



Bethany Browse Bsc (hons) Veterinary Nursing Science

Bethany qualified as a veterinary nurse in 2015 from Hartpury College. She has previously worked in a large first opinion and referral hospital, and now works at Cave Vet Specialists, a large referral centre in Somerset. She is passionate about veterinary nursing, with a special interest in inpatient nursing.

Email: Bethany.Browse@cave-vet-specialists.co.uk

Nursing the feline neurological patient with a traumatic brain injury

Bethany Browse Bsc (hons) Veterinary Nursing Science

Cave Veterinary Specialists, UK

ABSTRACT: Neurological disorders in cats require careful and considered nursing to increase the possibility of a full recovery. Nurses and clinicians are often daunted by nursing cats due to their specific behavioural responses and needs and the complex nature of neurological disorders. Nursing plays an important role in ensuring effective care is delivered across all areas of patient care, including mental wellbeing. Cat friendly handling techniques and personalised care plans are important to reduce stress in feline patients and should be implemented at all stages of hospitalisation.

Keywords: feline; cat friendly; neurological; nursing care

Introduction

Patients with a neurological disease are often difficult to manage in practice and daunting to both the clinicians and nursing team. These problems can evolve with feline patients due to their sensitive nature and heightened fight or flight response. These responses are essential to survival but in a veterinary clinic they can cause a variety of adverse effects. Nursing care can have an impact in ensuring the best possible outcome for the patient.

The incidence of cats presenting with neurological symptoms to a primary care practice has been reported to be as low as 10%, however, this does not lessen the importance of knowing how to nurse these patients (Nakamoto et al., 2019). Common feline neurological conditions may include:

- Seizures-possible causes are neoplasia, infection and traumatic brain injury
- Meningitis
- Vestibular disease
- Cognitive dysfunction
- Intervertebral disc disease
- Hyperaesthesia.

Cats may present to the clinic with a variety of symptoms, dependent on the condition, including behaviour changes, circling, seizures, ataxia, head tilt, nystagmus, abnormal spinal reflexes, paralysis, and urinary incontinence. In the article we will be focusing on traumatic brain injuries (TBI).

Nursing considerations

The role of the registered veterinary nurse (RVN) in practice is to act as an advocate for the patient recovering from illness, injury or surgery whilst ensuring the cat feels safe and secure by minimising stress in the environment. It has been found that the involvement of RVN's in cases will help enhance care, improve efficiency and productivity in feline case management (Davis, 2015). Nurses have a crucial role to play in working alongside clinicians in deciding treatment plans and highlighting areas of concern. Nursing care plans should be created and implemented to ensure no area of the patient's wellbeing and care are overlooked. Cats are not just small dogs and so their nursing care should be tailored to the patient and account for the specific needs of our feline patients and each individual. The use of validated models e.g. The ability model may also assist in a structured approach.

Mentation

Mentation should initially be assessed on admission to have a baseline to then decide if the patient has shown any deterioration or improvement, it is based upon:

- Response to auditory stimuli
- Response to Touch
- Ability to move around
- Showing interest in surroundings
- Reflexes

It should be noted whether the patient is alert, obtunded, stuporous or comatose. Assessments should be carried out initially every ten minutes until stabilisation, the clinician should then advise on further monitoring needs. The modified Glasgow Coma Scale (mGCS) can be utilised as a tool to assist in monitoring. It is based on a 1-6 scale, with 6 being normal and 1 being severely abnormal. The results of this can be used to monitor progression of neurologic deficits, effects of therapeutic measures and to determine prognosis (Lapsley et al., 2019).

For seizing patients an emergency plan should be created for them, this should be written in the hospital notes and on a laminated card which can be attached to the front of the kennel allowing faster interventions if required. It should include:

- Patient details
- Clinician
- Medication and dose that should be given if the patient seizes.

Nutrition

Cats that have suffered from a TBI may struggle to eat independently due to changes in mentation. Cats are prone to stress and a change in their feeding regime is a significant trigger for this (Carney et al., 2012). In the first forty-eight hours of hospitalisation nutrition may not be at the top of the priority list but early implementation of a nutritional plan is vital (Perea, 2008).

Ideally the cat should be offered the same diet that they eat at home in a shallow, non-reflective bowl (Figure 1). However, this may not be medically appropriate, for example if the patient is fed dry biscuits at home but is unable to chew. Instead it may be beneficial to offer a small portion of wet palatable food that the cat would be able to lap at to evaluate whether the patient is able to eat. The food may require water added to it or warmed up to body temperature to make it more palatable. If appropriate, an owner visit may encourage the cat to eat.



Figure 1. Hospitalised cat being hand fed (Photo courtesy of ISFM).

Table 1. Types of nutritional intervention.

| Types of Nutritional Intervention | Pros | Cons |
|---|--|--|
| Appetite Stimulants | Potential rapid improvement in appetite | Cannot be used long term |
| Naso-oesophageal feeding tube | Easy to place | Cause coughing and stimulate sneezing reflex, which can lead to an increase in ICP Safety reflexes for feeding cannot be relied upon in patients with reduced mentation |
| Oesophagostomy, gastrostomy or jejunostomy feeding tubes | Tolerated well by cats Can be used long term | Require general anaesthetic to place Higher rate of complications |
| Total Parenteral Nutrition | Reliable means of ensuring nutritional needs met | Requires proficiency in jugular or long-stay catheter placement Requires careful monitoring Not suitable if concern regarding raised ICP Expensive |

Food should not be left in the cage for prolonged periods of time as this may cause food aversion, signs include salivating, licking lips and vomiting.

For patients that are unable to eat, alternative nutritional support should be considered (Table 1). The RVN plays a key role alongside the vet in deciding the best course of action on how to ensure the patient receives its daily nutritional requirements.

Hydration

Patient hydration is especially important and can be sustained in a variety of ways. Routinely water bowls should always be available to patients to ensure hydration, these should be regularly renewed, and water consumption should be monitored if there are concerns regarding hydration. A study by Zanghi et al. (2018) has shown that 'nutritionally-enriched' water can improve water intake. Cats who eat wet food will achieve a proportion of their daily hydration needs through eating, when dehydrated a possibility may be to offer wet food to see if this improves hydration levels.

Feline patients who are suffering from a TBI may not be mentally capable of drinking or leaving a water bowl in the cage could risk drowning. These patients will often require a feeding tube to ensure nutrition, and so water can be given as part of their daily feeding regime. Water should already be used in the routine flushing of food down the tube, this should be included in calculations for water consumption. IVFT (intravenous fluid therapy) is a common means of ensuring hydration in feline patients. It is normally administered at a rate of 1-2ml/kg/hr but this can be altered on a case-by-case basis. It is important to monitor heart rate and respiratory rate regularly to ensure that the patient is not over infused.

Defaecating and urinating

It is important that feline patients are provided with a similar substrate for elimination to that used at home to encourage normal routines. The litter tray should be appropriate for their size and mobility and placed as far away as possible from feeding sources and the sleeping area.

TBI's can often lead to changes in feline urinary behaviour (Neilson, 2003). Seizing cats will often urinate involuntarily, to prevent urine scalds bedding needs to be checked regularly to ensure the patient is not lying on a urine-soaked bed. VETBED's should be used to help wick away fluids from the patients skin. The use of incontinence sheets beneath this should be considered as can assist in the collecting and measuring of urine produced-as they can be weighed before and after use. Ataxic cats might also urinate on their bed as they are unable to climb into a litter tray and posture for urination.

Respiration

On arrival, triage should take place, firstly, the airway should be checked for patency. During a seizure cats may experience hypersalivation and chomping down on their tongue causing bleeding and will require help to clear their mouth. Oxygen can be delivered to ensure optimal tissue perfusion, the patient's condition and demeanour will impact which route is best. Flow by oxygen via a mask or placing the cat in an oxygen cage can be used if the patient is conscious, or if unconscious intubation and mechanical ventilation may be necessary (Sines, 2018). It is recommended to use an eye lubricant on patients in intensive care, especially those receiving oxygen to prevent the eyes becoming dry and ulcerated, this should be done a minimum of every four hours, but can be performed as often as necessary (Chandler et al., 2013) (Figure 2).

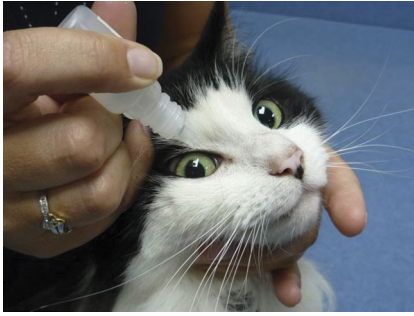


Figure 2. Eye lubricant being applied (Photo courtesy of VetWest).

In patients who have suffered a TBI it is imperative to minimise or reverse any changes that have occurred to the brain. It is important that blood flow and oxygenation to the brain is optimal whilst trying to avoid a sudden increase in intracranial pressure (ICP). Pulse oximetry can be used to ensure oxygen saturation levels are appropriate (Opperman, 2014).

Once stabilised the patient should be monitored closely. This should be done at least twice daily but, in some cases, may need to be performed hourly if the patient is at risk of deteriorating or there are concerns with the patient's ability to support respiratory function. Stress can play an important part in respiratory distress so their environment should be kept as quiet as possible (see Figure 3).

Circulation

Heart rate and blood pressure should be monitored to ensure blood flow to the brain is being maintained. Monitoring of arterial blood pressure should be performed whenever possible, in cases of hypertension due to ICP, Mannitol should be used as a first

line treatment (DiFazio & Fletcher, 2013). Intravenous access should be obtained to allow administration of IVFT and prescribed treatment (Figure 4).

The clinician may request blood sampling to monitor blood glucose, electrolytes and acid base status. Blood gases may be monitored as pulse oximetry isn't always accurate in patients with severe head trauma (Opperman, 2014). Options for venepuncture include the jugular, cephalic or medial saphenous veins. In feline patients the latter may be best requiring the least restraint, and shaving, which can increase stress levels and alarm the cat, is not normally required. In patients where ICP is a risk, such as those suffering from a TBI, the jugular vein should not be used as raising the vein will increase pressure to the head, which can cause a raise in ICP (Holowaychuk & Ostenkamp, 2012).

Maintain body temperature

Seizing patients will often be hyperthermic due to increased muscle activity so it is important for temperature to be monitored, if above 40°C cooling methods should be initiated and continued until normal temperature is reached (38.1-39.2) (Felder, 2016). These may include:

- Cool IVFT
- Ice packs; ensure they are wrapped in a tea towel or similar before applying
- Fans in front of the kennel.

To prevent rebound hypothermia the temperature should be closely monitored, every 15 minutes initially, the frequency can then be reduced once stabilised and the temperature is within the normal range. Patients who develop brain damage

struggle to maintain their temperature due to damage in the thermoregulatory centres in the brain, so it is important to monitor temperature at least twice daily (Sines, 2018). Patients who are paralysed will not be able to move around and therefore their temperature might be low, this can be rectified using a knitted jumper, thick bedding, a yoga mat against the cold bottom of the kennel etc. This is especially important in underweight, geriatric, or paediatric patients and specific breeds with little hair covering. Heat pads should not be used as patients are not always able to move away from the heat source which can lead to burns.

Mobilising

Patients who are admitted for TBI's often display mobility issues, varying from ataxia, paralysis to comatose. These patients should be handled carefully to prevent any sudden changes in ICP, respiratory arrest or aspiration pneumonia.

The cat should be hospitalised in a cage that is conducive to easy viewing and monitoring. If the cat is immobile it is recommended to place padding under the shoulders so any reflux or saliva will flow out of the mouth and away from the airway to prevent aspiration, for this to happen the nose must be lower than the thoracic inlet. However, in cases where ICP is a concern it might be suggested to elevate the head to reduce cerebral blood volume, nurses must ensure this does not cause kinking in the neck. In these cases it is important for the nurse and clinician team to discuss the priority of care. To reduce the occurrence of pressure sores or respiratory depression the patient should be turned ideally every four hours.

Immobile patients should receive physiotherapy, this should be discussed with the clinicians and a plan decided on (Figure 5). This is to promote circulation, prevent muscle wastage, provide pain relief and can be a relaxation exercise in some feline patients. Physiotherapy is becoming

Tips for maintaining a stress-free environment for cats:

- Dogs and cats are kept in separate wards
- Patients are kept out of each other's field of vision
- Low level lighting
- Personalised cage environment according to their needs and normal home environment
- Provide familiar bedding, toys, food and litter from home if possible
- Use adjustable temperature setting to create a comfortable climate
- Provide a hiding place

Figure 3. Tips for maintaining a stress-free environment for cats.

Tips for Feline Friendly IV catheter placement:

- Place in a quiet and calm environment
- Use large, thick towels or fleece for restraint
- Use small, quiet fur clippers
- Use topical application of local anaesthetic creams or sprays to desensitise the area
- Don't apply tape or bandages too tightly

Figure 4. Tips for feline friendly IV catheter placement.



Figure 5. Cat having passive range of motion exercises performed on (photo courtesy of Duong, L, University of Florida).

increasingly popular for cats with neurological conditions, potentially due to an increase in specialist practitioners or owner compliance and demand (Sharp, 2012). The ISFM guidelines for cat friendly care have aided better understanding and care in practice by reducing feline aggression and stress in practice, allowing for treatment plans like physio to be more readily performed (Halkett & Romano, 2017). Once mobile the cat should be encouraged to have some supervised time outside its cage to roam within the confines of a room. This has been shown to improve appetite and wellbeing and speed up recovery (Carney et al., 2012).

Expressing normal behaviours

Cats should be encouraged to express their normal behaviour. It is important to discuss normal behaviour and routine with the owner to improve the likelihood of the cat expressing them.

The nurse plays a vital role in getting to understand each patient on a personal level to improve their care whilst hospitalised. Some cats with TBI's may be hospitalised for several days and as they recover it is vital to ensure they are as stress free as possible. This can be achieved by:

- Grooming and cleaning patients to improve mental and physical



Figure 6. Cat provided with in kennel hiding place (photo courtesy of cat friendly clinic).



Figure 7. Cat with soft buster collar on (photo courtesy of DenGuy).

wellbeing, patient bonding as well as hygiene.

- Allowing at least four hours of uninterrupted time overnight to sleep and rest
- Supplying an inside-the-cage hiding place such as a cardboard box, carrier or cat fort will allow them to hide away and feel safe enough to rest (Figure 6).
- Using a soft buster collar rather than a hard one will be less restrictive for their natural movement and sleeping posture (Figure 7).
- Allowing them to mark their territory with facial pheromones, this is done by facial rubbing on bedding, walls, doors, and objects in the environment. Consequently, leaving some residual bedding or objects in the clean cage will allow the cat to return to an environment that they know is their territory.
- Using toys can enhance recovery through improved mental and physical wellbeing. When selecting a toy consider the reason the patient is hospitalised, for example if it has had brain trauma and is now blind, use a toy that makes a noise.

Pain relief

When any traumatic injuries are present it is reasonable to assume that pain is also present, so pain relief is vital. The clinician should decide the pain relief plan, but it is important for nurses to regularly evaluate pain levels and discuss potential changes with the team. With any changes the response should be carefully monitored, especially with regards to opioid drugs due to their potential side effects (Opperman, 2014).

Summary

Nurses play a vital role in assisting clinicians to ensure patients make a full recovery. For neurological patients there are many care points that need to be considered, all of these should involve feline friendly handling practices to reduce stress and anxiety for the patient.

Disclosure statement

No potential conflict of interest was reported by the author.

References

Carney, H.C., Little, S., Brownlee-Tomasso, D., Harvey, A.M., Mattox, E., Robertson, S., Rucinsky, R., & Manley, D.S. (2012). AAFP and ISFM feline-friendly nursing care guidelines. *Journal of Feline Medicine and Surgery*, 14(5), 337–349. <https://doi.org/10.1177/1098612X12445002>

Chandler, J. A., Van Der Woerd, A., Prittie, J. E., & Chang, L. (2013). Preliminary evaluation of tear production in dogs hospitalized in an intensive care unit. *Journal of Veterinary Emergency and Critical Care*, 23(3), 274–279. <https://onlinelibrary.wiley.com/doi/full/10.1111/vec.12055>

Davis, H. (2015). Nursing care: Care of the perioperative patient. *The Veterinary Clinics of North America. Small Animal Practice*, 45(5), 1029–1048. <https://www.sciencedirect.com/science/article/pii/S0195561615000753>. <https://doi.org/10.1016/j.cvsm.2015.05.001>

DiFazio, J., & Fletcher, D.J. (2013). Updates in the management of the small animal patient with neurologic trauma. *Veterinary Clinics of North America: Small Animal Practice*, 43(4), 915–940. [https://www.vetsmall.theclinics.com/article/S0195-5616\(13\)00054-5/pdf](https://www.vetsmall.theclinics.com/article/S0195-5616(13)00054-5/pdf). <https://doi.org/10.1016/j.cvsm.2013.03.002>

Felder, S.E. (2016). Normal rectal temperature ranges. Retrieved for MSD manual. <https://www.msdsmanual.com/special-subjects/reference-guides/normal-rectal-temperature-ranges>

Halkett, E.V.C., & Romano, L. (2017). Rehabilitation of the feline patient: physiotherapy treatment as part of a multidisciplinary team approach. *Veterinary Nurse*, 8(10), 26–31. <https://eds.a.ebscohost.com/eds/detail/detail?vid=2&sid=50edf571-6ec7-4ad2-9623-d60a8a21346c%-40sessionmgr4008&bdata=JnNpdGU9ZWRzLWxpdmU%3d#AN=ejs44258357&db=edo>

Hollowaychuk, M. K., & Ostenskamp, S. M. (2012). Care of the patient with intracranial disease. In *Advanced monitoring and procedures for small animal emergency and critical care*, 789–798. Wiley and Sons Ltd.

Lapsley, J., Hayes, G. M., & Sumner, J.P. (2019). Performance evaluation and validation of the Animal Trauma Triage score and modified Glasgow Coma Scale in injured cats: A Veterinary Committee on Trauma registry study. *Journal of Veterinary Emergency and Critical Care*, 29(5), 478–483. <https://onlinelibrary.wiley.com/doi/full/10.1111/vec.12885>

Nakamoto, Y., Uemura, T., Hasegawa, H., Nakamoto, M., & Ozawa, T. (2019). Feline neurological diseases in a veterinary neurology referral hospital population in Japan. *The Journal of Veterinary Medical Science*, 81(6), 879–885. <https://doi.org/10.1292/jvms.18-0447>

Neilson, J. C. (2003). Feline house soiling: elimination and marking behaviours. *The Veterinary Clinics of North America. Small Animal Practice*, 33(2), 287–301. <https://www.sciencedirect.com/science/article/pii/S0195561602001298?via%3Dihub>

Opperman, E. (2014). Head trauma in the feline patient—an update. *Veterinary Nursing Journal*, 29(6), 194–197. <https://www.tandfonline.com/doi/full/10.1111/vnj.12147?scroll=top&needAccess=true>

Perea, S. C. (2008). Critical care nutrition for feline patients. *Topics in Companion Animal Medicine*, 23(4), 207–215. <https://readerelsevier.com/reader/sd/pii/S1938973608000731?token=62260BCA3004410936F331F0CA16B666B996C8CE47D41C6EF34B708D29989F2E2705CE5E427E2E87A5573CA884BF3D6C>. <https://doi.org/10.1053/j.tcam.2008.08.001>

Sharp, B. (2012). Feline physiotherapy and rehabilitation: I. Principles and potential. *Journal of Feline Medicine and Surgery*, 14(9), 622–632. <https://journals.sagepub.com/doi/full/10.1177/1098612X12458209>. <https://doi.org/10.1177/1098612X12458209>

Sines, R. (2018). Seizures in companion animals. *Veterinary Nursing Journal*, 33(1), 26–29. <https://www.tandfonline.com/doi/full/10.1080/17415349.2017.1387413>

Zanghi, B. M., Gerheart, L., & Gardner, C. L. (2018). Effects of a nutrient-enriched water on water intake and indices of hydration in healthy domestic cats fed a dry kibble diet. *American Journal of Veterinary Research*, 79(7), 733–744. <https://avmajournals.avma.org/doi/full/10.2460/ajvr.79.7.733>. <https://doi.org/10.2460/ajvr.79.7.733>