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Owner perception of focal seizures in canine epilepsy

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Abstract

Focal seizures (FS) are a common feature in dogs with idiopathic epilepsy (IE). Vets rely upon owner reports of seizures to diagnose epilepsy and assess treatment outcomes. As such, accurate reports of FS frequency are of importance; however, FS are underreported in human medicine. A web-based survey was conducted to investigate owner perception of seizure types (FS vs. GS; generalised seizures). Owners of dogs diagnosed with IE (with at least tier I confidence), whose dog had experienced a FS in the past 3 months were eligible. Responses were received from 116 owners, of which 56 were valid. Owners reported that a median of 1 (0-2) FS per month was acceptable for their dog, compared to 0 GS (0-1). The majority of owners thought that GS caused more damage to their dog's brain (59.6%) and body (69.4%) than FS, and had a greater impact on quality of life (52.1%). Nearly half of owners (45.8%) were more likely to report a GS to their vet than an FS. The relative perceived unimportance of FS by owners may lead to inaccurate reports of seizure frequency, which may bias veterinarian perceptions of treatment efficacy, and reduce the accuracy of clinical trials including client-owned dogs.

Vets rely upon owner (carer) reports of seizures to initially diagnose epilepsy in their patients, and ongoing seizure diaries to assess changes in seizure frequency (and thus treatment outcomes). In addition, clinical trials of anti-epileptic therapies often heavily rely upon owner-reported seizure diaries to assess treatment efficacy. As such, accurate reports of seizure frequency are of high importance, with underestimations potentially jeopardising patient quality of life (QoL) due to undertreatment. In human medicine, patient seizure counts have been found to be unreliable, with some seizures going unreported (Hoppe and others 2007). Seizure type is a risk factor for unreported seizures, with focal epileptic seizures recognised and reported significantly less than secondary generalised tonic-clonic epileptic seizures (GS) (Hoppe and others 2007). In people with epilepsy, previous studies have reported that patients failed to document up to 73.2% of focal seizures (Hoppe and others 2007; Kerling and others 2006; Tatum and others 2001).

Focal epileptic seizures (FS) are a common feature in dogs with idiopathic epilepsy (IE), observed in several breeds (Licht and others 2002; Patterson and others 2003). Accurate seizure reporting may be affected by the patient, carer or owner's perception of a seizure. This perception may be influenced by seizure characteristics including seizure type, severity and length. In studies of children with epilepsy, seizures have been described as 'frightening' by parents, with uncertainty during the event regarding both their child's survival and the degree of damage resulting from the seizure (Mu 2005). As the ictal signs of a FS may appear less dramatic to carers than GS ictal signs, it is possible that this may reduce carer perception of their threat to both physical and mental health, and subsequent importance. No information regarding owner perception of seizure type in canine epilepsy exists to date, and our study aimed to investigate owner's perception of FS vs. GS in dogs with IE.

A web-based questionnaire study hosted on Survey-Monkey© from September 2015 to February 2016. Owners of dogs diagnosed with idiopathic epilepsy (IE) were recruited via social media. Consent was gained via a statement at the start of the questionnaire, and the study was approved by the Royal Veterinary College's Ethics and Welfare Committee (approval number URN 2016 1598b). To be eligible for inclusion, dogs must have (1) met the International Veterinary Epilepsy Task Force (IVETF) tier I confidence level for the diagnosis of IE (De Risio and others 2015), and (2) experienced a FS in the past three months to improve recollection of the event. All survey questions must have been answered completely by the owner for their data to be included in the analyses. FSs were defined in accordance with the IVETF classification as “an epileptic seizure with clinical signs indicating activity which starts in a localised area in the brain. Will present with focal motor, autonomic or behavioural signs alone or in combination” (Berendt and others 2015). To further describe the appearance of FS to owners, additional information was included stating that FS may present as “episodic movements e.g. facial twitches, rhythmic blinking, head shaking or repeated muscle contractions of one extremity; autonomic signs e.g. excessive salivation, vomiting, dilated pupils; and behavioural signs e.g. episodic changes in behaviour e.g. restlessness, anxiety, attention seeking, unexplained fear behaviour; or a combination of these signs”. Owners were asked to report the semiology of their dog's most recent FS, including the presence of motor, autonomic and behavioural signs.

Information on their dog's signalment and seizure phenotype (history of cluster seizures, status epilepticus) and owner demographics were collected. Owners were posed a variety of questions regarding their perception of different seizure types including which seizure type (out of FS, GS or equal) they thought (1) caused more damage to the dog's brain or body, (2) was more distressing for their dog, (3) had a greater impact on their dog's QoL, (4)

they wanted anti-epileptic drugs (AEDs) to reduce more, (5) they thought their vet was more concerned by, (6) they were more likely to report to their vet, (7) they understood more and (8) they felt more in control of (i.e. more able to manage).

In total, 116 responses were received, of which 56 were complete and met the inclusion criteria. The majority of the owners responding were female (91 per cent), and aged 31–45 years old (42.9 per cent), with the majority of responses from the USA (42.9 per cent) and the UK (30.4 per cent). Of the 56 dogs, there was a near equal distribution of sex (male: 51.8 per cent), and the mean age (months) \pm sd was 63.6 ± 36.6 months. Over half of dogs (60.7 per cent, $n=34$) had seen a first-opinion vet and a veterinary neurologist, with 37.5 per cent only seen by a first-opinion vet ($n=21$). The majority of dogs were pure bred (75.0 per cent), with 29 different breeds represented, the most common being the Border collie (8.9 per cent). The majority of dogs were on antiepileptic drug treatment (96.4 per cent), and all dogs had experienced both GS and FS previously. The median number of FS a dog had experienced in the last three months was 3 (1–11). With regard to their dog's most recent FS, the majority of owners reported that the FS occurred in isolation (66.1 per cent, $n=27$), with 30.4 per cent ($n=17$) evolving into an FS evolving into a GS. The most common owner-reported aspects of seizure semiology were increased clinginess (57.1 per cent), lip smacking (50.0 per cent) and facial twitching (53.6 per cent) (Table 1).

The median number of FS/month that owners thought was acceptable was 1 (0-2), compared to 0 (0-1) GS/month. If AEDs decreased the number of GS but increased the number of FS, 21.8% of owners considered this 'slightly acceptable', 5.5% 'completely acceptable' and 20.0% only 'slightly unacceptable'. The majority of owners considered GS to be more damaging to their dog's brain and body, and more distressing to their dog than FS (Table 2).

Table 1: Owner-reported focal seizure semiology

Sign	Present (%)	Not present (%)	Don't know (%)
Rhythmically blinking	30.4	46.4	19.6
Nystagmus	8.9	66.1	22.2
Head shaking	48.2	44.6	3.6
Facial twitching	53.6	32.1	10.7
Lip smacking	50	40.7	9.3
Chewing movements	48.1	42.6	9.3
Repeated swallowing	29.4	47.1	23.5
Fore limb twitching	46.4	33.9	17.9
Hind limb twitching	36.5	44.2	19.2
Vomit	10.7	85.7	3.6
Excessive salivation	48.2	48.2	3.6
Urinate	21.4	76.8	1.8
Defecate	7.1	87.5	5.4
Pupils dilate	42.9	8.9	48.2
Walk aimlessly	50	46.4	3.6
Cower	26.8	71.4	1.8
Clingy	57.1	41.1	1.8
Run uncontrollably	20	78.2	1.8
Aggressive	12.5	87.5	0
Tail chasing	3.6	96.4	0
Excessive licking	16.1	83.9	0
Pacing	25	83.9	0
Circling	16.1	83.9	0
Rhythmic barking	5.4	94.6	0

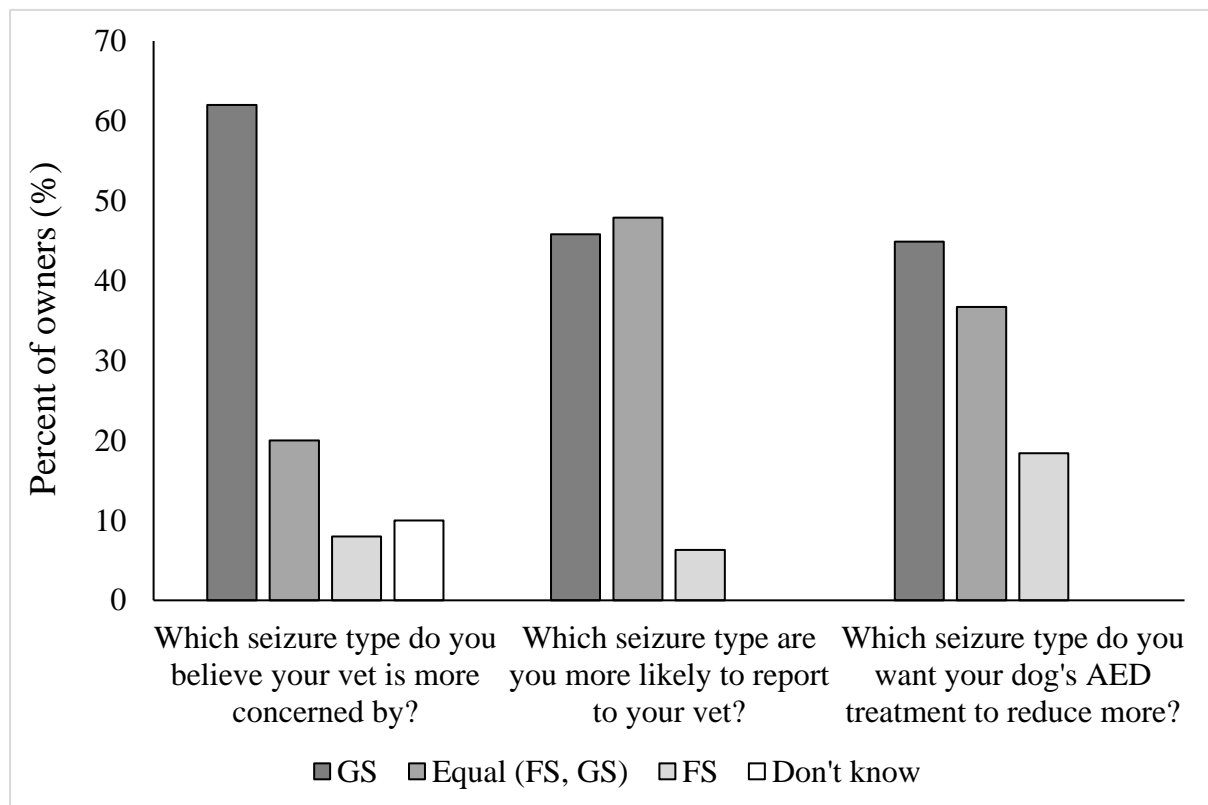
Half of owners (52.1%) believed that GS had a greater impact on QoL than FS, with only 10.4% of owners believing FS had a greater impact. A larger proportion of owners felt that they had a better understanding of GS (36.2 per cent) than FS (14.9 per cent), but more owners felt more ‘in control’ of FS (40.4 per cent) than GS (31.9 per cent) (i.e. that they were more able to manage the seizure if it was focal). The majority of owners perceived that their vet was more concerned by GS (62 per cent) than FS (8 per cent) (Fig 1). Around half of owners were equally likely to report a GS or FS to their vet; however, 45.8 per cent were more likely to report only a GS. In parallel, almost half of owners wanted their dog's AED treatment to reduce their GS more than their FS (44.9 per cent). Chi-square analysis revealed that an owner

being referred to a neurology specialist in addition to their first-opinion vet had no effect upon their responses to any of the questions in Table 2 ($P>0.05$).

Table 2: Owner perception of focal vs. generalised seizures in canine epilepsy

Question	Equal (FS and GS)	Focal (FS)	Generalised (GS)	Don't know
Which seizure type do you believe causes more damage to your dog's brain?	29.8%	6.4%	59.6%	4.3%
Which seizure type do you believe causes more damage to your dog's body (other than their brain)?	22.4%	6.1%	69.4%	2.0%
Which seizure type do you believe is more distressing to your dog?	32.0%	20.0%	42.0%	6.0%
Which seizure type do you believe causes a greater impact to your dog's QoL?	33.3%	10.4%	52.1%	4.2%
Which seizure type do you feel more in control of?	10.6%	40.4%	31.9%	17.0%
Which seizure type do you feel you understand better?	36.2%	14.9%	36.2%	12.8%

Figure 1. Owner perception of seizure types: veterinary and treatment perceptions



Focal seizures are at risk of being underreported in dogs with epilepsy, with owners perceiving their impact to be less severe upon their dog, and their motivation to both report and treat FS lower than for GS. This perception has the potential to lead to under-treatment of FS, with vets being led to believe that AED treatment is adequate when in reality it may be insufficient. Underreporting of FS in people commonly occurs due to the patient's lack of awareness of the event, rather than patients lacking reminders to count seizures, and indeed, randomised controlled trials of the effects of daily reminders to record seizures have been shown to not improve reporting (Hoppe and others 2007). As seizure reporting in dogs is dependent upon a proxy (the owner) the challenge of 'awareness' is not dependent upon the patient, but dependent upon the owners ability to (i) detect seizures are occurring, (ii) to record them accurately and (iii) to report them to their vet. Vets may be able to improve seizure detection via educating owners of ictal signs associated with FS; however, the detection of FS remains a challenge in veterinary medicine. In a study of seizure classification among veterinary neurology specialists and non-specialists, FS were the least agreed upon seizure type (Packer and others 2015), which may be due to their complex combination of ictal signs including motor, postural, autonomic and behavioural signs, with or without impairment in consciousness (Berendt and others 2004). Establishing consensus within the profession regarding what constitutes a FS, and providing this as clear advice for owners may improve their ability to detect this seizure type. A large proportion of owners were uncertain regarding the presence of several FS signs in their dog's most recent seizure, particularly pupil dilation (48.2 per cent='don't know'), repeated swallowing (23.5 per cent) and nystagmus (22.2 per cent). As such, the diverse nature of signs associated with FS should be emphasised. The use of video-EEG, more commonly used as a diagnostic tool in human neurology, could be used more widely in veterinary medicine to aid characterisation of suspected FS episodes.

In the future, the development of seizure detection technology (e.g. wearable devices) may bypass the need to rely upon owners for accurate seizure recording; however, at present vets need to impress upon clients the importance of recording and reporting all seizures or seizure-like episodes regardless of type. Reminding owners to record seizures may have more benefit than in human patients due to their role as a proxy, and further intervention studies of the effect of reminders on seizure recording could quantify the efficacy of this type of initiative. Accurate recording may also be helped by improving owners' understanding of FS, as fewer owners in this study felt they understood this seizure type which may contribute to their perception that they have a lesser impact upon QoL. Rodent studies have found that sustained focal seizure activity consistently results in cellular damage if allowed to continue for longer than one hour, resulting in hippocampal or Ammon's horn sclerosis (Olney and others 1986), and studies of human patients with focal seizures have reported the development of hippocampal atrophy (Van Paesschen and others 1998), with those experiencing higher numbers of seizures at higher risk (Salmenperä and others 2001). With nearly two thirds of owners perceiving that GS had a greater capacity to induce damage to the canine brain, educating owners that FS also pose threats to their dog's brain is of importance to protect neurological health.

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