

EQUINE VETERINARY NURSING

SECOND EDITION

EDITED BY KAREN M. COUMBE



 WILEY-BLACKWELL

Equine Veterinary Nursing

Equine Veterinary Nursing

Second Edition

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WILEY-BLACKWELL

A John Wiley & Sons, Ltd., Publication

This edition first published 2012 © 2001 by Blackwell Science Ltd, 2012 by John Wiley & Sons Ltd

Wiley-Blackwell is an imprint of John Wiley & Sons, formed by the merger of Wiley's global Scientific, Technical and Medical business with Blackwell Publishing.

Registered office: John Wiley & Sons, Ltd, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK

Editorial offices: 9600 Garsington Road, Oxford, OX4 2DQ, UK
The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK
2121 State Avenue, Ames, Iowa 50014-8300, USA

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Library of Congress Cataloging-in-Publication Data

Equine veterinary nursing / [edited by] Karen M. Coumbe. – 2nd ed.

p. ; cm.

Rev. ed. of: *Equine veterinary nursing manual* / edited by Karen M. Coumbe. 2001.

Includes bibliographical references and index.

ISBN 978-0-470-65655-6 (pbk. : alk. paper) 1. Horses–Diseases. 2. Veterinary nursing. I. Coumbe, Karen. II. British Equine Veterinary Association. III. *Equine veterinary nursing manual*.

[DNLN: 1. Horse Diseases–nursing. 2. Animal Technicians. SF 951]

SF951.E68 2012

636.1'089–dc23

2012014813

A catalogue record for this book is available from the British Library.

Wiley also publishes its books in a variety of electronic formats. Some content that appears in print may not be available in electronic books.

Cover images: courtesy of Karen Coumbe, Nick Bolas and Bonny Millar
Cover design by optadesign.co.uk

Set in 9/11.5 pt Sabon by Toppan Best-set Premedia Limited

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Foreword

I am delighted to have the opportunity to write the foreword to the second edition of this seminal book on Equine Veterinary Nursing. Much has happened in the world of equine nursing since the highly successful first edition. Perhaps most importantly the Royal College of Veterinary Surgeons (RCVS) has recognised officially the nursing of equidae, and there is now a firmly established direct-entry equine nursing diploma. The RCVS holds a non-statutory register and there is a published Guide to Professional Conduct for Veterinary Nurses, to mirror that for veterinary surgeons. At the time of writing, the RCVS is replacing this Guide with a Code of Professional Conduct for Veterinary Nurses.

Since 2002, the Veterinary Nurses Council has replaced the old Veterinary Nurses Committee and this RCVS council has created a disciplinary and preliminary investigation committee to deal specifically with veterinary nurses. The Veterinary Defence Society has therefore established a professional indemnity insurance policy for veterinary nurses, to support registered nurses in any potential action against them. We have seen the first nursing graduates from the courses at the Universities of Bristol and Middlesex. The decade has also seen the appointment of the first Professor of Veterinary Nursing in the UK, at the Royal Veterinary College, and the first qualified equine veterinary nurse to become President of the British Veterinary Nursing Association.

Such changes have afforded veterinary nurses a new professional confidence and a stronger voice to speak on their own behalf. However, with this increase in profile comes an increased responsibility for equine nurses to be correctly trained and to act in a manner becoming to a professional person, rather than merely as an employee, whose actions can only be called to account under the aegis of a veterinary surgeon. I cannot pretend that this has been an easy journey, nor yet that all the 'i's have been dotted or the 't's crossed. For example, there is still a major issue regarding

whether such changes require legislation to empower them, or whether they might be enacted under the RCVS Charter.

However, without question, the last decade has seen a visible, real and entirely appropriate increase in the professional status of veterinary nurses. Of course, increasing nursing aspiration must be underpinned by continued progression in educational standards. The current iteration of veterinary nurse training has a modular format and there is now a requirement for every veterinary nurse to study basic equine nursing, even if their ultimate aim is to become a small animal nurse. This book will therefore form an essential part of the general veterinary nursing syllabus, as well as being an essential manual for equine nursing trainees.

The first edition was required to be reprinted almost immediately and this edition, I am certain will be at least as popular. Whilst the chapter headings remain essentially the same, the information has been updated and several new authors have been recruited. Equine medicine and surgery has continued to evolve in the intervening years, and the number of specialist equine clinics and hospitals has also increased. Thus there is a definite need for the equine nursing profession to maintain its position at the cutting edge of equine clinical practice. As an equine surgeon working in an equine hospital, I have become accustomed to the support of top quality equine nurses, and greatly appreciate the benefits that such skilled professionals afford the whole surgical team and, more importantly, our patients.

I would like to congratulate Karen Coumbe on overseeing the production of yet another excellent edition of what in my opinion is the definitive text on equine nursing.

*Tim Greet
President, World Equine Veterinary Association
(Honorary member, British Veterinary Nursing
Association)*

Preface to the second edition

“Knowledge is power.”

Sir Francis Bacon,
Religious Meditations, Of Heresies, 1597

It is amazing that it is over ten years since the first edition of this reference book was published. Much has changed in equine nursing since then, both under the auspices of the Royal College of Veterinary Surgeons and in the wider world.

This second edition has the same intention as the first: to provide a definitive reference for equine veterinary nurses. The aim is that it will be practical, useful and educationally informative for all those involved in the veterinary care and professional management of sick horses, ponies and donkeys. The goal is to supply the technical knowledge and essential information on the practical techniques needed by all members of a successful nursing team.

This new and larger volume is very closely based on the ever-expanding nursing syllabus, which encompasses the breadth and depth of expertise essential for equine veterinary nursing today. It also contains succinct sections suitable for those nurses who may be specialising in other species, yet still wish to acquire some basic equine understanding as part of their training. The information included is designed to update every equine nurse's skills and I hope the book will become an essential guide, and a worthy successor to the first edition.

Many developments have occurred since I wrote the previous preface to this book and the equine nursing world has made enormous professional progress. This is reflected in the many innovations described in this second edition, which has been completely reworked, with an abundance of new information and clear colour photos. Every chapter has been rewritten, with complete updates throughout the volume and increased emphasis on the various responsibilities of

an equine nurse. Additional artwork (Figs 1.1, 2.8, 2.18, 7.4, 8.5, 11.3, 13.2, 14.3, 16.9, 16.22, 17.22, 17.23 & 20.13) has been accurately and beautifully produced by Samantha Elmhurst of www.livingart.org.uk and I would like to thank both her and the hard-working team at Wiley-Blackwell, especially Anne Bassett, Rupert Cousens, Rebecca Huxley, Lucy Nash, Sue Peter and Justinia Wood. I am very grateful to Deirdre Carson for all her helpful suggestions and support, and for those who helped by providing photographs, especially Peter Clegg, Marcus Head, Derek Knottenbelt, Sarah Mack, Tim Mair, Annie Makin (BCF Technology), Lorraine Palmer and Jess Spanton. I would also like to thank Jo Gregory, Matt Legg, Bonny Millar and Cassie Barber, but most of all Dr Nick Bolas, for their enormous photographic contribution, without which this book would have a blank cover! Also huge thanks to my family for allowing me the time to do this and their invaluable editorial input!

I am enormously grateful to all the contributors and thank everyone who has helped me, especially my colleagues at Bell Equine. I am delighted that, amongst the authors, there are now more qualified equine nurses. I am proud that these include many of the same exceptional individuals who have worked with me over many years, both clinically and in drafting the first syllabus, setting the initial examinations as well as writing several chapters.

It is more obvious now than ever before that good equine vets need good equine nurses. I hope that equine nursing will remain an evolving discipline and that this volume will help speed the progress, to the benefit of the animals under our care. As with the first edition, the credit should go to the authors, any errors are mine.

Feel free to comment and constructively criticise!

Karen Coumbe
Kent, 2012

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Abbreviations and Acronyms

AB	antibody	CEPEF	confidential enquiry into peri-operative fatalities
ACD	acid–citrate–dextrose	CFT	complement fixation test
ACTH	adrenocorticotrophic hormone	CID	combined immunodeficiency disease
ADH	antidiuretic hormone	CK	creatine kinase
AF	atrial fibrillation	CNS	central nervous system
AG	antigen	COPD	chronic obstructive pulmonary disease
AHS	African Horse Sickness	COSHH	Control of Substances Hazardous to Health
AHVLA	Animal Health & Veterinary Laboratories Agency	CP	crude protein
AI	artificial insemination	CPD	continuing professional development
AL-DDFT	accessory ligament of the deep digital flexor tendon	CPK	creatinine phosphokinase
AM	atypical myoglobinuria	CPR	cardiopulmonary resuscitation
AMTRA	Animal Medicines Training Regulatory Agency	CR	computed radiography
ANS	autonomic nervous system	CRT	capillary refill time
AP	alkaline phosphatase	CRI	continuous rate infusion
ATD	auditory tube diverticulum	CS	caesarian section
ASA	American Society of Anesthesiology	CSF	cerebrospinal fluid
ASIF	Association for the Study of Internal Fixation	CT	computed tomography
AST	aspartate aminotransferase	CVS	cervical vertebral stenosis
AVD	assisted vaginal delivery	DAP	dose area product
BAL	bronchoalveolar lavage	DCP	dynamic compression plate
BAR	Bright Alert Responsive	DCR	direct capture radiography
BCAA	branched chain amino acid	DDF	deep digital flexor
BCS	body condition score	DDFT	deep digital flexor tendon
BEF	British Equestrian Federation	DDSP	dorsal displacement of the soft palate
BHA	British Horseracing Authority	DE	digestible energy
BP	blood pressure	DEFRA	Department for Environment, Food & Rural Affairs
bpm	beats per minute	DM	dry matter
BUN	blood urea nitrogen	DOD	developmental orthopaedic disease
BVNA	British Veterinary Nursing Association	DR	digital radiography
BW	bodyweight	ECF	extracellular fluid
CA	cerebellar abiotrophy	eCG	equine chorionic gonadotrophin
Ca	calcium	ECG	electrocardiogram
CBC	complete blood count	EDTA	ethylenediaminetetraacetic acid
CCTV	closed circuit television	EED	early embryonic death
CCDL	colour coat dilution lethal	EGT	exuberant granulation tissue
CD	controlled drug	EHM	equine herpes virus 1-associated myeloencephalopathy
CDE	common digital extensor	EHV	equine herpes virus
CEM	contagious equine metritis		

ABBREVIATIONS AND ACRONYMS

EIA	equine infectious anaemia	LFS	lavendar foal syndrome
EIPH	exercise-induced pulmonary haemorrhage	LH	lutinising hormone
EIV	equine influenza virus	LMN	lower motor neurone
ELISA	enzyme-linked immunosorbent assay	MAC	minimum alveolar concentration
EMEA	European Medicines Evaluation Agency	MCV	mean corpuscular volume
ERS	equine rhabdomyolysis syndrome	MDP	methylene diphosphonate
ERV	equine rhinovirus	MRI	magnetic resonance imaging
ET	embryo transfer	MRSA	methicillin-resistant <i>Staphylococcus aureus</i>
EU	European Union	NILRD	non-infectious lower respiratory tract disease
EVA	equine viral arteritis	NIURD	non-infectious upper respiratory tract disease
EVN	equine veterinary nurse	NMS	neonatal maladjustment syndrome
FEI	Fédération Equestre Internationale	NRC	National Research Council
FFA	free fatty acid	NSAID	non-steroidal anti-inflammatory drug
FFD	film focal distance	NSC	non-structural carbohydrate
FSH	follicle-stimulating hormone	OCD	osteocondrosis dissecans
GBED	glycogen branching enzyme deficiency	OCLL	osseous cyst-like lesion
GGE	glyceryl guaiacolate ether	P	pharmacy medicine or phosphorus
GGT	gamma-glutamyl transferase	PCR	polymerase chain reaction
GIT	gastrointestinal tract	PCV	packed cell volume
GLDH	glutamate dehydrogenase	PG	prostaglandin
GnRH	gonadotrophin-releasing hormone	PIVA	partial intravenous anaesthesia
GP	guttural pouch	PPID	pituitary pars intermedia dysfunction (Cushing's disease)
h	hour	PLGE	protein-losing gastroenteropathy
Hb	haemoglobin	PML	pharmacy and merchant's list medicine
hCG	human chorionic gonadotrophin	PMT	photomultiplier tube
HERDA	hereditary equine regional dermal asthenia	POM	prescription-only medicine
hh	hands high	PSP	period of supervised practice
HR	heart rate	PSSM	polysaccharide storage myopathy
HSAWA	Health and Safety at Work Act	PTH	parathyroid hormone
HSE	Health and Safety Executive	QAR	Quiet, Alert, Responsive
HYPP	hyperkalaemic periodic paralysis	QAU	Quiet, Alert, Unresponsive
ICF	intracellular fluid	QP	Qualified Person
ICU	intensive care unit	RAO	recurrent airway obstruction
ILRD	infectious lower respiratory tract disease	RBC	red blood cell
IPPV	intermittent positive pressure ventilation	RCVS	Royal College of Veterinary Surgeons
IRAP	Interleukin-1 Receptor Antagonist Protein	RDDL	right dorsal displacement of large colon
IRU	increased radioisotope uptake	REVN	Registered Equine Veterinary Nurse
IURD	infectious upper respiratory tract disease	RIA	radioimmunoassay
IM	intramuscular	RIDDOR	Reporting of Injuries, Diseases and Dangerous Occurrences Regulations
IV	intravenous	RJB	Robert Jones bandage
JEB	junctional epidermolysis bullosa	RLN	recurrent laryngeal neuropathy
LCP	locking compression plate	RPA	radiation protection advisor
LDH	lactate dehydrogenase	rpm	revolutions per minute
		RPS	radiation protection supervisor

RQP	registered qualified person	TPN	total parenteral nutrition
RR	respiratory rate	TPR	temperature, pulse and respiration
SBC	subchondral bone cyst (<i>see</i> OCLL)	TRH	thyroid-releasing hormone
SCID	severe combined immunodeficiency disease	TSBA	total serum bile acid estimation
s.c.	subcutaneous	TSH	thyroid-stimulating hormone
SDF	superficial digital flexor	UMN	upper motor neurone
SDFT	superficial digital flexor tendon	USP	US Pharmacopeia
SDH	sorbitol dehydrogenase	UV	ultraviolet
SL	suspensory ligament	VFA	volatile fatty acids
SOP	standard operating procedure	VI	virus isolation
SPL	subpalpebral lavage	VMD	Veterinary Medicines Directorate
SQP	suitably qualified person	VMP	veterinary medical product
SSC	squamous cell carcinoma	VMR	Veterinary Medicines Regulations
STH	somatotrophic hormone	VN	veterinary nurse
TB	Thoroughbred	WBC	white blood cell
TBW	total body water	WNV	West Nile virus
TFT	thin film transistor	WSC	water-soluble content
TIVA	total IV technique	WSW	written system of work
TL	tracheal lavage		

1

Basic equine management

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General horse behaviour

Horses have evolved as a flight species and therefore, whenever a horse is to be handled, it should be remembered that it will try to escape from any uncomfortable or unfamiliar situation by running away. In instances where a horse feels that it is unable to escape, it may resort to kicking or biting as a form of defence. When handling unfamiliar horses, or horses in an unfamiliar or stressful situation (i.e. in a hospital setting), knowledge of how horses might react and proper methods of restraint are imperative for everyone's safety.

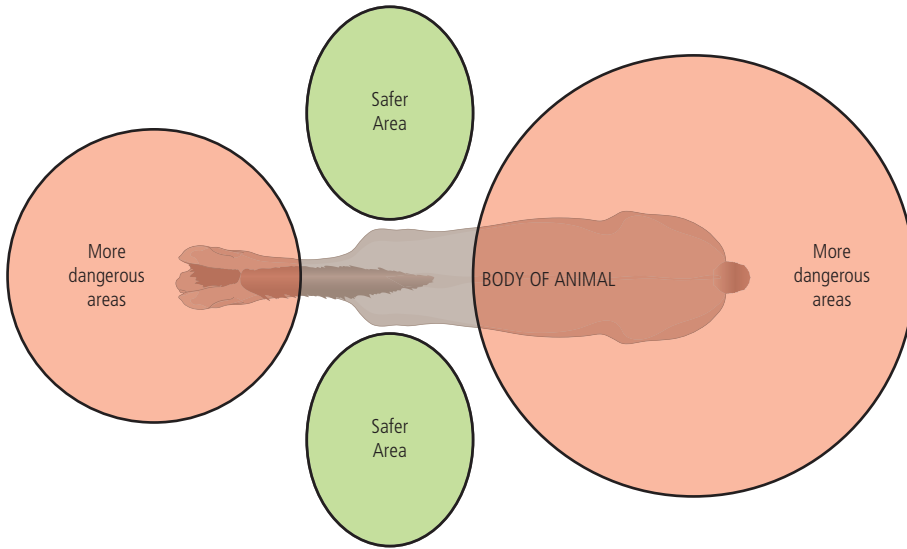
Most horses behave better if handled with confidence, firmness and kindness. Only deliberate bad behaviour should incur reprimand, and this should be immediate; hitting or kicking horses is completely counterproductive. A firm verbal reprimand is usually enough to make a horse pay attention. When persuading horses to do something unfamiliar or frightening, their primitive instincts for food and companionship can be utilised. If a horse is objecting to a particular task it is being asked to perform, it is important to understand whether its actions are motivated by fear or bad behaviour, since punishing a fearful horse will often make the situation worse. When horses flatten their ears, bare their teeth and lunge towards other animals or people, this is usually a sign of aggression rather than fear. A frightened horse may flatten its ears, yet turn away.

As horses are instinctively creatures of flight, it is important to understand the concept of a flight zone (Fig. 1.1). The flight zone can be thought of as the horse's personal space. The size of the flight zone is determined by the tameness of the horse; well-trained animals will usually have a small flight zone whilst wild horses invariably have a large one. The point of balance, which determines which direction a horse will flee from an approaching person, is at the shoulder. When the flight zone is entered from the head, the horse will move backward and vice versa. It is important to be aware that it is best to approach a horse from the left, if possible, in a slow and calm manner using your voice to let the animal know you are there.

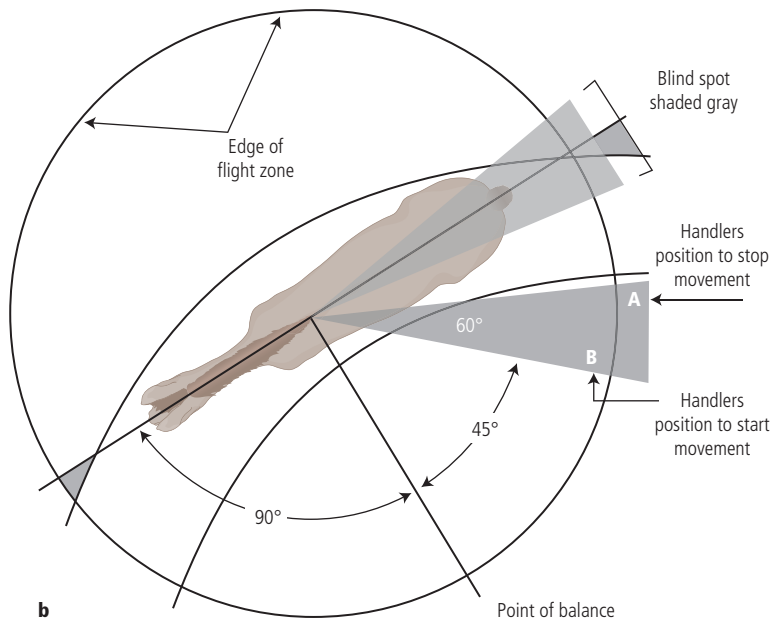
Vices, stereotypes and redirected behaviour

In the past, certain types of abnormal behaviour were known as *vices*. We now know that many 'vices' are the horse's attempts to cope with a stressful environment. Their significance to equine health is widely disputed, e.g. the link between colic and crib-biting is a good example of the controversy. Whilst there is a proven correlation between crib-biting and colic caused by epiploic foramen entrapment, the link with flatulent (gassy) colic is much less convincing.

Stereotypies are invariant and repetitive behaviour patterns with no apparent function. Examples of



a Safer approach area (left shoulder) in the standing animal



b

Fig. 1.1a&b. The flight zone of a horse is the distance at which the horse will choose to flee when approached by a human (or in the wild, a predator). See Box 1.1.

Box 1.1 The flight zone

- The flight zone can be thought of as a horse's 'personal space'. Movement into this area is likely to make a horse move away.
- The size of the flight zone depends primarily on the familiarity of the horse with the handler. With frequent handling, the flight zone decreases in size and may even disappear.
- A horse that is approached head-on has a larger flight zone than if it is approached from the side. A head-on approach by another horse or human is considered threatening.
- The edge of the flight zone can be determined by slowly walking up to the horse. The point at which the horse begins to move away is the edge of the flight zone.
- When working with a horse, there is a point-of-balance for moving the horse backward or forward.

The point-of-balance is at the shoulder, perpendicular to the length of the body. If you want the horse to move backwards, start in front of the point-of-balance and move into the horse's flight zone. If you want the horse to move forward, move into the horse's space from behind the point-of-balance.

- If a handler enters the flight zone suddenly, the horse will either bolt and run away or turn back and run over the person.
- It is important to be aware of the flight zone and the horse's response to the handler within and near the flight zone. This will help to ensure safety at all times for the handler.

stereotypies include weaving, box-walking, and wind-sucking or crib-biting (Fig. 1.2a,b&c). *Redirected behaviour* occurs when a certain type of motivational behaviour is prevented. The horse will perform another type of behaviour to replace the missing behaviour pattern. Self-mutilation is a compulsive behaviour that is seen occasionally, particularly in stallions. Psychogenic polydipsia (drinking water for no physiological reason) can be alarming and can result in significant renal physiological compromise.

Certain behaviours, such as pawing, digging or door-kicking, may be reinforced by attention. Stereotypical and redirected behaviours do not consistently cause direct harm to the horse. They are usually considered undesirable and may represent a welfare problem. Recent research has shown that some stereotypies may have a physiological basis. The relationship between gastric ulceration and cribbing is an example of this. It is thought that cribbing in some cases at least starts as a result of gastric discomfort when feeding methods are not natural; the horse cribs to induce salivation which acts as buffer for gastric acidity. Preventing a horse from cribbing can therefore be regarded as a harmful procedure. In addition there is some evidence that horses 'get some psychological sat-

isfaction' from the behaviour and so, again, prevention could be viewed as harmful. There is still much debate on the basis of most of these behaviour patterns.

General horse handling

Basic technique

When approaching a horse, and particularly a nervous animal, it is important to always speak to let it know of your presence. Approach from the front and slightly to the side, and walk towards the shoulder. Horses have a blind spot directly behind them. Handle the horse first on the lower neck or shoulder, and then put a lead rope around its neck. At this stage many animals will consider themselves 'caught'. Difficult individuals should wear a headcollar when turned out or even in the stable until they learn to be caught submissively. Headcollars with leather pieces that break if the headcollar snags on something are ideal to prevent injury (Fig. 1.3).

Food is a useful bribe for most horses, although they should not always come to expect it. Placing the noseband of a headcollar around the inside of a bucket may help when catching a difficult animal.



Fig. 1.2(a) Stereotypical behaviour: horse cribbing or crib-biting on a fence post, which is when a horse holds fixed objects with its teeth, arches the neck as shown and makes a grunting sound, usually as they gulp in air. Wind-sucking is when they gulp in air. Wind-sucking is when they do this without holding onto a fixed object. **(b)** Worn incisor teeth as a result of crib-biting (USA term = cribbing). **(c)** A horse box-walking.



Fig. 1.3 a,b &c How to approach a horse and fit a headcollar, all from left (near) side of the horse.

Speed and technique are always important in such situations but it is also important to avoid sudden (potentially threatening) movements that might frighten the horse.

Horses are trained to respond to pressure cues. A well-trained horse knows to move away from pressure as well as to respect a human's personal space. Young or untrained horses often do not understand these boundaries, particularly in stressful environments. Care and patience should be maintained when handling these types of horses. It is often better to allow the horse to 'come' to the handler. The horse is naturally inquisitive and will usually make an approach to a person standing in the vicinity in a quiet and non-threatening manner.

When being led, the horse should walk forward freely. Traditionally horses are led from the left (i.e. the 'near' side), although they should be trained to accept approaches from both left and right. The lead rope should be held near the horse's head, with the free end in the other hand. The rope should never be wound around the hand. Ideally gloves should be worn.

Handling mares and foals

When handling mares and foals, the handler must be aware of the mare's attitude. Even the most well-mannered mares can become aggressive when they have a foal at their side, particularly a maiden mare with her first foal. Conversely, some mares show inadequate maternal behaviour and may even reject their foal.

Young foals often have larger flight zones than mature horses if they are not accustomed to human interaction. The foal has highly developed hearing, good eyesight and is sensitive to touch. If properly handled, a foal will quickly become accustomed to people and will learn to trust them. In recent years, the concept of imprinting has gained popularity. This involves handling foals and accustomising them to human attention shortly after birth. The foal should be gently handled and regularly spoken to in the first few days of life. As soon as the foal is used to being touched and approached it should be fitted with its first headcollar, which is called a foal slip. Gentle handling of the head and ears in the early stages is important in preventing the foal from becoming headshy in later life.

Foals often resent being led by a halter. Foals that are not adequately halter broken should never be pulled as they will usually resist and injure themselves. Leading a foal while it is following the mare is a good way to teach it, accompanied by quiet but firm verbal aids and a hand around its hindquarters to gently push and guide it.

When restraining a foal for examination, one hand should be placed around the chest and one hand should grasp the hind quarters or tailhead. If the foal needs to be removed from the mare for examination, the mare should be sedated.

Handling stallions

Care should always be taken when handling stallions as they can be unpredictable. Proper restraint, using a stallion chain, chifney or bridle, is the safest way to handle these horses. An excited stallion can become very aggressive towards humans by biting, striking or kicking out. Caution should be shown when handling a stallion in the company of mares, particularly if a mare is displaying signs of oestrus (heat) or has a foal at foot. A stallion should always be housed in a safe environment (i.e. appropriate fencing and box design) so that they do not injure themselves or other horses or make attempts to escape.

Handling young horses

When handling young horses, the aim is to be gentle and not frighten the horse; the training process should produce a horse that is calm and confident to ride and handle. Horses, like people, differ in their natural ability and in their capacity for learning. Young horses often differ in their behaviour on being handled, due to differences in their training and temperament. They are rarely aggressive, and most often act out of fear based on inexperience.

Handling nervous horses

When handling a nervous horse, understanding their natural response to fear is the key to successful handling. It is most unwise to stand directly in front of or behind a horse, particularly a nervous animal, as these are the most dangerous areas around a horse. It is best to talk in a soothing voice to reassure it; punishing a nervous horse will often aggravate their behaviour.

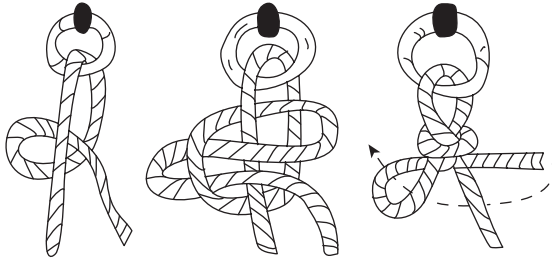


Fig. 1.4 Tying a quick-release knot.

Handling aggressive or disrespectful horses

Truly aggressive horses are extremely rare. Often a horse's behaviour is interpreted as aggression, but this is more often fear motivated. An aggressive horse can be very dangerous, so caution must be used at all times. Do not ever handle an aggressive horse alone; appropriate restraint using a bridle or chifney should be used at all times. The aggressive or disrespectful horse should always be handled with confidence but caution.

Appropriate restraint

For most procedures around the stable yard the horse can be restrained using a halter or headcollar. A foal slip, which will break easily, is preferable for very young animals. All horses should be trained to stand quietly when tied up. This should be achieved at an early age. A quick-release knot (Fig. 1.4) should always be used, and ideally the animal should be tied to a sturdy ring or post via a piece of string that will break if the horse pulls back violently.

For additional control a bridle may be used, but it is not recommended to tie a horse up using either a bridle or a chifney. A chifney, or anti-rearing bridle, is a useful device fitted with three rings – two for the cheek pieces and one for the lead rein – with a shallow inverted-port mouthpiece (Fig. 1.5). In animals that are too young to wear a bit, a lunge cavesson with lunge rein may provide better control. The lead rein or lunge line attaches to the front of the noseband on a lunge cavesson.

Additional restraints

Twitch

A traditional twitch (Figs 1.6 & 1.7) is made of a short pole 50–70cm in length, with a loop of rope



Fig. 1.5 A chifney bit with identifying tags for hospital.

6–7 mm thick at the end. The loop, which should be 40–50 cm long, is twisted around the horse's upper lip. The twitch works partially by causing pain and distracting the horse's attention, so should be used only when *absolutely* necessary. It also causes the release of natural endorphins, which have a narcotic effect. It can be an extremely useful method of restraint, but modern sedatives are often a more humane solution. On occasion, a horse may react violently and unexpectedly when a twitch is used. The handler must try to observe the behaviour of the horse and in particular try to detect increasing respiratory movements. The twitch must be removed as soon as these develop.



Fig. 1.6 Applying a twitch.

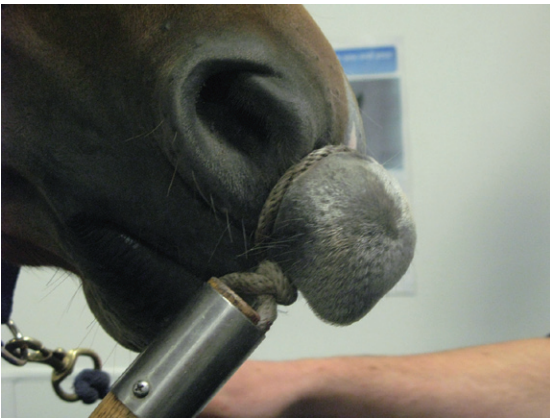


Fig. 1.7 When the twitch is applied to the nose it should not be excessively tight, but its effect does rely on significant pressure. Once it is tightened, the lead rein should be held firmly against the pole (without excessive rope dangling down) and the handler should stand back or to the side. The behaviour of the horse must be observed carefully and the twitch should be released if the horse shows signs of sweating or other discomfort.

When using a twitch the handler must stand appropriately when the twitch is in place and should be careful to hold the leading rein correctly. The twitch pole can become a dangerous missile if not held correctly.

Other methods of restraint include the following.

- Skin twitch: taking a firm grip of a fold of neck skin can distract some horses.
- Ear twitch: similar to a skin twitch; grasping and gently twisting the ear may control some horses, particularly youngsters.
- Raising a foreleg: this can be useful to encourage a horse to stand still if you are confident that you can keep the leg up when the horse tries to move.
- Stocks will limit horse movement, but must be designed to maximise horse and human safety. It is always important to remember a horse in stocks can still injure you, so caution should be taken.

Basic stable management

Medical reasons for stabling

Stabling is often essential for medical management of sick or injured horses, for example in the following situations.

- Orthopaedic problems requiring box rest.
- Monitoring of sick patients requiring the horse to be stabled.
- As a preventative measure for certain conditions such as laminitis, insect bite hypersensitivity (sweet itch or *culicoides* hypersensitivity) or horses suffering from mud fever or rain scald.
- In situations requiring isolation.

Requirements of a stable

Safety and good hygiene are essential. With the large throughput of animals in an equine hospital, there is a significantly increased risk of nosocomial (hospital-acquired) infections. Good examples are salmonellosis and methacillin-resistant *Staphylococcus aureus* (MRSA) infections of wounds. Suspected viral infections, such as influenza and herpes virus, are more difficult to contain since they are airborne.

General considerations

- Stables should be easy to clean and disinfect, particularly in hospital situations. The drains are a source

of disseminated infection and so are particularly important.

- Stables should be warm and dry and have adequate drainage.
- Adequate ventilation is essential with good air throughput and a lack of draughts and dust.
- Lighting is important – a lack of suitable lighting will be a potential danger for a person entering the stable and will necessarily limit the efficiency of any examination and procedure.
- Fresh water must be available at all times whether this is delivered by bucket or by automatic drinker.
- Food should be placed in areas where there is less chance of faecal or urinary contamination. Some horses may have special requirements, for example, airway disease horses need to be fed off the floor, whilst horses with some orthopaedic disorders may require feeding from an elevated position. Hay nets can be used but are a potential hazard.

All necessary precautions should be taken to minimise the risk of fire and suitable fire-safety measures must be readily to hand and properly functional.

Water provision

Adequate clean water always should be available.

- Automatic water bowls are efficient, but they must be checked regularly to ensure that they are working and a back-up supply of buckets should be available. A major drawback of automatic fillers is that monitoring water intake is impossible.
- Water buckets should be cleaned and refilled daily. Buckets can be secured in holders, old tyres or on hinged rings off the ground to prevent them being knocked over.

Food provision

- Mangers should be easy to clean. Ideally, mangers should be large, broad and have a completely smooth surface with well-rounded corners.
- Hay and mangers on the floor mimic the horse's natural way of eating. For some medical conditions, e.g. sinusitis, it may help the horse to eat from floor level to enable good sinus drainage.
- Hay racks fitted above head level oblige the horse to feed at an unnatural level and there is a risk of getting dust and grass seeds in the eyes.
- If hay nets are used, they should be tied high enough to prevent the horse getting entangled. This is more of a danger in horses shod with long-heeled

shoes. Hay nets should be tied with quick-release knots and attached to twine that will break easily if the horse gets caught and struggles.

Stable fittings

Internal fittings should be minimised and, where possible, should be flush with the walls with no sharp projections. Firmly fixed rings at shoulder level for tying the horse to, and another ring at eye level for a hay net, are the minimum requirements.

Ventilation

Good ventilation is particularly important for stabled horses.

- There is a tendency among horse owners to think large well-ventilated stables are too cold. Rugs can provide extra warmth but still permit the horse adequate fresh air.
- Windows and top doors are the main source of ventilation. Windows should be arranged so that they can be opened with an inward slant while ideally being protected by bars.
- In barns, louvre boards at the apex of the roof are ideal. These consist of two or more overlapping boards separated from each other by a few inches and set at such an angle that wind and rain cannot enter. Wind blowing across the top of buildings will aspirate air from the apex. Heat loss from horses also causes air to rise within the building. These factors contribute to the upward and outward flow of air, called *the stack effect*. In many barns, large doors at one or both ends allow a good inward movement of air. Wind blowing from side to side and end to end is known as *perflation*. Yorkshire boarding assists perflation.
- Barns often have better ventilation than individual loose boxes. However, there are disadvantages in that a group of horses share the same air space; this can encourage the spread of respiratory disease. In addition, hay and straw are commonly kept in the same air space and this can exacerbate allergic respiratory disease.
- Draughts should be avoided, particularly in foal accommodation.
- Mechanical ventilation can be employed in long or wide buildings.
- In a stable with a monopitch roof, an open top door will provide an adequate inlet for air. A second inlet in the front wall and an outlet in the back wall are ideal. Boxes with peaked roofs ideally should have a fourth opening in the form of a capped chimney.

Ventilation and respiratory disease The level of dust and spores in the centre of a box is dependent on the rate of release of the contaminant into the air and on the ventilation rate. Release rates depend on the activity in the stable and on the level of contamination of bedding and hay. Good ventilation combined with the use of bedding and hay with inherently low levels of potential antigens is important, because improving the ventilation alone may be insufficient to prevent respiratory disease.

Intensive-care facilities

Intensive-care facilities are an important part of an equine hospital. They should include the following resources.

- Facilities for provision of additional heat and excellent lighting
- Facilities for IV fluid administration (Fig. 1.8)



Fig. 1.8 Intensive care facilities: fluid administration, with elevated system to hang multiple bags of fluid, including plasma. It is important that any horse with an IV catheter cannot put its head out through the doorway, so running risk of dislodging the catheter. (See also Table 1.6 page 14).

- Colic boxes should have ample deep bedding right up to the door. Alternatively they can be constructed with a rubber floor and walls. Such boxes should have minimal fittings so that the horse does not injure itself if it rolls violently.

- Specialised facilities for sick foals should be available. Intensive-care systems for mares and foals should include a separation box, where the foal can be separated to facilitate treatment while the mare can still have some contact.

Biosecurity

Cleaning and disinfection

Stables should be designed and constructed, so they can be cleaned and disinfected readily and routinely. To minimise the risk of microorganisms becoming established in the fabric of stables, there should be a regular programme of depopulating the accommodation and subjecting it to a thorough disinfection. It is only possible to do this effectively if all internal surfaces have impervious and easily disinfectable concrete walls and floors. The materials used must withstand pressure cleaners, strong detergents and a full range of disinfectants. Chemical steam cleaners are valuable as they result in a dramatic fall in the bacterial bioburden within the treated environment.

Daily ‘mucking out’ is important and stables should be kept clean and dry with plenty of fresh bedding. As far as possible, horses should keep the same stables; repeated moving of horses from stable to stable is a definite biohazard for both that horse and other horses that follow it into the stables. A routine of removing all the bedding and thorough disinfection should be employed after each horse leaves the stable.

Hygiene

As with any stable yard, hygiene is vital. Hospitals should be organised so that stables are grouped according to the following categories. Notes on cleaning and hygiene are made for each category.

- Routine hospital cases: stables should be washed and cleaned between cases.
- Intensive-care hospital cases: particular care should be taken with the routine cleaning of intensive care boxes. It is important to observe the amount of faeces and urine produced by horses in intensive care.



Fig. 1.9 Hot water or steam and chemical solutions under pressure can be used to improve the disinfection of a stable, where an infectious agent might have been present.

- Isolation boxes: removal of all bedding (with appropriate disposal) should be carried out. Thorough disinfection preferably with high-temperature power-washer chemical disinfection is essential (Figure 1.9). Ideally the stable should be left vacant for a period of time before being re-used. This often depends on the microorganism implicated in the contagious disease, because different microorganisms can survive for differing lengths of time in the environment, even after disinfection.
- Quarantine: as with isolation boxes, quarantine boxes should be disinfected thoroughly between occupants. It would be advisable when working in such situations to obtain specific information about where the horse has come from and the nature of potential diseases it may carry.

Isolation facilities

Forward planning is vital to good isolation and the control of infectious disease outbreaks. See Tables 1.1 and 1.2 for indications for isolation and some infectious diseases.

Principles of isolation

If a serious infectious disease is suspected, then all movement onto and off the premises should be stopped immediately. If an infectious disease is suspected, the affected animal must be isolated immediately (Table 1.3). *Isolate first and confirm the diagnosis later!*

Table 1.1 Indications for isolation

-
- Individual acutely sick animals
 - In-contact animals not showing clinical signs. Particular attention should be paid to animals that may be immunocompromised (e.g. old horses, foals and horses with Cushing's disease)
 - Non-contact unaffected animals in an epidemic
 - Animals not showing clinical signs but in the recovery stages of disease (shedders)
 - Quarantine procedures preceding entry into the herd
-

Table 1.2 Some equine infectious diseases to be considered in the UK

-
- Equine influenza
 - Equine herpes virus infections
 - Other respiratory virus infections
 - *Streptococcus equi* infections (strangles)
 - Other streptococcal infections (e.g. *Streptococcus pneumoniae*)
 - Infectious enterocolitis (e.g. salmonellosis, clostridial disease, rotavirus, cryptosporidia)
 - Ringworm
-

The following are notifiable & although there have been cases are not endemic

- Equine viral arteritis
 - Equine infectious anaemia
-

Isolation accommodation

The stable should have no direct or indirect contact with others and should ideally be downwind of other stables so that airborne infection is less likely. Ideally, an isolation box should be at least 35m away from other animals, regular thoroughfares and from communal feeding and bedding stores. A completely separate set of feeding, watering, tools, grooming and veterinary equipment should be used. Everything must be thoroughly disinfected between horses. The drain away from isolation accommodation should be apart from other animal accommodation or natural watercourses.

All hospital boxes, but particularly isolation boxes, should have floors of roughened concrete or rubber mats with sealed edges. Walls should be impervious with central floor drains. There should be minimal

Table 1.3 Important questions to ask about an infectious disease

Clinical signs and diagnostic tests:

- What samples need to be collected?
- What is the incubation period?

Transmission of pathogens between animals:

- How does the animal contaminate its environment?
- How important are fomites or other animal vectors?
- Over what distance can aerosol transmission occur?

Survival of pathogen outside the animal:

- How long can the pathogen survive?
- What environmental conditions enhance its survival?
- Does the pathogen produce resistant spores?
- What disinfectants is the pathogen susceptible to?

Protection of susceptible animals:

- Will treatment/vaccination help?

During isolation:

- What is the incubation period and for how long can animals shed the pathogen following recovery?
 - Can asymptomatic carriers be identified (a recognised problem with strangles)?
-

fittings within the box itself and these should be easy to disinfect. Ledges and windowsills should be minimised because they can support a build-up of debris and potential infection. All waste feed and bedding should be disposed of appropriately, e.g. as clinical waste.

Nursing isolation cases

- A single person should look after the nursing and management needs of a patient in isolation. Contact with the animal should be reduced to the minimum necessary level. In situations where a nurse has to deal with normal and isolated horses, the isolated animal must be dealt with last.
- Overalls, shoe covers and a head cover should be kept outside the box and used whenever the horse is handled. Latex gloves should also be worn. These protective items should be disposed of in a closed clinical waste bin outside the box.
- There should be adequate facilities for staff to wash hands and disinfect at entry/exit to the box. A shoe dip should also be provided outside the box.

- Personnel in contact with the isolated horse should wash their hands and other exposed skin thoroughly with a suitable antiseptic detergent such as a surgical scrub immediately after contact.
- Fomites (i.e. inanimate objects such as feed buckets) can be a cause of disease transmission. Care should be taken to reduce this risk by ensuring disinfection and avoidance of contact with other horses.
- No items taken into an isolation area should return to the hospital without thorough disinfection.

Duration of isolation

The period of isolation will depend on the disease involved. The owner's willingness to continue with full isolation requirements is likely to be reduced following cessation of clinical signs.

Disinfectants and antiseptics

- *Disinfection* is the removal or destruction of pathogenic microorganisms. Bacterial and fungal spores may survive normal disinfection processes, but the number of 'vegetative' microorganisms can be reduced to a level that is not harmful to health. Disinfection can be achieved using chemical solutions, by heat treatment or by physical removal of microorganisms.
- A *disinfectant* is an agent usually applied to inanimate objects to destroy microorganisms. Many disinfectants are, however, harmful to living tissue. It is therefore important that anyone using disinfectants should be aware of this and take the appropriate precautions by implementing the manufacturer's instructions regarding concentration and application. It is essential always to read the data sheets and labels carefully and to adhere strictly to the safety instructions.
- *Antiseptics* destroy microorganisms, but not necessarily bacterial spores, on living tissue. They prevent the growth of micro-organisms and may usually be applied safely to living tissue.
- *Sterilisation* is the total elimination/destruction of microorganisms and spores.
- *Contamination* is the presence of microorganisms in tissues, which may or may not result in infection.

Principles of disinfection

It is important to establish whether a disinfectant is bactericidal (i.e. destroys the organisms) or

Table 1.4 Disinfectants and their properties

Active ingredients (product name)	Inactivated by organic material (Yes / No)	Effective against rotavirus	Comments
Chlorine compounds (bleaches)	Yes	No	
Quarternary ammonium compounds	Yes	No	
Phenolic compounds	No	Yes	Generally not utilised due to toxic and irritant properties
Iodophors	No	Yes	Usually utilised more for handwashing during outbreaks
Halogenated tertiary amines (e.g. Trigene)	No	Yes	Non-toxic and biodegradable. Commonly utilised
Halogenated peroxides (e.g. Virkon)	Yes	Yes	Commonly utilised. Has fungicidal properties

bacteriostatic (i.e. stops bacterial replication and growth). Bactericidal chemicals with activity against spores are preferable, but such substances are more likely to be harmful to the operator. Chemicals that are not inactivated in the presence of organic material (such as pus, blood and faeces) should be chosen. Removal of gross contamination is paramount and pressure hoses can be very useful for this purpose on solid inanimate surfaces (Fig. 1.9). Selection of a chemical that is effective against the pathogens that are most difficult to destroy is appropriate.

Susceptibility of microorganisms

- Gram-positive bacteria are destroyed most easily by disinfectants. Streptococcal organisms are susceptible to drying and heat but *Rhodococcus equi* is resistant to drying, heat, acid and alkali under natural conditions.
- Gram-negative bacteria, acid-fast bacteria and bacterial spores are increasingly resistant.
- Rotavirus and cryptosporidia are probably the most difficult organisms to destroy. Rotavirus commonly causes diarrhoea in foals, up to 5 months of age. It is a heat-resistant virus that is known to survive in the environment for up to 9 months. Choosing a disinfectant that is effective against rotavirus will also control most other commonly encountered pathogens.

- Cryptosporidia are a special case and only a minimum of 18h of fumigation of buildings with formaldehyde or ammonia will disinfect adequately. However, formaldehyde is highly toxic and has noxious fumes, making it impractical to use routinely in a stable environment.

Practical disinfection

Table 1.4 outlines the common disinfectants and their properties. Practically, it is best for a hospital to have one main type of disinfectant to be used for most circumstances. Halogenated peroxides and tertiary amines are highly effective against all bacteria and most viruses, including rotavirus.

Bedding and cleaning of stables

Table 1.5 summarises the basic bedding materials available.

Cleaning and changing of bedding

Deep litter systems

Deep litter stables are maintained by just removing the droppings on a daily basis. This type of management is not suitable for a hospital situation because of the lack of hygiene.

Table 1.5 Summary of bedding materials

Type of bedding	Comments
Hay	Generally not suitable because it is edible and expensive
Hemp	Low dust and mould free. Good for horses with RAO. Some horses try to eat it
Paper	Excellent for dust-free environment. May be expensive
Peat moss	Inedible. Dust free. Becoming less readily available (peat extraction is an ecological issue)
Straw: barley straw	Often cheapest but can be poor quality and cause skin irritation. Not suitable for horses with RAO. Any straw can cause impactions if eaten
Straw: oat straw	Often cheaper, but edible. Not suitable for horses with RAO
Straw: treated straw	Treated straw to prevent horses eating it is now available. It is more expensive
Straw: wheat straw	Generally considered the best straw bedding. Light, durable, not usually eaten. Not suitable for horses with RAO
Sawdust	May block drains. If damp, can cause foot problems such as thrush
Wood shavings	Less dusty than sawdust, but can also cause foot problems if damp or if hygiene is poor
Other: rubber, peanut hulls, corncobs, etc.	Ensure a fresh clean supply. Easy to muck out

Complete 'mucking-out' systems

Faeces and urine-soaked bedding should be removed daily. Ideally bedding should be removed completely between different horses. Personnel involved in the cleaning of stables should be aware of good personal hygiene and the potential problems of handling urine

and faeces. Regular washing of hands and wearing clean protective clothing daily is important. Gloves and masks are recommended.

Disposal of bedding waste

A 'muck' heap should be created in a suitable area some distance from the stables in an area where no animal contact can occur. It should be far enough away from the hospital treatment areas and the stables that flies are not a problem. Rotting mounds of bedding provide a source of potential pathogens and spores. Regular disposal of bedding, at least every third day, should be arranged. In some circumstances bedding waste can become very hot and this is a useful means of limiting infective potential. Burning is no longer an acceptable means of management.

Bedding for special cases

Recurrent airway obstruction (RAO)

RAO (previously known as chronic obstructive pulmonary disease, COPD) is an allergic disease caused by inhalation of fungal spores in hay and straw. If this condition is to be controlled it is vital that the horse is not exposed to materials containing spores. The spore content of feed or bedding depends largely on the moisture content. Straw, hay and grains harvested with high moisture contents develop a high mould burden (Figure 1.10). It should be noted that other bedding types that have been allowed to mould will exacerbate RAO. Non-biological beddings do not provide a base medium for fungal growth.

Orthopaedic and other recumbent cases

A deep bed is essential when a horse is recumbent since getting up and lying down are difficult and often uncontrolled. Additionally, pressure from a solid floor can cause significant damage and induce pressure sores (decubitus ulcers).

Convalescence

Recumbent horses, horses with lung compromise after an anaesthetic or pneumonic foals may inhale millions of spores into an already compromised respiratory system. A clean non-dusty bedding material is essential. Warmth may be an additional requirement under some circumstances.



Fig. 1.10 A magnified picture of mouldy damp straw used for bedding – it is easy to visualise that the spores from this could be inhaled. Similar moulds occur in hay and so this can also be a source of allergens for a horse with RAO.

Table 1.6 Special considerations for equine hospitals

Cross-tying facilities	Cross-ties should be attached to the wall with twine that can break if a horse panics
Intravenous fluid administration	Each stable should have an overhead rope and pulley system to hang fluid, the fluid should be attached to the horse with a spiral coil so the horse can move about the stable
Identification	Stables should be marked with the patient's name, medications, and current active problem; the patient and all equipment with it should also be clearly labelled with the owners name

Common hospital procedures

Lungeing

Lungeing is commonly performed for evaluation of lameness, but is also used as a form of training and exercise. A horse should be lunged in a bridle for safety and control. The person undertaking lungeing should wear a safety helmet and gloves. Care should

be taken to limit the slack in the lunge line and prevent it from dragging on the ground, where it might tangle in the horse's legs. A lunge whip is often used to encourage the horse to move forward. Most horses accept lungeing readily and will respond to verbal commands.

Transportation

Loading/unloading horses from transports

Horses may be transported by road in trailers or horse boxes. These come in varying forms and may have side and/or front or rear loading facilities. Many horses are accustomed to travelling and load and unload easily. Some horses can, however, be very difficult. Listed below are some common problems.

- Unfamiliarity with the vehicle or trailer (some horses will not travel well in a trailer, but accept a horse box readily and vice versa. Others travel better sideways or rear-facing).
- Steep ramps create significant difficulty and some ramps are dangerous if slippery or unstable.
- previous bad experiences can cause future problems with loading and unloading.
- If the compartment size is narrow (e.g. in end-loader trailers) some horses will be reluctant to load, especially if there is no visible exit.
- The biggest problems loading are usually with horses that have never loaded, rather than those that have had problems in the past. Lack of suitable training is the cause of most problems.
- Reluctance to travel alone: some horses only travel with company and others may not travel with an unfamiliar companion.

General points for loading and transporting

The trailer should be in a safe loading area with a closed gate between the loading area and any road. Many horses load more readily when the vehicle and trailer have been positioned with one side along a solid high wall. Backing the trailer into a barn could be considered for horses that readily run out of either side of the ramp. Many horses will enter more readily if a second ramp is open, so as to create the impression of a thoroughfare.

Ideally, all horses should be loaded in a bridle or with a chifney bit. Where two or more horses are to be transported together, the more sensible horse should be loaded first. Many horses that are nervous