After-hours equine emergency admissions at a university referral hospital (1998–2007): Causes and interventions

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ABSTRACT

Medical records of equine after-hours admissions from 1998 to 2007 are reviewed. Data extracted from the medical records included signalment, reason for admission, pre-admission treatment, clinical presentation, procedures performed, final diagnoses, complications occurring in hospital, length of stay and outcome. Eight hundred and twenty after-hours admissions were available of which 75 % were classified as emergencies. Most horses originated from Gauteng province (82 %), with Thoroughbred, Arabian, and Warmbloods representing 46 %, 10 % and 7 % of horses. Horses had a median age of 7 years and were predominantly male (60 %). Gastrointestinal (64 %) and musculoskeletal (19 %) disorders were the primary reasons for admission. Anti-inflammatories, sedation and antibiotics were given in 51 %, 20 % and 15 % of cases respectively prior to referral. On admission, 23 % of horses had surgical intervention. Intravenous catheterisation (64 %), rectal examination (61 %), nasogastric intubation (56 %), abdominocentesis (33 %) and ultrasonography (19 %) were the procedures performed most frequently. Surgical and medical colics constituted 28 % and 27 % respectively of the overall diagnoses, while piroplasmosis was diagnosed in 5 % of horses. Post-admission complications occurred in <2 % of horses. The median length of stay was 4 days (95 % CI: 1 to 21 days). Overall survival to discharge was 74 %. This study demonstrates that the majority of after-hours equine admissions to a university referral hospital required medical intervention and were mostly due to gastrointestinal disorders. Information obtained from this study can be used in emergency referral planning.

Keywords: emergency medicine, equine hospital, gastrointestinal, musculoskeletal, piroplasmosis, ultrasonography.

INTRODUCTION

After-hours intensive care and emergency treatment has played a significant role in the human health care system and have matured into a large, important speciality in human medicine[1]. Further development of intensive care facilities and patient care has improved diagnostic capabilities and treatment of critically-ill human patients[11], contributing favourably to their outcome[3].

Although advancement in equine emergency medicine has historically lagged behind human medicine, it has more recently shown rapid expansion in veterinary medicine. However, the quality of human emergency medicine and care may still be suboptimal, highlighting the need for further improvement of intensive care facilities[1,6]. Similar to human medicine, equine emergency medicine has evolved into a speciality field in large-animal veterinary medicine[2]. This has reinforced the need for equine emergency disciplines by veterinarians working in both referral and ambulatory settings[8].

Despite the extensive planning, time and financial commitments invested in the establishment and expansion of veterinary facilities worldwide, there still is a paucity of published information on after-hours case profiles, the level of training required and necessary qualifications of clinicians trained in emergency medicine, and critical care at veterinary hospitals. Hardy *et al.*[7] and Dolente *et al.*[5] both reported on emergency admissions to a referral hospital and found colic cases to be the most common emergency admitted. To the authors' knowledge, no reports have been published concerning emergency case profiles or after-hours admissions at a veterinary referral hospital in South Africa. A retrospective study was therefore performed to determine the after-hours equine emergency case load at the Onderstepoort Veterinary Academic Hospital (OVAH) to establish the requirements for emergency medicine.

The objectives of this study were 1) to determine the most frequent reasons for emergency after-hours admissions, and 2) to determine the most common diagnoses, diagnostic and therapeutic procedures performed, length of stay and outcome.

MATERIALS AND METHODS

The medical records of all after-hours equine admissions to the OVAH between 1998 and 2007 were reviewed and classified as an emergency. Records were either retrieved electronically from a computer database system or from patient files. After-hours admissions at the OVAH included all horses admitted between 16:30 and 08:00 during weekdays (Monday to Friday), and horses admitted at weekends between 08:00 to 08:00 (Saturday morning through to Monday morning). If a case received immediate medical intervention upon arrival and was examined by the after-hours clinician on duty, it was classified as an emergency. Non-emergencies were classified as cases that were admitted to the OVAH after hours, but did not need immediate attention and were only assessed by the clinician to whom the case was assigned on the day following admission. This was often the case and can be attributed to the fact that the Equine Clinic of the OVAH is one of only a few referral hospitals within the country. Owing to time constraints and convenience, these horses were admitted over weekends rather than during the week, and were not considered as emergencies.

Information obtained from the medical records included signalment (age, breed

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and sex), geographic location, date of admission, reason for admission, pre-admission therapy, clinical presentation (heart rate, respiratory rate, temperature, capillary refill time (CRT)), diagnostic and therapeutic procedures performed, diagnosis as confirmed in the hospital, complications occurring during hospitalisation, incidental findings, length of stay and outcome.

The reasons for emergency admission to the hospital as given by owners and referring veterinarians were classified as central nervous system (CNS), gastrointestinal (GIT), prematurity, viral infection, piroplasmosis, musculoskeletal, dermatological, respiratory, ophthalmic, cardiovascular, reproductive, renal and no specific reason for referral. The GIT category included all horses with acute abdominal pain, diarrhoea and oesophageal obstruction.

If medical intervention was the only means by which a patient presenting with acute abdomen was treated, the patient was classified as a medical colic. Surgical colic classification included all admissions that required surgical intervention after hours. This included admissions that had surgical intervention as well as those that were humanely destroyed either due to a poor prognosis or due to financial constraints. All procedures and therapies performed on horses admitted after hours were classified as medical intervention, including general wound management and repair. A horse was only classified under surgical intervention if a general anaesthetic was required.

Disorders that were not present at the time of admission but were recorded during hospitalisation were classified as complications, while those disorders that were detected on admission and were not directly associated with the reason for referral were classified as incidental. Outcome was defined as discharged from hospital (short-term survival), death in hospital or euthanasia (either due to a poor prognosis or financial constraints).

Descriptive statistics were performed for the total number of horses admitted after hours and the percentage of horses affected by each individual variable given using MS Excel 2003 and NCSS 2004 (http://www.ncss.com).

RESULTS

During the 10-year period, a total of 7962 horses were admitted to the OVAH of which 1136 horses were admitted after hours. Medical records of 820 horses admitted after hours were reviewed. The remaining records could either not be located at the time of this study or contained incomplete information.
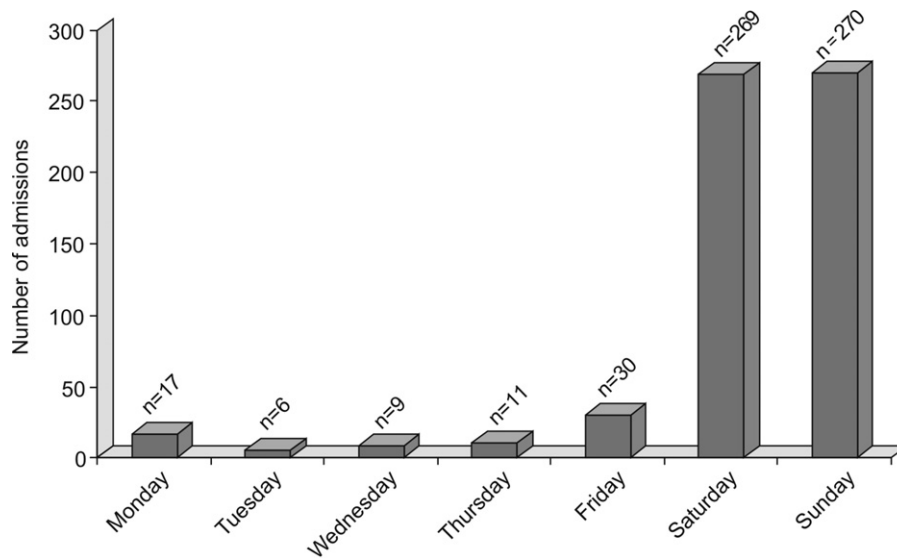

Fig. 1: **Equine after-hours emergency admissions at the OVAH (1998–2007) on a specific day.**

Of the 820 horses, 612 (75 %) were emergency admissions, of which the median age was 7 years (95 % CI: 0.25 to 17 years) and 60 % were male. Eighty-two per cent of emergency admissions were from Gauteng province, 5 % from Limpopo Province and the remaining 13 % from the other provinces in South Africa, as well as Botswana, Namibia and Swaziland, each constituting <5 % of admissions. Thoroughbred horses (46 %) were the most commonly represented breed, followed by Arabian (10 %), and Warmblood (7 %) horses, while Friesian horses, donkeys, Boerperd horses, Quarter horses and Lipizzaner horses, each constituted <5 % of admissions. Admissions occurred most frequently on a Sunday (270/612; 44 %), followed by Saturday

(269/820; 44 %) (Fig. 1). The month of admission, based on 612 emergency after-hours admissions is shown in Fig. 2. The primary reasons for emergency admissions to the OVAH as given by owners and referring veterinarians were GIT ($n = 390$, 64 %) and musculoskeletal ($n = 119$, 19 %). Prior to admission, anti-inflammatory drugs (51 %), sedatives (20 %), intravenous/*per os* (IV/PO) fluid therapy (18 %) and antibiotics (15 %) were most frequently administered. Other treatments included spasmolytics (7 %) and analgesics (7 %), corticosteroids (3 %), vitamins (2 %) and anti-protozoal therapy (2 %). Anti-ulcerogenic therapy, tranquilisers, hepatic cholegogues, pro-kinetic therapy, anti-cholinergic therapy, general anaesthetic, diuretics, alpha-adrenergics,
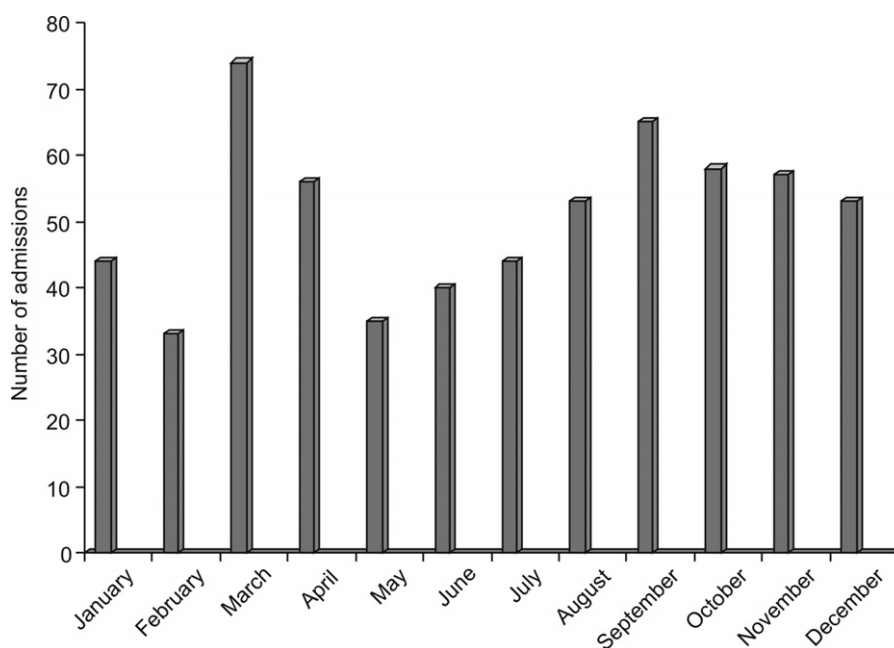

Fig. 2: **Equine after-hours emergency admissions at the OVAH per month of the year (1998–2007),** ($n = 612$).
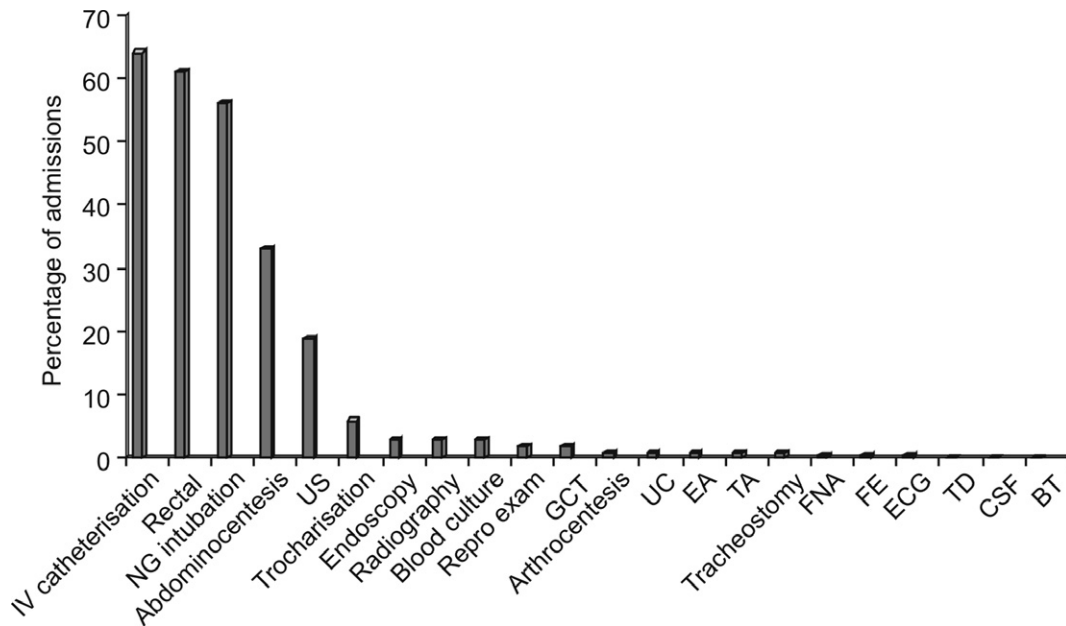
Fig. 3: **Percentage of all equine after-hours emergency admissions at the OVAH (1998–2007) with a particular diagnostic and therapeutic-related procedure performed.** IV = intra-venous; rectal = rectal examination; NG = nasogastric; US = ultrasonography; GCT = gluteraldehyde coagulation test; UC= urinary catheterisation; EA = epidural anaesthesia; TA = tracheal aspirate; FNA = fine needle aspirate; FE = foetal extraction; ECG = electro-cardiogram; TD = thoracic drain; CSF = cerebral spinal fluid sample analysis; BT = blood transfusion (performed in ≤1 % of cases).

chemotherapeutic drugs, electrolytes, hormone therapy and mucolytics were each given in ≤1 % of cases.

The median heart rate of horses on admission was 50 beats/min (95 % CI: 36–120 beats/min) and median respiratory rate was 24 breaths/min (95 % CI: 12–57 breaths/min). The median temperature was 37.9 °C (95 % CI: 36.4–39 °C) while the median capillary refill time ($n = 470$) was 2 s (95 % CI: 1–3 s). Medical intervention alone was performed on 77 % ($n = 474$) of emergency admissions, while 23 % ($n = 138$) of admissions received both medical and surgical intervention. Twenty-four per cent of admissions ($n = 145$ ($n = 138$ for surgical intervention in theatre and $n = 7$ for medical reasons)) required a general anaesthetic. Diagnostic and therapeutic procedures performed most commonly after hours are shown in Fig. 3. The most commonly performed diagnostic and therapeutic procedures were intravenous catheterisation, rectal examination, nasogastric intubation, abdominocentesis and ultrasonography.

Surgical colic, medical colic, traumatic incidents and musculoskeletal disorders were the main reasons for emergency admission (Fig. 4). Piroplasmosis was confirmed in 5 % of cases, while no definite diagnosis could be made in 3 % of admissions. The most common emergency musculoskeletal disorders were septic arthritis ($n = 16$), fractures ($n = 14$), cellulitis ($n = 7$) and tenosynovitis ($n = 5$). Less frequently diagnosed musculo-skeletal disorders included tendonitis ($n = 3$), rhabdomyolysis ($n = 3$), laminitis ($n = 2$), pedal osteitis ($n = 2$), non-specific

diagnosis ($n = 2$) and sesamoiditis, desmitis, pectoral oedema, vitamin E/selenium deficiency, thoracic spine bursitis and cervical vertebral subluxation ($n = 1$, respectively).

Incidental findings were recorded in 8 % ($n = 47$) of emergency admissions. Those that occurred most frequently included cardiovascular ($n = 18$, 38 %),

thrombophlebitis/phlebitis ($n = 10$, 21 %) and gastric ulceration ($n = 9$, 19 %). Less frequent findings included sarcoidosis, musculoskeletal conditions, piroplasmosis, cervical laceration, recurrent airway obstruction, corneal ulceration, strangles (*Streptococcus equi* subspecies *equi*) and intestinal lipoma, all of wich occurred in ≤1 % of cases.
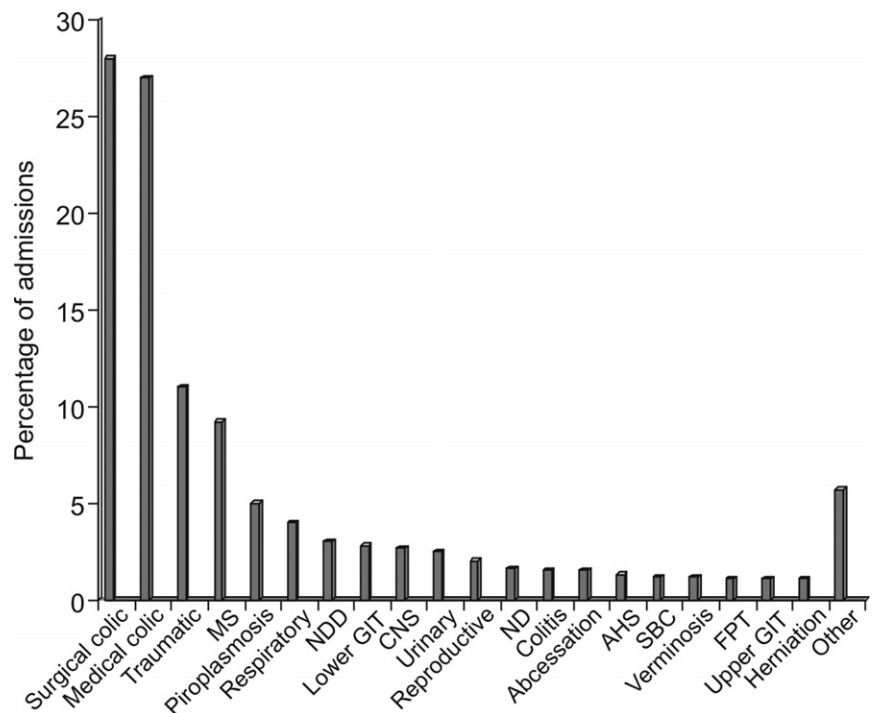

Fig. 4: **Percentage of equine after-hours emergency admissions with a particular diagnosis at the OVAH (1998–2007).** MS= musculoskeletal; NDD = no definite diagnosis; GIT = gastrointestinal); CNS = central nervous system; ND = neonatal diarrhoea; AHS = African horse sickness; SBC = sepsis based on culture; FPT = failure of passive transfer; GIT = gastrointestinal tract; Other = grain overload, anaphylaxis/hypersensitivity, envenomation, hypoxic ischaemic encephalopathy, thrombocytopenia, cervical vertebral instability, toxicity, tetanus, immune mediated haemolytic anaemia, hyperlipaemia (each recorded in <1 % of cases).

In hospital, complications were recorded in <2 % of cases and included thrombophlebitis/phlebitis ($n = 12$), colic ($n = 10$), rupture of GIT during surgery ($n = 7$), post-operative ileus ($n = 6$), diarrhoea ($n = 5$), piroplasmosis ($n = 6$), laminitis ($n = 4$), fractures ($n = 4$) and proud flesh ($n = 3$), while pneumonia, tracheal tear, oesophageal obstruction and wound dehiscence were only recorded once each.

The median length of stay was 4 days (95 % CI: 1 to 21 days). Of all the emergencies admitted to the hospital after hours, 74 % survived to discharge, 21 % received humane euthanasia, while 5 % died during hospitalisation.

DISCUSSION

The main objective of this study was to determine the most frequent causes for equine after-hours emergency admissions to the OVAH. Results indicate that gastrointestinal disorders were the most commonly presenting complaint. Twenty-three per cent of after-hours emergency admissions required both medical and surgical intervention and were mostly due to gastrointestinal disease, trauma and musculoskeletal disorders. These findings together with a reported survival rate of 74 % are similar to a previous study that recorded an overall survival rate of 76 % for emergency equine admissions only[5].

Nasogastric intubation, IV catheterisation, rectal examination as well as ultrasonographic examinations were the most common diagnostic and therapeutic procedures performed after hours. This may be due to the predominantly gastrointestinal-related admission profile. Since these procedures are commonly performed in horses with colic, clinicians, residents and interns trained in equine emergency treatment should be capable of performing these procedures[12,14].

Only 23 % of admissions had surgical intervention after hours. Dolente *et al.*[5] reported that the estimated percentage of emergency admissions requiring emergency after-hours surgery was <25 %. Surgical procedures such as wound repair/suturing, which did not require a general anaesthetic and were performed under sedation, were classified under medical intervention and not individually in this study. Based on the results of this study, although basic knowledge about wound management and repair are also necessary, specialist surgical skills for colic surgery are also necessary. Horses admitted for fracture diagnosis and treatment, septic arthritis and tendon injuries may also require surgical expertise for evaluation and repair of these lesions. Based on these findings it is therefore essential to

have a specialist surgeon at the referral hospital who can manage these disorders.

Twenty-three per cent of admissions received a general anaesthetic for surgical intervention, while 1 % received a general anaesthetic to enable for procedures such as manual correction of dystocia and resolution of oesophageal obstructions. It is therefore necessary to have a thorough understanding of general anaesthesia, including the physiology and side effects of drugs being utilised.

It is interesting to note that an ultrasonographic examination was only performed on 19 % of admissions. Although this retrospective study covered a 10-year period, ultrasonography has only recently been used to assist in prognosticating horses with colic. Ultrasonography is a quick and non-invasive technique which may yield valuable prognostic information about the equine abdomen, aiding emergency veterinarians in general patient monitoring and formulating accurate diagnoses[10,13].

Clinical pathological tests performed and other therapeutic procedures such as crystalloid fluid administration and antimicrobial drug therapy were not evaluated in this study. Necessary knowledge to interpret these results would require a different study. The ability to perform and interpret these results may be an important aspect of after-hours care.

Complications such as thrombophlebitis/phlebitis and post-operative ileus occurred most commonly in the period following GIT surgery. Although piroplasmosis is not normally listed as a complication, the OVAH is situated in an endemic piroplasmosis area[9]. Horses within such an area are usually infected at an early age and develop a premunity to the protozoan infection. However, with the various stresses associated with hospitalisation and surgical intervention, recrudescence of infection may occur[4].

The majority of after-hours admissions occurred in March and September, while most colic cases were admitted in March. Because March coincides with the beginning of autumn in the southern hemisphere, this corresponds with the findings of Hardy *et al.*[7] who reported August (early autumn in the northern hemisphere) to have the majority of emergency colic admissions. In addition to gastrointestinal disorders, Dolente *et al.*[5] also reported on reproductive emergency admissions. There are, however, very few breeding farms and facilities in the vicinity of the OVAH which, apart from the different classification systems used in the 2 studies, could be a reason why this study reported few reproductive disorders.

This study had several limitations

owing to its retrospective nature. The results may be biased towards the types of horses and diseases that are more prevalent in the region where the OVAH is located. Also, more severe medical and surgical disorders may be admitted due to the referral nature of such cases. The OVAH is situated in an endemic piroplasmosis area, therefore the 5 % of cases diagnosed in the hospital might be higher than what would be expected in the drier parts of the country unsuitable for the life cycle of the vector[9]. Unavailable records, incomplete record keeping and missing data made accurate interpretation of some cases difficult. The low complication rate (<2 %) recorded in our study might not be a true reflection of the complications occurring in hospital for the same reasons.

In conclusion, gastrointestinal and musculoskeletal disorders were the most common after-hours emergency admissions. The results of this study may aid referral hospitals in emergency patient management by being able to identify and correct critical shortages in equipment and train personnel accordingly, which will allow earlier effective diagnosis, and possibly contribute favourably to the outcome of hospitalised patients.

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