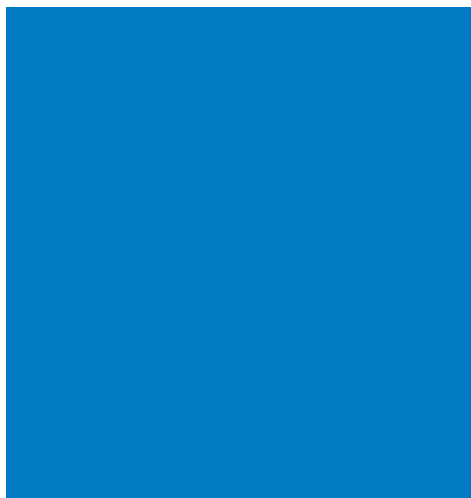
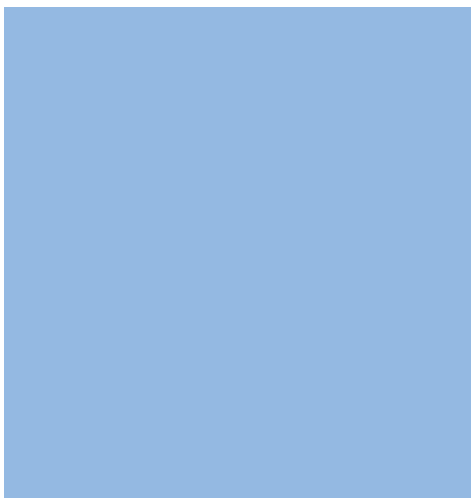
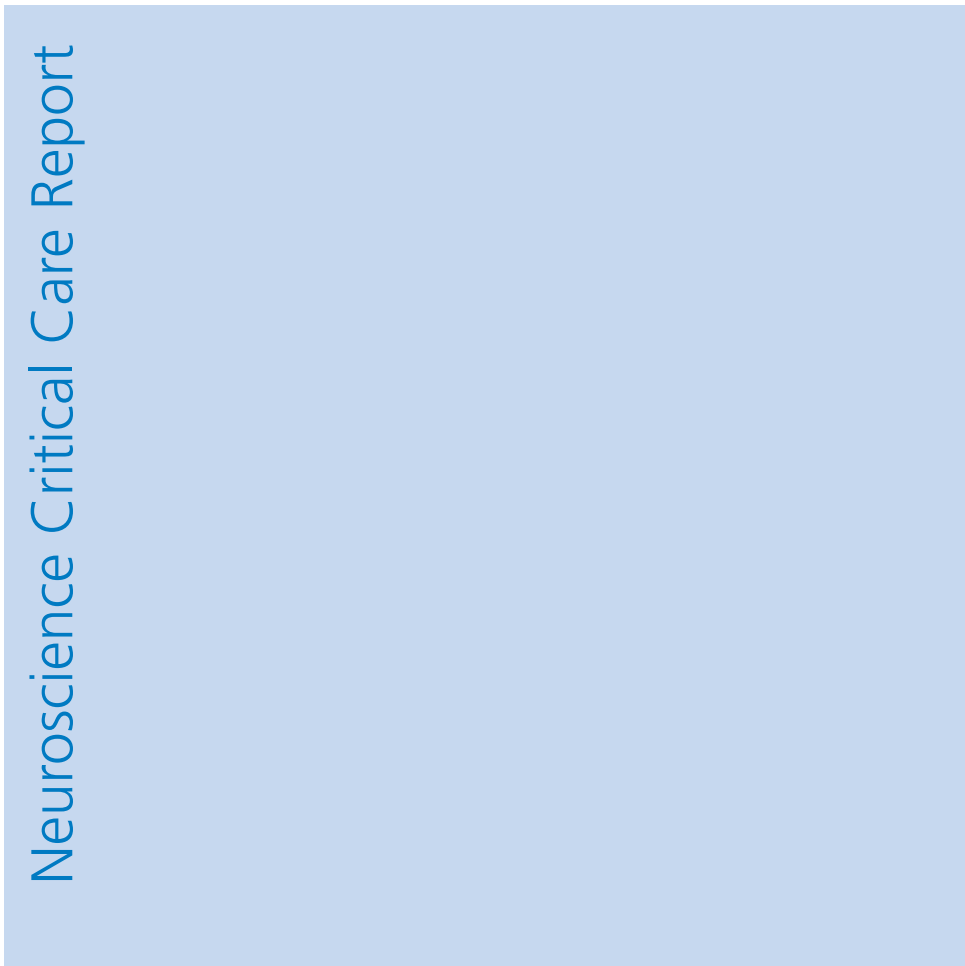


Progress in Developing Services

Neuroscience Critical Care Report



READER INFORMATION

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Neuroscience Critical Care Report

EXECUTIVE SUMMARY

In 1999 the Department of Health established a review of adult critical care services and invited a multi-professional expert group to develop a framework for the future organisation and delivery of critical care.

The report of the group, entitled *Comprehensive Critical Care* and published in 2000 outlined a far-reaching modernisation programme for the development of critical care services. However, in presenting the report the expert group identified several issues impacting directly upon the level and quality of critical care support within NHS Trusts, which would require further detailed evaluation. One such area related to the needs of patients requiring specialised neuroscience critical care.

The National Health Service's Modernisation Agency Critical Care Team assembled a multi-professional expert sub-group to consider specifically the provision of critical care services for neuroscience patients. The sub-group recognised that not all neuroscience patients with a critical illness require admission to a neuroscience centre. Some patients can receive quality care in a District General Hospital, provided that members of staff are appropriately skilled and experienced and have access to an expert opinion when required.

The expert sub-group identified the following topic areas for consideration:

- Improving access to care
- Capacity
- Outreach services
- Referral to a Tertiary Neuroscience Centre
- Repatriation
- Transfers
- Neuro-radiological services

- The workforce
- The role of Allied Health Professionals and Health Care Scientists

The sub-group discussed under each of the topic headings, issues relating to current practice and the resources needed to deliver the service. They proposed recommendations, based on the perceived future needs of the service and how these could be met.

This report outlines the findings of the expert sub-group. It shows that the current service does not always meet the published standards set by professional organisations. Therefore, the proposed recommendations and examples of good practice represent a significant further contribution to the modernisation of neuroscience critical care services.

If commissioners and providers of critical care were to develop services in line with the proposed recommendations as set out in the report; it would help improve the access, experience and outcomes for patients with potential or actual need of specialised neuroscience critical care support.

The Neuroscience Critical Care Report should be considered in the context of the National Service Framework for Long Term Conditions that is being developed by the Department of Health.

The report can be found on the NHS Modernisation Agency website at: www.modern.nhs.uk/criticalcare or on the Department of Health website at: www.dh.gov.uk/PolicyAndGuidance/OrganisationPolicy/EmergencyCare

INTRODUCTION

In 1999 the Department of Health established a review of adult critical care services and invited an expert group, comprising of experienced practitioners from relevant professional organisations, to develop a framework for the future organisation and delivery of critical care.

The report of the group, entitled *Comprehensive Critical Care* and published in 2000 (1), outlined a far reaching modernisation programme for the development of critical care services and a new approach based upon the severity of illness.

It was proposed that critical care services should be planned and delivered systematically across the whole health system. Therefore, the existing division of beds into high dependency, intensive care and 'ordinary ward' categories would be replaced by a classification focusing on the levels of care required by individual patients (see appendix 1 – levels of care). This would in turn determine the need for staff, in terms of numbers, skills and expertise.

The service would be integrated into a hospital-wide approach extending beyond the physical boundaries of Intensive Care Units (ICU) and High Dependency Units (HDU), thereby making optimal use of available resources. It would be delivered locally to a consistent standard whether in a general or specialist context and meet the needs of all patients who are critically ill including those with specialist needs. Therefore critical care would be provided within a continuum of primary, secondary and tertiary care.

However, within the overall integrated approach to critical care, patients requiring specialised neuro critical care were identified as a clinical area for further detailed review. As a result, the NHS Modernisation Agency's Critical Care Team assembled a multi-

disciplinary sub-committee to consider specifically within the terms of reference (see appendix 2) the provision of critical care services for neuroscience patients.

The group recognise that not all neuroscience patients with a critical illness require admission to a neuroscience centre. Some patients can receive quality care in District General Hospitals provided that members of staff are appropriately skilled and experienced and have access to an expert opinion when required.

This document outlines the findings of the group, and shows that the current provision of service does not always meet the published standards set by professional organisations. It therefore proposes recommendations and examples of good practice that can be adopted/adapted locally to improve access, experience and outcomes for patients with potential or actual need of specialised neuroscience critical care. *'The Neuroscience Critical Care Report'* is aimed at all staff involved in the delivery, development and commissioning of neuroscience critical care services.

The report should be considered in the context of the National Service Framework (NSF) for Long Term Conditions that is being developed by the Department of Health. The NSF will focus on improving services for people with neurological conditions by addressing issues across the patient pathway from diagnosis and acute care to treatment, rehabilitation, long term management and end of life care. It will also consider ways of promoting independence in people with long term conditions, for example through the provision of information and support for families and carers, access to community equipment and wheelchairs.

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IMPROVING ACCESS TO CARE

Currently, there are often difficulties in accessing beds and or services in an appropriate time frame, in neuroscience centres for patients who require emergency, urgent or elective care. These difficulties are frequently perceived to be associated with:

- A lack of equity in the geographical distribution of neuroscience services and centres, especially in neurology only centres.
- Competing claims between the provision of local and regional care leading to over provision of services for people who live in the immediate geographical area resulting in a decrease in equity of access.
- Dedicated neuroscience critical care capacity being frequently overlooked as a key element within a Trusts/Critical Care Network's overall critical care resource, which can remove an element of flexibility in the use of a critical care resource.
- An inadequate number of funded and staffed Level 2 and Level 3 neurosciences critical care beds.
- A lack of appropriately skilled staff to look after those patients on the acute wards or the critical care units in general hospitals, who require repatriation from the neuroscience centre (See outreach – page 7).
- A lack of appropriate neuroscience rehabilitation services, resulting in bed blocking.
- Poor communication and/or a lack of clear agreed guidelines on:
 1. Which patients should be referred to tertiary neuroscience centres (2, 3,).
 2. Admission and discharge criteria.
 3. The repatriation of patients to the admitting hospital from neuroscience centres.

4. The management of patients with hospital acquired infections.

- A lack of clear understanding about 'patient flow' along clinical pathways associated with this group of patients.

These difficulties can lead to the following impact on the provision of neuroscience critical care services:

- Neuroscience patients having to be looked after in general critical care beds, especially in neurological only centres. Some, if not all of these patients, reflect an 'unmet' need for the neuroscience centre and should be recognised in the future commissioning for neuroscience services.
- The early discharge of patients from neuroscience critical care beds to accommodate the admission of other patients. The 2002 report of the NCEPOD enquiry into perioperative deaths (4), clearly reported that the early discharge of postoperative patients to the wards is associated with a significant increase in morbidity and mortality for this group of patients.
- The cancellation of elective neuro-surgical procedures
- When there is pressure on capacity patients requiring emergency neuro-surgical intervention may take priority over neurology patients.
- Delayed or refused admission of patients to the tertiary centre who require specialised neuroscience care/assessment
- The inappropriate transfer of neuroscience patients between units

The neurosurgical unit in Oxford received 1756 (range 114-192 per month) referrals over 12 consecutive months. There was a mean of 5.5 days (3-11 days) with between 8 and 21 patients having their admission delayed each month. Between 5 and 12 patients had to be transferred to neurosurgical units outside the Oxford region each month.

Overall 23% of all emergency referrals to the unit had to be refused or inappropriately delayed during the 12 months of the study.

British Journal of Neurosurgery 2003, 17:92

A snapshot audit of emergency neurosurgical referrals in London in July 2003 confirmed many of these findings. A summary of the finding is in Appendix 3.

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Proposed Recommendations

- There is general agreement that all patients developing acute symptoms related to a disorder of the nervous system, including stroke and complications related to stroke, should have access to a specialist neuroscience opinion in an appropriate time frame determined by the seriousness of the insult – normally within 24 hours. (2, 5).
- Patients with potentially life threatening insults should expect immediate admission to a specialised neuroscience centre.

- Tertiary neuroscience centres should be fully equipped and optimally staffed with multi-professional teams trained and competent in the management of these conditions. HBN 57 (6), proposes the integration of and/or geographical co-location of all critical care facilities in future developments with each 'module' consisting of 4-8 beds.
- In its guidance on critical care services, The Royal College of Anaesthetists (7), recommends that immediate availability of critical care beds for emergency admissions must be available for greater than 95% of requests and that no elective patients should be cancelled more than once because of a lack of beds.
- To integrate escalation policies applicable to neuroscience critical care beds into the whole hospital bed escalation policy. This should improve flexibility in the way the local critical bed resource can be used.
- To develop communication and IT strategies to reduce the number of inappropriate transfers and facilitate discharges from neuroscience critical care beds.
- To develop appropriately resourced outreach services to support staff in ward areas that receive neuroscience patients discharged from critical care beds. These wards may be located in a hospital containing neuroscience services or in the referring district general hospital (see Outreach – page 7).
- To develop neuroscience networks to ensure that all patients with a neuroscience related critical illness within a geographic area can access a quality neuroscience critical care facility in an appropriate time frame.

A retrospective record review to compare the presentation, therapy and outcome in 285 patients aged 16-65 years with head injury referred to a region neuroscience centre showed that specialist neuroscience critical care with protocol-driven therapy is associated with a significant improvement in outcome for all patients requiring non surgical therapy, some of whom may need complex therapeutic interventions.

Specialist neuro critical care and outcome from head injury

Patel HC, Menon DK, et al. Intensive Care Medicine, 2002; 28:547-553

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CAPACITY

There are significant differences in the stated critical care resource available to support the care of neuroscience patients. This is because neuroscience critical care patients are often cared for in general critical care facilities or on general wards, without the active involvement of neurologists, neuro surgeons or neuro-intensivists. The fact that data on capacity is so poor makes it difficult to:

- Define the current true capacity for all levels of patient dependency.
- Determine the levels of met and unmet demand.
- Commission sensibly for the service. (At present, business cases are often based on 'averages'. This is inappropriate as it can lead to an underestimation of the resources required).

The appendix to the report 'Safe Neurosurgery 2000' by the Society of British Neurological Surgeons (8), recommends, after reviewing the evidence and taking into consideration changes in the workforce, workload and case mix, that 10 dedicated neurosurgical level 2 and 3 critical care beds are required per million population in order to deliver safe practice. The Association of British Neurologists additionally estimate that between 5 and 7 dedicated critical care beds per million population are required to support the care of neurology patients (9). If patients with a stroke who require ventilation or are undergoing thrombolysis are included, the figure would rise to between 7 and 10 dedicated beds per million population.

The Department of Health details on the number of Level 2 and 3 beds designated as the neuroscience critical care resource can be found in the KHO3 data (Tables 1 and 2). Whilst these figures reflect the returns from Trusts to the Department of Health, they may not necessarily be the true numbers of

Table 1 Open and staffed adult critical care beds at 15 January 2004, England
Department of Health form KH03a Published 11 March 2004

Location	Total available adult critical care beds	Used for intensive care (level 3) on census day	Used for high dependency care (level 2) on census day
General Beds	2,311	1,389	922
General IC unit or general HD unit	1,209	744	465
Combined IC and HD unit	912	599	313
Combined IC or HD and coronary care unit	99	46	53
Other general HD beds not in a unit	91		91
Specialist Beds	832	380	452
Cardiothoracic unit	499	276	223
Liver unit	21	12	9
Neurological (neurosciences) unit	193	82	111
Spinal injury unit	27	6	21
Burns unit	28	4	24
Other specialist HD beds not in a unit	64		64
Total general and specialist beds	3,143	1,769	1,374

Table 2 Open and staffed adult critical care beds at 16 July 2003, England
Department of Health form KH03a Published 11 September 2003

Location	Total available adult critical care beds	Used for intensive care (level 3) on census day	Used for high dependency care (level 2) on census day
General Beds	2,319	1,362	957
General IC unit or general HD unit	1,200	717	483
Combined IC and HD unit	902	582	320
Combined IC or HD and coronary care unit	140	63	77
Other general HD beds not in a unit	77	-	77
Specialist Beds	809	369	440
Cardiothoracic unit	487	265	222
Liver unit	13	10	3
Neurological (neurosciences) unit	187	83	104
Spinal injury unit	27	6	21
Burns unit	36	5	31
Other specialist HD beds not in a unit	59	-	59
Total general and specialist beds	3,128	1,731	1,397

Level 2 or 3 currently available. Beds can be incorrectly classified for various reasons such as where they are located or how they are staffed. The January 2004 data indicates that there were 193 staffed adult neuroscience critical care beds in total (82 Level 3 and 111 Level 2) on the census day. There were also 27 (6 Level 3 and 21 Level 2) critical care beds in spinal injury units. This represents 7% of the total number of adult critical care beds in England (6.1% if spinal beds are excluded) and reflects a 2.8% increase in the number of staffed neuroscience critical care beds available since July 2003. Based on data from the Office for National Statistics (www.statistics.gov.uk), the resident population in England for mid-2002 was just over 49.5 million. This clearly illustrates a shortfall in the number of neuroscience critical care beds currently provided and those recommended.

In July 2003, the NHS Modernisation Agency Critical Care Programme carried out a survey that looked at all emergency neurosurgical referrals to seven neuro-surgical critical care units in London. The results suggest (Appendix 3) that none of the units had sufficient capacity to admit all patients referred to them from their own catchment areas that required an episode of support in a critical care unit. Therefore, patients were transferred to distant units almost on a daily basis.

Many patients who might benefit from specialist neuroscience critical care continue to be managed in general critical care beds. This is particularly true for patients with closed head injury who do not require surgery and does not comply with the recent recommendations from the Royal College of Surgeons (10). It also applies to an increasing number of people with stroke, some of whom will undergo thrombolysis.

Critical Care Outreach Services

The concept of outreach, whilst not new, has been developed over the last few years in adult general critical care to improve the quality of care for all patients with or likely to develop a critical illness in level 1 and 0 beds within a hospital. The aims of critical care outreach services are:

- To avert admissions or ensure admissions are timely and appropriate. Outreach assists with the identification of patients who are deteriorating or are at risk of deteriorating in the hospital.
- To enable the safe discharge of patients from critical care units to lower levels of care. This is done by specialist critical care outreach supporting general ward staff with advice or direct help on patient management issues.
- To share critical care skills with general ward staff – increasing their knowledge, confidence and ability to manage patients with more complex requirements. General ward staff are usually nurses and doctors but may include other professionals involved in the care of patients such as physiotherapists who often provide care across wards and units.

A report written by the National Outreach Forum (11), highlights good practice in existing outreach services and offers practical guidance in the establishment, maintenance and delivery of services. The report complements the Guidelines for the introduction of Outreach Services published by the Intensive Care Society (12).

The concept of existing outreach services could easily be applied to neuroscience patients in ward areas when these are located in a hospital with a neuroscience service.

However, as the majority of patients in a neuroscience centre, especially in a neuroscience critical care unit, are referrals from district general hospitals, the concept of outreach would need to be adapted to recognise the referral process.

Several models of outreach services have been developed, using a modified MEWS scale, which includes a neurological assessment. Examples of these services can be found in the University Hospitals of Birmingham NHS Trust and in the Walton Centre NHS Trust

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Proposed Recommendations

- To incorporate protocols for the clinical management of neuroscience patients at all points of referral along the care pathway.
- To organise the follow-up process to include patients transferred back from the neuroscience critical care service to the referring district general hospital.
- To have tertiary neuroscience centres consider the development of outreach services to support neuroscience patients along their complete care pathway (i.e. in district general hospital and the community) by
- Supporting the development of local skills, knowledge and expertise in partnership with the local health communities.

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Referral to a Tertiary Neuroscience Centre

Presently there are inbuilt delays at all stages of the referral process. Hospitals often have difficulties in making appropriate and timely referrals to a Tertiary neuroscience centre, particularly for emergency cases. These difficulties potentially result in delays in the process of care, which can also impact on the quality of patient care provided. Many of these difficulties are associated with:

- A lack of staff with appropriate competencies in the district general hospital to treat patients' with neuroscience problems.
- Staff in district general hospitals being unaware of the range of services and facilities available in neuroscience centres or the referral guidelines appropriate to that centre.
- Problems in gaining access to the appropriate individual in the neuroscience centre who is able to offer timely advice about a referral
- Inconsistent advice given to the referring clinician because of fluctuating thresholds of admission, based on bed availability and/or differing criteria for admission amongst consultants in the neuroscience centre or between centres.
- Inadequate tele-radiology links between the referring hospital and the neuroscience centre and/or difficulties obtaining a senior neuro-radiological or neurosurgical opinion on the patients CT or MRI scan may impede timely advice being offered.
- Delays in arranging transfers with the ambulance service.

Clinicians need to work in partnership with local ambulance services in drafting an activation protocol to allow for the transfer of a patient with a neuroscience emergency in an appropriate time frame. The London Neuro Critical Care Advisory Group and the London Ambulance Service have produced such a protocol. The details are given in Appendix 9.

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Proposed Recommendations

- Doctors responsible for the management of emergencies in primary care, A&E departments, secondary care and in general critical care units should be competent in the emergency care of patients with an acute neurological condition
- Tertiary neuroscience centres should provide a comprehensive directory of the services and facilities that they provide
- There should be agreed guidelines/policies for examination and referral criteria between primary, secondary and tertiary services and for the most commonly referred cases (e.g. spinal cord compression, head injury and subarachnoid haemorrhage)
- Referring hospitals should have access to abbreviated dialling numbers for the neuroscience centre, and vice versa, to alleviate the need to make calls via hospital switchboards. This can avoid delays in obtaining expert advice and improve the chance that appropriate treatment is commenced within the first hour after the acute insult (Golden hour) potentially improving outcomes

- Tertiary neuroscience centres should provide regularly updated information on the contact details of core members of the multi-professional team, and explicit referral guidance for the most commonly referred cases (e.g. spinal cord compression, head injury and subarachnoid haemorrhage)

The departmental rota for the Consultant Neurosurgeons at the Leeds General Infirmary releases the on-call consultant from routine commitments so they are available to deal with emergencies at all times.

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- Tertiary neuroscience centres should also clearly indicate which types of case they cannot accept, with information relating to hospitals that are able to treat these cases
- The doctor responsible for accepting and receiving patients in the tertiary neuroscience centre should have specialist experience and should be easily contactable. The consultant on-call should be accessible by phone for urgent advice and be able to review tele-radiological images from home and attend within a time appropriate to the clinical situation when required
- Improve the quality of communication systems to allow for the efficient and timely electronic transmission of images to the neuroscience centre and to the on-call consultant neurosurgeon, neuro-radiologist and/or neurologist.

Repatriation

Many neuroscience centres experience difficulties in discharging patients from critical care units at the end of a period of specialist care. The problems are often associated with the repatriation of patients to their base hospital and in the discharge of patients from a level 2 or 3 bed to a step-down bed in the same hospital or Trust. Delays can occur at many points in the patients care pathway, and can be caused by difficulties in identifying appropriately staffed step-down beds, the inadequate provision of rehabilitation services and neuroscience critical care beds, and the impact of hospital acquired infections (e.g. MRSA) (13).

Consequently, the impact of these delays results in 'bed blocking'. This prevents access to this limited resource for neuroscience critical care patients with a higher clinical dependency. This causes the following problems:

- The inability to plan comprehensive and coherent care strategies for patients.
- Patients being transferred a greater distance for specialist care with the potential risks and stress for both patient and carer.
- The cancellation of elective surgical procedures.
- Increased difficulty in accessing a neuroscience critical care bed for neurology patients.
- Increasingly tense 'relationships' between the neuroscience critical care service and the referring unit.

Once repatriation/transfer of a patient from a neuroscience centre has been agreed further delays in effecting the transfer may be experienced because;

- There is pressure on beds in the District General Hospital (e.g. Targets such as trolley waits and cancelled operations).
- There are no agreed transfer and transportation guidelines in place.
- There are no staff available with the appropriate skills and experience.
- Ambulance services do not necessarily consider the inter-hospital transfer of non-acute neuroscience patients a priority. Time delays are not in the best interest of the patient and may lead to the loss of the step-down bed in the receiving unit.

There are often problems and delays in arranging the transfer of patients from an acute neuroscience centre to an appropriate rehabilitation facility. It is generally accepted that neuroscience patients that no longer need acute care should be cared for in a rehabilitation unit not on an acute general ward. However, there are currently insufficient resources available for all those that would benefit from a period of rehabilitation. Currently, the provision of rehabilitation beds is locally determined, often poorly planned and inadequately resourced. Those that are available may be co-located to a neuroscience centre, be in District General Hospitals or in the community. As a result:

- Many patients wait for considerable periods in acute hospital beds. This results in 'bed blocking' and can delay patient treatment, make subsequent treatment more difficult and protracted, and may adversely affect outcome.

- Neuroscience patients that require long-term ventilatory support may not be located in the most appropriate environment, or have access to appropriate therapeutic regimes. Guidelines for the provision of care for this group of patients have recently been published in 'Weaning and long term ventilation' (14).

Proposed Recommendations

- Network guidelines should be agreed locally by clinicians and managers and accepted by the Chief Executives of all affiliated hospitals. This should assist in the transfer/repatriation of patients to appropriate facilities and allow for the transfer of patients within neuroscience units. Guidelines should be based on those produced by the professional organisations so that there is some consistency of approach not only within but also between networks.
- The transfer/repatriation should be agreed at consultant level.
- Clinicians and local ambulance services should work in partnership, and treat the repatriation of patients from a specialist bed as urgent transfers.

An example of a repatriation protocol is included in Appendix 4.

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Transfers

The true demand for the transfer of neuroscience patients on clinical grounds is not known because:

- Patients not needing immediate neuro-surgical or neuro-radiological interventions are often not transferred due to a lack of specialist beds
- Patients with medical neurological problems that do not require a neuro-surgical or specialised neuro-radiological procedure are often not transferred due to a lack of specialist beds.
- Data collection on referrals and transfers is poor in most centres – it is both quantitatively and qualitatively incomplete.

However, we do know that there are costs of undertaking transfers in terms of:

- The need to provide clinical staff, which can compromise other clinical activities in the transferring hospital, especially outside normal working hours. In one study 46% of transfers occurred at night or at weekends (15).
- Transfers can take an average of 4-6 hours to complete from the initial referral to arrival at the accepting hospital and it can take up to 2 hours to repatriate staff involved in the transfer. Therefore, this resource needs to be back-filled at the referring hospital.
- The experience and skills of the medical practitioners transferring critically ill patients often being below that recommended in published national guidelines (15). In one report, 63% of transfers were accompanied by equivalent to a Year 1 SpR.

- Clinical staff being at risk because conventional personal insurance schemes are unlikely to cover the staff that accompany patients on transfers for injuries or death sustained in the course of a transfer. See the NHS Modernisation Agency Critical Care Programme website: www.modern.nhs.uk/criticalcare

This type of indemnity requires membership of a professional scheme such as those organised by the Association of Anaesthetists of Great Britain and the Intensive Care Society.

The quality of inter-hospital communications is often far from ideal and can lead to the inappropriate transfer of some patients, and delays in providing treatment in others that can sometimes be life threatening. Problems can be associated with:

- Difficulties in transmitting or accessing radiological images and the lack of appropriate facilities for the images to be transmitted to the on-call consultant for an expert opinion.
- Staff involved in the transfer may have limited knowledge of the patient as a result of a poor handover at the transferring hospital.
- A failure to agree on standard documentation for use in the transfer leading to deficiencies in clinical documentation across networks.

The Neuroscience Service at Addenbrookes NHS Trust in Cambridge and the Eastern Region Critical Care Network have developed a standardised neuroscience transfer form to be used during the inter hospital transfer of all neuroscience patients. This form complements the critical care transfer form used in the region.

These forms include all the relevant patient details, a checklist to ensure that all relevant documentation, including imaging, accompanies the patient and space to enable appropriate contemporaneous documentation of the physiological status of the patient to be recorded accurately prior to, during and on completion of the transfer.

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Proposed Recommendations

- Multi-professional guidelines covering the transfer and transportation of neuroscience patients should be agreed between all stakeholders (primary, secondary and tertiary).
- The decision to transfer a patient is always a balance of the associated benefits and risks and should be made between consultant colleagues in the referring and receiving hospitals and should be consistent with the principles of clinical governance. The final decision regarding the fitness of the patient for transfer lies with the consultant in the referring hospital who should ensure that the patient has been fully resuscitated and stabilised prior to transfer. The decision to accept a patient lies with the consultant in the receiving hospital who needs to have seen the patients CT and/or MRI scan before transfer.

-
- The transfer should be supported by contemporaneous documentation. The use of a standardised format is beneficial especially if this is part of an automated recording system with the capacity to generate printouts.
 - The most appropriate mode of transfer for an individual patient should be used based upon urgency, distance, weather conditions and availability.
 - Transfer by road is the easiest and cheapest. Their efficiency and quality can be significantly improved if protocols for the level of urgency are agreed by hospitals and their ambulance services. Helicopter and fixed wing aircraft should only be considered where road access is difficult or where the journey is over 150 miles.
 - All vehicles used to transfer a critically ill patient should be appropriately equipped (16), and designed to meet the needs of both the patient and transfer staff.
 - Each hospital should have dedicated transfer equipment with defined protocols for their use
 - The transfer team should be able to communicate with both the referring and receiving hospitals during the transfer

Critically ill patients should be accompanied by at least two suitably experienced clinicians, one of which should be a medical practitioner with appropriate training in anaesthesia, critical care medicine or another acute specialty; and who has received supervised training in the transfer of patients. The use of a dedicated transfer team would ensure staff with appropriate experience and skills were always available. They would also prevent the use of staff from the referring hospital that should be committed to other activities

A list of national and international organisations that have published guidelines on the transfer and transportation of the neurologically critically ill patient can be found in Appendix 5. The guidelines used by hospitals usually reflect the standards contained in these documents.

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IMPROVING NEURO-RADIOLOGICAL SERVICES

Neuro-radiology has played a significant role in the management of neuroscience critical care patients for some time and can be characterised as:

- Diagnostic – e.g. computerised tomography (CT), magnetic resonance imaging (MRI), cerebral angiography, carotid and trans-cranial ultrasound and plain films
- Therapeutic – Neuro-radiologists are increasingly being asked to apply neuro-radiological techniques in the treatment of neuroscience patients.

This is particularly the case for those that present with an acute problem.

Some fairly recent and new developments include:

Coiling of cerebral aneurysms – This is the treatment of choice for the management of aneurysmal subarachnoid haemorrhage and should be available to all patients with this diagnosis.

Intra-cerebral Angioplasty – This is widely used outside the UK to treat vasospasm, with a reported improvement in outcomes for patients of between 20-30%.

Thrombolysis disruption – Stroke is the commonest cause of long-term disability in the UK. The use of intravenous thrombolytic agents for the treatment of acute ischaemic strokes is becoming more widely available and requires patients to be observed in a critical care bed after the procedure.

Emergency ambulance protocols for the transfer of patients with stroke who might be expected to benefit from thrombolytic therapy are operating between the Accident and Emergency Department of the Northern Campus and the Neurology Department on the Central Campus of the Sheffield Teaching Hospitals NHS Trust. In the first ten months of their operation 22 patients were transferred and 17 of these underwent thrombolytic therapy within 6 hours of onset of stroke.

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Embolisation – This technique is used to treat cerebral and spinal arteriovenous malformations, dural fistulas, tumours and traumatic rupture of vessels or fistulas. The technique is less invasive than surgery and often life saving. Patients often need access to a critical care bed post procedure but this is often a level 2 rather than 3 bed with the length of stay being less than that of a post surgical case.

Endovascular repair – Endovascular carotid repair and vertebral angioplasty is used, mainly electively, for stroke prevention and may require the patient being admitted to a critical care bed for observation post procedure but usually for a shorter period than for postoperative cases. At present there is little place for emergency endovascular intervention.

All neuro-science patients requiring a neuro-radiological procedure should be able to access a neuroradiological service, either diagnostic or therapeutic, in an appropriate time frame (17).

- At present, most, but not all, district general hospitals provide patient access to plain film and computerised tomography. Larger District General Hospitals tend to have the full spectrum of imaging similar to that available in a tertiary neuroscience centre and a number of them also have the resources to perform some, if not all, of the therapeutic procedures described above. They usually have appropriately experienced and skilled neuro-radiologists to report on the images. However, the imaging services are not always available for 24 hours a day or at weekends, resulting in patients being referred to, and frequently transferred to a neuroscience centre for assessment – sometimes unnecessarily.
- In many hospitals the neuro-radiological services have developed as part of the main radiology department and are isolated from the Accident and Emergency department, operating theatres, critical care services and the wards. This arrangement is often associated with problems such as the transportation and transfer of patients to the facility and accessing the images in a timely way
- There is an urgent need to have a reliable communications system in place that allows for the efficient and timely transmission of images (plain films, CT and MRI scans) not only within hospitals, but also between district general hospitals and neuroscience centres, and also between neuroscience centres and the on-call consultant responsible for giving the opinion. Current IT systems utilise conventional telephone lines to connect the radiological departments in hospitals. As a result it can be difficult to establish a connection, system incompatibilities may prevent images being electronically transmitted or in transmitted images

being converted into hard copies at the receiving hospital. The problems inherent in having to transport images by taxi can delay obtaining an expert neuro-radiological opinion and therefore potentially delay the commencement of the best treatment regime for the patient

Proposed Recommendations

- A neuroscience centre should provide 24-hour access to plain films, CT, MRI and cerebral angiography. The latter should be biplanar with 3D reconstruction. Access to carotid artery and trans-cranial ultrasound is essential
- Ideally a fully integrated neuro-radiology service should be co-located to the neuroscience department, theatres and critical care unit.
- A CT scanner should be located near the A&E department.
- CT scanning and expeditious reporting of the images should be available in all district general hospitals.
- Facilities to allow the use of special treatment regimes should be made available in the neuroscience centre or larger secondary care facilities where the radiology staff are trained and experienced in the techniques (e.g. coiling of cerebral aneurysms, angioplasty and embolisation)

- Tele-radiology facilities need to be reviewed and standardised to allow for easy, timely transmission of quality images between hospitals. This resource would ensure the best quality of care could be affected to any patient regardless of location. Any proposal should be consistent with developments resulting from the Modernisation Agency's Radiology Programme and the National Programme for Information Technology (NpIT).
- This service should be based on a broadband inter-hospital communication network with terminals located not only in the hospitals but also in on-call consultants homes to allow an expert opinion to be given on a patient's images at all times.

Consultant Neurosurgeons at Essex Centre for Neurological Services in Romford, Essex are able to view images from home.

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Neuroscience Critical Care Report

THE WORKFORCE

New legislation and directives from the European Parliament and the Department of Health will have a profound effect on the delivery of clinical and non-clinical care to all patients that require critical care services including neuroscience critical care patients. These include the European Working Time Directive, the Consultant and GMS contracts, Hospital at Night programme, Modernising Medical Careers, the demands of SpR training, the Agenda for Change and Changing Workforce Programmes.

As a result, workforce planning is essential, in particular since there has been a steady annual increase in workload in neuroscience units, including their critical care units, over the last decade. The increase is expected to continue as a result of:

- The proposed transfer of all significant head injury management to neuroscience centres.
- The proposal that neuroscience centres should accept greater numbers of elderly independent patients for surgery.
- The plan to concentrate complex spinal surgery in regional centres.
- The development of neuroscience outreach services to cover the whole patient pathway.
- The increasing development of specialist neurological involvement in the care of the acutely neurologically ill in district hospitals.

Medical Workforce

Proposed Recommendations

The recommendations contained in the Intensive Care Society (ICS) Standards document, (18), on medical staffing requirements can be applied to all adult critical care units, including neuroscience

facilities. These recommendations are as follows:

- All consultants responsible for the care of patients requiring critical care support in a neuroscience centre should have the knowledge, skills and experience needed to treat this group of patients.
- Consultants responsible for the care of patients with acute neurological illness in District General Hospitals where there are no neuroscience services should have the knowledge and skills required to recognise and treat the immediate medical problems relating to the care of these patients in the acute phase.
- There should be a designated consultant responsible for the organisation and management of the unit. This consultant should have sessions allocated to this function and there should be an appropriate level of administrative support available.
- A neuroscience critical care service should be provided by a consultant with expertise in neuro critical care at all times.
- A minimum of 10 fixed daytime sessions is required to cover a small unit (4 to 8 beds). However 15 sessions are more appropriate after considering the issues raised above. In the larger neuro-science critical care units (8 or more beds) there should be a minimum of two consultants available during the weekdays. In this scenario, there should be at least 30 sessions per week allocated for consultant cover.
- All trainees in clinical neurosciences specialities should have appropriately structure substantive training in, and exposure to, neuroscience critical care.

- The medical establishment should be reviewed regularly so that it reflects local conditions, particularly the case mix, the dependence of the patients and the skill mix and experience of the other members of the multi-professional team.

Nursing Workforce

As in other critical care environments there has been increasing difficulties in recruiting and then retaining nurses with appropriate skills and experience to work in neuroscience critical care units.

There are a number of issues that need to be considered when assessing the number and skill mix of the nurses required to staff a neuroscience critical care unit. These include:

- The case mix, patient dependency and through put of the unit. Current guidance recommends the flexible use of Level 2 and 3 beds in a unit (19).
- The skill mix and experience of all members of the multi-professional team working in the unit.
- The service implications of training and personal development programmes.
- The outcome of the New Ways of working Programme.
- The impact on developing/running a comprehensive neuro-sciences critical care outreach service.
- The units location, facilities and physical environment.

Proposed Recommendations

- In their report 'Guidance for nursing staffing in critical care' (20), the Royal College of Nursing use a model for calculating appropriate staffing levels that propose, for a patient receiving Level 3 care (1:1 nurse: patient ratio) there should be 7 WTEs to provide nursing care at the bedside for 24 hours a day. This calculation should take into account the standard allowance for sickness and study leave, shift patterns, training and education. A further 7 WTEs should be added to the overall unit establishment so that there is a supervisory nurse in charge of the unit each shift.
- Nurse staffing levels in a Level 2 facility is usually calculated on a 1:2 nurse: patient ratio.
- The British Association of Neuroscience Nurses looked at the nursing levels needed to provide safe staffing levels in neuroscience critical care units (Appendix 8). They recommend that there should be 7.5 WTE registered nurses per Level 3 bed, 3.5 WTE per Level 2 bed and 1.25 WTE per Level 1 bed.
- The number of nurses required to staff a unit that uses the bed resource flexibly should be based on the expected mix of Level 2 and 3 patients admitted (Audit Commission Report, 1999) (19).
- The nursing establishment derived from the above recommendations should be reviewed regularly so that it reflects local conditions, particularly the dependence and specialist needs of the patients and the skills and experience of the other members of the multi-professional team.

- It is often inappropriate to leave patients with neurological disorders alone, even when they are physiologically normal, as they can self-harm or harm others. An allowance to cover the need for closer supervision of the patients, often 1:1, should be made when calculating the nursing establishment.

The Role of Allied Health Professionals

Allied Health Professionals (AHP's) play a vital role in providing specialist care to neuroscience patients (21). The level and degree of input from each professional group will vary and depend on the level of neurological impairment and resulting physical and cognitive manifestations.

However, there are a number of issues relating to the provision and quality of services provided by the AHPs to neuro critical care patients. The most significant relate to the following:

Rehabilitation

The rehabilitation process should start in the acute phase (e.g. the critical care unit or acute ward), and continue along the patients treatment pathway into a specialist centre (e.g. rehabilitation unit, specialist centre or the community) or in a 'slow stream facility' (e.g. ward, voluntary organisation or community).

AHPs are involved at every stage of rehabilitation as members of the multi-professional team. Their specialist skills contribute to ensuring the best possible outcomes for patients. However, there are only a limited number of specialist rehabilitation/inpatient units that are able to provide specialist multi-professional rehabilitation services. As a result, a significant number of neuro patients remain in acute facilities or have to be transferred to general wards where the AHP resource is

often inadequate to provide intense rehabilitation support.

There are also issues regarding a lack of adequate rehabilitation equipment to support the care of patients. This can directly affect the length of stay and outcomes.

Staffing

A lack of resources is often reflected in inadequate AHP staffing levels that may result in:

- An inequality of service provision across the different allied health professions. Therefore, patients will not receive the appropriate care, delivered by the appropriately skilled staff, in the right place at the right time.
- AHP's may end up working in isolation in hospitals, as the critical mass within each allied health professional group is relatively small. This can create difficulties in raising the group's profile, not only in respect of identifying and understanding the value AHPs can provide in improving outcomes for patients, but also in lobbying for adequate resources for the group.
- AHP's not functioning effectively as part of a multi-professional team in cross professional communication, training or service development. This may result in a decrease in the quality of care especially if they are not involved at an early stage of the development of the patient specific co-ordinated care plans for their management through the acute, recovery and rehabilitation phases of their illness
- With better resources and more effective systems in place the communication of patient treatment goals and programmes would be better between team members

Neuroscience Critical Care Report

Proposed recommendations

- Recommendations for AHP and HCS staffing levels in critical care were highlighted in the Staff Guidance report published in 2003 (22). Whilst these recommendations did not specifically address the levels required to care for neuroscience patients they are indicative of the numbers required.
- The development of a more coordinated and resourced MDT can ensure equality in the delivery of care to the neuroscience patient at every stage in the care pathway.
- Improve communications within the MDT to provide opportunities for team meetings, joint teaching and accurate sharing of patient information.
- AHPs and HCSs should be involved in the development of local guidelines and protocols.
- AHPs should be involved at all levels in the planning, management and delivery of outreach services.
- The different roles of the AHPs and HCSs in supporting the care of neuroscience patients that require critical care support need to be recognised.
- The impact of the introduction of new treatments and the way that services are delivered should be considered when planning staffing levels for all AHPs. An example is the increased demand on radiographers time resulting from the NICE guidelines on the management of head injuries that recommend the wider use of CT imaging in the treatment of this group of patients (23).

APPENDIX 1

Levels of care

- **Level 0** – patient needs met through normal ward care in an acute hospital;
- **Level 1** – patient at risk of deterioration but whose needs can be met on an acute ward with additional support or advice from the critical care team;
- **Level 2** – patient requires more detailed observation or intervention – e.g. required support for a single failing organ system or required post operative care;
- **Level 3** – patient requires advanced support e.g. advance respiratory support alone or support of at least two organ systems. This level includes patients requiring support for multi-organ failure.

The Intensive Care Society undertook a review of the new classification of critical care patients described above and produced expanded definitions of the proposed levels of care. These have been published in 'Levels of Critical Care for Adult Patients' (24). They have been agreed with the Department of Health through the Critical Care Information Advisory Group and represent the current standard for data collection.

APPENDIX 2

Terms of Reference for the Neuroscience Critical Care Sub-group

The sub-group was designed as a forum for multi-professional experts to discuss issues relating to the current practice in this area and the resources needed to deliver the service. The sub-group was also expected to advise on perceived future needs and how these can be met. The specific aims and terms of reference of the sub-group were:

1. To identify the types of neuroscience patient (by diagnosis) that may require access to critical care services
2. To access what the current demands on the service are related to the different types of patient identified in point 1
3. To access the current capacity available to meet the demand as defined in point 2
4. To access the resources currently available to deliver the service in terms of facilities, staffing levels, equipment and training
5. To review current practice relating to the care of these patients
6. To define what is considered best practice and to identify 'gaps' between this and current practice
7. To ensure the review of services and advice given reflects the needs for multi-professional working
8. To ensure that any recommendations are patient focused and consider the views of the user and carers.

Neuroscience Critical Care Report

APPENDIX 3

Summary of pan London capacity and demand audit of emergency neurosurgical referrals for July 2003

	No. of Patients	%
Number of referrals received by all hospitals (7)	1,071	
Number assessed as requiring Level 3 care	219	20%
Total number of patients admitted	71	
– Number of referrals for Level 3 care that required two or more contacts	35	49%*
– Number admitted to a Level 3 bed in the local unit	39	55%*
– Number admitted to a Level 3 bed in a distant unit	32	5%*
Total number of refused admissions	148	
Reason for refused admission		
– No Level 3 beds	35	24%**
– Did not require neuroscience critical care	43	29%**
– Had inevitable outcomes	47	31%**
– Other factors (e.g. Age)	7	5%**
– Unknown reason	16	11%**
Delays in repatriation to referring unit	Days	
– To a unit in the neuroscience units catchment area	2.7	
– To a unit outside the neuroscience units catchment area	7.2	
* % of total number admitted		
** % of total number of refusals		

APPENDIX 4

Membership of the group:

Professor B A Bell Consultant Neurosurgeon, St George's Hospital, London and the Society of British Neurological Surgeons.

Ms P Clarke Policy Manager, Emergency Care Strategy Team, Department of Health.

Ms B Crawford Neuroscience Project Manager (London), NHS Modernisation Agency, Critical Care Programme.

Ms D Ingleby National Neuroscience Project Manager, NHS Modernisation Agency, Critical Care Programme.

Dr B Matta Consultant in Anaesthetics and Neuro Critical Care, Addenbrookes Hospital, Cambridge and the Neuro-anaesthesia Society of Great Britain and Ireland.

Ms J Milligan Physiotherapy Services Manager, Tower Hamlets PCT, London.

Mr R Nelson Consultant Neurosurgeon, Frenchay Hospital, Bristol and the Society of British Neurological Surgeons.

Dr M L Pepperman National Clinical Lead – Medical, NHS (Chairman) Modernisation Agency, Critical Care Programme.

Ms L Preston Senior Nurse, Linlithgow and Chairman of The British Association of Neuroscience Nurses.

Dr R Sellars Consultant Neuro-radiologist, Western General Hospital, Edinburgh and the British Society of Neuro-radiologists.

Dr S R Shaw Consultant in Anaesthesia and Neuro Critical Care, Royal Free Hospital, London.

Dr M Smith Consultant in Anaesthesia and Neuro Critical Care.

Ms S Sumner Senior Nurse, Salford Royal Hospital, Manchester and the Royal College of Nursing.

Dr G Venables Consultant Neurologist, Hallamshire Hospital, Sheffield, and The Association of British Society of Neurologists.

Dr R Winters Consultant in Anaesthesia and Critical Care, Queens Medical Centre, Nottingham, The Intensive Care Society.

Mr K Young Senior Policy Manager, Emergency Care Strategy Team, Department of Health.

APPENDIX 5

Example of a Repatriation Protocol

The transfer of patients out of a neuroscience unit's critical care bed should be prioritised as follows:

High priority

- Patients transferred for specialist care to a neuroscience unit, when the specialist treatment episode has ended
- Patients waiting transfer from a critical care bed to a lower dependency bed within the same neuroscience unit

The last hospital has responsibility for patients referred for specialist care and should respond immediately to a request for repatriation. The patient should be transferred within 24 hours of the request being made. Similarly, discharge from a critical care bed to a step-down bed within the neuroscience unit should occur within 24 hours of the request

Medium priority

- Transfer of patients from a neuroscience bed to another (non specialist bed) within the same Trust, when the neuroscience episode has ended but the patient cannot be discharged home because of on-going non specialist problems
- Patients transferred from another neuroscience unit for super-specialty are not available locally

The referring team has a clear responsibility for these patients and should be obliged to respond promptly. The patients should be transferred within 48 hours of the request being made

Low priority

- Local residents, admitted as emergencies to a distant neuroscience unit, who are not known to their local neuroscience unit but who have continuing specialist needs which are best organised by the local unit prior to discharge
- Local residents, admitted as emergencies to another neuroscience unit, who are not known to the host hospital but who have continuing non-specialist needs

The best hospital or neuroscience unit has responsibility for these patients but should be allowed more time to make arrangements to take them back. Such patients should be repatriated within 5 days of the request being made

Neuroscience Critical Care Report

APPENDIX 6

A number of national and international organisations have published guidelines on the transfer and transportation of the neurologically critically ill patient. These include the following:

American Society of Critical Care Medicine (25).

Australian and New Zealand College of Anaesthetists (26).

Neuro-Anaesthesia Society of Great Britain and Ireland and the Association of Anaesthetists of Great Britain and Ireland (27).

Intensive Care Society, (28).

Whilst not covered by the terms of reference of the working group, the Paediatric Intensive Care Society has published standards of practice for the transfer of the critically ill child (29).

APPENDIX 7

Critical Care Provision for Neurosurgical Patients

An Appendix to Safe Neurosurgery 2004

Summary

- Recent studies have revealed serious shortcomings in the provision of critical care for neurosurgical patients in the United Kingdom
- Neurosurgical units should be provided with 10 dedicated critical care beds per million population served.
- These beds should be located close to neurosurgical theatres and scanners. They should be staffed to allow them to be used flexibly for level 2 and 3 care.

Introduction

Since the publication of Safe Neurosurgery 2000 several studies have examined the provision of emergency neurosurgical services and critical care for neurosurgical patients. The NHS Modernisation Agency established a Neurocritical Care Working Group in 2002. This report, an appendix to Safe Neurosurgery, makes recommendations to the Working Group for the neurosurgical aspects of neurocritical care in the light of the new evidence.

Availability of Neurosurgical Critical Care: Delays and Transfers

During a one month prospective audit of admissions to a neurosurgical unit in London (British Journal of Neurosurgery, 2001; 15: 342-246) the mean delay for all emergency admissions was 36 hours (range 0-17 days). Admission was denied to 23 emergency patients and 32 elective admissions were cancelled. Bed occupancy frequently exceeded 100%.

Data from the neurosurgical ITU bed service revealed that 26 emergency cases were referred to more than 3 units before a neurosurgical ITU bed was found and that

for 4 of these patients more than 6 units were contacted. Long distance emergency transfers included ambulance journeys from Shrewsbury to Manchester and from Colchester to London.

A twelve-month study of emergency neurosurgical referrals to the Oxford Neurosurgical unit was published in 2003 (British Journal of Neurosurgery, 2003; 17: 92). The mean delay in admitting patients was 5.5 days (range 3-11 days). Each month 8-21 patients had their admission delayed and 5-12 patients were urgently transferred to neurosurgical units outside the Oxford region. The Oxford neurosurgical unit received extra-regional ITU referrals during ten of the twelve months of the study.

The Bristol Neurosurgical Unit studied adult neurosurgical critical care eligibility between April and May 2001. Patients fulfilling critical care criteria were identified by a daily review of wards; high dependency and intensive care units; theatre, critical care and hospital information databases and by cross checking cases with medical and nursing staff. The end-points of the study were patient-days of critical care eligibility and critical care occupancy.

The critical care criteria were adapted from the Guidelines on admission to and discharge from Intensive Care and High Dependency Units (Department of Health Working Group March 1996). They were based on the principles of providing support for a single failing organ (the central nervous system) and/or a level of observation and monitoring not possible on a general ward (Standards for Intensive Care Units, the Intensive Care Society May 1997) as follows: any craniotomy in the preceding 24 hours; all procedures of more than six hours duration and any procedure finishing after 22:00 hours, a requirement for mechanical ventilation, inotropic support or one-to-one

nursing; a Glasgow coma score of 13/15 or less, or 14/15 in the presence of an abnormal scan or an impaired airway.

During the study period 132 (32%) of 407 adult admissions met at least one of the critical care criteria. Of those 132 patients 20% met two criteria, and 7% met three or more criteria. Each day a mean of 8 patients (range 1-17) was eligible for neurosurgical critical care. On average 3 eligible patients (range of 1-11) a day were nursed in standard care beds because no ITU or HDU bed was available.

Best Practice Guidance

NCEPOD 2002 reported that 80% of patients dying within three days of surgery were urgent or emergency admissions. Returning critically ill patients to wards post-operatively was associated with a poorer prognosis even amongst patients treated in an ITU preoperatively: 6% of patients died under those circumstances. The report concluded that a lack of a high dependency or intensive care beds, so frequently a feature of previous NCEPOD Reports, still blights postoperative care.

A study of 285 patients admitted to the Cambridge Neurosurgical Unit (Intensive Care Medicine, 2002; 28: 547-553) showed that specialist, protocol-based therapy was associated with a significant improvement in outcome for all patients with severe head injury. Reductions in the disability burden of head injured patients on the community and the health service will help meet the cost of increasing the availability of neurocritical care from present inadequate levels.

A recent analysis of national trauma databases has demonstrated significantly lower mortality rates in head injury patients managed both operatively and non-operatively in neurocritical care units compared with management in non-

specialist intensive care units (Patel et al. Mortality after Head Injury: Effect of Neurosurgical Care. Society of British Neurological Surgeons, Cardiff 2003)

Planning Services

Shahani (Institute of Modelling for Healthcare, Southampton) cautioned against the planning critical care bed capacity by simple calculation from average lengths of stay, target occupancy level, and expected number of patients and argues that challenges posed by uncertainty and variability must be met to provide effective and efficient critical care

The Royal College of Anaesthetists in its Guidance on Critical Care Services recommends that immediate availability of beds for emergency admissions must be satisfied for greater than 95% of requests and that no elective patient should be cancelled more than once because of lack of beds.

The Bristol study indicated that 16 beds would provide 95% of its neurocritical care requirements. The Bristol unit serves a population of 2.2 million. Thus, the appropriate level of critical care provision based on practice in a regional neurosurgical unit in 2001 was 7.5 critical care beds/million. However, the requirement for critical care will be influenced over the next 5-10 years by changes in workforce, workload and case-mix. To take these changes into account the SBNS considers that Trusts and Strategic Health Authorities should plan for 10 critical care beds/million.

Workforce

The Working Time Directive, Modernising Medical Careers, their respective effects on specialist nursing practice, and demographic changes in the nursing workforce will profoundly affect the delivery of medical and nursing care to neurosurgical patients.

The SBNS anticipates major changes in the case-mix and disease severity of patients for whom standard ward care will be appropriate. The numbers of patients needing level 3 (ITU) or level 2 (HDU) nursing will fluctuate daily and to best use scarce skilled neurosurgical critical care nurses flexible level 2:3 bed ratios and staffing will be essential.

Workload and casemix

Neurosurgical units have faced a steady annual increase in workload since the early 1990s. This increase will continue with the pressure to transfer all significant head injury management to neuroscience centres, to concentrate complex spinal surgery in regional centres and to accept greater numbers of elderly independent patients for surgery.

Siting

Critically ill neurosurgical patients are notably vulnerable to secondary insults and must have immediate access to and from neurosurgical theatres, interventional radiology suites and scanners.

Conclusions

Changes in workforce patterns, patient expectation and current limitations of resources in the NHS require the provision of neurocritical care to be reconfigured, supported by the evidence of recent studies.

Within the neurosurgical manpower of a unit there will require to be a provision of time for neurocritical care to ensure 24 hour availability of consultant opinion 365 days a year and opportunity for training.

Society of British Neurological Surgeons: June 2004

Neuroscience Critical Care Report

APPENDIX 8

This paper is a summary of a survey carried out by The British Association of Neuroscience Nurses to examine the issues surrounding the appropriate nurse staffing of Neuroscience units. The Association is convinced of the importance of this issue and sets out to make recommendations that should ensure safe practice and the provision of quality care. A competent and trained and nursing team shall nurse the neuroscience patient, providing 24-hour care. In order to provide this care, nurses employed in the speciality should hold a relevant post registration qualification, have relevant experience or be undertaking training in the field. This should ensure the best use of resources in addition to providing the highest possible standard of care for patients undergoing treatment for neurological or neurosurgical conditions, including rehabilitation.

Nursing establishments in many hospitals are historic and bear little relation to the changes in case mix and care delivery or to fluctuations in workload. Increasingly, managers must offer objective evidence of staffing need, rather than rely on subjective or intuitive criteria. This latter kind of decision-making lacks influence and credibility in the economically driven healthcare system. Therefore, in order to avoid staffing levels being determined by non-clinical managers, nurses must argue from an objective knowledge base, otherwise the philosophical and ethical underpinnings of professional nursing may be put at risk.

- Catchment areas were variable and this was reflected in the bed occupancy and throughput
- Only 20% of units had direct access to Neuro Rehabilitation which leads to an increased length of stay for some patients

- Due to the lack of High Dependency facilities, ventilation and respiratory support may be carried out in general neuroscience wards
- In all cases, other specialities had access to Neuroscience beds
- Staffing levels for general care beds ranged between 0.93 – 1.1 WTE per bed
- Staffing levels for Intensive Care were almost consistent at 5.5 WTE per bed
- Provision of Neuro Intensive Care and Neuro High Dependency was variable, although all units had access to a general Intensive Care Unit
- Staffing levels for High Dependency ranged between 2.5 – 3.5 WTE per bed

Skill mix was variable within the ward establishments.

Numbers of specialist nurses were variable and covered Epilepsy, Multiple Sclerosis, Motor Neurone Disease, Head Injury, Migraine, Parkinson's Disease, Stroke, Oncology Liaison, Clinical Nurse Practitioners.

30% of units surveyed utilised a workload methodology, but all had undertaken a management review of staffing.

The service pressures identified included:

- Increase in interventional radiology.
- Provision of respiratory support in general wards.
- Invasive monitoring.
- Complex surgery.
- Increase in day cases.
- Drug trials.
- Reduction in Junior Doctors hours.
- Consultant Contract.

CONCLUSIONS

There is little consistency across the specialist units within the UK. Concerns surrounding the safe provision of high quality care are evident and also the safe provision of Neuro Intensive Care and Neuro High Dependency Care. Most units have a significant vacancy factor and there is a high reliance on bank and agency staff leading to a lack of continuity of care and the potential for error.

There is an increasing demand for highly specialised nursing and this concern should be addressed as a matter of urgency. In addition, the increasing reliance on untrained staff must not compromise the contribution that specialist nursing brings to the speciality.

The creation of specialist posts and disease specific clinical posts must be consistent and subject to continual evaluation. All patients have the right to access specialist advice and knowledge and the experienced nurse practitioner is well placed to deliver this level of care. A requisite level of educational achievement experience must support nurses practising at this level.

The importance of establishing the appropriate number of staff and the skill mix cannot be underestimated. The correct skill mix cannot be determined centrally by relying on statistical measure but has to be tailored to the local situation. There is a need to combine professional judgement of experienced professionals with objective workload information.

RECOMMENDATIONS

- To provide safe staffing levels the British Association recommends

General Neuroscience bed
1.25 WTE Registered Nurses per bed

High Dependency bed
3.5 WTE Registered Nurses per bed

Intensive Care bed
7.5 WTE Registered Nurses per bed

- Provision of dedicated Neuro ICU and HDU facilities
- Provision of Consultant attached Clinical Nurse Practitioners to facilitate quality care and continuity of care
- Evaluation of the current specialist roles of Specialist Nurses / Clinical Nurse Specialists and standardisation of grading criteria is required. Consistency in the provision of such specialist knowledge and skills is required.
- That a specification for equipment is determined by the user for general, high dependency and Intensive Care
- That clinical staff require courses that are flexible, dynamic and widely available to Diploma, Degree and Masters level, such that inexperienced nurses are able to obtain the necessary knowledge and skills to nurse the neurologically impaired patient. Increased clinical supervision and education to support the newly qualified practitioner
- Implement a workload measurement tool across Neuroscience units for the purpose of benchmarking
- Any increase or change in service must be reflected in the provision of nursing

APPENDIX 9

NEUROSURGICAL EMERGENCIES: TO ACTIVATE CRITICAL CARE TRANSFER PROTOCOL

Ideally all patients potentially requiring urgent transfer to a unit with neurological capabilities will be treated as an emergency.

However the following categories will require a critical transfer procedure to be

used in order to minimise secondary brain damage or death.

This is not an exhaustive list and consideration should be paid to requests from neurosurgical consultants requesting an emergency response vehicle in order to transfer a patient to a neuro unit for immediate surgery.

Condition	Explanation	Effect
Extradural haematoma	Expanding blood clot usually due to ruptured artery	If treated quickly, surgery can relieve pressure on the brain and the pt will make a good recovery. If left may result in severe secondary (preventable) brain damage or death
Acute Subdural haematoma	Expanding blood clot that occurs beneath the membrane (dura) covering the brain. Usually due to trauma. It can be associated with extreme swelling of the brain and is usually associated with a very poor prognosis	If small clots are dealt with quickly the cycle of brain swelling (raised intra cranial pressure – ICP) can be interrupted.
Hydrocephalus (Effect more severe in children or when pressure is directed onto brain stem)	Accumulation & expansion of cerebrospinal fluid that puts pressure on the brain Often occurs after a sub arachnoid haemorrhage or when shunt blocks (see below). Also associated with cerebellar bleeds	If treated quickly, surgery can relieve pressure on the brain and the pt will make a good recovery. If left may result in severe secondary (preventable) brain damage
Blocks shunt (Very serious in children)	Usually due to infection of an existing shunt, this causes blockage of the tube leading to hydrocephalus, raised intra cranial pressure and brain damage if not relieved	As above, children can deteriorate very quickly from feeling a little unwell to unconsciousness. If left untreated will cause secondary brain damage due to raised ICP effects
Rapidly deteriorating level of consciousness with no CT access locally	CT scan will be essential to rule out or confirm one of the above conditions	

In all above cases surgery will be the only factor that improves the chances of a good recovery for the patient

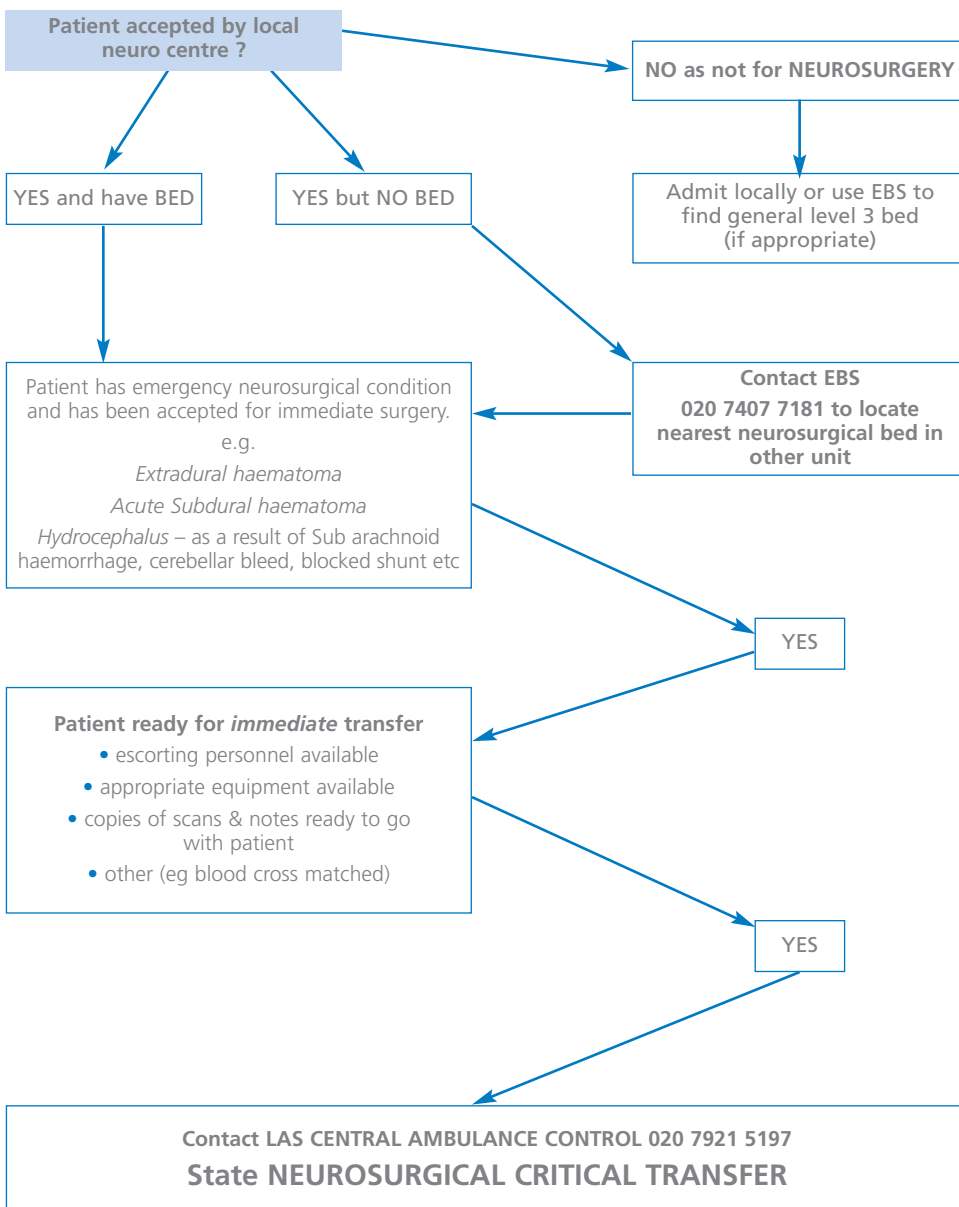
If patient fulfils above category AND has been accepted for immediate emergency surgery then contact: LAS Central Ambulance Control on 020 7921 5197 state Neurosurgical Critical Transfer

The Patient must be ready for immediate transfer, escorting personnel & copies of notes and scans etc must be available See Activation of Emergency Neurosurgical Critical Transfer Protocol

Produced by B Crawford/Lyn Sugg for LONDON NEURO CRITICAL CARE ADVISORY GROUP/LONDON AMBULANCE SERVICE version 1 January 2004

Neuroscience Critical Care Report

Activation of Emergency Neurosurgical Critical Transfer Protocol



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