reported. Since the majority of participants were using Doppler units to assess BP  
354 in conscious cats, equipment frustration was biased towards 'Doppler issues'. Lack of  
355 time was a frequent concern (73.0%), and 92.0% of participants expressed concern over  
356 situational hypertension, even in cats that appeared calm. Situational hypertension i.e.  
357 a transient increase in systolic BP due to excitement or anxiety associated with the clinic  
358 visit and/or the measurement process that occur in an otherwise normotensive patient,  
359 is unpredictable.<sup>5</sup> It can be severe in some cases with increases in systolic BP readings  
360 of as much as 75 mmHg documented in some cases.<sup>19</sup> Incorporating a ten minute period  
361 of acclimatization prior to collecting BP readings typically results in a significant  
362 reduction in systolic BP readings of around 20 mmHg<sup>20</sup> and thus is commonly  
363 recommended. The current study did not ask participants how much time was allocated  
364 for the procedure or whether an acclimatisation period was routinely included.

365 Eye examination is helpful in confirming a diagnosis of systemic hypertension. Patients  
366 with confirmed ocular TOD in addition to high BP readings are confirmed to be  
367 hypertensive and need to start anti-hypertensive therapy. Whilst the presence of ocular  
368 TOD routinely resulted in a recommendation for BP assessment, the current survey  
369 indicated that lack of confidence and/or ability in eye examination was common and  
370 that training and support in this procedure would be of great value to participants.

371 The current study identified the leading owner-related barrier to BP assessment as cost  
372 with potential solutions such as including BP assessment in the standard consultation  
373 fee and utilising nurses/technicians instead of veterinarians suggested. It is of note that  
374 more vet nurses/technicians completed the questionnaire than vets (54% vs 43%),  
375 which suggests that vet nurses are engaged and enthusiastic with respect to BP  
376 assessment.

377 This study has some limitations in that it was promoted via the author's (SMAC)  
378 database and therefore selected enthusiastic feline veterinarians and vet  
379 nurses/technicians who are more likely to work in clinics with equipment for BP  
380 measurement and practise high standards of feline medicine. Social acceptability bias is  
381 likely to further complicate results in that participants may have been tempted to, for  
382 example, exaggerate the frequency with which they were recommending BP  
383 assessment. Answers depended on participants memory and so recall bias may have

384 featured. Many nurses/technicians participating in the study commented that they did  
385 not feel able to make recommendations for BP assessment without a veterinarian's  
386 supervision and this impacted on some of the results (Figures 3, 4, 5). Since BP  
387 assessment is not in itself a diagnosis it was disappointing to see that some  
388 nurses/technicians are hesitant about recommending BP assessment, with many  
389 commenting that recommending BP assessment was primarily or solely a veterinarian's  
390 remit.

391 Confidence and clinical environment may play a role here since the number of  
392 nurses/technicians excusing themselves from answering some questions varied  
393 according to indication. For example, in Figure 4 the number of 'eligible' participants  
394 ranges from 263 (cats receiving erythrocyte stimulating agents) to 442 (overweight or  
395 obese cats) compared to Figure 5 where around 480 participants commented on the  
396 frequency of recommendation of BP assessment of healthy older cats and those  
397 requiring anaesthesia.

398 The final questions asked for participant solutions and suggestions for improving clinical  
399 practice illustrating a demand for more training and support of hypertension assessment  
400 for clinics. Further studies are warranted to determine whether client uptake can be  
401 increased through strategies highlighted by the participants such as including BP

402 assessment in a standard consultation fee rather than charging extra, staff training and  
403 increased use of nurses/technicians to recommend and perform BP checks.

#### 404 **Conclusions**

405 Whilst this study shows good awareness of hypertension as an issue and excellent  
406 availability of suitable measurement devices clear barriers to assessment exist with less  
407 than 10% of participants recommending BP assessment in their daily interactions with  
408 cat owners. Future support should be orientated towards practical training in obtaining  
409 reliable BP readings, performing ocular examinations and recognising the common  
410 ocular manifestations of systemic hypertension.

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427 This work did not involve the use of animals (including cadavers) and therefore informed  
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