



National Framework for Service Change  
in the NHS in Scotland

Neurosciences Action Team

Final Report

May 2005

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## List of Recommendations

- 1 The recommendations from the work of this Action Team should be remitted to identified accountable body(ies) to take forward. An implementation Team led by a Chief Executive or equivalent senior NHS Manager should be established to oversee the implementation. Implementation should not be taken forward in isolation, but in the context of clinical neurosciences and with patient involvement.
- 2 A needs assessment for neurosciences should be undertaken to support future planning of services. This should initially be undertaken by the implementation team identified to take forward the recommendations of this report and thereafter should form part of the planning arrangements.
- 3 Patients should continue to be involved in the future planning of neurosurgical services, both locally and in the service model adopted for NHS Scotland. Patients and patient representative groups should be at the centre of future development and decision making.
- 4 Explicit standards for the neurosurgery service should be agreed and set out in the service model. This should also include a mechanism for assessment against these standards and action plan to address areas for improvement. Patients should be involved in this process.
- 5 The standards should be based on the SBNS standards currently being used elsewhere in the UK and the service should work with the SBNS in their further development. The service should make them relevant to Scotland whilst ensuring comparison with other units and address the issues identified through the process of self assessment in Scotland carried out as part of the work of the Action Team.
- 6 The neurosurgery centres should work collaboratively to address areas for improvement, sharing good practice and develop action plans.
- 7 A common minimum data set of activity information should be agreed, collected and reported back to the service to inform planning and performance management. The data set should be relevant to the service and based on the Department of Health definitions.
- 8 A planned audit programme for the service should be developed, agreed and maintained; there should be a procedure register in each centre.
- 9 Arrangements, including funding, for clinical audit and data collection, analysis and reporting should be mainstreamed into the future model for neurosurgery.
- 10 The future planning of neurosurgery should take account of evidence in the field of associations between volume and health outcome.
- 11 The evidence base should continue to be developed based on agreed audit, research and data collection which is mainstreamed as proposed previously.

- 12 The NHS transport infrastructure should be reviewed to support future models of care including:
  - a. The role of the Scottish Ambulance Service and in particular the air ambulance service, is critical to achieving satisfactory response times. The Scottish Executive Health Department should ensure that the Scottish Ambulance Service is strategically positioned to support rapid transfer of expert teams from specialist centres to stabilise patients in remote and rural areas and the transfer of increasing numbers of ill children and adults over long distances to appropriate specialist centres
  - b. The protocols for transfer of head injured patients should be reviewed with the Scottish Ambulance Service.
  - c. The model of retrieval teams, used in paediatric and neonatal intensive care should be explored to ascertain whether a similar model might benefit the transfer of ill neurosurgical patients.
  - d. A transport service for the transfer of patients back to local care should be explored.
- 13 The NHS through the Scottish Executive Health Department, Regional Planning Groups and NHS Boards should develop plans to develop a public transport infrastructure with Local Authority partners and transport providers.
- 14 A strategy for the application of telemedicine should be developed using the findings of pilots, and implementation prioritised to support the maintenance of specialised services locally.
- 15 NHS Scotland should develop the SBNS consultant workforce tool appropriate to Scotland to support future planning of neurosurgery and to consider its application for other staff groups and specialties. It should develop the tool to reflect the service model identified and the needs of the other staff groups, particularly nursing staff and allied health professionals. It should also be developed to incorporate the requirements of employment legislation and regulations and the implications of different levels of intensity in units.
- 16 Future investment decisions on staff appointments to neurosurgical services should be made on a single service approach, ie decisions should not be taken by individual Health Boards and staff may be appointed to geographic areas wider than individual Health Boards.
- 17 Adult and paediatric neurosurgery should be regarded as a single service for Scotland, delivered on a number of sites and through managed clinical networks. Future decisions concerning investment in staff, facilities, equipment should be taken through the planning and commissioning model described in this report.
- 18 NHS Scotland should adopt the service model for neurosurgery as described in this report.
- 19 The Service Description, which include the key criteria, should form one element of the planning assumptions for future neurosurgical services.

- 20 National sub-specialisation on a planned and managed basis should be continued and be an immediate next step.
- 21 Neurosurgical services should be planned and commissioned on a national basis.
- 22 The Team recommends that the SEHD should assume strategic leadership responsibility for planning and commissioning neurosurgery on an all-Scotland basis, working with Regional Planning Groups and NHS Boards.
- 23 NHS Scotland should move towards providing adult and paediatric neurosurgical intervention on one prime site for the whole of Scotland within the service model described in this report.

## Introduction

- 1 This is the report of the Neurosciences Action Team. Neurosciences comprise a range of specialties which are concerned with diseases of the nervous system, principally neurology and neurosurgery. This report sets out the work of the Action Team, its conclusions and recommendations, for submission to the Advisory Group on the National Framework for Service Change in the NHS in Scotland to consider as part of their report to the Minister for Health and Community Care.
- 2 The Action Team was remitted to consider neurosciences, however it focussed its work on the specialty of neurosurgery and the other specialties did not receive much attention. It recognises that these, specifically neurology, neurophysiology and neuroradiology, might benefit from further consideration taking into account the inter-relationship between the neurosciences specialties and the outcome of the recommendations of this report.
- 3 Thanks is expressed to each member of the Action Team and those colleagues who worked with them and attended Action Team meetings to contribute to the discussion. We would like particularly to thank the Neurological Alliance Scotland who helped us with defining patient expectations and the development of the Criteria for the Service, and colleagues in the Information and Statistics Division of NHS National Services Scotland who supplied data on current activity and geographic mapping information. We would also like to acknowledge the assistance of colleagues in the Neurosurgery centres who carried out the self-assessment audit of standards.

## Background

- 4 The Neurosciences Action Team (the Team) is one of the Action Teams established by the National Advisory Group on the National Framework for Service Change in the NHS in Scotland. This Group was appointed by the Minister for Health and Community Care to set out a framework for health services in Scotland for the future and will report in Spring 2005. The Team was established to consider the future shape of neurosciences services in Scotland; its remit is set out in the Commissioning Document "Highly Specialised Care" and is included as Appendix 1. Highly Specialised Care was one of the work streams identified by the Advisory Group as an area which would benefit from consideration as part of its work, recognising that a number of issues apply to a range of specialities which are low in volume of activity and rely on scarce expertise and skills. The Advisory Group highlighted two specific areas of highly specialised care for its focus, those of neurosciences and specialised paediatric services. The Neurosciences Action Team's remit included paediatric neurosurgery, which required liaison with the work of the Specialised Paediatric Services Action Team and this was achieved through sharing the same project lead, regular meetings between the chairs of the Action Teams, project lead and the expert advisors to the chairs of the Action Teams, and members of the Specialised Paediatric Services Action Team attending a meeting of the Team. Additionally members of the Unscheduled Care Action Team attended a meeting of the Team, to discuss that specific element of neurosciences care.

- 5 The Team's work quickly became focussed on neurosurgery. These services in Scotland have been subject to previous reviews<sup>1</sup> - adult services had been reviewed twice and paediatric services once. However on a national basis they were continuing to experience significant difficulties in defining the shape of the service for the future and addressing the particular pressures of sub-specialisation in a relatively low volume speciality, and of workforce disposition to provide 24 hour cover. Some of the existing problems have been exacerbated as despite the presence of advice, existing systems of management and decision making had not progressed the previous work. Therefore although the work and this report of the Team is primarily concerned with neurosurgery it is in the context of neurosurgery being an element of an integrated multidisciplinary neurosciences service.

## Methodology

- 6 The Team met 7 times between August 2004 and February 2005 and was chaired by James Kennedy, a member of the National Advisory Group. Its membership was drawn from across the Scottish Neurosciences community and included representatives of patient groups. At its first meeting it agreed to be as inclusive as possible and extended its membership. (A list of members is enclosed as Appendix 2.) To support the inclusive approach the extended membership agreed to take individual responsibility for communication with colleagues and other networks they were linked in to. The communication networks identified by members are described in Appendix 3.
- 7 The Royal College of Physicians and Surgeons of Glasgow was requested to identify two expert advisors to support the chairman, and Professor Ian Bone, Consultant Neurologist and Professor Ian Whittle, Consultant Neurosurgeon, accepted this role for the duration of the work.
- 8 The Team were very aware of the previous work in the field and extant advice from professional organisations, but acknowledged the need for objective criteria to support planning the service. It did not wish to repeat previous work, however recognised the need to ascertain the level of support for the proposals set out in that previous work, particularly the preference for a single site for neurosurgery in Scotland.
- 9 It identified a number of themes that it would explore
- The need to change
  - Current range and organisation of services
  - Current activity
  - Future needs of neurosurgery
  - Standards
  - Clinical and data information needs
  - The service model

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<sup>1</sup> Review of Neurosurgical Services in Scotland, Sir David Carter, 2000; Planning for the Future Provision of Neurosurgical Services in Scotland, The Neurosurgical Viewpoint, Professor Graham Teasdale, 2003; Report of the Short Life Working Party on Paediatric Neurosurgery, Scottish Colleges Committee on Children's Surgical Services, October 2001

- Configuration of neurosurgery
  - Future planning and commissioning arrangements for neurosurgery
- 10 In exploring these themes it used a number of techniques and tools to try to take an objective perspective and referred to the previous work and reports. It reviewed data on neurosurgical activity in Scotland and information on travel times to the four neurosurgery units. Additionally a bibliography of key documents was developed and these documents were made available to the Team. (The bibliography is included as Appendix 4.)
- 11 The tools included:
- a self assessment audit by the 4 centres using the “Standards for Patients Requiring Neurosurgical Care” developed by the Joint Standards Development Group of the Clinical Standards Committee of the Society of British Neurological Surgeons (SBNS) and the English Regional Specialised Services Commissioning Group
  - an Option Appraisal involving the agreement of key criteria for the service
  - population of the SBNS consultant workforce tool
  - securing an independent opinion on medical workforce issues as they impact on the number of locations that can support 24 hour neurosurgical services.
- 12 The themes are covered in the sections below including the outcomes of the specific tools and techniques.

## Context

- 13 The work of the Team was carried out in the context of current Scottish Executive policy specifically in relation to health care. It also took account of the previous work undertaken in Scotland concerning neurosurgery. In considering this previous work it became clear that there was not a consensus regarding the preference for a single neurosurgical centre for Scotland, nor for the need to change from the current 4 locations. However there was support for further sub-specialisation developed on a national basis, ie concentrating low volume, complex surgery on one or two sites to serve the whole of Scotland. The Scottish College Committee<sup>2</sup> report on paediatric neurosurgery included a statement that the recommendation regarding the configuration of paediatric neurosurgery received general but not unanimous support.
- 14 Recognising the differing views and wishing to ensure these were discussed and considered by a wide range of stakeholders, the Action Team’s approach was inclusive (described earlier in Methodology), specifically all clinical interests from the four centres and patient representatives were members.
- 15 It also became clear that little progress had been made on implementing the recommendations of the previous work, although it is recognised that the group led by Professor Teasdale did consider opportunities for sub-specialisation in some

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<sup>2</sup> Report of the Short Life Working Party on Paediatric Neurosurgery, Scottish Colleges Committee on Children’s Surgical Services, October 2001

detail. However these have not been progressed since.

- 16 The Action Team has brought together representatives from each of the units with patient representatives, the wider clinical neurosciences and others from NHS Scotland to discuss the issues. The good working relations and contacts which have been generated by this need to be sustained through implementation of the recommendations of the Team and one way of doing this would be through working with the Joint Neurosciences Council for Scotland which is being developed currently.

## **Recommendation**

- 17 The recommendations from the work of this Action Team should be remitted to identified accountable body(ies) to take forward. An implementation Team led by a Chief Executive or equivalent senior NHS Manager should be established to oversee the implementation. Implementation should not be taken forward in isolation, but in the context of clinical neurosciences and with patient involvement.

## **Previous work on Neurosurgery Services**

- 18 The Acute Services Review<sup>3</sup> which reported in June 1998 had a neurology/ neurosurgery multidisciplinary sub-group. The neurosurgical element of this work was subsequently taken forward in a further group chaired by the then Chief Medical Officer, Sir David Carter, which reported in 2000<sup>4</sup>. This made a number of recommendations concerning the configuration of the service, information requirements, support for teaching, training and research and the commissioning of neurosurgical services. In terms of configuration of services it recommended rationalising the range and location of neurosurgery by differentiating between 'core services' which might be delivered from 4 sites and sub-specialist services which might be delivered from 1 or 2 sites. However it also recognised that the catchment population to provide critical mass for 'core services' required Aberdeen and Dundee to develop operational links and enhanced links with Edinburgh to create a functional entity equal in population catchment size to the Glasgow unit.
- 19 It also recommended that paediatric neurosurgery should only be undertaken in units with sub-speciality trained paediatric neurosurgeons, able to provide 24 hour care and maintain their skills.
- 20 At the time, although this advice was recognised, there was no consensus on how rationalisation might be achieved or the pattern of service reconfigured. Additionally it was noted that the group did not include paediatric neurosurgical representation.
- 21 Since this work was undertaken significant factors affecting the provision of neurosurgery had come into being, particularly workforce legislation and necessary changes in working practices, treatment advances, eg endovascular coiling for the treatment of subarachnoid haemorrhage, further sub-specialisation and increasing evidence for some diseases of a relationship between specialisation, higher volume and improved outcome.

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<sup>3</sup> Acute Services Report, Scottish Office Department of Health, 1998

<sup>4</sup> Review of Neurosurgical Services in Scotland, Sir David Carter, 2000;

- 22 Thus in 2002 the Chief Medical Officer requested Professor Graham Teasdale to ascertain the views of the Scottish neurosurgery community on the arrangements for the future provision of neurosurgical services. The outcome of this work was reported in October 2003<sup>5</sup>. It recognised the pressures on the service and through surveys of Scottish neurosurgeons, considered a number of options for service provision using factors of ranked importance to come to a view. This work concluded that there was a majority view amongst Scottish neurosurgeons that the extant provision for adult neurosurgical services in Scotland was not an appropriate basis for future planning and that future planning should incorporate substantial changes in service configuration. The preference expressed was for a single, integrated centre for neurosurgery and other neurosciences on a new site in Scotland.
- 23 A group under the aegis of the Scottish Colleges Committee on Children's Surgical Services had also reviewed the issues concerning paediatric neurosurgery, reporting to the Chief Medical Officer in October 2001<sup>6</sup>. This group made a range of recommendations concerning the configuration of services, principally recommending the long term arrangements for paediatric neurosurgery as being a managed clinical network with a single lead site, which is co-located with adult neurosurgery and has access to paediatric intensive care.
- 24 Additionally the Society of British Neurological Surgeons has published a range of reports setting out their best practice guidance on the provision of neurosurgical services including work on modelling the medical workforce in the light of changes in legislation and training programmes. Work has also been undertaken by the NHS Modernisation Agency in England in the area of Neurosciences Critical Care<sup>7</sup>.

## Why change?

### The nature of neurosurgery

- 25 Neurosurgery is a relatively low volume specialty by population. The population base to provide the volume and diversity in order to sustain full sub-specialisation has been proposed as a minimum of 2 -2½ million<sup>8</sup> and it has been proposed that for certain sub-speciality areas this might be larger, eg neurovascular services 7 million<sup>9</sup>. It is technologically dependent with a large acute element requiring 24 hour care. The specialised and skilled workforce required to do this is a relatively scarce resource.

### Scotland's Demography

- 26 Scotland is faced with a declining and ageing population; it is projected to decline at an accelerating rate over the next 40 years. The impact on healthcare is potentially

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<sup>5</sup> Planning for the Future Provision of Neurosurgical Services in Scotland, The Neurosurgical Viewpoint, Professor Graham Teasdale, 2003

<sup>6</sup> Report of the Short Life Working Party on Paediatric Neurosurgery, Scottish Colleges Committee on Children's Surgical Services, October 2001

<sup>7</sup> "Progress in Developing Services", Neuroscience Critical Care Report, NHS Modernisation Agency, 2004

<sup>8</sup> Hardy (2003) British Journal of Neurosurgery 17 (1): 8-14

<sup>9</sup> Shaw (2002) British Journal of Neurosurgery 16 (1): 6-9

twofold – in general the older a person is, the more ill-health they will suffer and the workforce available to provide healthcare is also ageing and potentially not replaced due to the decline in the birthrate in recent years and projected decline.

- 27 Additionally the pattern of demographic change is not consistent, Lothian NHS Board area is projected to see the biggest growth in population through to 2018 and the areas with the biggest projected falls are Orkney and the Western Isles. The pattern is different in rural areas compared to urban areas, with rural areas projected to see higher proportions of people aged over 75 years in their populations. There is also a projected migration of the population towards the central belt of Scotland.

## **Workforce**

- 28 As described previously the skilled specialist staff to provide neurosurgical services are scarce. This applies to medical, nursing and allied health professions in adult and paediatric care, and in the 'linked' specialties of neuroanaesthetics, neuro critical care, neuroradiology, neuropathology and neuro-rehabilitation, and in technical support services such as neurophysiology.
- 29 A number of factors have limited the amount of time that staff are available to provide direct patient care. These include the implementation of the Working Time Regulations, the requirements around the training of junior medical staff and the introduction of new contracts of employment for consultant medical staff. These factors are designed to underpin the provision of safe services and provide a mechanism for work:life balance. However in order to be compliant with regulations these potentially lead to a requirement for an increase in the minimum numbers of medical staff at consultant level and doctors in training to support rotas. Respectively these are estimated at between 6<sup>10</sup> to 9<sup>11</sup> consultants per rota, however other factors such as intensity need to be taken into account in defining the staffing needs of the service and its disposition in Scotland.

## **Patient Expectations**

- 30 Patients now have increased expectations of what the NHS should provide. These expectations focus on quality of service but also include access and waiting times. Increasingly explicit service specific standards are being developed and monitored in partnership with patients, eg, the Scottish Health Council will be involved in the performance assessment of Health Boards against the Performance Assessment Framework standards for patient focus and public involvement in service development and planning.

## **Summary**

- 31 These issues are not unique to Scotland, nor to Neurosurgery. The work led by Sir David Carter<sup>12</sup> recognised that the workforce, low volume nature of neurosurgery and sub- specialisation issues were challenging health services in many countries to re-think how neurosurgery was delivered. Work in England led by the

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<sup>10</sup> Safe Neurosurgery 2000, SBNS

<sup>11</sup> Hardy (2003) British Journal of Neurosurgery 17 (1): 8-14

<sup>12</sup> Review of Neurosurgical Services in Scotland, Sir David Carter, 2000

Modernisation Agency has supported specific service review and production of guidelines to support service delivery in the light of some of the issues, eg Neuroscience Critical Care Report, NHS Modernisation Agency 2004.

- 32 The combination of the changes in demographic, workforce, quality and clinical governance factors and the nature of neurosurgery sets a context for change in the way in which the service should be delivered in the future. It points to a different way of planning and providing this service, recognising the catchment population required to give the volume and diversity of activity to sustain a fully comprehensive neurosurgical service for Scotland.

## **Current Range and Organisation of Services**

- 33 Neurosurgery is delivered from four centres: Aberdeen Royal Infirmary and the Royal Aberdeen Children's Hospital, Ninewells Hospital, Dundee, Western General Hospital and Royal Hospital for Sick Children in Edinburgh and the Southern General Hospital and Royal Hospital for Sick Children, Glasgow. Each of these units is an integral part of a multidisciplinary neurosciences service and is connected to a University Medical School. Each unit provides a 'core service' for its local population and some sub specialisation on a Scotland wide basis.

### **Aberdeen Royal Infirmary and Royal Aberdeen Children's Hospital**

- 34 Adult and paediatric neurosurgery are co-located on the same site. Paediatric neurosurgery is provided in a new paediatric hospital which is an integral part of the main complex and which is equipped for paediatric neurosurgery. There is access to adult intensive care, imaging facilities and one operating theatre. The catchment population includes the Northern Isles and the Highlands and is notionally 0.75 million.

### **Ninewells Hospital, Dundee**

- 35 Adult and paediatric neurosurgery are co-located on the same site, the latter being housed in a separate paediatric area. The adult unit is adjacent to the A&E and has 4 dedicated high dependency beds, a dedicated operating theatre and access to adult intensive care. The catchment population is notionally 0.6 million.

### **Western General Hospital and Royal Hospital for Sick Children, Edinburgh**

- 36 Adult neurosurgery is based in the Department for Clinical Neurosciences at the Western General Hospital, whilst paediatric neurosurgery is based at the Royal Hospital for Sick Children. At the Western General Hospital neurosurgery has 2 dedicated operating theatres and access to intensive care and neuroradiology facilities. Accident and Emergency facilities are at the Royal Infirmary of Edinburgh. Paediatric Neurosurgery at the Royal Hospital for Sick Children is managed in a ward shared with neurology and has access to paediatric intensive care and imaging facilities. The catchment population is notionally 1.3 million.

## **Southern General Hospital, Glasgow**

- 37 Adult and paediatric neurosurgery are accommodated within the Institute for Neurological Sciences at the Southern General Hospital. It incorporates a Intensive Care Unit and separate paediatric ward. It has access to 3 dedicated operating theatres and a neuroradiology suite. Some children, ie those with spina bifida, hydrocephalus and some children with head injury, are managed at the Royal Hospital for Sick Children at Yorkhill and similarly children requiring a stay of more than 24 hours in intensive care in a paediatric environment are transferred to the Royal Hospital for Sick Children. The notional catchment population is 2.6 million.

### **Sub-Specialisation**

- 38 A degree of sub-specialisation on a Scotland wide basis has taken place with some low volume complex conditions being concentrated in one or two locations. Examples of this include the management of patients with cranio-facial abnormalities has been concentrated in Glasgow and neurosurgery for patients with mental disorders has been concentrated in Dundee. Most recently the development of the network approach to interventional neuroradiology for endovascular coiling for the treatment of subarachnoid haemorrhage has been concentrated in Edinburgh and Glasgow. The recommendations of the previous work led by Sir David Carter also included this concentration of small volume, complex work, however, other than those described above, there has been little progress in this area.

### **Clinical Linkages**

- 39 Within neurosciences centres, neurosurgery functions in clinical collaboration with neurology, neuroanaesthetics, neuropathology, neuroradiology and neurophysiology. It also has strong clinical linkages to oncology, stroke services, critical care and trauma and works closely with chronic pain services, and the specialties of Ophthalmology and ENT/Maxillo Facial. The service also works closely with the National Spinal Injuries Unit which is based at the Southern General Hospital in Glasgow.

### **Current Activity**

- 40 The majority of inpatient neurosurgical activity takes place at the Southern General Hospital in Glasgow, which accounts for c 43% of the total; Aberdeen Royal Infirmary and Ninewells Hospital, Dundee together carry out the approximately the same amount as The Western General Hospital in Edinburgh. Significantly more day case activity occurs in Edinburgh than elsewhere. The volume of new outpatient activity is fairly evenly spread across the four centres, however Aberdeen sees more new outpatients as a proportion of total outpatients than elsewhere and is the only centre that does significant outreach. Table 1 summaries this activity.

Table 1 Neurosurgical Activity 2002/3 – all ages

	<b>Aberdeen</b>	<b>Dundee</b>	<b>Edinburgh</b>	<b>Glasgow</b>	<b>Total</b>
Inpatient episodes	996 14.6%	870 12.8%	2005 29.4%	2942 43.2%	6813 100%
Day Cases	120 17	77 11%	363 51%	153 21%	713 100%
New Outpatients	1273 28%	1054 22%	1147 26%	1056 23%	4530 100%
Total Outpatients	2557 19%	3365 26%	3813 29%	3434 26%	13169 100%

Source ISD Scotland (Form ISD(S)1)

Notes: Aberdeen includes Aberdeen Royal Infirmary, Royal Aberdeen Children's Hospital, Woodend Hospital, Tor-Na-Dee Hospital, Raigmore Hospital; Dundee includes Victoria Hospital; Edinburgh includes Western General Hospital, Royal Hospital for Sick Children,

- 41 In adults the majority of activity is on an elective basis, however in children this is reversed with more emergency activity. In all age groups the level of transfer is not insignificant, reflecting the role as a tertiary centre. Table 2 summarises this activity.

Table 2 Discharges from Neurosurgery 1999-2004 (5 years grouped)

	<b>All Activity</b>	<b>Elective</b>	<b>Emergency</b>	<b>Transfers</b>	<b>Daycase</b>
Adults > 19 years	34253 100%	4282 42%	10169 30%	7492 22%	2310 7%
Children 0-18 years	3460 100%	840 24%	1475 43%	821 24%	324 9%

Source ISD Scotland SMR01 (excludes patients who live outwith Scotland)

- 42 The table below shows the number of discharges from Neurosurgery with an operation and a range of surgical interventions at each of the centres. Further selected activity data is included in appendix 6.

Table 3 Neurosurgical operations/procedures undertaken in Scotland's four neurosurgical units in the year ended 31 March 2003

Operation/Procedure	Numbers of discharges (percent <sup>1</sup> )				
	Aberdeen	Dundee	Edinburgh	Glasgow	SCOTLAND
<b>Discharges from neurosurgery with an operation</b>	<b>916</b>	<b>792</b>	<b>2044</b>	<b>2001</b>	<b>5753</b>
Craniotomy for Intracranial Aneurysm	29 (3.2)	17 (2.1)	9 (0.4)	36 (1.8)	91 (1.6)
Ventricular Shunts/Revisions					
Total	27 (2.9)	35 (4.4)	168 (8.2)	80 (4)	310 (5.4)
Hydrocephalus	16 (1.7)	20 (2.5)	86 (4.2)	18 (0.9)	140 (2.4)
Other	11 (1.2)	15 (1.9)	82 (4)	62 (3.1)	170 (3)
Ventricular Endoscopic Procedures					
Total	1 (0.1)	1 (0.1)	5 (0.2)	4 (0.2)	11 (0.2)
Hydrocephalus	0 (0)	0 (0)	3 (0.1)	3 (0.1)	6 (0.1)
Other	1 (0.1)	1 (0.1)	2 (0.1)	1 (0)	5 (0.1)
Operations for Trigeminal Neuralgia	0 (0)	8 (1)	20 (1)	36 (1.8)	64 (1.1)

Operation/Procedure	Numbers of discharges (percent <sup>1</sup> )									
	Aberdeen		Dundee		Edinburgh		Glasgow		SCOTLAND	
Craniotomy for Traumatic Haematoma										
Total	46	(5)	33	(4.2)	107	(5.2)	129	(6.4)	315	(5.5)
Spontaneous	32	(3.5)	14	(1.8)	65	(3.2)	64	(3.2)	175	(3)
Head Injury	12	(1.3)	14	(1.8)	37	(1.8)	59	(2.9)	122	(2.1)
Other	2	(0.2)	5	(0.6)	5	(0.2)	6	(0.3)	18	(0.3)
Operations for Spinal Degenerative Disease - Cervical Spine	65	(7.1)	64	(8.1)	150	(7.3)	81	(4)	360	(6.3)
Operations for Spinal Degenerative Disease - Lumbar Spine	215	(23.5)	203	(25.6)	350	(17.1)	157	(7.8)	925	(16.1)

Source: SMR01 (inpatient/ day case discharges from non-obstetric/ non-psychiatric specialties)

1 Percentage of all neurosurgical operations/ procedures undertaken in each centre

2 The four neurosurgical centres are based on the following hospitals:

Aberdeen: Aberdeen Royal Infirmary/ Royal Aberdeen Children's Hospital/ Tor-Na-Dee Hospital

Dundee: Ninewells Hospital/ Dundee Royal Infirmary/ Stracathro Hospital

Edinburgh: Western General Hospital/ Royal Hospital for Sick Children

Glasgow: Southern General Hospital

## The Need for Neurosurgery in the Future

- 43 The Action Team considered the needs of patients over a 20 year horizon including the implications for the next generation of the workforce
- 44 It is very difficult to predict the level and nature of demand and there is no needs assessment in this area, however the Team attempted to take a view on what the need for neurosurgery might be in the future, based on assessing the changes over the last 20 years and their knowledge of technological development and research into and the development of drug and therapeutic interventions.
- 45 It considered that the overall level of need may not change, but the type of neurosurgery would. Developments in genomics and drugs and therapeutic interventions would probably have the most significant affect on neurosurgery and these developments would have the most impact on need. In addition it is likely that the complexity of neurosurgery will continue to advance in terms of technological adjuncts, as well as a need for such therapies to be delivered in a highly specialised neuroscience centre, eg development of stem cell therapy for Parkinson's Disease, their insertion into the brain in the correct place, follow up, etc.
- 46 As a proportion of neurological disease is associated with ageing, the changing demographics of Scotland will influence the nature of demand. It is expected that there will be an increase in functional neurosurgery, ie epilepsy and tremors, which are associated with ageing. It is also expected that there will be a decrease in paediatric neurosurgery due to the declining birth rate. There is also a level of unmet need in some areas, eg epilepsy surgery, which points to an increase. As the population ages brain tumours become more common, therefore there will be an increase in neuro-oncology. As the physical status of many elderly people

improves, there will be an increase demand for complex surgery in an age group which hitherto is not being met.

- 47 Neurovascular surgery (that is aneurysm clipping and removal of arteriovenous malformations) may disappear in the future and there will be a new speciality of neurovascular disease. As the population ages and strokes become more common there will be an increased demand for intensive management of patients with intracerebral haemorrhages, large thrombotic or embolic ischaemic strokes and revascularisation procedures for some conditions. Current prospective randomised controlled trials show that decompressive hemicraniectomy may become more common. In addition in these patients (stroke in general who are doing badly) there will be an increased demand for intensive care beds, highly specialised monitoring systems and subsequent step down and rehabilitative requirement.
- 48 It is possible that due to advances in genomics the nature of brain tumour surgery may also change. However, as with neurovascular surgery for stroke it is likely that the type of surgery being performed will alter, but not disappear. Thus it is conceivable for such procedures as Parkinson's Disease, stem cells which release either LDOPA or neurotrophic factors may be implanted into the putamen or other regions of the basal ganglia, it is also possible stem cells which are cholinergic neurones could be implanted into various nuclei in patients suffering from Alzheimer's Disease or early stage dementia. If gene therapy using a Trojan horse technique also becomes established this will lead to an increased demand for surgery in patients with brain tumours.
- 49 There will continue to be a very small number of very specialised procedures which would be undertaken at a level beyond Scotland, ie in England; these tend to be very rare paediatric cases. There will also be the potential for cases from England to be treated in Scotland as areas of special expertise are developed.
- 50 It is expected that there will be an increase in interventional radiological techniques, such as has been shown in the treatment of subarachnoid haemorrhage, with a corresponding reduction in neurosurgical interventions.
- 51 Considering practice in recent years, it is likely that there will continue to be a decrease in trauma, particularly the number of patients with head injuries being admitted to neurosurgical units has reduced.
- 52 As the population ages there will be an increased demand for surgery for degenerative diseases of the cervical and lumbar spine. However the impact of various cytokines and other inflammatory modulating drugs could possibly reduce the longer term (20-30 year) demand for this type of surgery. In the immediate future however, as the current population ages and these people have not had the benefit of any "degenerative slowing agents" there is not expected to be any decrease in the requirement for degenerative neurosurgical or orthopaedic surgery for discs, canal stenoses, radiculopathy, or myelopathy.

## **Recommendation**

- 53 A needs assessment for neurosciences should be undertaken to support future planning of services. This should initially be undertaken by the implementation

team identified to take forward the recommendations of this report and thereafter should form part of the planning arrangements.

### What do patients want?

- 54 It is generally accepted that patient expectations have and continue to increase. The ActionTeam was keen to understand two things specifically concerning users of specialised services – were the general views of patients consistent with those held by users of specialised services and were there any particular views or issues associated with specialised services care?
- 55 In considering how to get patients’ perspectives, the Team recognised that wider consultation will take place following publication of the full report. Therefore they focussed on getting the involvement of patients in their work.
- 56 Members of the Action Team included representatives of patient groups who are part of The Neurological Alliance Scotland, and through them the Alliance involved its members in considering the questions described above and in developing the criteria for the future service.
- 57 Standards of care of set out in the Neurological Alliance document “Levelling Up”<sup>13</sup> were also considered and can be summarised as:

<ul style="list-style-type: none"> <li>• Independence and Quality of Life</li> <li>• Comprehensive Assessment</li> <li>• Well Trained Interdisciplinary Professionals</li> <li>• On-going Access</li> <li>• Co-ordinated Care across Sectors</li> <li>• User Involvement</li> <li>• Established Care Pathways</li> <li>• Addressing the needs of Carers</li> </ul>	<ul style="list-style-type: none"> <li>• Speedy Access</li> <li>• High Quality Information</li> <li>• Access to Voluntary Organisations</li> <li>• Equity of Service Provision</li> <li>• Prevention</li>   <li>• Holistic Rehabilitation</li> <li>• Good Record Keeping</li> </ul>
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- 58 In considering criteria for the future service the Alliance members advised the Team that they should focus on patients and services not organisations, structures and sites, staffed by professionals who were knowledgeable about their condition. The key patient priority was an integrated Scotland-wide service and they assumed that any change would improve the service. The model should provide equity of access, including to diagnosis, assessment and treatment provided as locally as possible.
- 59 They advised that irrespective of the final configuration proposed, the model should adopt a managed clinical network approach on an all-Scotland basis, which would develop a model of working which included clinicians as part of a virtual organisation that actively involved patients in service design. It would also promote interdisciplinary working at all levels and with other agencies, such as voluntary organisations.

<sup>13</sup> Levelling Up – Standards of Care for People Living with a Neurological Condition, Neurological Alliance, 2002

- 60 They acknowledged that a balance needed to be struck between centralisation, any critical mass issues and the needs of local and rural communities and expectations of patients, families and carers.

## **Recommendation**

- 61 Patients should continue to be involved in the future planning of neurosurgical services, both locally and in the service model adopted for NHS Scotland. Patients and patient representative groups should be at the centre of future development and decision making.

## **Standards for the Service**

- 62 In NHS Scotland the development and agreement of standards for services has been driven through two routes, by the Royal Colleges, in the case of neurosurgery, by the Society of British Neurological Surgeons and by NHS bodies, such as the former Health Technology Board of Scotland and Clinical Standards Board for Scotland, now integrated in NHS Quality Improvement Scotland, the Scottish Intercollegiate Guidelines Network (SIGN) and through participation in various audits, eg Scottish Trauma Audit Group, Scottish Audit of Surgical Mortality. These audits are discussed in more detail later in the report.
- 63 More recently managed clinical networks (MCNs) are developing standards in partnership with patients which can be incorporated into service delivery locally, eg Epilepsy MCN.
- 64 Additionally the Neurological Alliance has developed standards in their “Levelling Up” document, referred to previously, and its members are involved in managed clinical networks.
- 65 There are also condition specific standards, eg SIGN<sup>14</sup> Guidelines – Diagnosis and management of epilepsy in adults (June 2004) , Early management of patients with a head injury (September 2000, due for review) and for specific service areas, eg Neurosciences Critical Care described earlier.
- 66 The status of these standards varies, those issued by NHS Bodies are required to be considered by Health Boards and actions to progress towards meeting them considered as part of their prioritisation processes. Those issued by professional bodies, do not have the same status and are considered as professional advice and guidance. Thus progress towards meeting the standards has varied across Scotland.
- 67 The Team agreed very early that the future service should set out explicitly the standards of care it wished to achieve and that it should be assessed regularly against these. A mechanism to achieve this will need to be identified and agreed, however if a managed clinical network approach is adopted this would be an integral element. It also considered that assessing the current services against a set of standards would help them in understanding the start point and whether a

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<sup>14</sup> Scottish Intercollegiate Guidelines Network, [www.sign.ac.uk](http://www.sign.ac.uk)

particular service model or configuration would be better in terms of being able to meet them.

- 68 The SBNS in conjunction with the Regional Specialised Services Commissioning Group in England, have developed Standards for Patients Requiring Care<sup>15</sup> to support the commissioning and contracting process in the English NHS. The Team agreed that each neurosurgery centre would carry out a self assessment audit against these standards and submit this to the UK database for a comparison with other centres in the UK. A small panel of members of the Team would review this information, reporting back to the Team.
- 69 The Audit process identified a number of issues which required to be addressed to make the Standards relevant and applicable to Scotland. These were specifically:
- Achieving consistency on a self assessment process is problematic, eg the wording is open to interpretation, individuals will score differently
  - All the supporting evidence is required to be reviewed
  - The scoring attributes '0' where a standard is not applicable, which skews the overall score; as the Standards are based on the English NHS there are a number of standards which are not applicable to Scotland
  - Peer review and Site visits would enhance the process
  - Identification of similar units would assist comparison; the information is anonymous
- 70 The Team noted that the scoring indicated that all of the units in the UK had areas where changes were required to meet some of the standards.
- 71 The Team considered that the process and use of these specific standards were useful to the service and that work should be progressed to develop them and make them applicable to Scotland. The centres can then individually and working together agree action plans to address areas requiring changes.

## **Recommendation**

- 72 Explicit standards for the neurosurgery service should be agreed and set out in the service model. This should also include a mechanism for assessment against these standards and action plan to address areas for improvement. Patients should be involved in this process.
- 73 These standards should be based on the SBNS standards currently being used elsewhere in the UK and the service should work with the SBNS in their further development. The service should make them relevant to Scotland whilst ensuring comparison with other units and address the issues identified through the process of self assessment in Scotland carried out as part of the work of the Action Team.
- 74 The Neurosurgery centres should work collaboratively to address areas for improvement, sharing good practice and develop action plans.

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<sup>15</sup> Standards for Patients requiring Neurosurgical Care, Joint Standards Development Group of the Clinical Standards Committee of the Society of British Neurological Surgeons and Regional Specialised Services Commissioning Group, August 2002

## Information

- 75 In common with the previous reviews of neurosurgery the Team were concerned about the lack of information which was considered useful to their work. Particularly information from databases that are sufficiently large and consistent to allow meaningful comparison between the centres in Scotland and elsewhere. This information included activity data, clinical audit data and clinical information to form an evidence base particularly concerning any relationship between the volume of activity and outcome.
- 76 The work of Professor Teasdale's group did explore these issues in some depth, with some significant outcomes, for example Scottish Audit of Surgical Mortality introduced neurosurgery forms and a national project to agree coding in the speciality was taken forward as a pilot. However there is a need to assess the impact of this work and further develop it.
- 77 There is some comparative information available on specific patient groups, eg the Scottish Trauma Audit Group information on head injured patients and some of the centres do participate in UK wide audit activity, eg the Sub Arachnoid Haemorrhage (SAH) Audit and the UK Shunt Registry, however this activity is rather piecemeal. The Centres agreed to the release of this information so that it could be reviewed as part of the work of the Team.
- 78 At the time of writing the report preliminary information was available from the SAH audit, however it was not case-mix adjusted. This data would be available later in the year and the Team agreed that this should be reported to the Team and considered as part of the next stage of work in implementing the recommendations of the report.
- 79 The Team noted that clinical practice in the management of Sub Arachnoid Haemorrhage had changed recently and that the information from this audit would not reflect current practice fully. Therefore it is important that audit activities reflect and inform current and future practice.
- 80 Information from the Shunt Registry covers 3 Scottish centres, it excludes Dundee, and it is incomplete as some of the data for the Southern General Hospital is missing (August – November 2003). However it shows that the Scottish Units are broadly in line with rest of the British Isles in terms of relative proportions of diagnoses. Similarly there are no significant differences in the relative proportions of revision procedures and infections to the British Isles, and it is interesting to note that the proportion of these appears to be decreasing in both Scotland and the British Isles as a whole. The Scottish dataset is not large enough to draw any statistically significant conclusions. Summary information is presented in the Tables below and more detail is included in Appendix 8.

Table 4 – Major Diagnoses 2000-2004

<b>Diagnosis</b>	<b>British Isles</b>	<b>Scotland</b>
All Malformations	18.7 %	21.73 %
Acquired	66.6 %	67.29 %
All Idiopathic	14.7 %	10.98 %

Source: UK Shunt Registry

Excludes Dundee and August – November 2003 for Southern General Hospital, Glasgow

Table 5 – Shunt-Related Procedures 2000 – 2004 (All Ages)

	All Operations	1st Operations		Revisions		Infections	
	Number	Number	%*	Number	%*	Number	%*
<b>2000</b>							
Scotland	223	79	35.4	144	64.6	22	9.9
British Isles	2821	1194	42.3	1627	57.7	160	5.7
<b>2001</b>							
Scotland	195	97	49.7	98	50.3	10	5.1
British Isles	2665	1245	46.7	1420	53.3	143	5.4
<b>2002</b>							
Scotland	165	74	44.8	91	55.2	9	5.5
British Isles	2722	1254	46.1	1468	53.9	119	4.4
<b>2003</b>							
Scotland	110	41	37.3	69	62.7	7	6.4
British Isles	2827	1337	47.3	1490	52.7	142	5.0
<b>2004</b>							
Scotland	130	64	49.2	66	50.8	1	0.8
British Isles	2846	1623	57.0	1223	43.0	79	2.8

Source: UK Shunt Registry

\* % of All Operations

Excludes Dundee and August – November 2003 for Southern General Hospital, Glasgow

- 81 The need to ensure that funding of audit activity is mainstreamed and secured became obvious during the work of the Team. For example the SAH Audit was funded externally to the NHS for a fixed period, and this funding has now ceased. There is a requirement for future audit to be an integral part of the service and this has to be adequately funded together with an appropriate infrastructure to collect and analyse the data in a meaningful fashion. The development of an evidence base requires robust arrangements for clinical audit, research and data collection. This also assures quality of service.
- 82 The Department of Health in England has recognised definitions of specialist services relating to neurosciences, therefore it would be beneficial to consider adopting these as a basis to support a common dataset. These are:
- Definition 8 -Specialist Neurosciences Services (adult)
  - Definition 6 – Specialised Spinal Services (all ages)
  - Definition 7 – Complex Specialised Rehabilitation for brain injury and complex disability (adult)
  - Definition 23 – Children’s Specialised Services – paediatric neurosciences

- 83 The Team agreed that the development of common and shared datasets, both clinical and activity, will support equity in the quality of the services provided and access in terms of allowing improved management of a reduction in waiting times as well as support continuous improvement.

### **Recommendations**

- 84 The Team supports and enhances the previous works' recommendations:
- a common minimum data set of activity information should be agreed, collected and reported back to the service to inform planning and performance management. The data set should be relevant to the service and based on the Department of Health Definitions.
  - a planned audit programme for the service should be developed, agreed and maintained, including a procedure register in each centre.
- 85 Arrangements, including funding, for clinical audit and data collection, analysis and reporting should be mainstreamed into the future model for Neurosurgery.

### **Relationship between Volume and Health Outcome**

- 86 The Team was particularly concerned to understand the extent of the evidence base concerning the relationship between volume and health outcomes since the previous reviews. The National Advisory Group commissioned a re-review of the research evidence and the Team took this as its main evidence. It also was aware of specific papers published concerning neurosurgical interventions and took cognisance of these. A list of the papers is attached as Appendix 5.
- 87 From these the Team concluded that there is some evidence of a relationship between the volume of procedures undertaken and health outcomes, however that this was not universal and the threshold level might be relatively low.

### **Recommendations**

- 88 The future planning of neurosurgery should take account of evidence in the field of associations between volume and health outcomes.
- 89 The evidence base should continue to be developed based on agreed audit, research and data collection which is mainstreamed as proposed previously.

### **Transport and Travel**

- 90 Two of the values adopted by the National Advisory Group for its work were that of keeping as much health care as close to a patient's home as possible, and providing safer health care. In the area of specialised, low volume care, eg neurosurgery, there is a tension between these two values as the resources, in terms of staff expertise, equipment and facilities to provide care close to people's

homes would not be supported by the volume of care needed. This is more pronounced in paediatric neurosurgery because of the smaller number of children requiring treatment per population base.

- 91 There had been recognition in the previous work that a proportion of the population of Scotland are not within 2 hours surface travel time of a neurosurgical centre and that would be unlikely to change. The Team acknowledged that any reduction in the number of centres would increase this proportion to varying degrees and that issues concerning transport arrangements for ill patients and travel for families and carers were important. The transport of patients is important both in terms of into neurosurgical care and back out to local care once the specialised intervention is complete. Currently there are delays in this. Therefore it is important that any model of service should include access to specialised services for the minimum time and transfer back to local care as soon as possible, supported by intensive outreach.
- 92 The current NHS and public transport infrastructure would not support any re-configuration in neurosurgical services and would require review in advance of any revised service disposition being implemented. Transfer of ill patients in emergency and planned situations would require exploration of increased use of air transport and dedicated transport teams with appropriately trained staff. Additionally support for families, carers and visitors through improved public transport links, provision of accommodation and other support whilst attending the specialist centre would need to be strengthened.
- 93 Discussion in the Action Team on the transport of head injured patients identified that there might be value in reviewing the protocols with the Scottish Ambulance Service, exploring the potential for patients with an isolated head injury being transferred directly to a centre that could treat the head injury rather than to a local accident and emergency department for resuscitation. Additionally the model of appropriately staffed and resourced retrieval teams in paediatric intensive care and neonatal care potentially has merit in the areas of adult and paediatric neurosurgical care.
- 94 The Team reviewed travel time information supplied by ISD from their Geographic Information System. This was presented as maps showing the proportions of the population within 30, 60 and 120 minutes of one of the neurosurgical centres by surface transport. It was noted that this did not include public transport, however the information was considered very helpful in assessing the impact on populations of a reconfiguration of services and was also used in the Option Appraisal process described later in the report.
- 95 To minimise the potential travel requirements for families and carers the future neurosurgical service should provide as much care locally as possible and this should particularly include rehabilitation, outpatient consultation, pre and post operative care and access to diagnostic tests. Currently many of these are carried out at the centres, therefore this would be an improvement for patients if it could be achieved.

## Recommendations

- 96 The NHS transport infrastructure should be reviewed to support future models of care including:
- The role of the Scottish Ambulance Service (SAS) and in particular the air ambulance service, is critical to achieving satisfactory response times. The Scottish Executive Health Department should ensure that the SAS is strategically positioned to support rapid transfer of expert teams from specialist centres to stabilise patients in remote and rural areas and the transfer of increasing numbers of ill children and adults over long distances to appropriate specialist centres
  - The protocols for transfer of head injured patients should be reviewed with the Scottish Ambulance Service
  - The model of retrieval teams, used in paediatric and neonatal intensive care should be explored to ascertain whether a similar model might benefit the transfer of ill neurosurgical patients
  - A transport service for the transfer of patients back to local care should be explored
- 97 The NHS through the Scottish Executive Health Department, Regional Planning Groups and NHS Boards should develop plans to develop a public transport infrastructure with Local Authority partners and transport providers.

## E-Health

- 98 The development of robust, widely available technological infrastructure is fundamental to support future services models which retain rehabilitation, outpatient clinics and simple diagnostic tools within a local setting, whilst accessing more specialist services in a smaller number of centres. Opportunities for local testing and remote interpretation by a specialist at a centre and the exploitation of videoconferencing for clinical, training and case discussions rely on such an infrastructure. Experience in other areas, eg the Scottish Paediatric Telemedicine Project has demonstrated benefits.
- 99 Keeping as much neurosurgical service locally also requires electronic clinical communications, providing information on patients, including test results, to clinicians wherever and whenever it is needed.

## Recommendation

- 100 A strategy for the application of telemedicine should be developed using the findings of pilots, and implementation prioritised to support the maintenance of specialised services locally.

## Workforce Issues

- 101 Some of the key drivers for change in the service concern workforce issues. The workforce pressures are not unique to Scotland and are being felt on a global basis, thus NHS Scotland needs to create its own solutions. For neurosurgical services

this means creating satisfying jobs and opportunities for career progression across the spectrum of the workforce to recruit and retain staff.

- 102 The issues have been stated previously, but are specifically:
- The scarcity of skilled staff – medical, nursing and Allied Health Professions
  - The implementation of the new contract for consultant medical staff
  - The implementation of the requirements of the Working Time Regulations (WTR), with particular implications for consultants and junior medical staff
  - The demographic changes in Scotland which project a smaller workforce in the future
- 103 There are also issues concerning continuing professional development of staff in units with relatively small caseloads and which see limited numbers of cases of unusual type. These include practical issues of cover to release staff to develop skills and experience in sub-speciality areas.
- 104 Designing and providing a service which recruits and retains these scarce, skilled staff must remain fundamental to neurosurgery in Scotland. In a global market, it must remain attractive and provide opportunities for career development. The service also needs to recognise the contribution and needs of its current staff and acknowledge the potential risk of service reconfiguration on retention of these staff.
- 105 The workforce issues concerning implementation of the new consultant contract and the WTR could be addressed through employing additional medical staff, if the investment and suitably qualified and experienced staff were available. However this would increase consultant numbers to a level where the need, expressed in volume of activity, from the population catchment of each unit, or indeed for Scotland, would not be sufficient to support maintenance of skills, and junior doctors' numbers to a level that would not support training in skills or acquisition of experience. This increase in numbers is due to the requirements of the service to provide 24 hour cover for each unit and the requirements of the WTR as they relate to hours of work and rest requirements. The current consultant establishment is set out in Table 6 below:

Table 6 – Current Consultant Establishments

<b>Neurosurgical Unit</b>	<b>Catchment Population*</b>	<b>Programmed Activities**</b>
Southern General Hospital, Glasgow	2.6 m	7 NHS Consultants – 73 1 Academic – 11 Total – 84
Ninewells Hospital, Dundee	0.6 m	3 NHS Consultants – 36
Royal Aberdeen Infirmary	0.75 m	3 NHS Consultants – 36
Western General Hospital, Edinburgh	1.3 m	54 in the adult service 6 in the paediatric service Total – 60
Scotland	5.65 m	216 PAs

Source – The four neurosurgical centres

\* notional, note there will be some duplication due to sub-specialisation

\*\* Consultant Contract basis 10 PAs ≡ 1 Whole Time Equivalent

- 106 The Team asked for independent opinion on this issue from Mr James Palmer, Consultant Neurosurgeon, who had developed a consultant workforce modelling tool for the SBNS, particularly focussing on the medical resources needed to provide 24 hour cover in a location taking into consideration issues of intensity.

### **Independent Opinion**

- 107 The report from Mr Palmer was based applying the model to Scotland using two analyses - on data provided by the four units and on data extrapolated from the Plymouth Neurosurgery Unit. It noted a significant difference between these analyses and recommended further detailed work on the data. However it concluded that there are two key consultant workforce issues for NHS Scotland – sustaining the range and volume of operating activity to maintain skills and experience, and achieving compliance with the EWTR.
- 108 It summarises that to achieve EWTR compliance would require additional consultants to be appointed; the number suggested ranges from 2 to 24 depending on the configuration. As an indication, if the current configuration is maintained the figure could be between 10 and 24, if a single centre is established it could be between 2 and 13. Centres with small numbers of consultants may have difficulties meeting the rest requirements.
- 109 If this expansion in consultant numbers were to be implemented, the level of operating activity would fall well below the SBNS recommendation of 180-250 operations per surgeon per year to maintain the full spectrum of cranial neurosurgical practice.
- 110 A number of options are put forward for consideration, however all require a change to the status quo. These options include a concentration of operating activity into fewer centres, modernisation of patterns of work and the creation of a sub-regional unit completing limited surgery; the latter would impact on training recognition.
- 111 For other disciplines integral to the journey of patients through the neurosciences specialities, there is recognition of the lack of robust workforce modelling tools. Where these are available they tend to focus on the acute/intensive care requirements; for a service model which adopts a managed clinical network approach, the local rehabilitative structures require to be identified and invested in, therefore there is a need to develop these tools.

### **Recommendations**

- 112 NHS Scotland should develop the SBNS consultant workforce tool appropriate to Scotland to support future planning of neurosurgery and to consider its application for other staff groups and specialties. It should develop the tool to reflect the service model identified and the needs of the other staff groups, particularly nursing staff and allied health professionals. It should also be developed to incorporate the requirements of employment legislation and regulations and the implications of different levels of intensity in units.
- 113 Future investment decisions on staff appointments to neurosurgical services should be made on a single service approach, ie decisions should not be taken by

individual Health Boards and staff may be appointed to geographic areas wider than individual Health Boards

## Option Appraisal

- 114 The Team agreed that as part of the process to inform its work an option appraisal would be carried out. This would be beneficial in making explicit what the Team considered were the key criteria for the future service model and help to inform their recommendations on the configuration of that service model. The Team were clear that the option appraisal in itself would not give a definitive answer, but would indicate the relative merits of different options. The methodology for the option appraisal is in Appendix 7, however briefly:
- 1 A number of criteria were identified and agreed
  - 2 A weighting was applied to each criteria using the median score from individual weightings applied by Team members
  - 3 A number of options were identified and agreed
  - 4 The options were scored against the criteria by Team members individually
  - 5 The weightings were then applied to the scored options using the median score from the individual scoring applied by Team members
- 115 Further information on the context for the option appraisal and the assumptions Team members were advised to make in carrying it out were provided. This is included in Appendix 7.

## Criteria

- 116 The Team drew on previous work and their own discussions to identify criteria and included advice from the Neurological Alliance (described previously). It agreed the following as the key criteria for the service: (a full description is included in Appendix 7)
- Co-location on a University Teaching Hospital Site
  - Co-location of paediatric and adult neurosurgical services
  - Specialist neurosurgical beds, theatre facilities, intensive and high dependency care and multi-disciplinary teams
  - Co-location with other neurosciences specialties, ie, neurosurgery should be located within a neurosciences context
  - Provision of 24 hour care by a multi-disciplinary team
  - Integrated Service
  - Local Services
  - Ability to meet recognised Standards, eg SBNS, SIGN Guidelines for the management of head injury

## Options

- 117 The Team agreed 17 options for the configuration of the service. These options were limited to the existing locations of the neurosurgical service plus one other option of a new location. It was recognised that this does not cover all the potential options, however the Team worked with their collective knowledge of the options

available at the time and considered identification of any other potential options outwith their scope and expertise. The options are described in more detail in Appendix 7:

1 Location	
1.1	A new location
1.2	Glasgow
1.3	Edinburgh
1.4	Aberdeen
1.5	Dundee
2 Locations	
2.1	Glasgow and Edinburgh
2.2	Glasgow and Aberdeen
2.3	Glasgow and Dundee
2.4	Edinburgh and Aberdeen
2.5	Edinburgh and Dundee
2.6	Aberdeen and Dundee
3 Locations	
3.1	Glasgow, Edinburgh and Aberdeen
3.2	Glasgow, Edinburgh and Dundee
3.3	Edinburgh, Aberdeen and Dundee
3.4	Glasgow, Aberdeen and Dundee
4 Locations	
4.1	Glasgow, Aberdeen, Dundee and Edinburgh – planned proactive change
4.2	Glasgow, Aberdeen, Dundee and Edinburgh – status quo

## Outcome

- 118 The Team acknowledged that the option appraisal was an inexact process, however that it indicated a direction of travel. It gave serious consideration to the implications of the outcome of the process, and how the model of service, described later, would be organised through the proposed configuration.
- 119 The Team recognised that all the options would require capital investment and considered that the indicated direction of travel gave an opportunity to secure an improvement in service for all patients which should be fundamental to a change in configuration.
- 120 The table below summarises the outcome of the option appraisal process. The full detail is in Appendix 7.5

Table 7 – Total of Ranked Weighted Median Scores for Options

Rank	Configuration	Total Score
1	One prime site in Glasgow	835.8
2	Two sites – Edinburgh and Glasgow	823.0
3	One prime site in a new location	798.5
4	Two sites – Aberdeen and Glasgow	790.5
5	Two sites – Dundee and Glasgow	773.3
6	One prime site in Edinburgh	768.5
7	Two sites – Aberdeen and Edinburgh	758.0
8	Three sites – Aberdeen, Edinburgh and Glasgow	752.8
9	Two sites – Edinburgh and Dundee	750.8
10	Three sites – Dundee, Edinburgh and Glasgow	720.8
11	One prime site in Dundee	699.3
12	Four sites with planned, proactive change	687.8
13	One prime site in Aberdeen	684.8
14	Three sites – Aberdeen, Dundee and Glasgow	678.3
15	Three sites – Aberdeen, Dundee and Edinburgh	648.3
16	Two sites – Aberdeen and Dundee	641.5
17	Four sites – status quo	547.8

- 121 The outcome of the option appraisal indicated that Scotland should move from its current configuration (which was rated last in the option appraisal) towards a single centre for neurosurgical intervention for adults and children as part of a service model which would provide local outpatients, rehabilitation, pre and post operative care and diagnosis. This model, which is described in more detail in the next section, would take a Managed Clinical Network (MCN) approach and would require planning and commissioning on an all-Scotland level to establish a world class service which would provide an improved service, attract and retain staff, provide a robust basis for research and development, and support academic neurosurgery.

## The Neurosurgery Service for Scotland

- 122 Throughout the work of the Team there was a consensus that adult and paediatric neurosurgery in Scotland should be regarded as a single service delivered on a number of sites. This means that planning, service development and decisions on investment in staff equipment and facilities will be on an all-Scotland basis. The single service would adopt a managed clinical network approach to its work. The work identified a number of underpinning components to this service as well as key criteria which are recommended to become planning assumptions for the service.

### Recommendation

- 123 Adult and paediatric neurosurgery should be regarded as a single service for Scotland, delivered on a number of sites and through managed clinical networks. Future decisions concerning investment in staff, facilities, equipment should be taken through the planning and commissioning model described later in the report.

## Service Description

124 The key criteria provide a basis for the Service Model:

Adult and paediatric neurosurgery should be co-located on University Teaching Hospital sites with other neuroscience specialties. It should have access to identified specialty beds, theatre facilities, intensive and high dependency care and multidisciplinary team(s). These teams should provide 24 hour care. The service will be integrated, using a managed clinical network approach, across specialist, secondary and primary care and will be provided as locally as possible. The service will have explicit standards for care across the integrated care pathway.

125 The integrated service will provide patients with access to a network of care with specialists at the centre. It will be based on agreed patient pathways, supported by protocols providing consistent, equitable care wherever and whenever a patient requires it. The establishment of MCNs for agreed areas will be fundamental to securing integration. The experience of developing MCNs has shown benefits in the development of standards, pathways and, importantly, the involvement of patients in these. MCNs may have a national, regional or local focus, however clear links between all levels will be important.

126 The Team agreed that national sub-specialisation, as has already taken place in some areas, should be continued on an ongoing basis and this should be an immediate next step. However experience has shown that this should be done on a planned and managed basis. Initial areas should include acoustic neuroma, epilepsy surgery, functional surgery, cerebrovascular surgery, oncology, pituitary tumours, arteriovenous malformations and complex spinal surgery.

127 This principle should include the sub-specialty of paediatric neurosurgery which should be concentrated on one prime site, co-located with Paediatric Intensive Care. Previous work in this area<sup>16</sup> had indicated that Scotland should move towards a single lead paediatric neurosurgical unit at the centre of a managed clinical network. Care in this unit should be undertaken by subspecialty paediatric neurosurgeons within a tertiary paediatric service and supporting provision of rapid access to local neurosciences care through a national managed clinical network.

128 The Team was aware that the Specialised Paediatric Services Action Team was considering Paediatric Intensive Care provision in Scotland and to ensure consistency with their recommendations, an immediate next step action would be for a national MCN to be established to consider the model and to implement the recommendations of each Action Team. Additionally, in being taken forward, this work should be cognisant of the opportunities to re-provide children's services being considered currently in NHS Scotland.

129 The issue of how unplanned neurosurgical activity would be managed locally within the model was considered and the service model supports local unplanned care and subsequent transfer, where necessary, to specialist services through agreed

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<sup>16</sup> Report of the Short Life Working Party on Paediatric Neurosurgery, Scottish Colleges Committee on Children's Surgical Services, October 2001

pathways. It is recognised that there will need to be investment in training of other local staff to deliver this and the neurosurgical centres will have a significant role to play in this.

- 130 The single service can be described as being delivered at a number of levels, each level will provide Level N1 for their local population, there will be a number of Level N1 locations within the population covered by a level N2 location and there will be a number of level N1 and N2 services within the population covered by an N3 centre.

The individual levels are described below:

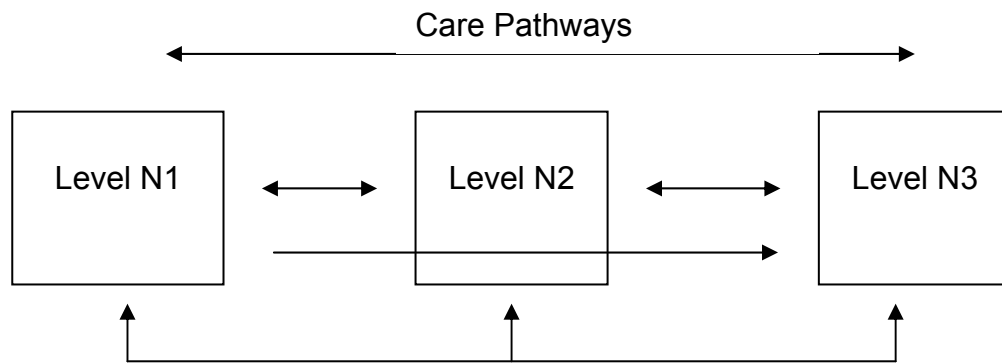
<p>➤ <b>Level N1</b></p> <p>Focussed through Community Health Partnerships, Minor Injury Services and GP Practices, this level will have access to neurological teams facilitating access and re-access when needed supported by nurse led clinics and rehabilitation facilities. It will be able to refer to Level N2 and directly to Level N3. It will provide:</p> <ul style="list-style-type: none"> <li>• Simple tests</li> <li>• Referrals</li> <li>• Decision support</li> <li>• Pre-admission clinics</li> <li>• Local neurology</li> </ul>
<p>➤ <b>Level N2</b></p> <p>Focussed through District General Hospitals, this would be supported by neurologically trained accident and emergency resuscitation staff as well as specialist outreach and follow up clinics with rapid access to deal with the urgent Neurological emergencies. It will provide:</p> <ul style="list-style-type: none"> <li>• Simple tests</li> <li>• Referrals</li> <li>• Decision support</li> <li>• Pre-admission clinics</li> <li>• Local neurology</li> <li>• CT/MRI with image transfer</li> <li>• Rehabilitation</li> <li>• Stroke Medicine</li> <li>• General Neurology</li> <li>• Neurophysiology (linked to level N3 centre)</li> <li>• Local orthopaedic service</li> <li>• Outpatient neurosurgery</li> <li>• Post operative care for neurosurgery (supported by education and training from level N3 centre)</li> <li>• General Intensive Care</li> </ul>

➤ <b>Level N3</b>
<p>Specialist Neurosurgical Centre co-located with all neurosciences specialties and the major specialties of a teaching hospital. Provides a comprehensive range of sub-specialty expertise and national subspecialties. It will provide:</p> <ul style="list-style-type: none"> <li>• Simple tests</li> <li>• Referrals</li> <li>• Decision support</li> <li>• Pre-admission clinics</li> <li>• Local neurology</li> <li>• CT/MRI with image transfer</li> <li>• Rehabilitation</li> <li>• Stroke Medicine</li> <li>• General Neurology</li> <li>• Neurophysiology</li> <li>• Local orthopaedic service</li> <li>• Outpatient neurosurgery</li> <li>• Post operative care for neurosurgery</li> <li>• Complex medical and surgical management</li> <li>• CT/MRI/CTA/MRA/angiography</li> <li>• Interventional Neuroradiology</li> <li>• Neuro Critical Care</li> <li>• Inpatient Neurosurgery</li> <li>• Emergency surgery</li> <li>• Paediatric Neurosurgery</li> </ul>

131 The underpinning components to support the above network of care are:

- Development of e-health to support local delivery of diagnosis and care, particularly local access to scanning linked to specialist centres for interpretation and advice
- Development of robust information technology infrastructure to support transfer of clinical information across NHS Scotland to support local delivery of care
- Transport services for patients to flow into and out of neurosurgical centres in a timely and safe manner.
- A minimum core dataset and agreed, funded audit programme

132 The integrated service is illustrated in **Figure 1**



**Service Specification:**

- Standards
- Minimum data set
- Audit programme
- Discharge and referral protocols
- Specialist Centre supports all levels (training)
- Transport
- Information
- MCNs

**Figure 1** Integrated Neurosurgical Service

**Recommendations**

- 133 NHS Scotland should adopt the service model as described in this report.
- 134 The Service Description, which include the key criteria, should form one element of the planning assumptions for future neurosurgical services.
- 135 National sub-specialisation on a planned and managed basis should be continued and be an immediate next step.

**Planning and Commissioning Model**

- 136 The limited progress with implementing recommendations from previous reviews of neurosurgery indicates that clear accountability for this is required. This accountability needs to reflect the organisation of the service, which vests accountability with NHS Boards. The strengthened role of Regional Planning Groups may provide opportunities to clarify accountability, but the Team considered that an all Scotland approach to planning and commissioning neurosurgery was necessary.
- 137 The difficulties faced by neurosurgery are focussed around workforce issues, therefore it is essential that the planning of neurosurgical services is aligned with planning its workforce, including identification and development of education and training programmes.
- 138 The Team consider that the service and its patients will benefit from being planned and commissioned on a national basis. Decisions on investment in major staff,

equipment and facilities resources would be taken on this basis using the service model described previously. A national overview will ensure implementation of recommendations and continued service development on a consistent basis.

- 139 A national approach will enable a consistent service specification to be developed and implemented for NHS Scotland and it will allow trends in neurosurgery to be monitored and consequent changes in service planned.
- 140 A national approach will support the centres working collaboratively in the areas of research and training, providing a larger population catchment for these. Discussions with the medical schools concerning the organisation of undergraduate and postgraduate training will be required.
- 141 In planning neurosurgical services for children and young people cognisance should be given to the recommendations of the National Framework Child Healthcare Services report proposals concerning age appropriate services.
- 142 Patient involvement in MCNs has provided many benefits and they should continue to be involved in the planning and development of neurosurgery.
- 143 In considering how this might be organised, there are a number of options:
- 1 Designation as a national service and commissioned by National Services Division (NSD)<sup>17</sup>. The service does not meet the criteria for such designation and this approach has the potential to isolate neurosurgery from other specialities locally
  - 2 An individual Health Board would take lead responsibility on behalf of NHS Scotland. This would require infrastructure and resource to support and experience with other services has shown limited success for this approach
  - 3 Regional Planning Groups take responsibility, either by working collaboratively or by one of the Groups taking lead responsibility
  - 4 The SE Health Department assume leadership responsibility for planning neurosurgery establishing a national Planning function to co-ordinate those services where an all-Scotland approach is considered appropriate. This national Planning function would link with RPGs to ensure co-ordination between national and regional agendas.

## **Recommendations**

- 144 Neurosurgical services should be planned and commissioned on a national basis.
- 145 The Team recommends that the SEHD should assume strategic leadership responsibility for planning and commissioning neurosurgery on an all-Scotland basis, working with Regional Planning Groups and NHS Boards.

## **Organisation and Location of Services**

- 146 To support an integrated service it needs to be organised so that the specialist centres provide practical support to local teams in terms of skills and gaining

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<sup>17</sup> National Services Division of NHS Scotland National Services

experience. This can be done through multi-disciplinary outreach and inreach being focussed on educational opportunities, development of video and telephone conferencing for advice and training, and the establishment of more outreach services, including potentially one-stop diagnostic clinics. These could be developed through agreed service frameworks between specialist centres and local services and complement managed clinical networks. These service frameworks would be part of the service specification for the service commissioned on a national basis.

- 147 The pattern of work will need to be re-organised to ensure that staff time is utilised effectively. Rotations and the organisation of outreach services on a block basis, eg spending complete day(s) in local hospitals will need to be explored.
- 148 The configuration of the service model depends on how many locations NHS Scotland can support in providing 24 hour/7 day care in neurosurgery. This refers to level N3 in the service model described previously.
- 149 The Team discussed the nature of neurosurgery, looking to identify those interventions that did not require 24 hour/7 day care. They concluded that this might be limited to common spinal surgery, which although was relatively high volume in neurosurgery, would not constitute a substantial service to be delivered locally in isolation. Neither would it be an attractive job for staff.
- 150 The Team considered that an independent opinion would be beneficial to inform their view on the configuration of neurosurgery and the number of locations that could continue to provide 24hr 7day cover and commissioned Mr James Palmer, Consultant Neurosurgeon to carry this out as described earlier in the report.
- 151 In considering the entirety of its work, particularly the service model – neurosurgery as a single, national service, the option appraisal, the desire to underpin the service through standards and audit, the Team considers that the current configuration of neurosurgery is not the optimum to continue to provide comprehensive, high quality care to patients in the future.
- 152 It has consensus that the service should move towards one prime site for adult and paediatric neurosurgery within a network of care as previously described.
- 153 However in reaching this consensus the Team recognises the significance of its implications and that there will need to be important further work; it will be a substantial project. Identification of a prime site will need to take into account a number of vital factors including:
  - None of the current neurosurgery units has capacity to provide for the whole of Scotland, therefore potentially a significant level of investment will be required for buildings and staff
  - Emergency neurosurgery will need to be managed by the prime site in partnership with other specialities locally
  - A robust transport infrastructure will be required to support transfer of patients on an emergency and planned basis
  - The imperative of continuity of service during implementation. Particularly the sequencing of plans. The service model will need to be developed with

staff and facilities in place in advance of moves of emergency and elective neurosurgery to the prime site. The establishment of managed clinical networks is fundamental to provide local service delivery in support of this.

## **Recommendation**

- 154 NHS Scotland should move towards providing adult and paediatric neurosurgical intervention on one prime site for the whole of Scotland within the service model described earlier in the report.

## **Learning Points**

- 155 As part of its remit the Team was asked to identify learning from the process to build into future service planning and reviews. A key learning point was the importance of bringing together representatives from each of the units together with patient representatives to discuss the issues. They identified the following learning points from the process:

- The identification of the specialist advisors to the Chairman was beneficial to provide access to clinical expertise between meetings
- The size of the group and inclusive approach was felt by the majority to be helpful, it allowed the Team to speak from all the four centres
- The involvement of patient representatives was vital in providing that perspective and in keeping the work focussed on the patient
- The inclusion of clinicians in the field was essential to ensure the issues were well articulated and understood
- The involvement of members with workforce expertise was very helpful to understand those issues
- The effectiveness of the chair was essential to progress the work and having an independent chair from outside the specialty was beneficial in this
- The Team suffered from the lack of effective follow through of previous work
- There was frustration from having to re-visit old discussions and information
- The lack of an evidence base and information, clinical and activity, to inform the process hindered the work of the Team and there was particular frustration as this was an area recommended for action in the previous work
- The process was felt to be fair and transparent
- The Team felt that some technical support in the option appraisal process would have been beneficial

- The expertise of the individual members of the Team underpinned the process
- Implementation of the recommendations will benefit from the maintenance of the contacts and good working relations which have been generated by this piece of work.

This report has been compiled on behalf of the Action Team by:

Myra Duncan

## NATIONAL FRAMEWORK FOR SERVICE CHANGE IN THE NHS IN SCOTLAND COMMISSIONING DOCUMENT: HIGHLY SPECIALISED CARE

### Definition

This work will;

- consider the future requirements for tertiary care in specialist centres (in this context we see tertiary services as those which are highly specialised and usually delivered in a few national or regional centres),
- identify the scale and scope of such activity during the day and at night,
- consider the relationships between the provision of tertiary and specialised care and 24 hour emergency care,
- have regard to the direction of travel signalled in reviews of acute services underway or about to get underway at the NHS Board level,
- have a particular focus on the planning and provision of highly specialised care such as neurosurgery services and paediatric tertiary services.

### Background

The Acute Services Review, published in 1998, considered in some detail the provision of acute services to patients in Scotland. It made a number of far-reaching recommendations, including the need to develop a regional approach to service planning and the promotion of Managed Clinical Networks. Many of the issues considered in the Review remain at the forefront of public debate about the NHS – particularly the challenge of continuing to provide equity of access to specialised acute care. The Acute Services review identified 26 major hospitals across Scotland receiving acute medical emergencies. We need to set this alongside professional guidance which suggests that in order to attain “critical mass”, Acute Hospitals should serve a population of 400,000 to 500,000. There is a continuing tension between the increasing specialisation of care (and the implications this has for the medical and surgical cover) and of the demand for services to be delivered close to home. In a number of areas, including neurosurgery (and neurosciences) and children’s tertiary services, an analysis has been done of the issues and the development of a national framework provides an opportunity for follow up and implementation.

### Objectives

The National Planning Team will report on the following;

- what health care services should be provided in the future in tertiary centres,
- the implications for the number and location of tertiary centres,
- the planning methodologies relevant to mapping tertiary and highly specialised care,

- to what extent specialised care services need to be planned at a national, regional or Board level,
- the implications for the planning and provision of neurosurgery (and neurosciences) and of tertiary children's services of the proposed planning methodology,
- the impact on the provision of intensive care and emergency care of any proposed reconfiguration of highly specialised or tertiary care,
- specific issues affecting remote and rural areas

## **Milestones**

1. Membership of short-life working group identified by end June.
2. Steering Group to agree Commissioning Document at July meeting.
3. Data/analytical report by end October.
4. Report by end December (and report to Steering Group)

## **National Advisory Group Lead**

Peter Bates  
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## **National Planning Team Lead**

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Callum Kerr	General Manager West Central Division, Scottish Ambulance Service	

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# Neurosciences Action Team Report

## Appendix 6

### Selected Activity Information

The Team would like to thank colleagues in the Information and Statistics Division of National Services Scotland for producing the attached data.

- 6.1 Neurosurgical operations/procedures undertaken in Scotland's four neurosurgical units in the years ended 31 March 1999-2004 by year
- 6.2 Neurosurgical operations/procedures undertaken in Scotland's four neurosurgical units during the period January 1990 – March 2004
- 6.3 Selected activity statistics by location:
  - Average available staffed beds
  - Average occupied beds
  - Inpatient episodes including transfers out
  - Day cases
  - New outpatients
  - Total outpatient attendances
  - All available staffed beds
  - Total occupied beds
  - Mean stay (days) per episode
  - Bed occupancy (%)

Neurosurgical operations/ procedures undertaken in Scotland's four neurosurgical units in the years ended 31 March: 1999-2004  
(Data refer to patients of all ages)

Year ended 31 March:	Operation/Procedure	Numbers of discharges (percent <sup>1</sup> )				
		Aberdeen	Dundee	Edinburgh	Glasgow	SCOTLAND
<b>1999</b>	<b>Discharges from neurosurgery with an operation</b>	<b>949</b>	<b>700</b>	<b>1933</b>	<b>2490</b>	<b>6072</b>
	Craniotomy for Intracranial Aneurysm	43 (4.5)	20 (2.9)	31 (1.6)	113 (4.5)	207 (3.4)
	Ventricular Shunts/Revisions					
	Total	45 (4.7)	32 (4.6)	136 (7)	156 (6.3)	369 (6.1)
	Hydrocephalus	30 (3.2)	14 (2)	74 (3.8)	71 (2.9)	189 (3.1)
	Other	15 (1.6)	18 (2.6)	62 (3.2)	85 (3.4)	180 (3)
	Ventricular Endoscopic Procedures					
	Total	1 (0.1)	1 (0.1)	2 (0.1)	16 (0.6)	20 (0.3)
	Hydrocephalus	0 (0)	1 (0.1)	1 (0.1)	12 (0.5)	14 (0.2)
	Other	1 (0.1)	0 (0)	1 (0.1)	4 (0.2)	6 (0.1)
	Operations for Trigeminal Neuralgia	5 (0.5)	9 (1.3)	8 (0.4)	45 (1.8)	67 (1.1)
	Craniotomy for Traumatic Haematoma					
	Total	35 (3.7)	36 (5.1)	110 (5.7)	249 (10)	430 (7.1)
	Spontaneous	18 (1.9)	25 (3.6)	68 (3.5)	173 (6.9)	284 (4.7)
	Head Injury	16 (1.7)	7 (1)	28 (1.4)	70 (2.8)	121 (2)
	Other	1 (0.1)	4 (0.6)	14 (0.7)	6 (0.2)	25 (0.4)
	Operations for Spinal Degenerative Disease - Cervical Spine	56 (5.9)	65 (9.3)	127 (6.6)	131 (5.3)	379 (6.2)
	Operations for Spinal Degenerative Disease - Lumbar Spine	202 (21.3)	179 (25.6)	239 (12.4)	186 (7.5)	806 (13.3)

Neurosurgical operations/ procedures undertaken in Scotland's four neurosurgical units in the years ended 31 March: 1999-2004  
(Data refer to patients of all ages)

Year ended 31 March:	Operation/Procedure	Numbers of discharges (percent <sup>1</sup> )				
		Aberdeen	Dundee	Edinburgh	Glasgow	SCOTLAND
<b>2000</b>	<b>Discharges from neurosurgery with an operation</b>	<b>952</b>	<b>756</b>	<b>1952</b>	<b>2505</b>	<b>6165</b>
	Craniotomy for Intracranial Aneurysm	32 (3.4)	33 (4.4)	30 (1.5)	102 (4.1)	197 (3.2)
	Ventricular Shunts/Revisions					
	Total	33 (3.5)	27 (3.6)	118 (6)	132 (5.3)	310 (5)
	Hydrocephalus	19 (2)	16 (2.1)	38 (1.9)	49 (2)	122 (2)
	Other	14 (1.5)	11 (1.5)	80 (4.1)	83 (3.3)	188 (3)
	Ventricular Endoscopic Procedures					
	Total	1 (0.1)	1 (0.1)	2 (0.1)	13 (0.5)	17 (0.3)
	Hydrocephalus	0 (0)	1 (0.1)	0 (0)	6 (0.2)	7 (0.1)
	Other	1 (0.1)	0 (0)	2 (0.1)	7 (0.3)	10 (0.2)
	Operations for Trigeminal Neuralgia	9 (0.9)	6 (0.8)	21 (1.1)	37 (1.5)	73 (1.2)
	Craniotomy for Traumatic Haematoma					
	Total	55 (5.8)	27 (3.6)	110 (5.6)	251 (10)	443 (7.2)
	Spontaneous	26 (2.7)	15 (2)	70 (3.6)	146 (5.8)	257 (4.2)
	Head Injury	22 (2.3)	9 (1.2)	28 (1.4)	97 (3.9)	156 (2.5)
	Other	7 (0.7)	3 (0.4)	12 (0.6)	8 (0.3)	30 (0.5)
	Operations for Spinal Degenerative Disease - Cervical Spine	67 (7)	61 (8.1)	128 (6.6)	97 (3.9)	353 (5.7)
	Operations for Spinal Degenerative Disease - Lumbar Spine	218 (22.9)	189 (25)	278 (14.2)	159 (6.3)	844 (13.7)

Neurosurgical operations/ procedures undertaken in Scotland's four neurosurgical units in the years ended 31 March: 1999-2004  
(Data refer to patients of all ages)

Year ended 31 March:	Operation/Procedure	Numbers of discharges (percent <sup>1</sup> )				
		Aberdeen	Dundee	Edinburgh	Glasgow	SCOTLAND
<b>2001</b>	<b>Discharges from neurosurgery with an operation</b>	<b>949</b>	<b>726</b>	<b>1996</b>	<b>2266</b>	<b>5937</b>
	Craniotomy for Intracranial Aneurysm	33 (3.5)	28 (3.9)	27 (1.4)	87 (3.8)	175 (2.9)
	Ventricular Shunts/Revisions					
	Total	31 (3.3)	18 (2.5)	167 (8.4)	122 (5.4)	338 (5.7)
	Hydrocephalus	19 (2)	12 (1.7)	69 (3.5)	56 (2.5)	156 (2.6)
	Other	12 (1.3)	6 (0.8)	98 (4.9)	66 (2.9)	182 (3.1)
	Ventricular Endoscopic Procedures					
	Total	1 (0.1)	0 (0)	3 (0.2)	3 (0.1)	7 (0.1)
	Hydrocephalus	1 (0.1)	0 (0)	2 (0.1)	2 (0.1)	5 (0.1)
	Other	0 (0)	0 (0)	1 (0.1)	1 (0)	2 (0)
	Operations for Trigeminal Neuralgia	9 (0.9)	10 (1.4)	8 (0.4)	32 (1.4)	59 (1)
	Craniotomy for Traumatic Haematoma					
	Total	44 (4.6)	30 (4.1)	123 (6.2)	196 (8.6)	393 (6.6)
	Spontaneous	33 (3.5)	16 (2.2)	66 (3.3)	123 (5.4)	238 (4)
	Head Injury	9 (0.9)	10 (1.4)	47 (2.4)	62 (2.7)	128 (2.2)
	Other	2 (0.2)	4 (0.6)	10 (0.5)	11 (0.5)	27 (0.5)
	Operations for Spinal Degenerative Disease - Cervical Spine	59 (6.2)	66 (9.1)	124 (6.2)	122 (5.4)	371 (6.2)
	Operations for Spinal Degenerative Disease - Lumbar Spine	198 (20.9)	198 (27.3)	246 (12.3)	180 (7.9)	822 (13.8)

Neurosurgical operations/ procedures undertaken in Scotland's four neurosurgical units in the years ended 31 March: 1999-2004  
(Data refer to patients of all ages)

Year ended 31 March:	Operation/Procedure	Numbers of discharges (percent <sup>1</sup> )				
		Aberdeen	Dundee	Edinburgh	Glasgow	SCOTLAND
<b>2002</b>	<b>Discharges from neurosurgery with an operation</b>	<b>960</b>	<b>751</b>	<b>2040</b>	<b>2197</b>	<b>5948</b>
	Craniotomy for Intracranial Aneurysm	24 (2.5)	25 (3.3)	24 (1.2)	81 (3.7)	154 (2.6)
	Ventricular Shunts/Revisions					
	Total	43 (4.5)	24 (3.2)	172 (8.4)	103 (4.7)	342 (5.7)
	Hydrocephalus	19 (2)	16 (2.1)	78 (3.8)	41 (1.9)	154 (2.6)
	Other	24 (2.5)	8 (1.1)	94 (4.6)	62 (2.8)	188 (3.2)
	Ventricular Endoscopic Procedures					
	Total	1 (0.1)	2 (0.3)	3 (0.1)	10 (0.5)	16 (0.3)
	Hydrocephalus	0 (0)	2 (0.3)	3 (0.1)	7 (0.3)	12 (0.2)
	Other	1 (0.1)	0 (0)	0 (0)	3 (0.1)	4 (0.1)
	Operations for Trigeminal Neuralgia	13 (1.4)	9 (1.2)	8 (0.4)	38 (1.7)	68 (1.1)
	Craniotomy for Traumatic Haematoma					
	Total	47 (4.9)	29 (3.9)	115 (5.6)	198 (9)	389 (6.5)
	Spontaneous	30 (3.1)	19 (2.5)	78 (3.8)	103 (4.7)	230 (3.9)
	Head Injury	13 (1.4)	7 (0.9)	31 (1.5)	85 (3.9)	136 (2.3)
	Other	4 (0.4)	3 (0.4)	6 (0.3)	10 (0.5)	23 (0.4)
	Operations for Spinal Degenerative Disease - Cervical Spine	78 (8.1)	72 (9.6)	136 (6.7)	125 (5.7)	411 (6.9)
	Operations for Spinal Degenerative Disease - Lumbar Spine	191 (19.9)	191 (25.4)	282 (13.8)	200 (9.1)	864 (14.5)

Neurosurgical operations/ procedures undertaken in Scotland's four neurosurgical units in the years ended 31 March: 1999-2004  
(Data refer to patients of all ages)

Year ended 31 March:	Operation/Procedure	Numbers of discharges (percent <sup>1</sup> )				
		Aberdeen	Dundee	Edinburgh	Glasgow	SCOTLAND
<b>2003</b>	<b>Discharges from neurosurgery with an operation</b>	<b>916</b>	<b>792</b>	<b>2044</b>	<b>2001</b>	<b>5753</b>
	Craniotomy for Intracranial Aneurysm	29 (3.2)	17 (2.1)	9 (0.4)	36 (1.8)	91 (1.6)
	Ventricular Shunts/Revisions					
	Total	27 (2.9)	35 (4.4)	168 (8.2)	80 (4)	310 (5.4)
	Hydrocephalus	16 (1.7)	20 (2.5)	86 (4.2)	18 (0.9)	140 (2.4)
	Other	11 (1.2)	15 (1.9)	82 (4)	62 (3.1)	170 (3)
	Ventricular Endoscopic Procedures					
	Total	1 (0.1)	1 (0.1)	5 (0.2)	4 (0.2)	11 (0.2)
	Hydrocephalus	0 (0)	0 (0)	3 (0.1)	3 (0.1)	6 (0.1)
	Other	1 (0.1)	1 (0.1)	2 (0.1)	1 (0)	5 (0.1)
	Operations for Trigeminal Neuralgia	0 (0)	8 (1)	20 (1)	36 (1.8)	64 (1.1)
	Craniotomy for Traumatic Haematoma					
	Total	46 (5)	33 (4.2)	107 (5.2)	129 (6.4)	315 (5.5)
	Spontaneous	32 (3.5)	14 (1.8)	65 (3.2)	64 (3.2)	175 (3)
	Head Injury	12 (1.3)	14 (1.8)	37 (1.8)	59 (2.9)	122 (2.1)
	Other	2 (0.2)	5 (0.6)	5 (0.2)	6 (0.3)	18 (0.3)
	Operations for Spinal Degenerative Disease - Cervical Spine	65 (7.1)	64 (8.1)	150 (7.3)	81 (4)	360 (6.3)
	Operations for Spinal Degenerative Disease - Lumbar Spine	215 (23.5)	203 (25.6)	350 (17.1)	157 (7.8)	925 (16.1)

Neurosurgical operations/ procedures undertaken in Scotland's four neurosurgical units in the years ended 31 March: 1999-2004  
(Data refer to patients of all ages)

Year ended 31 March:	Operation/Procedure	Numbers of discharges (percent <sup>1</sup> )				
		Aberdeen	Dundee	Edinburgh	Glasgow	SCOTLAND
<b>2004<sup>p</sup></b>	<b>Discharges from neurosurgery with an operation</b>	<b>987</b>	<b>788</b>	<b>2023</b>	<b>1217</b>	<b>5015</b>
	Craniotomy for Intracranial Aneurysm	13 (1.3)	7 (0.9)	2 (0.1)	16 (1.3)	38 (0.8)
	Ventricular Shunts/Revisions					
	Total	31 (3.1)	19 (2.4)	159 (7.9)	48 (3.9)	257 (5.1)
	Hydrocephalus	15 (1.5)	7 (0.9)	75 (3.7)	24 (2)	121 (2.4)
	Other	16 (1.6)	12 (1.5)	84 (4.2)	24 (2)	136 (2.7)
	Ventricular Endoscopic Procedures					
	Total	5 (0.5)	1 (0.1)	2 (0.1)	5 (0.4)	13 (0.3)
	Hydrocephalus	3 (0.3)	0 (0)	1 (0)	4 (0.3)	8 (0.2)
	Other	2 (0.2)	1 (0.1)	1 (0)	1 (0.1)	5 (0.1)
	Operations for Trigeminal Neuralgia	2 (0.2)	16 (2)	19 (0.9)	17 (1.4)	54 (1.1)
	Craniotomy for Traumatic Haematoma					
	Total	37 (3.7)	25 (3.2)	111 (5.5)	118 (9.7)	291 (5.8)
	Spontaneous	28 (2.8)	15 (1.9)	61 (3)	51 (4.2)	155 (3.1)
	Head Injury	7 (0.7)	6 (0.8)	45 (2.2)	60 (4.9)	118 (2.4)
	Other	2 (0.2)	4 (0.5)	5 (0.2)	7 (0.6)	18 (0.4)
	Operations for Spinal Degenerative Disease - Cervical Spine	77 (7.8)	79 (10)	119 (5.9)	66 (5.4)	341 (6.8)
	Operations for Spinal Degenerative Disease - Lumbar Spine	189 (19.1)	180 (22.8)	297 (14.7)	78 (6.4)	744 (14.8)

Source: SMR01 (inpatient/ day case discharges from non-obstetric/ non-psychiatric specialties)

Ref: ISD/HIG/IR2004-01962

p Provisional

<sup>1</sup> Percentage of all neurosurgical operations/ procedures undertaken in each centre

<sup>2</sup> The four neurosurgical centres are based on the following hospitals:

Aberdeen: Aberdeen Royal Infirmary/ Royal Aberdeen Children's Hospital/ Tor-Na-Dee Hospital

Dundee: Ninewells Hospital/ Dundee Royal Infirmary/ Stracathro Hospital

Edinburgh: Western General Hospital/ Royal Hospital for Sick Children

Glasgow: Southern General Hospital

Neurosurgical operations/ procedures undertaken in Scotland's four neurosurgical units during the period January 1990 - March 2004  
(Data refer to patients of all ages)

Operation/ Procedure	Time period	Numbers of discharges				SCOTLAND
		Aberdeen	Dundee	Edinburgh	Glasgow	
<b>Operations on Pituitary Gland</b>	1990-1992	31	30	44	129	234
	1993-1995	20	31	43	122	216
	1996/7-1998/9	31	26	71	178	306
	1999/0-2001/2	19	28	75	115	237
	2002/3	6	8	37	34	85
	2003/4 <sup>p</sup>	11	9	32	17	69
<b>Operations on Acoustic Neuroma</b>	1990-1992	10	11	24	50	95
	1993-1995	13	20	25	65	123
	1996/7-1998/9	15	26	21	44	106
	1999/0-2001/2	13	11	16	51	91
	2002/3	1	2	9	21	33
	2003/4 <sup>p</sup>	4	10	2	5	21
<b>Craniotomy for Meningioma</b>	1990-1992	30	24	62	75	191
	1993-1995	39	33	67	63	202
	1996/7-1998/9	34	30	82	120	266
	1999/0-2001/2	37	21	97	133	288
	2002/3	18	11	23	47	99
	2003/4 <sup>p</sup>	14	10	33	24	81
<b>Craniotomy for Arteriovenous Malformation</b>	1990-1992	2	3	13	26	44
	1993-1995	2	8	9	18	37
	1996/7-1998/9	2	8	6	20	36
	1999/0-2001/2	3	5	5	38	51
	2002/3	1	2	0	15	18
	2003/4 <sup>p</sup>	1	1	1	3	6
<b>Lobectomy</b>	Total					
	1990-1992	16	6	12	60	94
	1993-1995	13	16	21	50	100
	1996/7-1998/9	15	9	30	42	96
	1999/0-2001/2	15	5	13	43	76
	2002/3	2	4	2	2	10
2003/4 <sup>p</sup>	1	1	2	4	8	
<b>Lobectomy with a diagnosis of Epilepsy<sup>2</sup></b>	1990-1992	0	4	2	21	27
	1993-1995	0	9	11	11	31
	1996/7-1998/9	3	8	23	14	48
	1999/0-2001/2	0	2	9	19	30
	2002/3	0	3	1	2	6
	2003/4 <sup>p</sup>	0	1	1	2	4
<b>Lobectomy with other diagnoses</b>	1990-1992	16	2	10	39	67
	1993-1995	13	7	10	39	69
	1996/7-1998/9	12	1	7	28	48
	1999/0-2001/2	15	3	4	24	46
	2002/3	2	1	1	0	4
	2003/4 <sup>p</sup>	1	0	1	2	4

Source: SMR01 (inpatient/ day case discharges from non-obstetric/ non-psychiatric specialties)

Ref: ISD/HIG/IR2004-01962

p Provisional

1 The four neurosurgical centres are based on the following hospitals:

Aberdeen: Aberdeen Royal Infirmary/ Royal Aberdeen Children's Hospital/ Tor-Na-Dee Hospital

Dundee: Ninewells Hospital/ Dundee Royal Infirmary (closed March 1999)/ Stracathro Hospital

Edinburgh: Western General Hospital/ Royal Hospital for Sick Children

Glasgow: Southern General Hospital

2 Members of the Working Group have questioned whether all patients categorized as undergoing lobectomy with a diagnosis of epilepsy will have been classified appropriately (note sourced from original Acute Services Review report and referred to time periods 1999-92, 1993-95, 1996/7-1998/9)

Table	Operation/Procedure (neurosurgery specialty throughout)	Clinical Codes (OPCS4 operation <sup>1,2</sup> ; ICD9/ ICD10 diagnoses)
4.1	Discharges ... with an operation	Includes discharges where at least one operation was recorded (i.e. excludes discharges where first operation field was blank (no operations recorded))
	Craniotomy for Intracranial Aneurysm	OPCS4: L30.2 L30.4 L33
	Ventricular Shunts/Revisions	OPCS4: A12 A13 A14
	Hydrocephalus	OPCS4 as above and any occurrence of ICD10 Q03 Q05.0-Q05.4 G91 G94.0-G94.2 (asterisk codes)
	Other	OPCS4 as above and any other diagnoses
	Ventricular Endoscopic Procedures	OPCS4: A17 A18
	Hydrocephalus	OPCS4 as above and any occurrence of ICD10 Q03 Q05.0-Q05.4 G91 G94.0-G94.2 (asterisk codes)
	Other	OPCS4 as above and any other diagnoses
	Operations for Trigeminal Neuralgia	OPCS4: A253 A263 A281 A313 A323 A343 A29.3 A30.3 A33/Z03.5 (pair) A36/Z03.5 (pair) A24.4-A24.9/Z03.5 (pair)
	Craniotomy for Traumatic Haematoma	OPCS4: A05.2 A05.4 A05.8 A05.9 A40.1 A41.1
	Spontaneous	OPCS4 as above and principal diagnosis ICD10 I60-I67 Q04.6 Q27.8 Q28.2
	Head Injury	OPCS4 as above and principal diagnosis ICD10 S00-S09
	Other	OPCS4 as above and any other diagnoses
	Operations for Spinal Degenerative Disease - Cervical Spine	OPCS4: V22 V23 V27 V29 V30 V37 V39.1 V48.1 V48.2
	Operations for Spinal Degenerative Disease - Lumbar Spine	OPCS4: V25 V26 V33 V34 V35 V52 V38.2 V38.3 V38.4 V39.3 V39.4 V39.5 V48.5 V48.6
4.2	Operations on Pituitary Gland	OPCS4: B01 B02 B04
	Operations on Acoustic Neuroma	OPCS4: A29.5 A34.5
	Craniotomy for Meningioma	OPCS4: A38 A42.2
	Craniotomy for Arteriovenous Malformation	OPCS4: L75.1
	Lobectomy	OPCS4: A01.2 A01.3
	Lobectomy with a diagnosis of Epilepsy	OPCS4 as above and any occurrence of ICD10 G40 G41
	Lobectomy with other diagnoses	OPCS4 as above and any other diagnoses

Ref: ISD/HIG/IR2004-01962

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1 Operations classified using the Office of Population Censuses & Surveys 4th Revision Classification of Surgical Operations and Procedures (OPCS4)

2 SMR01 may contain up to eight OPCS4 codes (in the form of four pairs of codes) in each discharge summary - the analyses are based on the presence of relevant OPCS4 codes in either of the first two operation fields. SMR01 (from 1997/8) was developed from SMR1 (up to 1996/7). SMR1 could only record up to two pairs of OPCS4 codes (four codes in total). The first two operation fields have been used throughout the analyses for consistency over the period Jan 1990-Mar 2004.

3 Diagnoses classified using the World Health Organization's International Classification of Diseases 9th and 10th Revisions (ICD9 and ICD10 respectively).

ICD9 applies up to 31 March 1996 and ICD10 applies from 1 April 1996.

4 SMR01 may contain up to six ICD9/ ICD10 codes in each discharge summary.

**NHSScotland - Selected activity statistics; by location;  
Neurosurgery specialty: years ending 31 March 2000 - 2004**

	2000	2001	2002	2003	2004
<b><u>Average available staffed beds</u></b>					
All locations	185	188	185	186	183
Aberdeen Royal Infirmary	27	27	27	28	27
Ninewells Hospital	22	22	22	23	22
Southern General Hospital	89	88	88	91	93
Western General Hospital	47	49	47	43	41

Definition: The average daily number of beds which are staffed and are available for the reception of inpatients. Borrowed and temporary beds are included; beds in day bed units are excluded.  
Derived as all available staffed bed days for the year / number of days in the year.

**Average occupied beds**

All locations	145	145	140	137	134
Aberdeen Royal Infirmary	24	23	24	25	23
Ninewells Hospital	20	20	19	19	17
Southern General Hospital	63	59	59	59	59
Western General Hospital	37	43	38	34	34

Definition: The average daily number of beds which were occupied by inpatients.  
Derived as all occupied bed days for the year / number of days in the year.

**Inpatient episodes including transfers-out**

All locations	7 218	6 957	6 979	6 813	7 837
Aberdeen Royal Infirmary	987	988	1 030	981	1 449
Ninewells Hospital	869	840	852	870	862
Royal Aberdeen Children's Hospital	18	16	7	11	1
Royal Hospital for Sick Children, Edinburgh	38	36	56	53	54
Southern General Hospital	3 195	2 986	3 034	2 942	2 874
Tor-Na-Dee Hospital	6	8	8	3	-
Western General Hospital	2 105	2 083	1 992	1 952	2 593
Woodend General Hospital	-	-	-	1	4

Definition: The number of hospital inpatients who are discharged, die or are transferred out of one specialty, or hospital, to another.

**Day cases**

All locations	371	402	590	713	759
Aberdeen Royal Infirmary	98	119	124	120	97
Ninewells Hospital	68	71	60	77	97
Royal Hospital for Sick Children, Edinburgh	-	-	2	1	4
Southern General Hospital	116	100	102	153	105
Western General Hospital	89	112	302	362	456

Definition: Includes day cases seen in inpatient facilities, day bed units and day case other (e.g. embedded day case)

**NHSScotland - Selected activity statistics; by location;  
Neurosurgery specialty: years ending 31 March 2000 - 2004**

	2000	2001	2002	2003	2004
<b><u>New outpatients</u></b>					
All locations	4 884	4 830	4 662	4 530	4 844
Aberdeen Royal Infirmary	968	969	984	1 082	1 152
Ninewells Hospital	1 134	1 067	906	907	1 031
Perth Royal Infirmary	-	-	-	-	2
Raigmore Hospital	211	231	188	191	186
Southern General Hospital	1 128	1 195	1 238	1 056	1 150
Stracathro Hospital	7	13	20	5	
Victoria Hospital	-	-	-	142	187
Western General Hospital	1 436	1 355	1 326	1 147	1 136
<b><u>Total outpatient attendances</u></b>					
All locations	13 785	13 275	12 894	13 169	13 153
Aberdeen Royal Infirmary	2 126	1 901	1 764	2 076	2 212
Ninewells Hospital	3 137	3 096	2 555	2 563	2 968
Perth Royal Infirmary	-	-	-	-	8
Raigmore Hospital	510	454	426	480	505
Royal Aberdeen Children's Hospital	-	-	-	1	1
Southern General Hospital	3 742	3 680	3 795	3 434	3 292
Stracathro Hospital	16	21	34	11	-
Victoria Hospital	-	-	-	791	395
Western General Hospital	4 254	4 123	4 320	3 813	3 772
<b><u>All available staffed beds</u></b>					
All locations	67 881	68 444	67 533	67 737	66 878
Aberdeen Royal Infirmary	10 061	9 961	10 035	10 285	9 741
Ninewells Hospital	8 154	8 185	8 060	8 232	7 951
Royal Aberdeen Children's Hospital	92	177	30	55	3
Royal Hospital for Sick Children, Edinburgh	-	-	126	146	72
Southern General Hospital	32 439	32 193	32 172	33 348	34 120
Tor-Na-Dee Hospital	85	126	115	35	-
Western General Hospital	17 050	17 802	16 995	15 629	14 943
Woodend General Hospital	-	-	-	7	48
<b><u>Total occupied beds</u></b>					
All locations	53 129	52 983	51 196	49 844	48 954
Aberdeen Royal Infirmary	8 942	8 414	8 734	9 007	8 400
Ninewells Hospital	7 328	7 246	6 882	6 835	6 191
Royal Aberdeen Children's Hospital	92	177	30	55	3
Royal Hospital for Sick Children, Edinburgh	-	-	126	146	72
Southern General Hospital	23 048	21 491	21 443	21 431	21 776
Tor-Na-Dee Hospital	85	126	115	35	-
Western General Hospital	13 634	15 529	13 866	12 328	12 464
Woodend General Hospital	-	-	-	7	48

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**NHSScotland - Selected activity statistics; by location;  
Neurosurgery speciality: years ending 31 March 2000 - 2004**


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	2000	2001	2002	2003	2004
<b><u>mean stay (days) per episode</u></b>					
All locations	7.4	7.6	7.3	7.3	6.2
Aberdeen Royal Infirmary	9.1	8.5	8.5	9.2	5.8
Ninewells Hospital	8.4	8.6	8.1	7.9	7.2
Royal Aberdeen Children's Hospital	5.1	11.1	4.3	5.0	3.0
Royal Hospital for Sick Children, Edinburgh	-	-	2.3	2.8	1.3
Southern General Hospital	7.2	7.2	7.1	7.3	7.6
Tor-Na-Dee Hospital	14.2	15.8	14.4	11.7	-
Western General Hospital	6.5	7.5	7.0	6.3	4.8
Woodend General Hospital	-	-	-	7.0	12.0

Definition: Mean stay per episode derived as: total occupied beds days / inpatient episodes.

**Bed occupancy (%)**

All locations	78	77	76	74	73
Aberdeen Royal Infirmary	89	84	87	88	86
Ninewells Hospital	90	89	85	83	78
Royal Aberdeen Children's Hospital	100	100	100	100	100
Royal Hospital for Sick Children, Edinburgh	-	-	100	100	100
Southern General Hospital	71	67	67	64	64
Tor-Na-Dee Hospital	100	100	100	100	-
Western General Hospital	80	87	82	79	83
Woodend General Hospital	-	-	-	100	100

Definition: The percentage of available staffed beds that were occupied by inpatients during the year.

Derived as total occupied bed days / all available staffed bed days \* 100.

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Please note that that frequent borrowing and lending of beds between significant facilities and specialties, limits the use of derived statistics

p Provisional

Source: ISD Scotland [Form ISD(S)1]

Reference: ISD/HIG/IR2004-02829

Date: 08/11/04

## Neurosurgery Service Option Appraisal

At the Neurosciences Action Team on 10 January it was agreed that:

- Further clarification of the criteria would be incorporated into the Criteria Description
- The further information regarding the options and option appraisal process would be set out
- Members would be asked to carry out an option appraisal

### 1 Context for Option Appraisal

It is acknowledged that the process of option appraisal is difficult and that it will be based on individual value judgements. It is not intended to be a scientific process, but to give information to the Action Team to help in their considerations.

Option appraisal should be undertaken looking to the future. It should be focussed on services and patients. It should be realistic but not constrained by the current environment.

At the meeting it was agreed that the status quo would be added to the options and that adult and paediatric neurosurgical would be appraised as one service.

### 2 Further information

The Action Team has agreed the following information as useful to members of the Action Team in considering their scoring of the options.

#### 2.1 Assumptions

The following assumptions should be made:

- Neurosurgery will be planned as an all-Scotland service, eg the following elements being delivered on a national basis – standards, care pathways, data collection, clinical audit, investment in major staff, equipment and facilities
- The model of service will support as much care as possible being delivered locally, eg outpatients, rehabilitation, diagnostic services
- A level of capital investment will be required whichever option is preferred, including the status quo.

#### 2.2 Travel Time information

% of Scottish Population within		30 mins	60 mins	120 mins
Option				
1 Location				
1.1	A new location *	13.8	60.0	80.7
1.2	Glasgow	26.3	49.0	76.5
1.3	Edinburgh	15.3	37.5	80.0
1.4	Aberdeen	5.8	7.9	16.9
1.5	Dundee	4.9	11.5	57.9
2 Locations				

% of Scottish Population within		30 mins	60 mins	120 mins
Option				
2.1	Glasgow and Edinburgh	41.6	69.7	81.4
2.2	Glasgow and Aberdeen	32.1	56.9	90.6
2.3	Glasgow and Dundee	31.3	60.5	86.2
2.4	Edinburgh and Aberdeen	21.0	45.4	90.7
2.5	Edinburgh and Dundee	20.2	64.5	86.1
2.6	Aberdeen and Dundee	10.6	19.2	62.5
3 Locations				
3.1	Glasgow, Edinburgh, Aberdeen	47.3	83.8	92.1
3.2	Glasgow, Edinburgh, Dundee	**	**	**
3.3	Edinburgh, Aberdeen, Dundee	**	**	**
3.4	Glasgow, Aberdeen, Dundee	**	**	**
4 Locations				
4.1	Glasgow, Aberdeen, Dundee, Edinburgh - planned proactive change	52.2	84.5	92.2
4.2	Glasgow, Aberdeen, Dundee, Edinburgh - Status Quo	52.2	84.5	92.2

Source – GIS maps

\* assumption is Larbert

\*\* this information is not available

### 3 Process

To carry out the option appraisal the following papers will be required:

- This paper
- Criterion Description 13 January 2005
- Options for Neurosurgical Services as amended following 10 January Action Team meeting
- Option appraisal proforma

Action Team members should score each option using the criteria and return their completed proforma.

Myra Duncan  
Advisor  
National Planning Team  
SEHD

## National Framework for Service Change in the NHS in Scotland Highly Specialised Care – Neurosciences

### Neurosurgery Service Criterion Description – 13 January 2005

#### Introduction

At the meeting of the Action Team on 10 January, further clarification of the criteria was agreed. These are incorporated below.

Criterion:

1 Co-location on a University Teaching Hospital site
--

The elements here are the linkages with teaching and training and research, and the recruitment and retention benefits to the service of such a co-location.

Criterion:

2 Co-location of paediatric and adult neurosurgical services
--

The benefits of providing the right environment for caring for children are recognised and to support this it is acknowledged that paediatric specialities should be co-located. Therefore it follows that if paediatric and adult neurosurgical services should be co-located and that paediatric hospital services should be co-located, then paediatric and adult hospitals services should be co-located.

Criterion:

3 There should be specialist neurosurgical beds, theatre facilities, ICU, HDU and multidisciplinary team (s)
--

Paediatric neurosurgery requires access to Paediatric Intensive Care.

Criterion:

4 There should be co-location with other neurosciences specialties, ie neurosurgery should be located within a neurosciences context
--

It is recognised that other neuroscience specialties will probably be configured in a different way, however neurosurgery should be co-located with neurology, neuroradiology, neuropathology, neurophysiology and neuroanaesthesia services. This is information drawn from the presentation made at the meeting of 18 November by Jim Miller.

Criterion:

5 Provision of 24 hour care by multi-disciplinary team
--

This criterion has two elements to it and focuses on a consultant led MDT:

- Sufficient volume of procedures to maintain expertise. This is suggested as between 180 and 250 pa per consultant (Safe Neurosurgery 2000). This is also linked to sufficient catchment population to generate this volume and the diversity of work. Suggested catchment is 5 million to allow for sub-specialisation, which the service model will need to reflect. The Review of Neurosurgical Services in 2000

recommended that the centres work on a complementary basis, ie each centre does not need to provide a full range of services.

- Need to deliver statutory and mandatory requirements to assure a safe service. This includes the implementation of the EWTR which Safe Neurosurgery 2000 suggests requires a minimum of 6 wte consultant surgeons. The focus on medical resource is due to the fact that other clinical staff, eg nurses, AHPs in ICU, work on a rota basis providing 24 hour cover.

Criterion:

#### 6 Integrated Service

This is about support for an integrated service across specialist, secondary and primary care.

- Clear pathways of care, wherever a patient touches the system. This will be further described in the Service Model and include Managed Clinical Network and one stop clinic models
- Equity in waiting times

Criterion:

#### 7 Local Services

This concerns the location of care delivery. There is a desire to maintain as much neurosurgical service as possible the exact nature of this will be described in the service model, eg rehabilitation, outpatients, pre and post operative care.

As many of the population of Scotland being within 2 hours surface travel time of a neurosurgical centre. The Review of Neurosurgical Services in Scotland acknowledged that due to Scotland's geography the recommendation of Safe Neurosurgery 2000 that neurosurgical units should be within 2 hours surface travel time is unattainable for all of Scotland's inhabitants.

This travel time should be considered for emergency care, elective care and for patients' relatives and visitors.

Criterion:

#### 8 The ability to meet recognised standards, eg SBNS, SIGN Guidelines for the Management of Head Injury

This encompasses support to teaching, training and research activities.

Myra Duncan  
Advisor  
National Planning Team  
SEHD

## Options for Neurosurgical Services

Following the Action Team meeting on 10 January 2005 the following have been agreed as options for the Neurosurgical service.

The options are based on between 1 and four locations using the existing locations and one new location. They are grouped in numbers of locations and given a reference:

Option	Neurosurgery	
1 Location		
1.1	A new location	A1.1
1.2	Glasgow	A1.2
1.3	Edinburgh	A1.3
1.4	Aberdeen	A1.4
1.5	Dundee	A1.5
2 Locations		
2.1	Glasgow and Edinburgh	A2.1
2.2	Glasgow and Aberdeen	A2.2
2.3	Glasgow and Dundee	A2.3
2.4	Edinburgh and Aberdeen	A2.4
2.5	Edinburgh and Dundee	A2.5
2.6	Aberdeen and Dundee	A2.6
3 Locations		
3.1	Glasgow, Edinburgh, Aberdeen	A3.1
3.2	Glasgow, Edinburgh, Dundee	A3.2
3.3	Edinburgh, Aberdeen, Dundee	A3.3
3.4	Glasgow, Aberdeen, Dundee	A3.4
4 Locations		
4.1	Glasgow, Aberdeen, Dundee, Edinburgh – planned, proactive change *	A4.1
4.2	Glasgow, Aberdeen, Dundee, Edinburgh – status quo **	A4.2

\* this is not the status quo. It is the planned, proactive move towards a single service the components of which will include on an all-Scotland basis:

- identifying “national sub-specialisms” which will be delivered on a very limited number of sites,
- planned changed to achieve agreed standards,
- development of care pathways,
- agreement of core dataset and collection,
- programme of clinical audit,
- national overview of investment in major staff, equipment and facilities

\*\* this is the status quo, ie evolutionary, reactive service development on an individual NHS Board basis

Myra Duncan  
Advisor  
National Planning Team, SEHD

### Methodology for Assessment of Options

Criteria have been agreed and weightings applied and agreed by the Action Team

Likewise, Options have been identified and agreed.

Please assess the options in terms of how far they meet the criteria on a scale of 1 – 10 with 10 being “met fully”.

Please give your name and contact telephone number – this will help if we need to contact you for any clarification

Name..... Tele contact number .....

Criteria	Co-location UTH	Co-location Paediatric/ Adult	Specialist Neuro Facilities	Co-location Neurosciences	24 hr care	Integrated Service	Local Services	Standards
Option Ref	Score	Score	Score	Score	Score	Score	Score	Score
A1.1								
A1.2								
A1.3								
A1.4								
A1.5								
A2.1								
A2.2								
A2.3								
A2.4								
A2.5								
A2.6								
A3.1								
A3.2								
A3.3								
A3.4								
A4.1								
A4.2								

**PLEASE RETURN TO JIM MILLER BY CLOSE OF PLAY 18 JANUARY 2005**

Myra Duncan  
 Advisor, National Planning Team, SEHD

**Neurosciences Action Team**  
**10<sup>th</sup> February 2005.**

### **Option Appraisal Summary**

Members are asked to: -

1. Note the outcome of the agreed process to assess options against the agreed criteria.
2. Note the observations from the analyses
3. Agree any further actions to be taken as a result of the observations

Dr J A Miller  
General Manager (Regional Services)  
South Glasgow

**Background**

Following the process to agree the criteria and their weighting, it was decided that each individual member of the action-team should assess all potential options of site configuration against these criteria. (Neurosciences Action Team Meeting 10<sup>th</sup> January 2005). The results were submitted to J Miller for collation and analysis for presentation at the meeting on 10<sup>th</sup> February 2005. This paper summarises the results of the submissions and highlights some points for the group to note.

**Returns**

A total of 19 responses were made. In undertaking an analysis of the submissions, both average and median scores were calculated. In order to remain consistent with previous analyses the median score has been used to determine the final score of the group. Appendix 1 presents the outcome of this analysis. These individual scores were then applied to the composite weightings for each of the criteria. Appendix 2 details the product of the median scores and the weighting. There are a number of scores worthy of some further exploration.

**Co-location with a University Teaching Hospital**

The median score for this criterion for the new site was 5 (range 0-10) with a weighted score of 50. This demonstrates that some members of the team score have assumed that the new site would be located with a teaching hospital and therefore scored 10 others have assumed this would not be the case and would therefore score 0. The group should review whether any alteration should be made in light of an agreed probability of the new site being part of an University Teaching Hospital.

**Co location of Adult and Paediatric Neurosurgery**

Following discussion at the January meeting it was agreed that the issue related to the need for paediatric intensive care. It is recognised that neurosurgery has a small requirement for paediatric intensive care and therefore there needs to be this provision as part of the co-location. Currently, paediatric intensive care is provided in two centres, Glasgow and Edinburgh and there are no plans to extend this provision. Therefore any configuration that does not include one of these two centres should have a low score for this criterion. Accordingly, a weighted score of 100 for the new site would seem illogical. The current provision does not provide a co-location and the only firm plan, which would potentially see a paediatric and adult co-location, is the ministerial announcement re a new paediatric hospital for Glasgow. The group should review whether any alteration should be made in light of an agreed probability of any expansion of paediatric ICU provision within Scotland.

**Provision of Local Services**

At the January meeting of the group it was agreed that the scores should be based on the percentage of population able to travel by land to a centre within 2 hours. This information was circulated in advance. From the range of scores it is clear that some personal interpretation has also been applied. The group should agree whether any alteration should be made in light of the previous decision.

**Overall Summary**

Appendix 3 outlines the final outcome of the preferred configuration if the totals are arranged in descending order.

At the outset of this exercise it was emphasised that the process does not provide a final result but an indication of the relative merits of different options. An examination of the results, in broad terms, suggests that the strategic direction of neurosurgical care within Scotland should be to provide the service across one or two sites. This configuration accounts for the 7 highest scoring options. The highest scoring 3 site option is ranked 8<sup>th</sup> and the highest 4 site option is 12<sup>th</sup>.

J A Miller  
February 2005.

**Appendix 1  
Median Scores**

<b>Criteria</b>		Co-location UTH	Co-location Paediatric/ Adult	Specialist Neuro Facilities	Co-location Neurosciences	24 hr care	Integrated Service	Local Services	Standards
<b>Option</b>	Sites	Score	Score	Score	Score	Score	Score	Score	Score
<b>Ref</b>									
A1.1	New	5	10	10	10	10	8	6	10
A1.2	G	10	8	10	10	10	8	7	10
A1.3	E	10	5	10	10	10	7	6	8
A1.4	A	10	6	7	8	10	7	1	8
A1.5	D	10	5	7	8	10	8	3	8
A2.1	G / E	10	8	10	10	10	8	8	8
A2.2	G / A	10	6	9	10	10	8	8	8
A2.3	G / D	10	5	9	10	10	8	7	8
A2.4	E / A	10	5	8	10	10	7	8	8
A2.5	E / D	10	5	8	10	10	7	7	8
A2.6	A / D	10	5	5	8	9	6	4	8
A3.1	G / E / A	10	6.5	9	9	8	8	9	8
A3.2	G / E / D	10	6	8	9	8	8	7	8
A3.3	E / A / D	10	5	7	8	7	7	7	7
A3.4	G / A / D	10	7	7	8	7	7	7	8
A4.1	G / A / D / E	10	7	9	9	5	8	9	7
A4.2	G / A / D / E	10	5	5	9	4	5	9	5

**Appendix 2**  
**Weighted Median Scores**

Criteria		Co-location UTH	Co-location Paediatric/ Adult	Specialist Neuro Facilities	Co-location Neurosciences	24 hr care	Integrated Service	Local Services	Standards	Total
Option		Score	Score	Score	Score	Score	Score	Score	Score	
A1.1	New	50	100	125	100	200	80	43.5	100	798.5
A1.2	G	100	80	125	100	200	80	50.75	100	835.75
A1.3	E	100	50	125	100	200	70	43.5	80	768.5
A1.4	A	100	60	87.5	80	200	70	7.25	80	684.75
A1.5	D	100	50	87.5	80	200	80	21.75	80	699.25
A2.1	G / E	100	80	125	100	200	80	58	80	823
A2.2	G / A	100	60	112.5	100	200	80	58	80	790.5
A2.3	G / D	100	50	112.5	100	200	80	50.75	80	773.25
A2.4	E / A	100	50	100	100	200	70	58	80	758
A2.5	E / D	100	50	100	100	200	70	50.75	80	750.75
A2.6	A / D	100	50	62.5	80	180	60	29	80	641.5
A3.1	G / E / A	100	65	112.5	90	160	80	65.25	80	752.75
A3.2	G / E / D	100	60	100	90	160	80	50.75	80	720.75
A3.3	E / A / D	100	50	87.5	80	140	70	50.75	70	648.25
A3.4	G / A / D	100	70	87.5	80	140	70	50.75	80	678.25
A4.1	G / A / D / E	100	70	112.5	90	100	80	65.25	70	687.75
A4.2	G / A / D / E	100	50	62.5	90	80	50	65.25	50	547.75

**Appendix 3**  
**Ranked Weighted Median Scores**

Criteria	Sites	Co-location UTH	Co-location Paediatric/Adult	Specialist Neuro Facilities	Co-location Neurosciences	24 hr care	Integrated Service	Local Services	Standards	Total
A1.2	G	100.0	80.0	125.0	100.0	200.0	80.0	50.8	100.0	835.8
A2.1	G / E	100.0	80.0	125.0	100.0	200.0	80.0	58.0	80.0	823.0
A1.1	New	50.0	100.0	125.0	100.0	200.0	80.0	43.5	100.0	798.5
A2.2	G / A	100.0	60.0	112.5	100.0	200.0	80.0	58.0	80.0	790.5
A2.3	G / D	100.0	50.0	112.5	100.0	200.0	80.0	50.8	80.0	773.3
A1.3	E	100.0	50.0	125.0	100.0	200.0	70.0	43.5	80.0	768.5
A2.4	E / A	100.0	50.0	100.0	100.0	200.0	70.0	58.0	80.0	758.0
A3.1	G / E / A	100.0	65.0	112.5	90.0	160.0	80.0	65.3	80.0	752.8
A2.5	E / D	100.0	50.0	100.0	100.0	200.0	70.0	50.8	80.0	750.8
A3.2	G / E / D	100.0	60.0	100.0	90.0	160.0	80.0	50.8	80.0	720.8
A1.5	D	100.0	50.0	87.5	80.0	200.0	80.0	21.8	80.0	699.3
A4.1	G / A / D / E	100.0	70.0	112.5	90.0	100.0	80.0	65.3	70.0	687.8
A1.4	A	100.0	60.0	87.5	80.0	200.0	70.0	7.3	80.0	684.8
A3.4	G / A / D	100.0	70.0	87.5	80.0	140.0	70.0	50.8	80.0	678.3
A3.3	E / A / D	100.0	50.0	87.5	80.0	140.0	70.0	50.8	70.0	648.3
A2.6	A / D	100.0	50.0	62.5	80.0	180.0	60.0	29.0	80.0	641.5
A4.2	G / A / D / E	100.0	50.0	62.5	90.0	80.0	50.0	65.3	50.0	547.8

## Diagnoses

### British Isles 2000-2004

	%
<b>Malformations</b>	
Unspecified Congenital	1.3
Aqueduct stenosis	6.5
Dandy-Walker	1.1
Chiari	1.7
With Spina Bifida	5.8
Other	2.1
<b>All Malformations</b>	<b>18.7</b>
<b>Acquired</b>	
Cysts	0.9
Colloid	1.9
Arachnoid	0.7
Unspecified	11.6
Tumour	9.7
Benign	2.1
Malignant	2.8
Unspecified	6.0
Trauma	0.5
Infection	0.1
Meningitis	9.8
Cerebral abscess	1.5
Unspecified Infection	12.6
Post-Haemorrhagic	1.3
Perinatal IVH	5.1
AVM	66.6
SAH	14.7
Unspecified Haemorrhage	0.6
Other	0.6
<b>All Acquired</b>	<b>14.7</b>
<b>Idiopathic</b>	
Normal pressure' hydrocephalus	9.2
Benign Intracranial Hypertension	4.9
Other	0.6
<b>All Idiopathic</b>	<b>14.7</b>

### Scotland 2000-2004

	%
<b>Malformations</b>	
Unspecified Congenital	0.23
Aqueduct stenosis	7.48
Dandy-Walker	0.93
Chiari	2.57
With Spina Bifida	6.54
Other	3.97
<b>All Malformations</b>	<b>21.73</b>
<b>Acquired</b>	
Cysts	0.47
Colloid	3.04
Arachnoid	1.40
Unspecified	14.95
Tumour	12.15
Benign	1.87
Malignant	3.27
Unspecified	7.48
Trauma	0.00
Infection	0.00
Meningitis	5.14
Cerebral abscess	2.80
Unspecified Infection	10.05
Post-Haemorrhagic	0.23
Perinatal IVH	4.44
AVM	67.29
SAH	10.98
Unspecified Haemorrhage	0.00
Other	0.00
<b>All Acquired</b>	<b>67.29</b>
<b>Idiopathic</b>	
"Normal Pressure" Hydrocephalus	5.84
Benign Intracranial Hypertension	5.14
Other	0.00
<b>All Idiopathic</b>	<b>10.98</b>

**Scotland by centre and year**

2000	Under 17				Adult				All			
	All Ops	1st Ops	Rev.	Inf.	All Ops	1st Ops	Rev.	Inf.	All Ops	1st Ops	Rev.	Inf.
Aberdeen Childrens Hospital	4	1	3	0	1	1	0	0	5	2	3	0
Aberdeen Royal Infirmary	5	5	0	0	5	4	1	1	10	9	1	1
INS Southern General, Glasgow	53	12	41	11	88	32	56	5	141	44	97	16
Glasgow Childrens Hospital	3	1	2	1	1	0	1	0	4	1	3	1
Western General, Edinburgh	4	1	3	0	33	13	20	1	37	14	23	1
Edinburgh Childrens Hospital	22	6	16	3	1	0	1	0	23	6	17	3
Ninewells Hospital Dundee	0	0	0	0	3	3	0	0	3	3	0	0
<b>Total</b>	<b>91</b>	<b>26</b>	<b>65</b>	<b>15</b>	<b>132</b>	<b>53</b>	<b>79</b>	<b>7</b>	<b>223</b>	<b>79</b>	<b>144</b>	<b>22</b>

2001	Under 17				Adult				All			
	All Ops	1st Ops	Rev.	Inf.	All Ops	1st Ops	Rev.	Inf.	All Ops	1st Ops	Rev.	Inf.
Aberdeen Childrens Hospital	2	0	2	2	0	0	0	0	2	0	2	2
Aberdeen Royal Infirmary	8	4	4	0	16	13	3	0	24	17	7	0
INS Southern General, Glasgow	43	11	32	4	78	47	31	2	121	58	63	6
Glasgow Childrens Hospital	0	0	0	0	0	0	0	0	0	0	0	0
Western General, Edinburgh	4	1	3	0	18	11	7	2	22	12	10	2
Edinburgh Childrens Hospital	26	10	16	0	0	0	0	0	26	10	16	0
Ninewells Hospital Dundee	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>83</b>	<b>26</b>	<b>57</b>	<b>6</b>	<b>112</b>	<b>71</b>	<b>41</b>	<b>4</b>	<b>195</b>	<b>97</b>	<b>98</b>	<b>10</b>

2002	Under 17				Adult				All			
	All Ops	1st Ops	Rev.	Inf.	All Ops	1st Ops	Rev.	Inf.	All Ops	1st Ops	Rev.	Inf.
Aberdeen Childrens Hospital	0	0	0	0	0	0	0	0	0	0	0	0
Aberdeen Royal Infirmary	6	4	2	1	8	6	2	0	14	10	4	1
INS Southern General, Glasgow	33	7	26	6	61	29	32	0	94	36	58	6
Glasgow Childrens Hospital	0	0	0	0	0	0	0	0	0	0	0	0
Western General, Edinburgh	1	1	0	0	27	18	9	0	28	19	9	0
Edinburgh Childrens Hospital	29	9	20	2	0	0	0	0	29	9	20	2
Ninewells Hospital Dundee	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>69</b>	<b>21</b>	<b>48</b>	<b>9</b>	<b>96</b>	<b>53</b>	<b>43</b>	<b>0</b>	<b>165</b>	<b>74</b>	<b>91</b>	<b>9</b>

Source: UK Shunt Registry, University of Cambridge, Academic Neurosurgery Unit, Addenbrookes Hospital, Cambridge  
Data excludes Dundee and August - November 2003 for Southern General Hospital, Glasgow

2003	Under 17				Adult				All			
	All Ops	1st Ops	Rev.	Inf.	All Ops	1st Ops	Rev.	Inf.	All Ops	1st Ops	Rev.	Inf.
Aberdeen Childrens Hospital	0	0	0	0	0	0	0	0	0	0	0	0
Aberdeen Royal Infirmary	5	4	1	0	3	2	1	0	8	6	2	0
INS Southern General, Glasgow	21	1	20	2	41	18	23	1	62	19	43	3
Glasgow Childrens Hospital	0	0	0	0	0	0	0	0	0	0	0	0
Western General, Edinburgh	0	0	0	0	14	8	6	1	14	8	6	1
Edinburgh Childrens Hospital	26	8	18	3	0	0	0	0	26	8	18	3
Ninewells Hospital Dundee	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>52</b>	<b>13</b>	<b>39</b>	<b>5</b>	<b>58</b>	<b>28</b>	<b>30</b>	<b>2</b>	<b>110</b>	<b>41</b>	<b>69</b>	<b>7</b>

2004	Under 17				Adult				All			
	All Ops	1st Ops	Rev.	Inf.	All Ops	1st Ops	Rev.	Inf.	All Ops	1st Ops	Rev.	Inf.
Aberdeen Childrens Hospital	0	0	0	0	0	0	0	0	0	0	0	0
Aberdeen Royal Infirmary	5	5	0	0	3	2	1	0	8	7	1	0
INS Southern General, Glasgow	10	4	6	0	73	38	35	0	83	42	41	0
Glasgow Childrens Hospital	0	0	0	0	0	0	0	0	0	0	0	0
Western General, Edinburgh	0	0	0	0	9	4	5	1	9	4	5	1
Edinburgh Childrens Hospital	29	11	18	0	1	0	1	0	30	11	19	0
Ninewells Hospital Dundee	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>44</b>	<b>20</b>	<b>24</b>	<b>0</b>	<b>86</b>	<b>44</b>	<b>42</b>	<b>1</b>	<b>130</b>	<b>64</b>	<b>66</b>	<b>1</b>

2000-2004	Under 17				Adult				All			
	All Ops	1st Ops	Rev.	Inf.	All Ops	1st Ops	Rev.	Inf.	All Ops	1st Ops	Rev.	Inf.
Aberdeen Childrens Hospital	6	1	5	2	1	1	0	0	7	2	5	2
Aberdeen Royal Infirmary	29	22	7	1	35	27	8	1	64	49	15	2
INS Southern General, Glasgow	160	35	125	23	341	164	177	8	501	199	302	31
Glasgow Childrens Hospital	3	1	2	1	1	0	1	0	4	1	3	1
Western General, Edinburgh	9	3	6	0	101	54	47	5	110	57	53	5
Edinburgh Childrens Hospital	132	44	88	8	2	0	2	0	134	44	90	8
Ninewells Hospital Dundee	0	0	0	0	3	3	0	0	3	3	0	0
<b>TOTAL</b>	<b>339</b>	<b>106</b>	<b>233</b> 68.7 (%)	<b>35</b> 10.3 (%)	<b>484</b>	<b>249</b>	<b>235</b> 48.6 (%)	<b>14</b> 2.9 (%)	<b>823</b>	<b>355</b>	<b>468</b> 56.9 (%)	<b>49</b> 6.0 (%)

Source: UK Shunt Registry, University of Cambridge, Academic Neurosurgery Unit, Addenbrookes Hospital, Cambridge  
Data excludes Dundee and August - November 2003 for Southern General Hospital, Glasgow

Scotland	Under 17				Adult				All			
	All Ops	1st Ops	Rev.	Inf.	All Ops	1st Ops	Rev.	Inf.	All Ops	1st Ops	Rev.	Inf.
2000	91	26	65 71.4 (%)	15 16.5 (%)	132	53	79 59.8 (%)	7 5.3 (%)	223	79	144 64.6 (%)	22 9.9 (%)
2001	83	26	57 68.7 (%)	6 7.2 (%)	112	71	41 36.6 (%)	4 3.6 (%)	195	97	98 50.3 (%)	10 5.1 (%)
2002	69	21	48 69.6 (%)	9 13.0 (%)	96	53	43 44.8 (%)	0 0.0 (%)	165	74	91 55.2 (%)	9 5.5 (%)
2003	52	13	39 75.0 (%)	5 9.6 (%)	58	28	30 51.7 (%)	2 3.4 (%)	110	41	69 62.7 (%)	7 6.4 (%)
2004	44	20	24 54.5 (%)	0 0.0 (%)	86	44	42 48.8 (%)	1 1.2 (%)	130	64	66 50.8 (%)	1 0.8 (%)

## British Isles

### Shunt-Related Procedures

	Under 17				Adult				All			
	All Ops	1st Ops	Rev.	Inf.	All Ops	1st Ops	Rev.	Inf.	All Ops	1st Ops	Rev.	Inf.
<b>2000</b>	1021	252	769	83	1800	942	858	77	2821	1194	1627	160
<b>2001</b>	956	277	679	83	1709	968	741	60	2665	1245	1420	143
<b>2002</b>	880	310	570	56	1842	944	898	63	2722	1254	1468	119
<b>2003</b>	944	320	624	76	1883	1017	866	66	2827	1337	1490	142
<b>2004</b>	829	373	456	38	2017	1250	767	41	2846	1623	1223	79
<b>TOTAL</b>	4630	1532	3098	336	9251	5121	4130	307	13881	6653	7228	643

### Revisions and Infections as Percentages

	Under 17		Adult		All	
	Revisions	Infections (%)	Revisions	Infections (%)	Revisions	Infections (%)
<b>2000</b>	75.3	8.1	47.7	4.3	57.7	5.7
<b>2001</b>	71.0	8.7	43.4	3.5	53.3	5.4
<b>2002</b>	64.8	6.4	48.8	3.4	53.9	4.4
<b>2003</b>	66.1	8.1	46.0	3.5	52.7	5.0
<b>2004</b>	55.0	4.6	38.0	2.0	43.0	2.8
<b>TOTAL</b>	66.9	7.3	44.6	3.3	52.1	4.6

Source: UK Shunt Registry, University of Cambridge, Academic Neurosurgery Unit, Addenbrookes Hospital, Cambridge  
Data excludes Dundee and august - November 2003 for Southern General Hospital, Glasgow