Effect of temperament on recovery in isoflurane-anaesthetised horses

Background: Recovery is a crucial phase of equine anaesthesia and factors influencing recovery quality are an active area of research.
Aim: To investigate the effect of temperament on recovery score after isoflurane-anaesthesia in 30 adult horses undergoing elective surgery.
Methods: Two veterinarians used a numerical rating scale to score each horse's response to five tests as a gauge of temperament. Owners used a numerical rating scale to score their horse's temperament according to seven behaviour-related questions. Horses underwent elective surgery under general anaesthesia using a standardised protocol. Recovery was recorded and scored by a blinded assessor using the simple descriptive scale for scoring recovery (R1) and the Edinburgh system (R2).
Findings: There was no correlation between veterinarian or owner-assessed temperament and recovery score. Veterinary-assessed temperament score was negatively correlated with pre-induction romifidine and total romifidine dose. Both recovery scores were negatively correlated with anaesthetic duration and R1 was positively correlated with time to first movement in recovery.
Conclusions: Temperament did not influence recovery score in our population of horses.

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Helen Bryant BVetMed (Hons) MRCVS, Veterinary Surgeon, Scott Dunn's Equine Clinic, Wokingham, Berkshire, UK, **Kate Loomes** BVSc MSc CertAVP (EP)(VA)(EM) DipECVAA MRCVS, RCVS and European Specialist in Veterinary Anaesthesia and Analgesia, Rainbow Equine Hospital, Malton, North Yorkshire, UK, **Alex Dugdale** MA VetMB PhD DVA DipECVAA PGCert (LTHE) FHEA MRCVS, RCVS and European Specialist in Veterinary Anaesthesia and Analgesia, Chestergates Veterinary Specialists. Cheshire, UK. hbryant3@rvc.ac.uk.

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Equine peri-anaesthetic mortality is reported to be between 0.12 and 0.9% in horses undergoing elective procedures (Bidwell et al, 2007; Dugdale et al, 2016). While the overall peri-anaesthetic mortality rate has changed very little over the last 20 years, intra-operative mortalities attributable to cardiac arrest have significantly decreased, possibly as a result of the replacement of halothane with agents less depressant to the cardiovascular system (Dugdale et al, 2016). Peri-anaesthetic mortality occurs most frequently in the recovery period, which is one of the least controllable periods (Bidwell et al, 2007; Dugdale et al, 2016). During recovery, fractures and dislocations have reportedly been responsible for 71% of all anaesthesia-related fatalities (Young and Taylor, 1993; Bidwell et al, 2007; Dugdale et al, 2016). Furthermore, poor recovery quality is known to increase the risk of peri-anaesthetic mortality (Laurenza et al, 2020). Factors known to influence recovery include:

- Age (Johnston et al, 2002; Laurenza et al, 2020)
- Bodyweight (Franci et al, 2006)
- Breed (Luoro et al, 2020)
- American Association of Anesthesiologists (ASA) physical status score (Dugdale et al, 2016)
- Anaesthetic duration (Johnston et al, 2002)
- Hypotension (Hector et al, 2020)
- Time to standing (Young and Taylor, 1993)
- Out-of-hours surgery (Dugdale et al, 2016)
- Administration of opioids (Love et al, 2006; Louro et al, 2020),
- Heart rates after induction (Young and Taylor, 1993)
- Type of surgery (Johnston et al, 2002).

Despite advances in assisted recovery techniques, provision of sedation and recovery flooring, the recovery period remains a time of significant risk. Further investigation into factors influencing recovery quality is warranted, considering the significant proportion of peri-anaesthetic mortality occuring in recovery.

To the authors' knowledge, the influence of temperament on recovery quality has not been widely investigated in horses, so the present study was conducted to determine this, taking into ac-

count the variability in characters of horses encountered in clinical practice.

This study investigated the effect of temperament on recovery quality in adult horses following elective surgery under isoflurane-anaesthesia, with the assistance of a head and tail rope system for recovery. The authors hypothesised that temperament score would be positively correlated with recovery quality.

Materials and methods

Animal population

Ethical approval was granted by the Ethical Review Group of the Association of Veterinary Anaesthetists (AVA) (2019-016). It was calculated that a minimum of 29 horses were required to detect a correlation coefficient of 0.5 between temperament score and recovery score, with a β of 0.2 and α <0.05. A group of 30 adult horses was enrolled after gaining informed owner consent. Horses over 1-year-of-age, with an ASA score of 1, admitted to the hospital at least 24 hours before undergoing elective surgery under isoflurane-maintained anaesthesia were included.

Temperament assessment

Veterinary assessment of temperament

Horses were undisturbed in the stable for a minimum of 1 hour before the temperament assessment. Temperament assessment (*Figure 1*) was carried out by two veterinary surgeons at the same time of day (evening) and in the same environment (stable block). A single test was simultaneously but independently scored by both assessors to generate two temperament scores (T1 and T2). A combined temperament score was generated from the mean of T1 and T2.

Owner assessment of temperament

Owners were invited to complete a questionnaire (*Figure 2*) relating to the temperament of the horse in the home environment to generate a single owner-assessed temperament score.

Figure 1. In-hospital, veterinarian assessed temperament score

Numerical rating scale	Score
1. How easy is it to place a head collar in the stable?	
1 2 3 4 5 1. = Requires multiple attempts and enticement, such as a feed bucket. 5. = Walks straight to you and allows you to place	
2. How easy is it to lead the horse around the yard?	
1 2 3 4 5 1. = Dangerous to lead. 5. = Very calm, no real response to surroundings	
3. How does the horse respond to being left in an isolated space with no other horses?	
1 2 3 4 5 1. = Frantic, will not settle. 5. Very calm, no change to previous demeanour	
4. How does the horse respond to clapping of the hands (a single clap).	
1 2 3 4 5 1. = Frantic 5. = No response, continues its previous activity	
5. How does the horse respond to having its temperature taken?	
1 2 3 4 5 1. = Unable to take as dangerous 5. = Stands as they did prior to taking temperature	
Total score	/25

Anaesthetic protocol

All horses were premedicated with acepromazine (Acesedate; Jurox, UK) (0.01–0.02 mg/kg) intra-muscularly (IM), 45 minutes before placement of an intravenous (IV) jugular cannula (BD Angiocath, UK). If necessary and at the discretion of the anaesthetist, romifidine (Sedivet; Boehringer-Ingelheim, UK) was administered for placement of the IV cannula if the horse's temperament required. The requirement and dose for pre-cannula romifidine was recorded. Horses underwent preliminary surgical preparation (hair clipping, mouth washing and feet cleaning) and antimicrobials including procaine penicillin (Depocillin; Intervet, UK) (21 mg/kg IM), and gentamicin (Genta-Equine; Dechra, UK) (8.8 mg/kg IV) or oxytetracycline (Engemycin; MSD, UK) (5 mg/kg IV) were administered. The anti-inflammatory phenylbutazone (Equipalazone; Dechra UK) (4.4 mg/kg IV) was also administered.

Horses were walked into the induction box and given pre-induction sedation, including romifidine (Sedivet; Boehringer-Ingelheim, UK) (0.05–0.10 mg/kg IV) and morphine (Morphine; Hameln, UK) (0.1–0.15 mg/kg IM) was administered. Sedation was deemed adequate when the horse lowered its head, accepted pressure by the squeeze gate and was unresponsive to external stimuli. General anaesthesia was induced with ketamine (Ketamidor; Chanelle, UK) (2.5 mg/kg IV) and diazepam (Diazepam; Hameln, UK) (0.05 mg/kg IV) behind a squeeze door in the induction box. Endotracheal intubation (Kruuse, UK) was performed before hoisting the horse to the operating table, following which the endotracheal tube was connected to a circle breathing system, which also enabled the provision of controlled mechanical ventilation (JD Bird Large Animal Anaesthetic Machine; JD Medical, Arizona, US). Isoflurane (IsoFlo; Zoetis, UK) was delivered in 100% oxygen to maintain general anaesthesia. Instrumentation included electrocardiography, pulse oximetry, invasive blood pressure monitoring, capnography and inspired and expired anaesthetic agent concentration (Datex S/5; GE Healthcare, UK). If surgical stimulation occurred (abrupt elevation in mean arterial pressure, nystagmus or head/neck/limb movement), then additional ketamine (0.2–0.4 mg/kg) was administered and the delivered isoflurane concentration was reassessed at the anaesthetist's discretion. Intravenous fluid therapy (Hartmann's solu-

Figure 2. Owner-assessed temperament score

Numerical rating scale	Score
1. How amenable is your horse to lead around the yard at home?	
1 2 3 4 5 1 = Dangerous to lead 5 = Very calm, no real response to surroundings	
2. How relaxed is your horse when schooling?	
1 2 3 4 5 1 = Very easily spooked, often multiple times in one period 5 = Very calm, very rarely spooks	
3. How relaxed is your horse when hacking?	
1 2 3 4 5 1 = Very easily spooked, often multiple times in one period 5 = Very calm, very rarely spooks	
4. How does your horse respond to being isolated (left on a yard or in a field with no companions)?	
1 2 3 4 5 1 = Frantic, will not settle 5 = No change to normal behaviour	
5. How well does your horse load into a box or trailer?	
1 2 3 4 5 1 = Requires multiple attempts/multiple people in order to load 5 = Walks straight on every time	
6. Does your horse have any stereotypies such as box walking or wind sucking?	
1 2 3 4 5 1 = Multiple present and/or severe 5 = None present	
Question 7 - Does your horse show any undesirable traits such as biting, kicking or rearing?	
1 2 3 4 5 1 = Multiple present and/or severe 5 = None present	
Total score	/35

Figure 3. The simple descriptive scale for scoring recovery (R1)

5 — No ataxia, no struggling, stood up at first attempt as if fully conscious

4 — Slight ataxia and staggering, stood at first or second attempt, no serious instability

3 — Some staggering and ataxia, a few unsuccessful attempts to stand, ataxic immediately after standing up

2 — Excitement, paddling when recumbent, several attempts to stand, severe ataxia once standing, may fall, danger of self-inflicted injury

1 — Excitement when recumbent, persistent unsuccessful attempts to stand, severe ataxia and falls once standing, aimless walking, high risk of self-inflicted injury

0 — Very violent ('wall of death'), self-inflicted injury, prolonged struggling, or unable to stand 2 hours after the end of anaesthesia

Adapted from Young and Taylor (1993)

tion; Animalcare, UK) was administered (5–6 ml/kg/hour) to all horses. Intra-operative loco-regional anaesthetic techniques were used at the surgeon and anaesthetist's discretion.

Recovery

On completion of surgery, the horse was hoisted to the recovery box and placed in lateral recumbency with the feet towards the wall. Head and tail ropes were attached and supplemental oxygen was provided via a Hudson's demand valve (JD Medical, AZ, USA). This also enabled provision of artificial breaths if spontaneous breathing did not resume promptly after placement in lateral recumbency. A nasopharyngeal tube was placed and once spontaneous breathing was regular, endotracheal extubation was performed. A single operator controlled the ropes (XX) and another operator (YY) restrained the horse's head to discourage premature attempts to rise. Horses were restrained until they lay quietly or could no longer be physically prevented from rising. Xylazine (IV) (Nerfasin; Dechra, UK) (0.2 mg/kg) was administered to all horses once spontaneous breathing had resumed and palpebral reflex was brisk. Additional xylazine was administered if there was rapid nystagmus or indications of rapid emergence from general anaesthesia. Total xylazine dose administered was recorded. Recoveries were recorded using closed circuit television (CCTV) and scored by a blinded veterinary surgeon (ZZ), using a simple descriptive scoring system (Young and Taylor, 1993) (*Figure 3*) and the Edinburgh system (Vettorato et al, 2010) (*Figure 4*) to generate two recovery scores (R1 and R2).

Statistical analysis

Data on the following were included in the statistical analysis:

- Age
- Bodyweight
- Breed
- Sex
- Surgical procedure
- Recumbency
- Two veterinary-assessed temperament scores (T1 and T2)
- Owner-assessed temperament score
- Pre-cannula romifidine, pre-induction romifidine dose and total romifidine dose
- Intra-operative ketamine administration
- Intra-operative movement
- Anaesthetic duration

Figure 4. The Edinburgh system for scoring recovery (R2)

	Number	S value		Number	Multipled by	T value
Attempts to stand	1	1	Mid fall	1 2 3 4 5	x2	
	2	1.5	Hard fall	1 2 3 4 5	x5	
	3	1.8	Scrabbles	1 2 3 4 5	x2	
	4	2.5	Mild wall impact	1 2 3 4 5	x3	
	5 to 9	4	Hard wall impact	1 2	x10	
Gut busting fall	1	2	Leg entrapment	1 2 3 4	x5	
	2 or more	6	Nasal entrapment	1 2	x10	
Critical event	1	2	Relapse to lateral	1 2	x10	
	2 or more	6				
	Total S value				Total T value	

Adapted from Vettorato et al (2010)
Recovery score = (100—total T value)/total S value with the higher the number the better the quality of recovery.
A gut busting fall is defined as a violent collapse with abdominal impact.
A critical event is a 'head on' impact with the wall or an attempt to stand with the leg at 90° to the neuraxis.
A scrabble is where a horse obviously tries to stand, but fails to lift its abdomen off the floor, so only succeeds in sliding forward a small distance across the floor.

- Xylazine dose administered in recovery, time to first movement in recovery
- Time to standing
- Recovery scores from the simple descriptive system (R1) and Edinburgh system (R2).

Statistical analyses were performed using Minitab statistical software (Minitab; UK). Percentage agreement analysis and Cohen's Kappa coefficient were used to analyse scorer agreement. The correlation between temperament scores and recovery scores and other relevant variables including age, bodyweight, pre-cannula romifidine dose, pre-induction romifidine dose, total romifidine dose, intra-operative ketamine requirements, anaesthetic duration, time to first movement in recovery, xylazine dose administration in recovery and time to standing were analysed by calculating the Pearson's correlation coefficient. The Mann-Whitney U test was used to compare groups of non-parametric data. The Chi-squared test for association was used for categorical data. Data were assessed for normality using Anderson Darling normality test and normally distributed data are reported as mean +/- standard deviation, while non-parametric data are reported as median (range). Statistical significance was assigned when $p<0.05$.

Results

Data from 30 horses were included in the analysis. The sample consisted of 12 mares and 18 geldings of mixed breeds (10 Warmblood, four Thoroughbred, seven Cob, three Connemara ponies and six Irish Draught horses). The sampled horses were undergoing orthopaedic (17), neurectomy (4), airway (5) or soft tissue (4) elective procedures, in dorsal (24), left lateral (2) or right lateral recumbency (4). Intra-operative loco-regional anaesthesia was used in six horses. Temperament scores, R1 and R2, did not differ between sexes, breeds, surgical procedures or recumbency positions. R1 and

Table 1. Demographic data, temperament scores, anaesthetic drug administration, recovery timing and recovery scores for 30 horses undergoing elective surgery under isoflurane anaesthesia

Variable	Mean +/- standard deviation
Age (years)	8 (3–20)
Bodyweight (kg)	555.1 +/- 72.8
Temperament score 1 (T1)	24 (18–25)
Temperament score 2 (T2)	24 (17–25)
Combined temperament score (T1+T2)/2)	24 (17.5–25)
Pre-cannula romifidine (mg/kg)	0.02 (0–0.05)
Pre-induction romifidine (mg/kg)	0.06 +/- 0.01
Total romifidine (mg/kg)	0.07 +/- 0.02
Intra-operative ketamine (mg/kg)	0.36 (0–1.73)
Anaesthetic duration (minutes)	116 +/- 38
Time to first movement in recovery (mins)	25 (5–40)
Xylazine administration in recovery (mg/kg)	0.35 +/- 0.13
Time to standing (minutes)	31 +/- 7
Recovery Score 1 (R1)	3 (1–4)
Recovery Score 2 (R2)	91 (8.33–100)
Owner-assessed temperament score	29.5 (20–35)

Table 2. Pairwise Pearson's correlation between combined temperament scores, R1 and 2 and demographic variables, anaesthetic drugs and recovery characteristics in 30 horses after elective surgery under isoflurane-anaesthesia

Pairwise Pearson's correlation	Correlation	95% CI for *p*	*p*-value
Combined temperament score			
Age	0.32	(-0.04, 0.61)	0.08
Bodyweight	0.09	(-0.26, 0.44)	0.60
Pre-cannula romifidine	-0.27	(-0.57, 0.10)	0.15
Pre-induction romifidine	**-0.36**	(-0.63, -0.007)	**0.047**
Total romifidine	**-0.38**	(-0.65, -0.03)	**0.035**
Intra-operative ketamine	-0.16	(-0.49, 0.20)	0.38
Anaesthetic duration	0.22	(-0.14, 0.54)	0.23
Time to first movement in recovery	0.04	(-0.30, 0.38)	0.85
Xylazine administration in recovery	-0.09	(-0.43, 0.27)	0.64
Time to standing	0.25	(-0.12, 0.56)	0.18
R1	-0.03	(-0.38, 0.33)	0.86
R2	-0.07	(-0.42, 0.29)	0.69
Recovery score 1			
Age	-0.08	(-0.43, 0.28)	0.65
Bodyweight	0.03	(-0.33, 0.38)	0.87
Pre-cannula romifidine	-0.21	(-0.52, 0.16)	0.26
Pre-induction romifidine	-0.34	(-0.62, 0.015)	0.06
Total romifidine	-0.33	(-0.61, 0.03)	0.07
Intra-operative ketamine	-0.31	(-0.60, 0.052)	0.09
Anaesthetic duration	**-0.35**	(-0.63, -0.002)	**0.049**
Time to first movement in recovery	**0.36**	(0.01, 0.64)	**0.045**
Xylazine administration in recovery	-0.06	(-0.41, 0.30)	0.73
Time to standing	0.30	(-0.07, 0.59)	0.11
R2	**0.72**	(0.49 – 0.86)	**< 0.001**
Recovery score 2			
Age	-0.16	(-0.48, 0.21)	0.41
Body weight	0.07	(-0.30, 0.41)	0.72
Pre-cannula romifidine	-0.29	(-0.59, 0.07)	0.11
Pre-induction romifidine	-0.20	(-0.52, 0.17)	0.29
Total romifidine	-0.31	(-0.6, 0.05)	0.09
Intra-operative ketamine	-0.25	(-0.56, 0.11)	0.17
Anaesthetic duration	**-0.41**	(-0.67, -0.07)	**0.02**
Time to first movement in recovery	0.19	(-0.18, 0.51)	0.3
Xylazine administration in recovery	-0.28	(-0.58, 0.09)	0.13
Time to standing	0.07	(-0.29, 0.41)	0.71

Bold used to denote where statistical significance was assigned ($p<0.05$)

R2 scores were not different between the horses that did and did not receive intra-operative loco-regional anaesthesia.

Temperament scoring

There was moderate agreement between scorers (Cohen's Kappa co-efficient 0.42) and 55% agreement. The mean of T1 and T2 was used to generate a combined temperament score for each horse (*Table 1*). Horses were divided into two groups according to temperament: group A (n = 13) (those with one or no deviations from scoring maximum points in all dimensions of the temperament test and a combined temperament score ≥24.5) and group B (n = 17) (those with more than one deviation in any dimension of the temperament score and a combined temperament score ≤24.0).

Effect of Temperament

There was a weak negative correlation between combined temperament score and pre-induction romifidine and total romifidine dose (-0.36; p=0.047; -0.38; p= 0.035) (*Table 2*).

Horses aged over 6 years had a significantly higher combined temperament score than those aged under 6 years (p= 0.01).

When horses were divided into two groups according to combined temperament score (group A and B), there were no differences between procedure type (p=0.35) or any other measured variable between the groups (*Table 3*).

Recovery scores

There was a strong positive correlation (r=0.87; p<0.001) between R1 and R2. There was no correlation between combined temperament score and R1 or R2. There was no difference in recovery score between group A and group B using either recovery score (R1 p=0.3; R2 p=0.34).

Both R1 and R2 were moderately negatively correlated with anaesthetic duration (-0.35, p=0.049; -0.41, p=0.02) (*Table 2*). R2 was significantly higher (better quality) in horses where general anaesthesia time was ≤90 minutes compared with >91 minutes (p=0.03). R1 was weakly positively correlated with time to first movement (r=0.36, p=0.045) (*Table 2*) and R1 values were significantly higher (better quality) in horses where time to standing was ≥30 minutes compared to those where time to standing was <30 minutes (p=0.01).

Four horses moved their limbs intra-operatively. There was no significant difference in combined temperament score, R1 or R2 in horses that did and did not move. Romifidine 0.02 (0.015–0.05) mg/kg IV was required for IV cannula placement in 18 (60%) horses. There was no difference in combined temperament score, age, breed, or sex between those horses which did and did not require pre-cannula romifidine.

A total of 26 owners completed the questionnaire. There was no correlation between owner-assessed temperament score and any other variable. There was a trend towards a weak positive correlation between owner-assessed temperament score and combined temperament score but statistical significance was not reached (r=0.38, p = 0.054).

Discussion

There was no recorded effect of temperament on recovery score in the sample population of horses using the scoring systems de-

scribed. The study results agree with an earlier study in which sedation, manual restraint of horses and a head rope were also employed during recovery (Donaldson et al, 2000). In two other studies, where a correlation between temperament and recovery quality was detected, horses were given sedation but were not physically restrained or assisted with ropes (Leece et al, 2008; Hector et al, 2020).

Temperament scoring systems in three previous studies were based on a simple descriptive score of behaviour including the categories calm, apprehensive, restless, slightly nervous, frightened/very nervous, aggressive or unruly/unhandled (Donaldson et al, 2000; Leece et al, 2008; Hector et al, 2020). In the present study, the authors endeavoured to design a temperament score to assess response to an unfamiliar environment, sound and human intervention, as these typically occur in the recovery period. Additionally, the use of two scorers was employed to reduce bias.

The recovery scores selected have been deemed suitable for assessing recovery from general anaesthesia in horses (Vettorato et al, 2010). Improved recovery quality has been associated with xylazine administration after isoflurane anaesthesia (Matthews et al, 1998; Ida et al, 2013) and the provision of head and tail ropes may also improve recovery (Arndt et al, 2019). All horses in the present study were given xylazine in recovery and were assisted with head and tail ropes which may have obscured the influence of temperament on recovery quality.

The authors detected a negative correlation between temperament scores and pre-induction romifidine dose. Horses with a lower temperament score were likely to require a higher romifidine dose to provide adequate sedation for safe induction of general anaesthesia. The finding that horses older than 6-years-of-age had better temperament scores may reflect the effect of training and experience in unfamiliar environments, which may be more developed in older horses resulting in calmer behaviour in the hospital.

Both recovery scores were negatively correlated with anaesthetic duration, which is in agreement with the findings of other studies (Young and Taylor, 1993). Longer times to first movement and standing resulted in improved recovery scores when R1 was used, which supports the previous suggestion that longer recovery times allow 'brain concentrations of inhalational agents to be lower, thus avoiding uncoordinated and unsuccessful attempts to stand' (Young and Taylor, 1993).

Several limitations were present in the study, most of which were largely associated with its clinical nature. The sample size was small and different surgical procedures, breeds and ages of horses were involved. A larger and more standardised population of horses may be required to detect more subtle associations between temperament and recovery. Cannula placement was not carried out by the same technician, which may have caused variation in the requirements for pre-cannula romifidine in some horses. The time between pre-cannula romifidine and pre-induction romifidine was not standardised or recorded. While the total romifidine dose was calculated for each horse, the time frame during which it was administered was not standardised. Surgical procedures were broadly categorised but varied in their invasiveness which may have affected recovery quality. Local anaesthetic techniques, which were also not standardised, may have also affected recovery quality. The distribution of temperament scores was narrow, meaning that either most of the study population had good temperaments or the scoring system was unable to distinguish worse temperaments, making it potentially harder to detect an influence on recovery quality.

Table 3. Anaesthetic drug administration and recovery characteristics for 30 horses undergoing elective surgery under isoflurane anaesthesia.

Parameter	Group A (n = 13)	Group B (n = 17)	*p*-value
Age (years)	10.0	6.5	0.19
Weight (kg)	550.0	542.5	0.78
Pre-cannula romifidine (mg/kg)	0.019	0.017	0.75
Pre-induction romifidine (mg/kg)	0.057	0.06	0.16
Intra-operative ketamine (mg/kg)	0.31	0.53	0.08
Anaesthetic duration (minutes)	120.0	111.5	0.48
Time to first movement (minutes)	25.0	25.0	0.25
Recovery xylazine (mg/kg)	0.31	0.37	0.17
Time to standing (minutes)	30.0	30.0	0.23
Recovery Score 1 (R1)	60.0	60.0	0.69
Recovery Score 2 (R2)	97.0	76.84	0.42
Owner-assessed temperament score	29.5	29.5	0.70

Horses were divided into two groups according to temperament: group A (*n*=13) consisted of those with one or no deviations from scoring maximum points in all dimensions of the temperament test, with a combined temperament score ≥24.5. Group B (*n*=17) consisted of those with more than one deviation in any dimension of the temperament score (combined temperament score ≤24.0)

Conclusion

This study did not identify an association between temperament score and recovery score in horses following elective surgery under isoflurane anaesthesia. A larger sample size of horses with a wider range of temperaments may be required to detect more subtle differences in recovery score. Furthermore, the administration of xylazine, manual discouragement of premature attempts to rise, and head and tail rope assistance in recovery may have obscured the influence of temperament on recovery in the sampled population of horses. EQ

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KEY POINTS

- Peri-anaesthetic mortality in horses occurs most frequently in the recovery period, which is the period that is most difficult to control.
- There are many factors influencing the postoperative recovery period and further research is both warranted and ongoing.
- The present study found no association between temperament score and recovery in the sample population of 30 horses having undergone elective surgery under isoflurane anaesthesia.
- Limitations of the present study included the limited sample size and limited range of temperaments, so further research may be needed to determine the more subtle connections between temperament and recovery.