

Report of the Short life Working Party on Paediatric Neurosurgery

Scottish Colleges Committee on Children's Surgical Services

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PREFACE

Children's surgical services were subject to examination as part of the process of the Acute Services Review. One of the recommendations from the review was the establishment of a multi-disciplinary working party involving all the surgical disciplines dealing with children in Scotland. The Scottish Colleges Committee on Children's Surgical Services (SCCCSS) developed in response to this and has contributed to the process of rationalising and supporting children's surgery in various disciplines.

Part of the work has involved recommending service reconfiguration, particularly in the case of several centres dealing with small numbers of the same condition. Paediatric cardiac surgery has evolved, to be provided by a single centre and paediatric renal transplantation is similarly now focused in the paediatric environment of the Royal Hospital for Sick Children, Yorkhill, Glasgow.

The SCCCSS has now been directed by the Chief Medical Officer to advise on reconfiguration of paediatric neurosurgery within Scotland. Although precedents in service redesign have included merger as the basis of care, alternative models include managed clinical networks and other designs such as the development of consortia. The inter-dependency of neurosurgery with other tertiary services, make redesign important, not only so that patients can benefit, but also so that the specialty within Scotland, can contribute to research, teaching and the further development of neurosurgery.

Moreover, this exercise provides Scottish Paediatric Neurosurgery with an opportunity to define its needs, monitor current service delivery against recognised standards, and indeed where appropriate, question the application of these standards to the Scottish context.

Paediatric neurosurgery benefits from the skills of adult neurosurgical practice but requires the children's environment to achieve complete delivery. Similarly paediatric anaesthetic and neuro-anaesthetic skills need to be merged to provide optimal care. This inter-dependency is complicated by the needs to condense activity of a relatively small volume of cases so that fewer clinicians have a greater allocation of their time and experience in the paediatric component of the specialty.

The working party, during the course of its work, kept the following considerations at the forefront of its deliberations:-

- ❖ Neurosurgery is a surgical discipline highly dependent upon technology with a demand upon highly skilled medical and non-medical support.
- ❖ The subspecialty of paediatric neurosurgery faces many of the challenges of the adult specialty but in addition requires the particular considerations of child care to be incorporated as an integral part of practice.
- ❖ Neurosurgical intervention, per se, will often represent only one isolated incident during the complex and multidisciplinary care requirement of a child. Even though the neurosurgical contribution to care may be relatively simple from a technical viewpoint, the overall care in many children may be complex.
- ❖ No evidence exists to suggest that the current service delivery is unsatisfactory in terms of quality of outcome of neurosurgical care. There is however a need to recognise the difficulties imposed by the pairing of the specialist neurosurgical agenda and paediatric standards of children's care in future service delivery. This poses difficulty for all aspects of in the service and is currently lacking in all centres.
- ❖ The gains perceived by re-configuration of paediatric neurosurgery in Scotland should not be at a cost to the overall care of children with neurological illness
- ❖ There must be preservation of the ability to institute life-saving emergency neurosurgery in all of the neurosurgical centres currently treating children
- ❖ There is recognition of the need for a paediatric environment for the provision of care
- ❖ Appropriately trained and credentialed carers are a pre-requisite.

It should be noted at the outset that this review was complex. Indeed the disparity of professional opinion made available during the working party's deliberation is such that few if any of the conclusions and recommendations are made with unanimity. In many areas consensus was an elusive commodity. However, many if not most of the items recognised as drivers for change were identified as being applicable to all tertiary medical and surgical services in the children's sector within Scotland and not unique to paediatric neurosurgery. Hence selection of this specialty for scrutiny and re-configuration was considered opportunistic at best and those reasons identified relevant to centralisation of paediatric neurosurgery, if pertinent, are also likely to apply to most other paediatric tertiary services.

Considerations therefore such as working time directives apply across the range of other medical and surgical specialties as much as they apply to paediatric neurosurgery. Paediatric neurosurgery should be seen as neither a forerunner nor as a pilot for all other tertiary services for children in Scotland. Equally however, if there are cogent reasons for centralisation and re-configuration, it is incumbent on the involved professionals to respond.

Finally, an important omission from the study has been the economic implications of the recommendations. As a consequence clinical effectiveness has not been included in the analysis. However the remit provided, directed the work to be resource neutral in its implications and as such the working party elected to omit fiscal considerations from its agenda. There is however no belief that any reconfiguration can be resource neutral.

1. Introduction

The perceived benefits of centralising services assume a direct correlation between volume of patients treated and the quality obtained from such care. During the Acute Services Review chaired by Sir David Carter, a number of children's services were subjected to appraisal and evaluation. As a consequence of this exercise, paediatric cardiac surgery and paediatric renal transplantation had their services result in a merger of all cases in one centre. In both cases the Royal Hospital for Sick Children, Yorkhill, Glasgow was the favoured location. The demography of Scotland, the population concentration, and the allied clinical support services with which these specialties function, were important considerations influencing the decision to locate within this institution.

The identified paediatric intensive care bed requirement from Scotland (paediatric population 1 million), is for 25 beds (SPICA 1999). The existing bed capacity within the existing PICU's is 14 RSCHG and 8 RHSCE. However central funding is available for only 8 of these beds in Yorkhill (6 cardiac and 2 retrieval) and for two beds in Edinburgh (2 retrieval). The remaining beds (6 G and 6 E require health board funding to be identified. The Southern General Hospital has 2.5 beds identified within its intensive care unit for children. There is similarly no nationally identified funding for these beds.

The importance of retaining this bed capacity and the current disposition of beds was emphasised to the working party and was retained as an important consideration during the group's work.

One of the actions emanating from the Acute Services Review was an appraisal of all neurosurgical services in Scotland. This was undertaken by a working party chaired by Sir David Carter and reported to Management Executive. Within this report the section on paediatric neurosurgery included a variety of recommendations. The development of a two centre service for paediatric neurosurgery was suggested but dissatisfaction with this recommendation from a variety of quarters prompted the current CMO, Dr M Armstrong, to review this component of the report. Following this review, which was carried out in consultation with a number of other professionals involved in Scottish Paediatric Neurosurgery, the brief of the working party was developed.

The specified remit was: -

"To review the options for models of service delivery for elective paediatric neurosurgery in Scotland, within existing resources, with the aim of moving over a five year period towards the establishment of a single service for Scotland as a whole, and to make recommendations".

However, only around one-in-three children admitted to neurosurgical units will undergo surgery and of all the operations undertaken, approximately 60% are emergencies. The working party therefore considered it important to include emergency surgery within its remit, as well as the elective component as instructed.

The working party was composed such that both specialty and geographic interests were encompassed. Representation was also had from paediatric nursing, paediatric intensive care and paediatric anaesthesia, Action For Sick Children, Local Health Councils, and a representative from Trust Chief executives. The membership of the group is set out in Appendix 1. In addition consultation was obtained from ISD, Dr Bryson, NSD, paediatric oncology, rehabilitation and Capability Scotland, accident and emergency services, child protection, maxillofacial surgery, and the lead Dean for postgraduate neurosurgery.

The working group held six closed meetings. A seventh meeting was held as an open meeting for consultation with all interested parties and held prior to completion of the working party report (see appendix 7). The first meeting considered remit and membership of the working group; the need to establish communication with other workers and specialties involved in paediatric care; identifying the relevant documentation and bibliography. The minute of each meeting is contained in appendix 2. The second meeting reviewed current activity and the relative merits of differing formats of service configuration. An option appraisal exercise was carried out. The third meeting evaluated the impact of the various options upon other components of the service and the implications for patients and families. Transport considerations were also reviewed. The following meetings involved the development of the exit strategy, evaluated manpower and the effect of the rapid flux in manpower considerations in contemporary hospital medicine; timescale for implementation was discussed, as was the identified care pathway for specific conditions and procedures. The open meeting, held in Stirling Management Centre, Stirling University, was an opportunity for public and professional consultation and dialogue.

The working party was aware of the specialist nature of the subject matter but ensured patient advocacy by the presence of representatives from Action for Sick children and Local Health Councils. In addition, the presence of a member from the department of Health directed the working party usefully. The size of the group precluded representation from all the interfacing specialties. Instead those specialties with an interface with paediatric neurosurgery (paediatric oncology, Accident & Emergency surgery, professionals allied to medicine, the national services division, child protection

services and cranio-facial surgery) were each invited to specific meetings. Professor Gillian Needham, lead Dean in Neurosurgery, gave useful advice on manpower issues.

2. Age

For the purposes of this report the working party considered all procedures in hospital admissions in children aged 15 years and under. Discussions emphasised the need to be flexible in older children, since their physiology, environment and disease may be more closely aligned to that of adult patients. By the same token, however, it was recognised that adolescents are frequently enforced to share an adult environment, communication and care model which is inappropriate for their specific needs, and while some members of the group considered 18 to be the more appropriate age threshold, the consensus directed the age limit to 16.

3. Standards of Care

Many authorities and independent bodies have given advice on the standards surrounding the care of children in hospital. In particular, reports emanating from surgical colleges and departments of health (NCPOD report 1999, Acute Services Review 1998, Children's Surgery – A First Class Service, the Children's Forum) emphasise the need for provision of a paediatric environment for children undergoing any form of surgical care. This environment not only ensures the clinical care appropriate for the needs of young children and their family but also allows a condensation of resource and expertise specifically for children.

In some surgical specialties, however, the highly technical nature of the operative care to be delivered and the dependency upon complex and highly expensive equipment makes the pairing between the demands of specialist care and the demands of children's care an extraordinarily difficult combination. This has been recognised throughout the report and indeed it is recognised that no one centre at the present time in Scotland, can provide a perfect combination of neurosurgical and paediatric treatment venue for children.

An early consideration absorbed by the working group was the motivation behind the need for reconfiguration of the service. Reports obtained during the neurosurgical review and other contemporary documents (SPICA 1999) failed to identify adverse outcome from the existing pattern of care, even when adjusted for case mix. It was the working group's opinion, however, that in small volume practice, adverse outcome may be difficult – indeed impossible – to identify, and in addition other important drivers existed to ensure that the expertise and resource be concentrated. Not least was the opportunity to provide training, to contribute to research, and to ensure succession planning of clinicians dedicated to neurosurgical practice in childhood (vide infra).

In addition, the working party recognised that the discussions were not informed by outcome of care since such data was not held centrally nor indeed consistently and immediately available at individual unit level. Performance assessment was not the main objective of this review. Instead, optimising delivery of the service within the constraints of available resources had been given primacy.

Early recognition of the tension that such a reconfiguration engenders was made. A need for the working party to dissociate itself from institutional loyalty and viability was requested since it was recognised that no existing centre complied with all optimal standards of care laid out by recommending bodies. These were as follows: -

Society of British Neurological Surgeons (SBNS) 1997

- Each centre should have a minimum of two whole time equivalent consultants for planned paediatric work who would support and advise on emergency paediatric neurosurgical work which for the foreseeable future will be carried out by both paediatric and adult neurosurgeons.
- Mid grade cover – there must be middle grade cover consisting of both neurosurgical and paediatric staff.
- Specialist paediatric neurosurgeons should have, in addition to the six months common to the adult curriculum, a further six months in a specialist unit dealing with more than 100 cases per annum. A 24-hour service requires paediatric beds, paediatric intensive care unit, paediatric neuro-anaesthesia, paediatric nurses and on-site CT scanning; the need for specialist services in neuro-radiology and neuro-pathology is recognised. Paediatric neurology and general paediatric medicine is essential.
- Neurosurgical units offering a comprehensive service must be capable of delivering a full 24-hour service.

- High quality children's care should be delivered by recognised paediatric neurosurgeons supported by appropriate staffing facilities.
- Paediatric neurosurgery should offer at the very minimum the same quality, degree of care and level of expertise as regarded as the norm for adult neurosurgical practice.

The working group on the transport of critically ill and injured children (2000) made the following observation: -

Children may suffer multiple trauma and the non-head injury trauma may prove more life threatening. Deciding which injury is the more serious may prove difficult. Even when head trauma is the main injury only a minority of children with acute head injury undergo any form of neurosurgical intervention. Experience suggests that these children may not receive optimal general paediatric care. Future care of such children should be determined by discussion between senior members of staff. This should include dialogue/conference calling between A & E consultants, paediatricians, anaesthetists, neurosurgeons and PICU consultants. Priorities of care should be established and a decision made as to the most appropriate place for care to be delivered. If necessary, the neurosurgeon could travel to the patient.

The Acute Services Review (1998) emphasised -

"The Review endorses the view that paediatric neurosurgical services should be in close proximity to adult neurosurgical services and sited wherever possible within a paediatric hospital along with other paediatric services. It sees merit in continuing to concentrate on complex elective surgery in Glasgow and Edinburgh, while at the same time maintaining the capacity for emergency neurosurgery in all four Scottish centres. It recognises that the pace of change dictates that it may become desirable within the coming decade to revisit these arrangements and develop one major paediatric neurosurgical unit for all the investigation and treatment of children with complex neurosurgical disorders".

The National Confidential Enquiry Into Peri-Operative Death (NCEPOD) 1999 - recognised that infrequent practice in small children is still carried out by neurosurgeons within the United Kingdom. Neurosurgical deaths were 28% of the total of post-operative mortality and referred to the guidance of the minimal services required for the care of children, emphasising the need for pairing the requisite skills in both neuro and paediatric anaesthesia, with the intra and post-operative care required. This combination creates considerable problems in isolated units. The death rate referred to in this report suggested that the combined facets of care were unavailable to several children.

An audit of paediatric intensive care was carried out in Scotland in 1997 (**SPICA report**). In this audit paediatric neurosurgery contributed the second largest cohort of patients to paediatric intensive care and in spite of the fact that actual mortality was less than expected mortality, re-design of the service for retrieval of sick children in Scotland has taken place (Report Of The Working Group On The Transport Of Critically Ill And Injured Children – June 2000).

All agree that infants and young children should be dealt with by paediatric specialists working in a hospital setting appropriate for children's care. The availability of appropriate specialist neuro-anaesthetic skills is of paramount importance, particularly in respect of children beneath the age of 3 years (**Review of Neurosurgical Services in Scotland**).

The failure to identify adversity in current practice is such that the expectation of gain through reconfiguration will be modest in terms of outcome. However, compliance with paediatric standards of care in conjunction with achieving the best possible clinical outcome is the desired result.

4. Current Service Provision

Paediatric neurosurgery in Scotland is currently delivered at five sites. These are:-

- Royal Hospital for Sick Children, Yorkhill, Glasgow
- Institute of Neurosciences, Southern General Hospital Glasgow
- Royal Hospital for Sick Children, Edinburgh
- Royal Aberdeen Children's Hospital
- Ninewells Hospital, Tayside

The Royal Hospital for Sick Children, Yorkhill, Glasgow

This is a tertiary referral centre and houses one of the two national paediatric intensive care units in Scotland. Paediatric neurosurgical activity is restricted to the management of newborns with congenital anomalies of the central nervous system including spina bifida. Shunt surgery and closure of all the spinal lesions is undertaken by the paediatric

surgeons working in Yorkhill. This practice has a long and historic basis but is possibly out of line with practice elsewhere in United Kingdom where such surgery is predominantly performed by neurosurgeons. Follow up is however provided by the same clinicians ensuring good continuity of care until the teenage years. The surgical care of children in Glasgow is currently itself under reconfiguration and one of numerous ambitions is to relocate all accident and emergency services in the Royal Hospital for Sick Children, Glasgow. This change is perceived to be imminent. This will render Yorkhill the equivalent of the trauma centre for children in this part of Scotland. However the absence of an in-house neurosurgical service is anomalous and the need to transfer children with multiple injuries is suboptimal. Provision of neurosurgical care for acute head injury, particularly as part of polytrauma care, would be substantially improved by relocation, at least in part, of paediatric neurosurgical services with the A&E and PICU facility. The impact of that however, upon in the viability of the paediatric services within the Institute of Neurosciences, Southern General Hospital, requires further consideration.

There appears to be a poor infrastructure for correspondence, dialogue and communication between the two centres within Glasgow both of which appear in many areas to function in an autonomous fashion. However there are exceptions in that oncological services for CNS malignancies are located in Yorkhill and an example of good practice is the relationship that exists between The Institute of Neurosciences and the Schiehallion ward (oncology unit), Yorkhill. Similarly joint clinics are run with a clinical oncologist and SGH, and an outreach paediatric oncology nurses visits children in the Southern General Hospital following neurosurgery, in preparation for the chemotherapy regime if indicated.

Paediatric radiotherapy is off-site at the Beatson oncology centre and an anaesthetic outreach service is required for children under 3 and for all medically compromised children up to age 12 years.

Yorkhill includes the regional paediatric neurology service, which is in the main tertiary referral service for the specialty in the West of Scotland. Rehabilitation of head injured children with disability following surgery is carried out in Yorkhill although not exclusively since the majority of children with isolated head injury are catered for at the Institute of Neurosciences, Southern General Hospital. Paediatric intensive care is also located at this institution. Currently 14 beds are being expanded by way of a new build to include an HDU with a capacity ultimately for 28-30 beds. Although there is the capacity both in terms of intensive care and theatre, Yorkhill does not contain specific stereotactic or other specialist neurosurgical operating equipment.

By the nature of this hospital there is a full complement of all supporting services ranging through nurses, PAMS, affiliated surgical and medical disciplines. The environment is clearly dedicated to the care of children and meets standards set out in all paediatric charters

Paediatric Neurosurgery, Institute Of Neurosciences, Southern General Hospital, Glasgow

The department is a unit within the Institute of Neurosciences, the largest neurosurgical unit in Scotland and amongst the largest in the UK. This unit comprises a 12 bedded ward dedicated to neurosurgical care of children and staffed predominantly by RSCNs. There is one play specialist. The ward environment is appropriate for children; there are ambitions to develop a separate adolescent facility. Parental accommodation is provided and there are dedicated outpatient facilities, sessions for paediatric neuroimaging and appropriate arrangements for parental attendance in the anaesthetic room. Perioperative care is managed predominantly by neurosurgeons although in the case of infants and young children, the in-house neonatologists will assist management. In the case of complex neuro-endocrine disorders the children may require to be transferred to Yorkhill hospital. This is an infrequent occurrence.

The consultant neurosurgical staff comprise one full-time paediatric neurosurgeon who is supported by two consultant colleagues who practice both adult and paediatric care, but whose main commitment is normally to adult care.

Four anaesthetists, who have had considerable experience in the combined challenges of paediatric and neurosurgical anaesthesia, provide paediatric anaesthesia. There are however no dedicated paediatric beds in the intensive care unit, which is predominantly an adult environment. 2.5 beds are theoretically allocated children in the Neurosciences Institute and but this allocation is inconsistent in use. Adult ITU nurses look after all children but anaesthetists and all ITU staff are PALS trained.

The in-house team combines a long experience in both adult and paediatric neurosurgery. There is an expressed view that such experience is synergistically beneficial to the care of children in that the skills of complex adult neurosurgery transfer well to the intricate requirements of complex paediatric neurosurgery. Loss of this adult expertise and experience was considered to potentially impact adversely upon continued paediatric technical expertise and skill.

Similarly, there is the view that the fusion of both elective and emergency paediatric neuroanaesthesia in this centre is advantageous, and the loss of elective responsibilities (by relocating this component to Yorkhill) could adversely affect the quality of care provided in the emergency setting by paediatric neuro-anaesthetists. It is clear that the existing cohort of anaesthetists have considerable experience in combining paediatric neuroanaesthesia, with three of these anaesthetists

with a declared interest in paediatrics. The paediatric facility is in relative isolation from paediatric support, - there are neither in-house paediatricians nor paediatric SpRs (although there is a neonatology service on site). Moreover in the intensive care unit there are no registered paediatric nurses. Whilst the therapy department is highly rated and highly skilled there is again no paediatrically credentialed PAMS working with children. This Hospital provides an outreach nursing service for continued to children with head injury in the community.

Reconfiguration of paediatric services within Greater Glasgow NHS includes relocating maxillo-facial surgery from Canniesburn Hospital to this institution. Clearly the strategy of Greater Glasgow Health Board as it relates to childcare has a major influence on the interactions, viability and future configuration neurosurgical care of children in the West of Scotland.

Department of Paediatric Neurosurgery, Royal Hospital for Sick Children, Edinburgh

This unit is part of a fully integrated paediatric neurosciences unit located in the paediatric environment of a children's hospital. The unit is staffed by three consultant surgeons, with shared duties in both paediatric and adult neurosurgery. The dominant surgical activity in the city is at the Western General Hospital and as such mid-grade Paediatric neurosurgical staff are not based in this hospital. Indeed there are 2 half days when there is no fixed session for neurosurgery in this unit, but consultation is available on an on-call basis. This creates a dependency for postoperative continuity of care in the consultant surgical and medical staff. The future plan for adult neurosurgical services in Edinburgh is to relocate, along with the academic neurosurgical dept, to the new site within Edinburgh Royal Infirmary. Such relocation would expose the continuing vulnerability of the RHSCE as a stand-alone children's hospital to problems of split site cover, and also challenges the accessibility of this hospital to rapid transport routes. The future of this aging building requires consideration with potential relocation adjacent to ERI clearly a distinct advantage.

The current strengths of the unit include capacity within the PICU created as a consequence of the relocation of paediatric cardiac surgery, the close alliance in clinical care, between neurosurgery and neurology and other paediatric services. Follow-up and several other clinical functions are multi-disciplinary in their nature.

The unit has a strong track record in research, and whilst MR and CT facilities exist in house, angiography is only available at the Western General Hospital. Radiotherapy, in common with the other centres in Scotland is offsite in an adult environment.

Reduction in activity in paediatric neurosurgery in this hospital, would distinctly compromise the continued viability of the Edinburgh PICU, which in turn would impact upon the sustainability of other clinical services. A one-site model located in Glasgow threatens the integrity of services in this part of Scotland.

Department Of Neurosurgery, Aberdeen Royal Infirmary

Children undergoing neurosurgical care in Aberdeen are treated under the care of adult neurosurgeons in the Royal Aberdeen Children's Hospital. Aberdeen Royal Infirmary and Royal Aberdeen Children's Hospital are co-located on a single large campus. Three Neurosurgeons provide neurosurgical care usually in the paediatric environment of the children's hospital. There is however no paediatric intensive care unit in this institution and any children requiring any length of PICU care are transferred. This department serves all of Highlands and Northeast Scotland as well as the islands around Scotland.

The two institutions are co-located in one large campus that is extremely well served by both air and road transport links. There is established experience in telemedicine and children's surgery is supported by a strong service in paediatric anaesthesia with good linkage is into other subspecialties e.g. endocrinology. Outreach practice to the Highlands of Scotland is already established, as is regular transfer of images by telemedicine. Many of the skills utilised in children's surgery at transferred from adult practice.

One of the existing drawbacks is a separation of the Children's Hospital from the adult hospital such that major trauma admitted to the Children's Hospital has to be transferred by ambulance to Aberdeen Royal Infirmary for head scanning. This is soon to be rectified by the build of the new Children's Hospital adjacent to Aberdeen Royal Infirmary. The paediatric caseload is intermittent and a major deficiency is the absence of any paediatric neurologist on site. In addition general paediatric nurses may have to look after complex neurosurgical problems and the size of the unit (three consultants) prohibits any major sub specialisation in paediatric neurosurgery. Moreover paediatric neurosurgery is inconsistent in its workload and constitutes occasional practice.

Department of Neurosurgery, Ninewells Hospital, Dundee

Dundee serves a population of Tayside, Angus, North Fife and East Perthshire. The department is located within Ninewells Hospital and children are treated within the paediatric department, an integral part of Ninewells Hospital. It provides a paediatric environment within an adult hospital with adjacent radiotherapy and imaging facilities. There are also good air/rail travel routes.

There are however only three consultant neurosurgeons and there is no paediatric intensive care unit. Moreover neuropathology is offsite and radiology is restricted to general radiology with no specialist neuroradiology in children's services, although a committed radiologist provides an excellent non-specialist neuroradiology service.

5. Information & Statistics

The working party attempted in the first instance to use available data held at the Information Services Division (ISD) of the Common Services Agency to obtain a measure of clinical activity and to potentially identify clinical outcome in order to inform the working of the group. However, it became clear on the receipt of this data that, irrespective of the method of interrogation, the existing data set would provide neither accurate nor discreet information in relation to institution, nor any individual operating surgeon. (See appendix 7)

This was in part due to an inability to separate diagnostic from therapeutic coding (e.g. both lumbar puncture and an open procedure on the meninges could be given the same procedural code, and imaging of the CNS may be recorded as a procedure when anaesthesia was involved but not if under sedation or without anaesthesia). The comparisons with locally held data sets resulted in little confidence in the accuracy of the national health data.

The working party recognised that this was attributable both to the methods of collection (i.e. the information sought) and the quality and consistency of the data produced from hospitals. The difficulties in data analysis were not resident in the ISD who were fully supportive of the working party's endeavours.

It was noted that Paediatric Neurosurgery was not a separate data set with a unique identifier and that retrieval of information was only obtainable by seeking information based on procedural or diagnostic codes relating to the central nervous system in patients under 16 years. The data failed to distinguish between numerous variables but primarily would not distinguish between paediatric neurology and paediatric neurosurgery.

Given that the health service in Scotland considers paediatric neurosurgery as a distinct component and a significant subspecialty and that this is reflected in the remit and the need to assess activity and quality of outcome, then this process can only be reliably informed, audited and compared if robust, accessible, clinically significant and contemporary data, can be grouped through appropriate collection method.

It is noted that such data collection method is an integral feature of a managed clinical network.

In the absence of reliable, centrally held data, the working party elected to collect and analyse information obtained from each centre providing paediatric neurosurgery. The template used was modified from that devised on behalf of the British Paediatric Neurosurgical Group (see appendix 3). Modification included identification of provision of paediatric nursing, contributions to cranio-facial audit, and the introduction of quality measures in relation to child and family facilities at the institutions involved in paediatric neurosurgery. The template is outlined in appendix 3, as is the activity profile of each unit.

Mortality data

The thirty-day post operative mortality in all adult surgical patients in Scotland is recorded through SASM (Scottish Audit of Surgical Mortality). However with the exception of those found in the paediatric surgical section, there are no discrete identifiers for mortality rates in children collectively in all specialties. **The working party therefore recommended that SASM should collect details of deaths in childhood. Relevant factors would include the profile of the involved clinicians notably their prior experience in paediatric care, the familiarity of the anaesthetist involved with paediatric practice, and the utilisation of paediatric services and paediatric intensive care.**

The current information shows that of the 55 postoperative deaths in children in Scotland between 1999 - 2000 inclusive, 23 involved diseases of the central nervous system.

Benchmarking

The working party undertook a literature search in an attempt to identify the existence of any national or international comparisons relating to volume. No data were found to establish a relationship between these two variables. In the absence of outcome as the motivation for change other indices, including economic and resource utilisation, need consideration. The working party had been guided on keeping its advice resource neutral. Influences such as change in manpower regulations are therefore proportionately more important. These and other drivers are discussed below.

Outcomes

Discussions on outcome are complicated by the fact that the term is often used as a singular denominator. In reality there are numerous outcomes of therapy and each individual therapists involved in a child with complex neurological disease may have quite distinct and separate target outcomes. Moreover outcome is contextual in that the stage of disease process at presentation may well be substantially more influential than any effect of treatment. The time to presentation and diagnosis may therefore be equally as influential as the differing surgical approaches and techniques to the problem and may thus mask any difference in surgical expertise.

6. The Need for Change

There are several relevant issues prevailing upon NHSiS, which will force review of current practice and patterns of work as we currently know them. These include the following: -

- An elevated national profile for Child health
- An increasing need for accountability and openness in performance assessment
- Improved setting and monitoring of clinical standards
- Commitment to national and international benchmarking
- A public awareness/expectation of improved clinical standards
- Increasing sub specialisation
- Adherence to national strategies re staffing ratios
- Need for a critical mass to sustain certain areas e.g. P ICU
- Condensation of Research and training
- Changes in training structure reducing the level of skill and availability of junior staff
- Implementation of Junior doctors hours of work (New Deal)
- European Working Time Directive as it affects all workers including consultants
- an assumption of direct correlation between volume and outcome
- Findings of the Kennedy report
- Lack of adherence by existing units to all aspects of children's and neurosurgical charters of care

All these point towards the need for change through merger and the development of fewer but larger centres. However by common consent, there is no one centre currently providing the service that meets the desired standards of both neurosurgical and paediatric charters. As a consequence, there has been some resistance within Scotland to transferring children from units outwith the central belt where there is ready recognition that there is not a dedicated Paediatric neurosurgical service, to any of the centres in the central belt, particularly when each individual centre fails to adhere to recognised standards.

The working party discussed at length the drivers for change and the reasoning behind reconfiguration of this service in Scotland. Adherence to quality standards of child care in hospital was recognised as one such driver, and the identification of benchmarking levels of care identified in a variety of documents outlined in the bibliography, notably Safe Paediatric Neurosurgery, Framework for the Future, the Kennedy report and SPICA Report. The working party expressed concern that the findings of the neurosurgical review carried out by Sir David Carter were not (at the point of writing) published. Moreover it noted that the dissatisfaction with the paediatric section of this report by some professional groups may have contributed to the decision not to place the document in the public domain. Most discussion, however, was centred on the inability to identify any one variable, which could distinguish or characterise the quality of clinical outcome from surgical units. Thus, in the absence of any proxy of the service neither excellence of quality in care provision nor adversity in clinical outcome can be documented. As a consequence, a comparison between units is an arbitrary event and the relationship between volume and outcome remains unconsolidated.

At several stages in the review process it was also clear that "outcome" is ill defined. There are different outcomes for different components of treatment, and the time at which measurement of outcome is made, is also influential upon the interpretation of clinical results. It is clear therefore that outcome following neurosurgery is not a singular event. There are early and late outcomes making comparison a complex undertaking.

A lack of confidence in quality outcome measures can variously be used, therefore, to either promote change on presumption of a direct relationship between quality and outcome or to suppress change based on an inability to demonstrate any difference between units irrespective of volume of clinical activity. Clearly low volume and poor outcome requires immediate action, but this is not the situation prevailing in Scottish paediatric neurosurgery (although the poor quality of the data held centrally made even that assumption possibly invalid).

The committee recognised, therefore, that other important influences on provision of the service, including capacity, ability to provide training and research, equity of access and provision of continuity of care throughout the illness of the child rather than merely provision of a neurosurgical procedure, are all issues that contributed to the decision making process to centralise.

The working party was also mindful of the potential impact on future patterns of work by doctors and the probable application of statutory measures to define and restrict the duration of the working week of all medical grades including consultant paediatric neurosurgeons. This poses extra challenges to the provision of continuity of medical care and a round the clock service. The smaller units in Aberdeen and Dundee clearly face major difficulties in this regard but any stand alone service will be challenged such that retention of the current manpower base and collaborative working of all constituent specialists, with concentration of services would appear to provide the only main potential solution to this.

7. Institutional Activity

The average available staffed beds for children in Scotland for the year ending 31 March 2000 is as follows;

Surgical paediatrics 138
Medical paediatrics 823

There is no specific bed allocation for paediatric neurosurgery at national level. The detail of each individual neurosurgical unit size and disposition is seen in appendix 3.

For the purposes of the report, it is recognised that within Glasgow, two hospitals provide neurosurgical care for children, i.e. Royal Hospital for Sick Children, Yorkhill and the Neurosciences Institute of the Southern General Hospital. For the purposes of this report the term "centre", unless denoted otherwise, is used to denote the cities involved rather than specific institutions within these cities.

An individual from each of the five institutions providing paediatric neurosurgery in Scotland obtained data on clinical activity and existing facilities in each of the centres. The collation of this information is shown in appendix 3. In addition, each hospital has provided commentary on their distinct profile and has added qualifiers to the data collected. There are clear variations in the method through which each institution attempts to conform to the recommended standards.

One of the aims of the review is to try and analyse the quality of service and in so doing identify gaps within each institution such that may be offset by complementary and collaborative working and if so indicated introduce redesign.

Data were extracted from the information provided by the working party members so that analysis of activity could be informed, and the implications of change best projected. The following is considered to be activity in the last calendar year:-

Centre based activity 2000

Centre	Volume (patients)	Operations	Level 2/3 ICU patients
RHSCE	320	130	48
SGH	410	200	74
RHSCG	27	89	19
Ninewells	30	30	5
Aberdeen	31	28	12
Total	818	477	158

Table 1 The case load at each centre and the number of children requiring ventilation or ICU care

Condition based surgical activity 2000

Condition	RHSCE	RHSCG	SGH	Aberdeen	Dundee	Total
Tumours	20	-	20	5	3	48
Trauma	31	-	40	5	8	59
hydrocep	64	76	65	12	18	235
Cranio-fa	25	-	12	1	-	38
Epilepsy	6	-	3	-	-	9
AVM	3	-	3	-	1	7
craniotomy	10	-	15	1	3	29

Table 2

The trauma figures quoted include various interventions. Craniotomy for trauma is seen in the final row. It should also be noted that the figures quoted for craniofacial surgery in RHSCE are predominantly for single suture synostosis, whereas in the INS, this practice is reducing and the figure quoted above relates to complex synostosis.

Working on the premise that the majority of existing trauma cases will remain in the current sites (assuming many are urgent cases) and also making the assumption that the current disposition of neonates will result in a little change in the location hydrocephaly surgery in the short-term, then it would appear that the cohort of patients which are available for relocation during the process of reconfiguration is restricted to those requiring tumour surgery and the smaller numbers requiring surgery for epilepsy and vascular malformations. This is estimated at approximately 150 cases per year.

The benefits therefore between a single centre and the two centre model within a managed clinical network are perhaps less apparent than initially perceived. It was the opinion of some committee members that the vacancy factor introduced by imposition of a one-centre model both in geographic terms and in failing to utilise existing expertise, would be a considerable loss to sustain for a minimal gain of condensation of these few patients in one location.

The benefits and disadvantages of a network for hospitals donating cases is explored in papers D & E, Appendix 5.

8. Implications for Scottish PICU's

One of the recommendations from the acute services review was that Scotland should contain 2 specialist paediatric intensive care units. This recommendation was made cognisant of the fact that exceeding capacity would result in children having an unacceptable distance to travel to the nearest paediatric intensive care unit in England. The transfer of paediatric cardiac surgery to a single site in Yorkhill, Glasgow has resulted in the congestion in the paediatric intensive care unit of this hospital such that expansion is currently underway. In the Royal Hospital for Sick Children Edinburgh and the vacancy factor introduced by the relocation of paediatric cardiac surgery has yet to be completely filled although activity levels in other spheres of critical illness have increased thus preserving work patterns to an extent. The working party was advised to be mindful of the need to support two paediatric intensive care units when making recommendations on the future of paediatric neurosurgery.

Activity in the regional PICU's is as follows: -

(a) RHSCE

Currently has 8 PICU beds (with 6 HDU beds which can be used flexibly as PICU beds if necessary). In 2000-2001, there were 296 admissions (a drop from 340 the previous year – this figure included 3/12 of cardiac work). The average length of stay was 5 days (was 4.5) with a range of bed occupancy from 1 to 10 cases at any time. The mean/mode bed occupancy was 4 cases. Of the 296 patients, 42 (15%) were neurosurgical – of which 18 were neurotrauma and 24 non-neurotrauma (including elective and acute cases). Of the 18 neurotrauma patients, few needed surgery except for invasive monitoring. Approximately one third of neurosurgical cases were admitted to PICU post-op. Most patients come from the Lothians and the SE of Scotland.

(b) RHSCG

Currently has 14 funded PICU bed spaces. PICU admits 600-650 cases per year. Average length of stay is 4 days. 50% of bed days are cardiac. There is no adjacent HDU therefore there is no step-down facility and a proportion of the total bed days are HDU bed days. Neurotrauma patients are occasional and usually have multiple injuries. Bed occupancy is

65% but peaks have meant that patients have had to be turned away in recent months. An outline business case is being put together to establish a 28-30 bedded combined PICU/HDU commencing April 2002.

These figures do not include the neonatal shunt and spina bifida patients which are currently managed in the neonatal surgical unit. Few of these patients require ICU level care.

(c) SGH, Glasgow

Currently has two beds designated for paediatric use. Last year there were 74 PICU admissions – 44 emergency, 15 urgent (not all ventilated) and 15 elective (majority not ventilated, most for an overnight stay only).

110 patients therefore needed PICU with an average length of stay of 4 days. This amounts to 440 bed days spread throughout the year. The impact of neurosurgery on the viability of either PICU in Scotland is therefore limited consuming approximately 1-2 paediatric intensive care unit bed per year out of the total complement of 24.5. When this is factored by an average occupancy of 66%, then approximately three beds per year will be required for paediatric neurosurgery patients. Whilst constituting a small number of beds, loss of neurosurgical activity from Edinburgh would substantially adversely affect the viability of this unit.

The activity in the individual PICU's as it relates to neurology/neurosurgery is seen below. A sum total of 672 bed days (3 beds per year) is required to cope with the peaks in demand assuming a constant occupancy of 66 per cent. Whilst acknowledging that this represents only three annualised bed days for this specialty within Scotland, the working party recognised that this did constitute a significant volume of specialist expertise required from, and investment in, both nursing and medical staff.

	No of Patients	Ventilated	Deaths	Total PICU Bed Days	Mean	Range	Location	
							PICU	HDU
Neuro Trauma	21	19	2	137	6	1 - 29	20	1
Neurosurg	29	6	2	62	2	1 - 13	9	20
Neurology	39	32	1	87	2	1 - 12	33	6

Table 3 Edinburgh RHSC PICU - Neuroscience Activity Calendar Year 2000

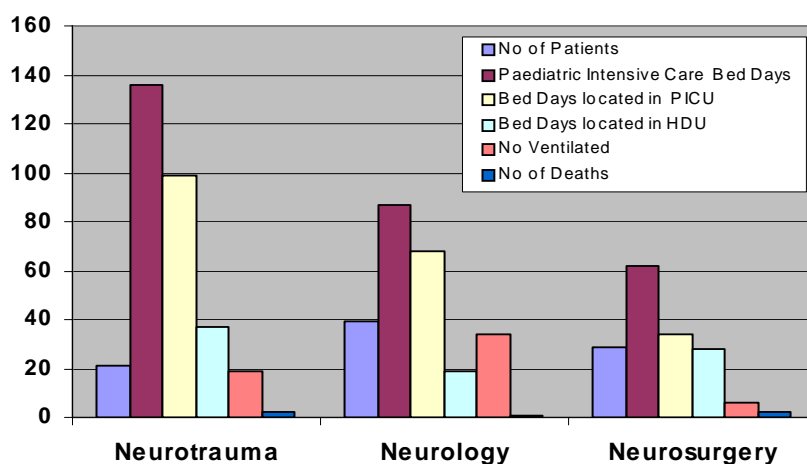


Fig1

ICU NEUROSURGERY AND NEUROTRAUMA ACTIVITY: SGH 2000

	PATIENT NUMBERS	BED DAYS	MEAN LOS
Neurosurgery PICU	47	41.6	21.2 hrs
Neurotrauma PICU	28	44.9	38.5 hrs
Total	75	86.5	27.7 hrs

Table 4**PAEDIATRIC ITU ABERDEEN 1996 - 2001**

Year	ITU	admissions	bed days
1996-1997	24	trauma 5 infection 3 anoxia 2 tumour 1 haemorrhage 1	58
1997-1998	26	trauma 4 infection 2 tumour 4 haemorrhage 1	87
1998-1999	19	trauma 8 tumour 1 haemorrhage 1	65
1999-2001	28	trauma 7 infection 2 anoxia 1 tumour 3 haemorrhage 1	114
2001 -	9	trauma 3 infection 1 haemorrhage 1	15

Table 5**Dundee**

In Nine wells there were 5 neurosurgery patients requiring ventilation. Mean stay was 4.8 days (range 1.8 -7.8) with no transfers out to PICU. There were 7 neurology patients with a mean stay of 7.8 days (range 0.1 -37.5).

PICU NEUROSURGERY AND NEUROTRAUMA ACTIVITY: Scotland 2000

	SGH	RHSCG PICU	RHSCG Ward 2B (NSICU)	RHSCE PICU+ NSICU	Dundee	Aberdeen	Total patients	Total PICU bed days
Neurosurgery PICU Patient numbers	47	9	4	29	0	6	95	
Neurosurgery PICU, Bed days	41.6	19	23	62	0	12		157.6
Neurotrauma PICU Patient numbers	28	12	0	21	5	7	73	
Neurotrauma PICU Bed days	44.9	32	0	137	25	28		266.9
						Totals	168	424.5

Table 6

Significant variation exists between the mean stay of patients suffering from neurotrauma in Glasgow (Southern general hospital mean stay -1.6 days) and Edinburgh (RHSCE mean stay 6 days). The apparent difference is unexplained. Moreover data collection as it relates to HDU has been inconsistent amongst the units.

9. Options in Models of Service Delivery

The working party debated several options for Scotland comprising Option 1. Existing Referral Patterns; Option 2. Development of a Single Centre for Scotland; Option 3. Development of a two-centre model within Scotland; Option 4. A Managed Clinical Network.

Cognisant of the remit and instructions obtained by our commissioning agent (Chief Medical Officer) and in an attempt to be comprehensive and complete in the exercise, the working party perceived benefit in identifying and comparing four models of a reconfigured service.

These comprised: -

- A single service for Scotland based on a managed clinical network.
- A single centre for Paediatric Neurosurgery with referral from the four existing adult neurosurgical services.
- A two-centre model with a centre in Glasgow and in Edinburgh.
- Preservation of the Status Quo with retention of the current distribution of service, cognisant of the enhanced facility for retrieval.

The relative merits of the each option is outlined in appendix 4 (reconfiguration options)

An option appraisal was undertaken whereby key discriminators were identified as below and weighted to summate to 100. The important features of the service were identified and weighted as follows: -

Outcome	40
Access	10
Paediatric environment	25
Training/manpower	12
Multidisciplinary care	13

Table 7

Each option was then appraised and scored +5 to –5. The outcome of this exercise is tabulated below (totals for each cell are in brackets):

		Single Centre	MCN	Two Centre	Status Quo
Outcome	40	+2 (+80)	+3 (+120)	+1 (+40)	0
Access	10	-3 (-30)	+2 (+20)	-1 (-10)	0
Paediatric environment	25	+3 (+75)	+2 (+50)	+3 (+75)	0
Training/manpower	12	+4 (+48)	+1 (+12)	+2 (+24)	-2 (-24)
Multidisciplinary care	13	0	+3 (+39)	0	0
Totals		+173	+241	+129	-24

Table 8

This exercise is clearly subjective and imprecise. It does however allow an opportunity to align some of the important variables involved and prioritise them. The interactions involved produce a reasonably validated and supported recommendation.

Alternatives within an overarching MCN

The working party discussed an number of alternatives within the frame work of a MCN which included a single, lead centre within a MCN with four satellite units, a two centre model, or a disease based MCN concentrating specific diseases in specific hospitals

In the absence of quality driven indications for change, residual surrogates include the future sustainability of the service in the face of manpower changes and hours of work directives. In this respect a single site is most favoured. The condensation of work in one centre also permits easier and better analysis of outcomes, favours training and is advantageous to research and staff development. It could also facilitate nurse postgraduate education by creating the necessary critical mass for training purposes. Such a model would retain some of the current activity in existing centres and would require retention of all existing facilities, although it would have major implications for staff whose practice is primarily concentrated in paediatric neurosurgery. This model was favoured by the smaller units who saw little advantage to transfer of cases within a two centre MCN, when neither centre adhered to children's charters as well as they did themselves.

The two centre model is the one which best protects utilisation of existing resource and expertise, some of which is lost in the single centre MCN. However a two centre configuration has little impact upon relocation of cases given the obligate retention of some cases of trauma at base site, continued disposition of neonatal units, and retention of neonatal surgical activity for spinal dysraphism within established paediatric surgical centres in Scotland. Approximately 150 –200 operative cases would be transferred from one centre to another in a one-centre model.

However, both models fail to address the unsatisfactory disposition of paediatric neurosurgical services within both Glasgow and Edinburgh. Irrespective of the model chosen re-configuration of paediatric tertiary services should be considered in both Edinburgh and Glasgow such that the paediatric institutions are located adjacent to an adult Hospital. This recommendation has also been highlighted by the Kennedy report following the Bristol Inquiry (2001).

A disease based network could result in those children with rare and complex neurological diseases being centralised and gaining benefit while preserving the overall standards of care offered other children being treated locally.

10. Interactions and Synergies

Like many other paediatric specialties, but to a greater extent than most, neurosurgery is inextricably linked with many other disciplines in performance of clinical practice. This ranges through paediatric neuroradiology to accident and emergency services, paediatric oncology services, maxillofacial surgery, PAMS, nursing, PICU, neonatal surgery, anaesthesia, child protection and most notably to paediatric neurology. Included are other agencies and services working with disability including social work, educational psychology, and external agencies of a voluntary nature.

The isolation of surgical activity from this template of care so that it could be provided in one centre in isolation, runs the risk of destabilising the intricate network of communication and interdisciplinary working. Whilst not an insuperable challenge, the benefits perceived from condensing surgical activity to one centre are counterbalanced via the imposed

remoteness and dislocation of the neurosurgical unit from many other aspects of care provided in the locality in which the child resides.

The working party attempted to evaluate the impact of any redesign upon the specialty is most closely allied in patient care. The method chosen to achieve this was to invite representatives from all appropriate specialties to individual meetings. Presentations were given or submitted and are identified in appendix 5.

The central features from each presentation are discussed below.

Paediatric Neurology

There is an inextricable link between paediatric neurosurgery and paediatric neurology. Hence the strong representation of the specialty on the working party

This close affiliation is such that the specialist relationship ensures a holistic yet specific therapeutic approach. Perioperative care benefits from this close alliance. Not only is medical care being provided by neurology, but their role as overall coordinator of input to care from other disciplines and agencies is also highly rated and valued. Continuity of care and the continued management of disability, if present, constitute a substantially different profile in comparison to the episodic nature of surgical intervention (even if recurrent). Paediatric neurology has features that necessitated local delivery of the service, and close and frequent clinical contact irrespective of the site of surgical activity. The modifications to the surgical service will clearly affect this relationship that benefits most from both specialties being on one site. Clearly this is at variance with the desire to centralise the surgical component of care.

The potential difficulties of a single unit for provision of neurosurgery have been set out in the paper found in appendix 5. Moreover the challenges set by delivery of an outreach and in reach service in paediatric neurology if one centre is to provide surgical services is also outlined in a paper in this section.

Maxillofacial Surgery

The working party had representation from maxillofacial surgery, which again confirmed interdependency of services with paediatric neurosurgery particularly for transcranial surgery.

Whilst consensus exists as to the desirability of a single Scottish service for Paediatric craniofacial surgery, there is a gulf between Edinburgh and Glasgow services as to where the should be located. There is apparently an over provision of expertise in the specialty within Scotland, with consequent competition for the caseload rather than collaborative working. In addition difficulty apparently surrounds the definition of what constitutes Paediatric craniofacial surgery, and hence it has been difficult to identify the activity and institute analysis of the services in Edinburgh and Glasgow.

Emphasis has been placed on the provision of a condition based care plan as opposed to an age related care package and hence the value of continuity of care throughout the lifetime of the patient or until treatment was completed, was emphasised to the committee. Indications for surgery in the specialty may not be absolute and hence increased activity may be viewed as constituting a lower threshold for intervention

This subjectivity similarly therefore obscures the position of outcomes in evaluating the quality of the service.

Complex syndromic craniofacial surgery is a low volume specialty activity in Scotland, currently constituting approximately 1-2 cases per month, and whilst there is no suggestion of the adverse outcome in Scottish practice, the advisability of a competitive approach within Scotland, when only four super regional centres exist in England and Wales must be questioned. There is clear recognition of the ambitions of each service, but the caseload, split as it is, can hardly support current practice.

The management of these patients is complex but their operative care is not distinct from care of non-syndromic bicoronal synostosis, metopic synostosis and some cases of unicoronal synostosis where a bifrontal advance is required. Thus, the twelve complex cases performed last year in Glasgow and two in Edinburgh should be regarded as the relevant volume of operative experience. The medical care of these patients is ongoing and there is a large roster of these patients kept under review by the Glasgow service. One team operates across age groups in Glasgow, increasing the relevant operative experience. The volume of work in Glasgow is sufficient to allow audit of complications and this group regularly contributes to the National Audit with figures comparable to the two smaller English supraregional centres.

In Edinburgh, close working between experienced surgeons in both neurosurgery and maxillofacial surgery are the hallmarks of this unit, with children care for within the environment of the Children's Hospital.

Supra- regional centres status has been conferred on four centres, namely Great Ormond Street, Alder Hey Liverpool, Oxford and Birmingham with no such designation with the Scottish service providers.

The Glasgow service was reported to the working party as relocating to institute of neurosciences. Irrespective of the model chosen for Paediatric neurosurgery, continued collaboration between these two specialties will be essential, and further refining of paediatric craniofacial surgery is highly desirable.

Refinement of craniofacial surgery was viewed as out with the remit of the working party. See enclosures appendix 5.

Child Protection

Based on epidemiological research carried out in the Department of Paediatric Neurology Edinburgh, the profile of non-accidental brain injury in childhood was presented as approximately 1% of all cases of child abuse. Physical abuse comprises 54%, sexual abuse 21%, and emotional abuse 25 percent of such cases.

The incidence of non-accidental head injury in infancy (less than one year) has been quoted a 24.6 per 100,000 children. The mean age in this group is 2.2 months. Neurological intervention was estimated is required in approximately 50-60% of this group. Such children present at all acute hospitals and the working party recognised the primacy of resuscitative care according to establish protocol in this group irrespective of the need for secondary neurosurgical intervention.

Evacuation of a life-threatening acute subdural haemorrhage was seen as appropriate and indeed obligate intervention upon any of the existing centres receiving such children.

Outcome of care in Scotland currently reflects a lower morbidity than seen elsewhere in the United Kingdom with 25 percent of children being subsequently normal, two-thirds having a motor deficit, 30% being blind, and approximately 18% having intractable epilepsy.

All presented data may constitute an under representation due to the diagnostic ascertainment difficulties as regards the intentional nature of such injury.

See Appendix 5.

Nursing

A review of Scottish Paediatric nurses dealing with children throughout Scotland was under taken by the nursing representative. There were a number of areas of concern. The predominant points were as follows: -

- Difficulty in achieving a match between paediatric skills and specialist neurosurgical skills.
- The intimidating environment of a specialist intensive care unit for an RSCN taken out of a ward situation in order to meet the standards of RCN and presence in recovery/X-ray/PICU. This may constitute a challenge in terms of governance.
- The skill mix similarly was extremely difficult to obtain and there is a noted deficiency in training courses. The centralisation of paediatric neurosurgery may allow development of such but currently there is little collaboration between centres and no academically accredited courses within Scotland.
- Competence – Nurses expressed a sense of vulnerability in issues concerning child protection, drug administration (when in a non-paediatric centre) and paediatric resuscitation when non-paediatric nurses are requested to look after children. It was noted, however, that RSCNs cover in excess of 90% of patients currently cared for in Scotland in a paediatric neurosurgical setting.

It is also clear that relocation of institution may not be accompanied by relocation of the workforce. Prior experience in centralisation of paediatric cardiac surgery has indicated that nurses who are already established in the domestic setting will not readily move to another city even though their specialist nursing duties are relocated in the merger of clinical services.

Accident and Emergency Medicine

See paper B appendix 5

Presentations were submitted to the working party highlighting in need for rapid access to paediatric neurosurgery for severely injured children. By necessity in the response required is an urgent one and best served by co-location of neurosurgical and accident and emergency services. Currently in this is well provided and Dundee in Aberdeen but challenges exist for response times in the services in Edinburgh and Glasgow. Whilst operative intervention is the exception, management of severe head injury is best achieved by combined working of accident and emergency consultants appropriately trained in paediatric resuscitation working in concert with paediatric anaesthetists and paediatric surgeons. The working party was reminded that the commonest cause of death in childhood and in early adult life is trauma and head trauma features predominantly as the lethal injury. Activity data therefore relates only to such

children as survive retrieval and resuscitation; this may represent an under estimate of the value of collaboration between neurosurgery and this clinical service.

The potential disadvantage of a single site centre is that it will diminish expertise in the residual satellite centres such that occasional practice becomes even more occasional, and the benefits from familiarising staff with the problems posed by elective surgery will not be brought to bear in emergency care of brain trauma. This again emphasises the benefits of a mixed adult/paediatric practice.

The age distribution of paediatric head injury is seen below and highlights the need for co-location of neurosurgical and paediatric services: -

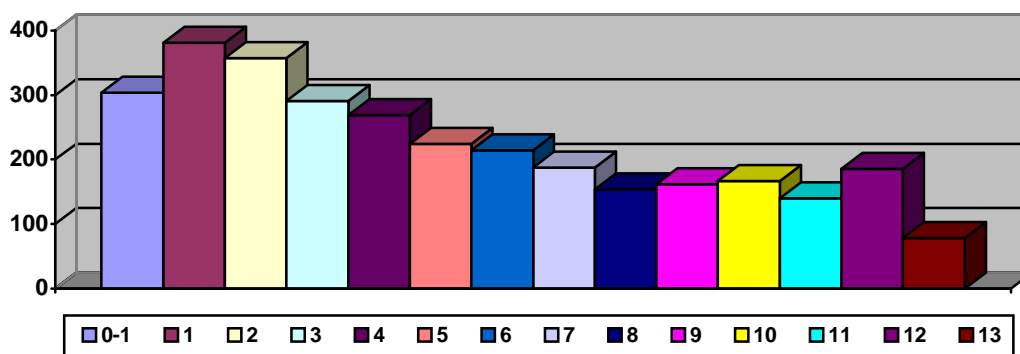


Figure 2

Paediatric Oncology

There is close working in the management of children with brain tumours between paediatric neurosurgery and paediatric oncology. It is also a strong need for continuity of care, close collaboration in nursing and family support which is continuous, consistent and integrates beyond the perioperative period into further hospital care and continuity in the community. In addition such conditions require subspecialty input from paediatric endocrinology, radiotherapy and adult services for continuity of care through adolescence into adult life.

There are approximately 35 new brain tumours in Scotland each year currently distributed between four centres. Brain tumours constitute approximately a quarter of all malignancies in children. Whilst there may be an occasion to implement surgery as an emergency in those children presenting with a life-threatening rise in intracranial pressure, the majority of children can be managed such that elective paediatric neurosurgery could feasibly be carried out in one unit in Scotland. Concentration of neurosurgical activity does not predicate against continued oncological practice as currently deployed. Radiotherapy treatment moreover, is often moderately protracted, requires and outreach service from the paediatric centres into the adults radiotherapy units delivers anaesthesia to immobilise such children thus permitting care implementation.

The essential features of paediatric neuro-oncology service are as follows:-

- Age-specific outpatient and day care facilities.
- A neuroradiology suite with cranial ultrasound, CT and MR imaging, and angiography.
- Arrangements for performing scans under sedation or anaesthesia.
- Fully equipped paediatric neurosurgical theatre supported with paediatric neuro-anaesthetists and equipped with operating microscope, CUSA and monitoring equipment.
- Endoscopic and stereotactic instrumentation.
- Radiotherapy facilities should include a minimum of two linear accelerators, simulator, full mould room facilities, computer planning facilities and access to CT scanning and MRI.
- Paediatric ITU facilities with capability for controlled hypothermia, intracranial pressure and cerebral function monitoring.
- Neuropathology laboratory staff with experience in histochemistry, immunocytochemistry and EM.
- Facilities for frozen and fixed tissue storage.
- Access to molecular pathology and cytogenetics laboratory.
- Rehabilitation department with staff experienced in paediatric physiotherapy, OT and speech and language therapy.
- Pharmacy with expertise in paediatric chemotherapy preparation and dispensing.
- Clinical trials support staff and data management facilities.
- Family accommodation.

The service within Scotland meets these disparate requirements but only in a fragmented way . Whilst it may be possible to preserve current practice in oncology in all existing centres, condensation of Neurosurgical activity is likely to impact upon the viability of existing oncological services. This is particularly the case in the smaller centres such as Aberdeen and Dundee, where paediatric oncology is a Consultant delivered, single-handed practice requiring retention of all paediatric tumours within that area to preserve and retain existing manpower and expertise.Scottish paediatric

oncology considers the recommendations in conclusions of the working party report to be likely influential upon the future format all their own specialty.

Rehabilitation and support services

Rehabilitation: There is probably no other branch of surgery that is so closely allied to and dependent upon multi-disciplinary working. Children with neurological disease requiring surgical intervention will not invariably have a substantial legacy requiring committed and protracted rehabilitation. Capability Scotland was invited to the meetings of the working party and was involved in several parts of the discussion on rehabilitation. A needs assessment exercise concerning the creation of a rehabilitation centre in Scotland networking closely with feeding local authorities is part of the brief of Capability Scotland at the present time. Members of the working party were able to inform this debate. See minutes of meeting three item 9. The working party were reminded constantly on the need for good continuity and dialogue between surgical units and those involved in the subsequent care of children with complex need. This was considered to be a function of the quality of any individual unit rather than benefiting specifically from re-configuration of shape of the service. Concerns expressed from paediatric neurology in particular about dislocating neurosurgical care from paediatric neurology. See paper A, appendix five

Paediatric radiology services are only available within the 3 Children's Hospitals in Scotland; there is however a good general radiology service for Paediatrics in Ninewells and in the Southern General Hospital the radiology service is specifically a neuroradiology service. Children are integrated into this service in the Southern General Hospital in a preferential manner but shared the same adult environment as indeed they do in Aberdeen. There are challenges to all institutions in providing RSCNs and paediatric anaesthesia at all contact points during patient care but every attempt is made to provide the service. Angiography is not available at RHSCE, and children requiring the service need to be transferred to the Western General Hospital. Imaging facilities for paediatric neurosurgery in general were felt to be at least adequate, throughout Scotland. Both paediatric radiology and neuroradiology face enormous recruitment pressures at the current time in common with all radiological subspecialties and indeed with general radiology. Radiographers in Scotland currently receive either one module of paediatric training (four weeks) or one module of neurology. They seldom receive both and the majority of training is obtained in post. A substantial increase in interventional radiology is predicted. The use of expensive radiology equipment has to be at near capacity to warrant the return on the expensive purchase investment.

It should be noted that The Royal Colleges of Radiologists does not consider paediatric neuroradiology as a separate subspecialty. As a consequence, staffing and succession planning is opportunistic. See appendix 5

PAMS

This is a group of disparate specialist therapists with totally separate job descriptions. It comprised dietetics, orthoptics, physiotherapy, occupational therapy, and speech and language therapy. This group has highlighted the need for multidisciplinary working in neurosurgical patients and have highlighted the need for rehabilitation and surgery to be closely allied. The absence of any one national forum where all clinicians and therapists dealing with neurosurgical patients can meet, is an omission. There is a chronic shortage of dieticians and consequently outreach services are expensive on resources at home base, not only in terms of time but also in terms of effort required to creating links within the community.

Improvements to the service should include better discharge planning and the collaborative approach over managed clinical network is attractive to therapists. That is a concern that any reconfiguration may result in a loss of established links. (see Paper G appendix 5). Moreover it should be noted that many therapists currently treating children have no specific qualification in paediatric care

Paediatric neuropathology is currently a very specialist and restricted service within Scotland and dependent upon a few doctors with special expertise. Retention of such expertise is essential for continued practice particularly in neuro-oncology. However adult neuropathologists perform the bulk of paediatric neuropathology. This service within Scotland is under dire pressure. There are currently only two neuro pathologists in Glasgow one of whom has a full-time academic appointment and contributes 0.4 whole time equivalent to NHS practice. The other NHS pathologist is close to retiral age and there is no apparent successor, with the SPR post in neuropathology in Glasgow currently vacant.

In Edinburgh, there are three neuropathologists. One has a strong commitment to Jacob-Creuzfeldt surveillance unit, another holds a chair in pathology and has an academic contract and the remaining consultant has a full-time NHS contract. There is one SPR training in neuropathology in Scotland and that post is currently located in Edinburgh. In Aberdeen a neuropathologist with 0.8 WTE contract provides both adult and children's services for Aberdeen, the Highlands and Dundee.

This subspecialty of pathology is therefore under considerable pressure and relocation of paediatric neurosurgical services should give consideration to the support that is available and the current disposition all paediatric neuropathology. Tumour pathology is dealt with by those pathologists on United Kingdom children's cancer study

group panels which include all Scottish new pathologists. It is however the metabolic, forensic and foetal pathology that requires the special expertise of neuropathologists.

Action For Sick Children

The representatives from this important body gave advice to the working party on their views of quality measures in family and child facilities. These were assessed in each location. It was repeatedly emphasised to the working party that the chronological age of the patient was less important than in their stage of maturity and emotional need. The following were used as proxies of quality and responsiveness of the service to family need: -

- Overnight accommodation for parents
- Overnight accommodation for siblings
- Parental access to anaesthetic room
- Parental access to recovery room
- Pre-admission programmes
- Special facilities for adolescents
- Dedicated paediatric list
- Do you have a schoolroom
- Do you have a full time teacher
- Are your play workers qualified hospital play specialists
- Is there play preparation for theatre day

Action for sick children contributed to all aspects of discussion and provided a useful review, as did representation from local health councils, in all phases of discussion and decision-making.

Commentary

This review was a complex exercise for a number of reasons, not least of which was the numerous links that the specialty makes with adjacent medical and non-medical services. Moreover outcome analysis was unavailable to the working party; indeed the definition of outcomes is poorly defined and reliable data on clinical activity were difficult to secure.

While the clinical outcomes in individual neurosurgical units treating children in Scotland may be satisfactory, the integration of these units with all other aspects of paediatric care has room for improvement. Moreover each neurosurgical unit works in a discreet, autonomous fashion. As a consequence, the service is fragmented and irrespective of the ultimate configuration chosen for implementation, the continued lack of communication between units and services fails to optimise the skill and opportunities available to patients in the service. This aspect of the service must be improved. None of the existing centres is ideal for provision of neurosurgical care for children but the recommendation of an ideal model (the Children's Hospital co-located with an adult constitution) is not within the gift of the working party.

This report suggests a change to the current configuration of service but does so in a vacuum of clinical evidence to direct change. As a consequence the reconfiguration option chosen is somewhat empiric and in the absence of evidence for change, these recommendations may be considered contentious. If reconfiguration is seen to potentially exclude any sector of the service, then that in turn may potentially result in demotivation with a reduction in standards from those currently existing. The attraction therefore of a managed clinical networking is to ensure that such exclusion does not occur and it may be considered as an antidote to centralisation by retention of existing expertise co-ordinated in a way that optimises utilisation of the components of the service. It is important therefore, for the current regional aspects of the service to be replaced by a national networking in which there is dialogue and effective working relationships between the involved consultants and their clinical teams. In this way unnecessary patient movement can be reduced, but also accurate and targeted the patient care can be enhanced.

An economic evaluation of the work has not been done and this is an important sequitur to the current analysis. The working party had been directed to keep any recommendation neutral from the budgetary viewpoint and hence economic considerations were excluded from the deliberations of the working party.

The pace of change is similarly important. A change is likely to be better accepted and implemented if sufficient time is taken to allow implementation and change through attrition rather than enforcement is to be preferred if the morale of the workforce is to be preserved. However that is important that this change is firmly managed and ensured.

Re-siting the services in the preferred format would involve substantial capital expenditure. In addition, reconfiguration makes the assumption that the current workforce would be willing to relocate. Recent experience with the centralisation of paediatric cardiac surgical services have shown that specialist nurses are not prepared to relinquish their domestic attachments to follow the service to the preferred location. In the case of paediatric neurosurgical nursing, the numbers involved are small and constitute a scarce resource. The service can ill afford to lose the expertise it currently contains.

These therefore, are the difficulties that reconfiguration poses. On the other hand, manpower, research and development, training and expertise of the workforce would probably all improved by centralisation of the service in one institute. The existing pathways of care, which are currently highly rated by those currently working in the service, would need to be reviewed and re-established. The implications of reconfiguration of paediatric neurosurgery on other services would also need careful consideration as outlined in this report. These are likely to be many but are not reasons per se for prohibiting revision of the service. Indeed the benefits to patient care notably secondary trauma care, tumour surgery, arteriovenous malformation, and functional surgery for epilepsy, all potentially stand to gain from reconfiguration and centralisation. There is a view that hemispherectomy in children should only be performed in one centre in the UK.

Scotland has a number of unique features, not least of which is its population distribution, landmass, and disposition of secondary and tertiary care centres. It cannot comply therefore with some of the features of those charters recommending a maximal journey distance of 2 hours by road nor indeed the population to staffing ratio. Instead it is important that the issue of rurality is given due consideration and this is reflected in the development of the paediatric transport teams based in Yorkhill and Edinburgh.

Conclusions

1. The existing configuration of paediatric neurosurgical services in Edinburgh and Glasgow are both unsatisfactory, and relocation of the paediatric standalone hospitals adjacent to adult institutions may be required for resolution of existing deficiencies in the service. Such advice recognises the scale of change but is made cognisant of the need for reconfiguration of other tertiary services in these cities, and throughout Scotland.
2. The working party endorses the importance of a paediatric environment for childcare with the appropriately trained staff involved in treatment at all sites. Moreover provision must be made for ongoing professional development.
3. Given that the health service in Scotland considers paediatric neurosurgery as a distinct component and a significant subspecialty with a need to assess activity and quality of outcome, then this process can only be reliably informed, audited and compared if robust, accessible, clinically significant and contemporary data, can be grouped through an appropriate collection method.
4. Scottish paediatric neurosurgical activity requires an intensive care support of a maximum of three paediatric intensive care beds to be available year round if these beds were to be available on a single site.
5. Continued investment in Scottish paediatric intensive care units is required to retain the necessary capacity. Both a single centre and two centre model may allow this, but a single centre placed in Edinburgh would best protect retention of existing PICU services, based on a two centre model for the delivery of PIC.
6. There is no national or international data available to correlate volume with optimal outcome in paediatric neurosurgical practice
7. The existing fragmentation of services makes adverse outcomes difficult to identify but preliminary investigation suggests perioperative mortality to be at a rate comparable with other nations
8. There is a general and increasing expectation of children's care to be delivered in a paediatric centre. The split site arrangement of neurosurgical care in both Edinburgh and Glasgow is therefore sub optimal.
9. The current transfer of critically ill children from one institution to another within Glasgow is highly undesirable
10. There was no unanimity as to the optimal future shape of the service. However all but one member supported the long term goal of a single lead neurosurgical unit at the centre of a managed clinical network.
11. The interim position was variously supported, with opinion ranging from immediate implementation of a single centre through an interim two centre model to a model which recommended the continuation of elective and emergency services as currently disposed, with a dependency upon the discretion of the involved clinician as regards onward referral of cases.
12. Compliance with issues of governance surrounding the framework of the European Directive on Working Time can only effectively be achieved by condensation of activity in paediatric neurosurgery into one central institute that was co-located with an adult neurosurgical centre.
13. A single paediatric Neurosurgical Institute in Scotland would have distinct advantages for training and service development. Research may similarly benefit from such a structure.
14. The immediate creation of a single paediatric Neurosurgical Institute would result in loss of the available expertise in the short-term.
15. Any reconfiguration is likely to have significant knock on effects on many other tertiary paediatric services throughout Scotland.
16. Any re-configuration of services will not remain resource neutral.
17. Current recruitment rates into neuroradiology, paediatric neurology and neuropathology are a matter of significant concern

Recommendations

1. A managed clinical network (MCN) with a single lead site, co-located with an adult neurosurgical service is the preferred, long-term configuration to the service of paediatric neurosurgery in Scotland.
2. The MCN will require active management along the lines of a national services framework, with a lead clinician supported by an appropriately funded management coordinator. This development should commence forthwith.
3. Opinion on the timescale of implementation of the single centre was disparate but thought to be likely predicated by the rate of implementation of manpower regulations and the development of a co-located adult and children's hospital in the central belt. A minority of members felt immediate implementation to be preferable. The working party recommends development of this centre in a children's hospital.
4. The interim position could not be agreed but there was a clear view that any plan must include a firm commitment to achieving the long (and / or short term goal) of a single lead centre.
5. The working party endorses the importance of a paediatric environment for childcare with the appropriately trained staff involved in treatment at all sites.
6. Given that the health service in Scotland considers paediatric neurosurgery as a distinct component and a significant subspecialty with a need to assess activity and quality of outcome, then this process can only be reliably informed, audited and compared if robust, accessible, clinically significant and contemporary data, can be grouped through appropriate collection method.
7. A robust database of activity as part of a managed clinical network is obligate.
8. A distinct paediatric section should be created within Scottish Audit of Surgical Mortality (SASM)
9. Existing neurosurgical units should continue to admit and treat children. Facilities for the emergency care of life-threatening neurosurgical conditions will continue to be provided locally.
10. Whilst current services are adequate, succession to the existing posts would benefit from condensation of the service.
11. Relocation of neurosurgical services from the Western General Hospital to the new site of the Edinburgh Royal Infirmary will continue to pose difficulties in access and split site cover for paediatric neurosurgery in Edinburgh. As above co-location of paediatric services with adult services on one site would be the optimal configuration of paediatric services for Edinburgh. Similar problems in achieving the optimal configuration exist in Glasgow.
12. Further Investment in Telemedicine, particularly image transfer, would benefit Scottish Paediatric Neurosurgery.
13. Consideration should be given to a review of craniofacial services for children in Scotland
14. Retention of paediatric neurology, neuroradiology and neuropathology is an essential feature of Scottish paediatric neurosurgical services. There is grave concern about the continued viability of these support services.
15. The working part recommends the appointment forthwith of a steering group to develop the MCN, appoint the lead clinician (preferably a neurosurgeon) and collect data that may inform decisions concerning the timescale of any future reconfiguration.

Appendix 1

PAEDIATRIC NEUROSURGERY: WORKING PARTY MEMBERSHIP

Professor George G. Youngson (chairman)
Consultant Paediatric Surgeon
Royal Aberdeen Children's Hospital
Aberdeen

Dr Paul Eunson
Royal Hospital for Sick Children
Sciennes Road
Edinburgh

Dr Martin Kirkpatrick
Consultant Paediatric Neurologist
Ninewells Hospital
Dundee

Ms Jennifer Brown
Consultant Neurosurgeon
Southern General Hospital
Glasgow

Mr David Currie
Consultant Neurosurgeon
Ward 40
ARI

Mr James Steers
Consultant Neurosurgeon
Western General Hospital
Edinburgh

Prof. Donald Hadley
Consultant Neuro-Radiologist
Department of Neurosciences
Southern General Hospital
Glasgow

Dr David Simpson
Consultant Anaesthetist
Royal Hospital for Sick Children
Sciennes Road
Edinburgh

Lesley Clemenson
National Co-ordinator
Action for Sick Children (Scotland)
15 Smith's Place
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EH6 8NT

Mrs Winnie Miller
Clinical Nurse Manager
Yorkhill NHS Trust
Royal Hospital for Sick Children
Glasgow G3 8SJ

Dr Robert McWilliam
Royal Hospital for Sick Children
Yorkhill
Glasgow

Mr Constantinos Hajivassiliou
Consultant Paediatric Surgeon
Royal Hospital for Sick Children
Yorkhill
Glasgow

Dr E Ballantyne
Consultant Neurosurgeon
Ninewells Hospital
Dundee

Miss Lynn Myles
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Western General Hospital
Crewe Road
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Mr Ken Lindsay
Consultant Neurosurgeon
Southern General Hospital
Glasgow

Dr Iain Bashford
Senior Medical Officer
Department of Health
St Andrew's House
Edinburgh

Dr Neil Morton
Consultant Anaesthetist
Royal Hospital for Sick Children
Yorkhill
Glasgow

Dr Graham Haddock
Consultant Paediatric Surgeon
Royal Hospital for Sick Children
Yorkhill
Glasgow

Ms Louise Ogilvie
Barnhills
Denholm
Roxburghshire
TD9 8SH

Mr Jonathan Best
Chief Executive
Royal Hospital for Sick Children
Yorkhill
Glasgow G3 8SJ

The working party also received considerable support, direction and advice from the following:-

MRS SARAH JOHNSON, ACTION FOR SICK CHILDREN
MR TOM BEATTIE, CONSULTANT, ACCIDENT AND EMERGENCY, RHSCE
DR HAMISH WALLACE, CONSULTANT PAEDIATRIC ONCOLOGIST, RHSCE
DR ROBERT MINNS, CONSULTANT PAEDIATRIC NEPHROLOGIST RHSCE
MR DAVID KOPPELL CONSULTANT MAXILLOFACIAL SURGEON, CANNIESBURN HOSPITAL, GLASGOW
MR GLEN LELLO, CONSULTANT MAXILLOFACIAL SURGEON, RHSCE
PROFESSOR GILLIAN NEEDHAM, LEAD DEAN NEUROSURGERY COPMED
MRS. SANDRA KERLEY, PAEDIATRIC ADVISER,CAPABILITY SCOTLAND
MS CAROLINE CURRIE, ACTION FOR SICK CHILDREN, SCOTLAND
MS LISA CRAMPTON, SPEECH LANGUAGE THERAPIST, GLASGOW DENTAL HOSPITAL
PROF.KEVIN WOODS, CHAIR OF HEALTH ECONOMICS AND RESEARCH UTILISATION, GLASGOW UNIVERSITY
DR ANNE BURKE, CONSULTANT PEDIATRIC NEURO-ANAESTHETIST, SOUTHERN GENERAL HOSPITAL,
GLASGOW

Appendix 2

Minutes from Meetings

Meeting 1

Venue: The Barclay Room, Royal College of Surgeons of Edinburgh

Present:

Professor George Youngson (Chairman) - Aberdeen
 Dr Neil Morton (Chairman of Clinical Board of Anaesthesia & Surgery, RHSC, Glasgow)
 Miss Lynne Miles, Consultant Paediatric Neurosurgeon, RHSC, Edinburgh
 Ian Bashford, Senior Medical Officer, Department of Health
 Dr Paul Eunson, Consultant Paediatric Neurologist, RHSC, Edinburgh
 Mr David Currie, Consultant Neurosurgeon, Aberdeen Royal Infirmary
 Dr Robert McWilliam, Consultant Paediatric Neurologist, RHSC, Glasgow
 Dr David Simpson, Consultant Anaesthetist, Director of Paediatric ITU Services, RHSC, Edinburgh
 Mr James Steers, Consultant Paediatric Neurosurgeon, RHSC, Edinburgh
 Dr Martin Kirkpatrick, Consultant Neurologist, Ninewells Hospital, Dundee
 Mr C A Hajivassiliou, Consultant Neonatal/Paediatric Surgeon, RHSC, Glasgow (Deputising for Mr Graham Haddock and minute keeping)
 Miss Jennifer Brown, Consultant Paediatric Neurosurgeon, Institute of Neurological Sciences, Southern General Hospital, Glasgow
 Mr Eric Ballantyne, Consultant Neurosurgeon, Ninewells Hospital, Dundee
 Leslie Clemenson, Co-ordinator for Action for Sick Children Scotland
 Louise Ogilvie, Representative of Local Councils.

Apologies:

Mr Ken Lindsey, Consultant Neurosurgeon, Southern General Hospital
 Mr Graham Haddock, Consultant Neonatal/Paediatric Surgeon, RHSC, Glasgow
 Professor Donald Hadley, Consultant Neuroradiologist, Institute of Neurological Sciences, Glasgow

Introduction:

The Chairman summarised the issues raised to date by the Acute Services Review 1998 and the events and subsequent meetings which led to the development of the current Working Party and stressed the recent important developments, namely, the establishment of the ITU based transfer teams in the Royal Hospital for Sick Children of Edinburgh and Glasgow and also the ministerial directive recommending that the current model would be based on the service developed by two tertiary centres evolving into a single centre, single service provision within the next five years. The re-shaping of services, namely, centralisation of Paediatric Cardiac Surgery and Paediatric Renal Transplantation and also the potential implications of centralisation of other rare paediatric conditions in England and Wales have been discussed.

In conclusion the Chairman confirmed that the recommendations of this Working Party will be based in the best interests of children.

Task List:

The general headings of discussions would be:

1. Agree the remit of this group.
2. Define the problem.
3. Assess the need for change and decide how best to implement it.
4. Review the current service provision.
5. Consider possible future implications (including manpower) and evolution.
6. Ways of communication with the various relevant parties.
7. Draw an implementation plan and report back to the Chief Medical Officer.

Dr Eunson asked what percentage of the service attracts national funding which was reported to be zero by Mr James Steers.

Dr McWilliam questioned the level of authority that this working party's recommendations will have and was reassured by the Chairman that the final recommendations will carry a very heavy weight.

Dr Bashford stressed the Department of Health does not wish to make a unilateral decision and cited the consultation process around paediatric cardiac and renal transplantation services and stressed that all recommendations will be listened to.

Dr Kirkpatrick recommended caution in trying to draw parallel conclusions in paediatric neurosurgery and the Chairman reassured that the service will be looked independently and appropriate recommendations made, taking the interests of children as paramount. There was general agreement, however, that parallels could be drawn as in all categories a very significant proportion of patients would require life-long treatment.

Item 1. Remit of the meeting. Dr David Simpson, Mr David Currie and other members of the group asked to define elective paediatric surgery and sought the reassurance of the Chairman that all models will be reviewed. The Chairman stated, within the limits of the ministerial directives of the initial 2 centre service evolving into a 1 centre service the following five years, that there are several models that will be considered. One is the managed clinical network, one is a East and West Coast network, continuation of the status quo and indicated that these will be discussed in the subsequent meetings. Dr Neil Morton expressed concerns and confirmed that all options will need to be objectively and fully appraised, as there have been many inaccuracies in the previous report (which is not going to be published, according to Dr Ian Bashford).

The main inaccuracies are:

- 1) that The Royal Hospital for Sick Child may not relocate to site adjacent to the Southern General Hospital in either short or long term.
- 2) the neurosurgical activity at the Royal Hospital for Sick Children did not appear in that report
- 3) neurosurgical activity did not appear in the ISD statistics.

Dr Ian Bashford undertook to try to find out why the previous report is not going to be published and agreed that the group should go through all the possible options and accepted that emergency activity would possibly be maintained in all four centres. Mr Ballantyne also confirmed support to full option appraisal and raised concerns that only Mr Steers and Mr Kilpatrick were involved with the previous report. Dr David Simpson, Dr Kilpatrick, Dr McWilliam suggested that the Chief Medical Officer may wish to revisit the original process and extend the remit of the working party to both elective and emergency paediatric neurosurgical services. The Chairman agreed to look at the whole service, both elective and emergency and report back to Chief Medical Officer to inform him of this.

Item 2. Define the problem. The cut-off age for being considered a paediatric patient in this context was extensively debated, Mr Steers emphasised the differences between biological and chronological age and even though the cut-off age at RHSC in Edinburgh is 13 and possibly 14 in Glasgow, it was proposed by Dr McWilliam, Dr Bashford and Dr Eunson that an age of 16 be accepted as the upper cut-off, but be flexible up to the age of 18 depending on clinical issues, maturity, previous paediatric surgical, paediatric neurosurgical provision etc., before a patient is accepted or not in a paediatric neurosurgical centre. There was general agreement to that effect by the group, but this extensive discussion emphasised the lack of services for adolescents and Dr Morton suggested that a spin off group would be required to look at adolescent services and the transition to adult services. The age of 16 with flexibility to the 18th birthday was supported by the Chairman and the rest of the group and the issues of the lack of adolescent services and need for further action was also supported by Leslie Clemenson and Louise Ogilvie.

Item 3. The Need for Change. The Chairman briefly summarised the pros and cons of small versus high turnover units in various other specialties and the Chairman, Dr Simpson and Mr Steers reaffirmed the necessity to keep contributing to the audit process, in this case the Scottish Audit of Surgical Mortality. The group recommended that a paediatric neurosurgical death section should also be added to the SASM reports and this was supported by the Chairman. Mr Steers recommended that clear evidence of changes in outcome should be identified and ensure that changes are recommended on the basis of clinical reasons and not simply allow resource pressures to drive the changes to the service. The Chairman agreed that markers should be identified to define a "good" service. This broadly speaking being the volume of work, outcome measures, mortality, medium and long term morbidity, availability of all ancillary services; single handed service is not acceptable. Mr Steers recommended that all factors identified in previous reviews as standard for good practice to be included in the requirements of a paediatric neurosurgical service providing centre and this was supported by Dr David Simpson.

In summary it was recommended to review the levels of paediatric care and ensure they comply with above and ensure full availability of paediatric resources. The service should move away from occasional practice to apply standards as fast and as far as possible. To ensure the availability of all other services, as many agencies need to be integrated and there is inter-dependency of various aspects of other specialties (especially applying to multi-trauma victims). Linda Ogilvie suggested that adolescents should be given the choice whether they wish to be treated in paediatric or adult neurosurgical centre. The Chairman asked for a representative from each centre to provide activity levels and resource availability and Mr Steers will endeavor to circulate the paediatric neurosurgery group questionnaire which is an all encompassing questionnaire including all the parameters the group needs to assess. Mr Steers will forward the electronic form to the Chairman who will distribute to the other members. The necessity for change was once again discussed especially on the basis of lower than expected mortality in Scotland, as summarised in the SPICA report by Dr Simpson. Currently 25 intensive care beds should be budgeted for Scotland.

Miss Brown questioned the fact that it is important to consider the maintenance of paediatric intensive care beds in Scotland when the recommendations are made. Dr Kilpatrick suggested and agreed by the group that it would be helpful to define the percentage of neurological procedures that require access to the PICU. Dr Morton outlined the plans for expansion in PICU beds in the Royal Hospital for Sick Children in Glasgow, especially with the paediatric cardiac surgery change in funding structure from April 2002. Another useful parameter would be to establish the frequency that PICU in Scotland is unable to accept a referred patient. Dr Morton, Dr McWilliam and Dr Simpson agreed that although there is an extremely rare occasion, the Glasgow and Edinburgh centres are in full communication and co-operation to ensure that only one journey is made by the patient. Dr Morton and Dr Simpson agreed to provide ITU bed occupancy in the last 12 months. Miss Brown asked where would patients be transferred if they were referred to Glasgow, the Southern General or Sick Children's, especially since there have been difficulties with peripheral units and ambulance crews and Dr Morton confirmed that in such cases there should be a consultant to consultant discussion to decide on an

appropriate destination on the basis of clinical needs. He emphasised that the ITU transfer service is a retrieval service and not a mobile resuscitation service.

Item 4. Dr Kilpatrick summarised the response to the Chief Medical Officer from the North/North East and in summary he stated that it is difficult to be convinced that transfer will improve outcome in certain situations and propose that instead of transferring by default, a clinician will transfer the more elaborate problems only and call for a nationally agreed list of such conditions requiring transfer. Although they agreed in principal with the single centre in these circumstances, implications for children and their families, implications on other centres and their services, implications on one's own centre and their services should be evaluated. Mr Steers and the Chairman agreed to write to Mr James Leggate to ask for their opinion regarding guidelines for such a service. The safe paediatric neurosurgery report in 1997 recommended

- no more than 2 hour travelling time to the centre provision of adequate services
- two whole time equivalent of paediatric neurosurgeons performing elective work and advising on emergency work
- middle grade neurosurgical and paediatric staff available and
- greater than 6 months training in paediatric neurosurgery in middle grade staff regularly involved in the care of children
- greater than 100 cases per year for the unit and
- provision of all ancillary services, including, paediatric, neuroradiology, paediatric anaesthesia, PICU, and a paediatric environment.

Mr Steers outlined the difficulties, especially in a multicentre model in providing a service which nowadays will be limited by training implications, post Calman changes, European working time directives etc. and stated that one should be involved in the real issues of providing the manpower for such a unit instead of being interested in solving the finer details first.

Clinical activity:

- Number of neurosurgical procedures performed at the Southern General Hospital per year approximately 250 (reported by Miss Brown).
- Procedures performed at the Royal Hospital for Sick Children in Glasgow, between 80 and 100 per year (reported by Mr Hajivassiliou).
- Procedures at the Royal Hospital for Sick Children in Edinburgh, approximately 120 (Miss Myles and Mr Steer).
- Dundee, approximately 50 (Eric Ballantyne).
- Aberdeen, approximately 25 (David Currie).

The ISD forms were reviewed and the group was unanimous in the recommendations that opinions should not be based on the ISD returns as these are grossly inaccurate and several examples from each centre were discussed. The Chairman delegated the completion of the questionnaire's which will be supplied by Mr Steer as follows:

- Aberdeen, Mr David Currie
- Dundee, Dr Martin Kilpatrick and Mr Eric Ballantyne
- Southern General Hospital, Miss Jennifer Brown
- Royal Hospital for Sick Children, Edinburgh, Lynne Myles
- Royal Hospital for Sick Children in Glasgow, Mr Hajivassiliou.

Lesley Clemenson suggested that the group add the quality of outcome measures outlined in the action for children publication.

Item 5. International models. The Arkansas and John Hopkins Hospital report support that outcome measures improve with increasing volume of work in paediatric neurosurgery. The Victoria region report in Australia showed positive correlation, especially in trauma victims, which is also depending on quality of pre-hospital care. The suggestion that France has one single paediatric neurosurgical unit as appeared in the previous recommendation to the CMO was unanimously declared as false by all paediatric neurosurgeons present (Lynne Myles, James Steer and Jennifer Brown) as there are several big paediatric neurosurgical units in France (Lyon, Marseille and Paris). A good example for a single provider for a large population is the neurosurgical unit in Toronto Sick Children's Hospital; but it is the general trend in the Western Hemisphere for paediatric neurosurgery to move away from the adult services. After a general discussion re-emphasising single points already touched upon (immediate but also mid and long term outcome indicators and patient/family satisfaction criteria, ensure that a unit's experience is audited, re-emphasis of the importance of a whole package offered by a centre, importance of objective criteria to measure outcomes), the discussion part of the meeting was closed.

Item 6

Dates for future meetings:

Monday 11th June - Glasgow

Thursday 12 July - Edinburgh
Friday 24 August - Glasgow
Monday 24 September - Edinburgh
Friday 5th October - Open meeting Stirling

A further meeting is planned subsequent to the October meeting prior to drawing the final recommendation document.

The option appraisal of various models to be represented at the next meeting were delegated as follows:

- One centre model - Mr David Currie.
- Retention of status quo - Dr Martin Kirkpatrick.
- Two centre model – Miss Jennifer Brown.
- Managed clinical network – Miss Lynne Myles.

The following will be invited to attend subsequent forthcoming meetings as follows:

11th June - Mr Adam Bryson and nursing representative

12th July - Oncology and A & E specialties

24th August - PAM and Craniofacial specialties

The meeting was closed at 14.55.

Meeting 2

Minute of Meeting 11th June, 2001
RCPS Glasgow

Present:

Prof. George Youngson (Chairman)	Consultant Paed. Surgeon RACH, Aberdeen
Mr Eric Ballantyne,	Consultant Neurosurgeon, Ninewells Hospital, Dundee
Dr Adam Bryson,	Medical Director, National Services Division, Scotland (part meeting)
Mr Jonathan Best,	Chief Executive, Yorkhill Hospitals NHS Trust, Glasgow
Miss Jennifer Brown,	Consultant Paed. Neurosurgeon, SGH, Glasgow
Leslie Clemenson,	Co-ordinator, Action for Sick Children, Scotland
Mr David Currie,	Consultant Neurosurgeon, Aberdeen Royal Infirmary
Dr Paul Eunson,	Consultant Paed. Neurologist, RHSC, Edinburgh
Mr Graham Haddock,	Consultant Paed. Surgeon, RHSC, Glasgow
Prof. Donald Hadley,	Consultant Neuroradiologist, SGH, Glasgow
Dr Martin Kirkpatrick,	Consultant Neurologist, Ninewells Hospital, Dundee
Mr Ken Lindsay,	Consultant Neurosurgeon, SGH, Glasgow
Miss Lynne Myles,	Consultant Paed. Neurosurgeon, RHSC, Edinburgh
Dr Neil Morton,	Consultant Paed. Anaesthetist, RHSC, Glasgow
Dr David Simpson,	Consultant Paed. Anaesthetist, RHSC, Edinburgh
Mr James Steers,	Consultant Paed. Neurosurgeon, RHSC, Edinburgh

1. Apologies:

Dr Robert McWilliam, Consultant Paed. Neurologist, RHSC, Glasgow
Dr Ian Bashford, Ms Louise Ogilvie

2. New members

2.1 The Chairman welcomed Mr Best as representative of the Chief Executive's group in Scotland. He also welcomed Mr Lindsay and Mr Haddock to their first meeting of the subgroup. No nursing representative has yet been identified. **The Chairman will continue to pursue this.**

3. Minutes of the previous meeting

3.1 Amendments to minutes:

Page 1:

- the Chairman clarified that the Neurosurgery report produced under the auspices of the previous CMO (Sir David Carter) had been accepted by the Minister, but would not be published. The Minister had subsequently directed the new CMO (Dr Mac Armstrong) to establish a two centre model for Paediatric Neurosurgery in the interim, moving towards a one centre model in five years. This Working Group were unhappy with the process that led to this recommendation, which is why all options are being considered.

- the wording of the exact recommendation from the CMO was

"As far as the remit is concerned, I would suggest that it should be quite broadly worded, possibly along the lines of: "to review the options for models of service delivery for elective paediatric neurosurgery in Scotland, within existing resources, with the aim of moving over a 5-year period towards the establishment of a single service for Scotland as a whole, and to make recommendations". As you will see, I have taken on board the point you made about the benefits of concentrating on a single service, rather than a single centre, when dealing with these specialised services. I think it is also worth pointing out that we would find it helpful if it could be made clear that this work was being undertaken under the aegis of the Scottish Colleges' Committee on Children's Surgical Services." (extracted from CMO letter)

- Mr Lindsay reminded the Working Group that this was not the recommendation of the initial Neurosurgery Report. The Chairman accepted this and indicated that the Working Group had decided to include emergency provision and all possible options for service disposition in its deliberations.

Page 2:

- add manpower implications to task list 5

- RHSC in bullet points under item 1 refer to RHSC Glasgow (in future minutes, RHSCG = Glasgow and RHSCE = Edinburgh)

- item 1, bullet point 1, expand minute to read – Greater Glasgow Health Board are currently engaged in an option appraisal process looking at the co-location of a maternity/children's hospital and an adult hospital on the same site. Previously, the Yorkhill Hospitals NHS Trust has not been in favour of relocation to the Southern General site.

Page 3:

- item 3, second paragraph, 4th line from the bottom of the page – Miss Brown clarified that she had questioned whether PICU should be considered in isolation or whether other associated related services should not be included in our discussion.
- item 3, second paragraph, 2nd line from bottom of the page – 25 PICU beds is the target for Scotland recommended in the SPICA report. This has not yet been achieved.

Page 4:

- item 4 – reword the sentence at the end of the first paragraph to read ‘Mr Leggate should be informed that this group is up and running and request that he provide us with any recognised outcome measures in paediatric neurosurgery.’
- item 4 - last bullet point should read paediatrics, neuroradiology,.....

Page 5:

- item 5 – there is no one paediatric neurosurgical unit in Canada. The Toronto unit covers a notional population of 10 million. Patients often require to travel considerable distances by air for treatment. This brings into question the recommendation that no child should be further than two hours by road for treatment.

4. Matters arising

(a) **Not elsewhere on the agenda**

(i) Dr Bashford has not yet clarified the status of the initial report particularly with respect to manpower issues. Dr Kirkpatrick asked whether we need to get the CMO's agreement to widen the remit of the Working Group. **The Chairman undertook to write to the CMO to seek clarification of the status of the initial report.** Mr Steers indicated that the recommendations of the adult part of the report seemed to be moving forward.

(ii) The Chairman has discussed coding issues with ISD. Paediatric neurosurgery is not coded separately. If we want specific data from ISD, we will need to specify conditions. Miss Myles expressed concern that ISD was inaccurate. The Chairman pointed out that as data input was the responsibility of clinicians and Trust, any inaccuracies were our own.

(b) **On the agenda**

(i) Elective/emergency split as part of the remit

The Chairman has informed the CMO that the Working Group has decided to look at emergency care in addition to the initial remit. The current retrieval process would take children to the central belt centres in the recommended timescale if helicopters were used. It is less clear whether this could be achieved if road transfer was used. He also expressed concern that the risk of occasional emergency practice when urgently required outwith the two central belt centres would increase as that practice became more occasional.

Mr Currie warned that we would have to guard against the absurdity of a child presenting to Aberdeen requiring urgent neurosurgical intervention, being made to move to another centre for treatment. Dr Morton suggested that Consultant to Consultant discussion should obviate against this. Mr Currie asked that the wording of our final report needs to be carefully crafted to protect against all professional flexibility being removed.

Dr Simpson indicated that transfer after treatment could always occur. The Chairman suggested that this might fly in the face of the Transport document recommendations which suggests that no child should have to undergo more than one transfer. Dr Kirkpatrick suggested that the real question was whether we have the infrastructure in place to support children with critical head injuries outwith the two designated PICU's and whether our review needs to be widened to look at this. The Chairman agreed that the review should be comprehensive and should balance the need for critical mass against the immediacy of need for care.

Dr Morton suggested that we might need to consider transferring teams of specialists to help at non-designated centres if a child was too unwell to be transferred. Mr Ballantyne informed the group that the last three paediatric head injuries under his care were too unstable to transfer. Dr Simpson suggested that the provision of 24 hour cover by suitably trained doctors and nurses may impact on this discussion. **Dr Morton informed the group that a new Paediatric Intensive Care Society document on standards of care would shortly be published which might help these discussions. He will endeavour to obtain a copy.**

(ii) SASM

The Chairman indicated that it was not within our remit to decide about inclusion of paediatric neurosurgery in the SASM report. Adding a paediatric box to the form might stimulate other specialities to do the same. **He suggested that we take this issue to our parent Committee (the SCCSS) to ask for the support of all surgical specialities for this proposal.** A short discussion ensued about the need for such a box and the possible repercussions of same. The Chairman's proposal was accepted.

(iii) PICU bed occupancy

The Chairman indicated that whatever the outcome of our discussions, a decision had already been reached that Scotland would support the viability of two PICU's.

(d) RHSCF

Currently has 6 PICU beds (with 6 HDU beds which can be used flexibly as PICU beds if necessary). In 2000-2001, there were 296 admissions (a drop from 340 the previous year – this figure included 3/12 of cardiac work). The average length of stay was 5 days (was 4.5) with a range of bed occupancy from 1 to 10 cases at any time. The mean/mode bed occupancy was 4 cases. Of the 296 patients, 42 (15%) were neurosurgical – of which 18 were neurotrauma and 24 non-neurotrauma (including elective and acute cases). Of the 18 neurotrauma patients, few needed surgery except for invasive monitoring. Approximately one third of neurosurgical cases were admitted to PICU post-op. Most patients come from the Lothians and the SE of Scotland.

(e) RHSCG

Currently has 14 PICU bed spaces but only has had 12 funded beds until recently – this has recently increased to 14, but staff recruitment has only just started. PICU admits 600-650 cases per year. Average length of stay is 4 days. 50% of bed days are cardiac. There is no adjacent HD therefore there is no step-down facility and a proportion of the total bed days are HDU bed days. Neurotrauma patients are occasional and usually have multiple trauma. Bed occupancy is 65% but peaks and troughs has meant that patients have had to be turned away in recent months. An outline business case is currently being put together to establish a 28-30 bedded combined PICU/HDU.

These figures do not include the neonatal shunt and spina bifida patients which are currently managed in the neonatal surgical unit. Few of these patient require ICU level care.

(f) SGH, Glasgow

Currently has two beds designated for paediatric use. Last year there were 74 PICU admissions – 44 emergency, 15 urgent (not all ventilated) and 15 elective (majority not ventilated, most for an overnight stay only).

Dr Morton indicated that some paediatric patients are transferred back to RHSCG PICU for further treatment.

The Chairman then tried to summarise the current PICU patient workload generated by neurosurgical patients in Scotland. It would seem that 110 patients needed PICU with an average length of stay of 4 days. This amounts to 440 bed days spread throughout the year. He then questioned whether neurosurgery would have any significant impact on the viability of either PICU in Scotland.

Dr Simpson suggested that all three centres needed to firm up their data. The calendar year 2000 should be used. Data from the RHSCG neonatal surgical unit should be added to the total.

(iv) Quality outcomes

Ms Clemenson circulated a document entitled 'Quality services for children – providers' which outlined the recommended standards issued by Action for Sick Children (appendix 1 to this minute). She referred to 'Children's Surgery – a First Class Service' (RCS England) which highlighted some of the quality indicators mentioned in the ASH document. At a recent meeting of the Clinical Standards Board, it was agreed that the ASC standards would be incorporated into their discussions.

Ms Clemenson highlighted point 18 from the ASC document that looked at outpatient preparation for surgery and mentioned the value of Family Information Centres and the importance of good communication in general. He also highlighted point 75 referring to the importance of community care after surgery.

The Chairman asked whether ASC had any data on respite care or rehabilitation. Ms Clemenson undertook to find this out.

(v) Dr Adam Bryson, NSD (taken out of order after item (ii))

The Chairman introduced Br Bryson and gave some background information on the issue recently or currently being addressed by NSD. The CMO had specifically asked the Dr Bryson be invited to one of our meetings to inform discussions.

Dr Bryson indicated that NSD has responsibility for designated national services (DNS) and for national managed clinical networks (NMCN). NSD is a division of the Common Services Agency and is therefore part of the NHS. It has a commissioning role for DNS etc, in much the same way that a Health Board has for its own services. He then gave as an example the recent changes in the disposition of paediatric cardiac surgery. What had been a DNS run on two sites has become a DNS run on one site. The NSD meets regularly with the service provider to monitor pressures in the system and adjusts funding accordingly. Being a DNS does not necessarily mean that the service has to be run on one site. Adult cystic fibrosis provision is run from three sites plus one further satellite site. It is also possible to have a service based on one site which covers the whole of Scotland but is not a DNS eg retinoblastoma treatment currently offered in Glasgow to the whole of Scotland is not currently a DNS.

NSD was commissioned to consolidate paediatric cardiac surgery in Scotland onto one site. Input to the discussion was obtained from 'experts' to help with the decision-making process. NSD then worked with the two Trusts to make the transition work. NSD is not a policy-making body; it provides an executive function.

NSD has a midwifery role in bringing NMCN's into being. There are now two such NMCN's in place. Cleft lip and palate surgery was the first. This was relatively easy to establish and was based on a CRAG-supported group of clinicians keen to improve their service. This is now funded through NSD. Protocols have been written, standards have been set and governance issues explored. The number of sites where surgery is undertaken and the number of surgeon's involved has decreased. The process has been professionally driven. The lead clinician produces an annual report for NSD and other interested parties.

Before a NMCN is established, a number of parameters have to be satisfied:

- standards have to be agreed
- patient involvement is essential
- an annual report has to be agreed
- the lead clinician must not usurp Trust Chief Executives re: governance etc.

Dr Bryson indicated that NSD would be happy to work with us if we wished to establish paediatric neurosurgery as a DNS or NMCN. There exists some resistance from Health Boards to the establishment of both of these structures, as funding has to be top-sliced from their budget. One other possible funding route should be considered by this working group – regional funding consortia are being established involving groups of Health Boards.

Dr Bryson then answered questions on several topics including whether extra funding could be found and the impact of DNS/NMCN's on associated, adjacent specialities, and the need for six monthly review for both DNS and NMCN's.

The Chairman expressed concern that many of these decisions were being driven in the face of a lack of useful outcome data. In the case of cleft surgery, the outcomes which drove the decision to establish a NMCN were later found to be erroneous.

The Working Group thanked Dr Bryson for his valuable input into our discussions and left the meeting.

(vi) Review of existing services (reports from members)

Each of the centres (SGH, Glasgow, RHSCE, RHSCG, Aberdeen, Dundee) gave a brief summary of their current service configuration using the proposed British Paediatric Neurosurgery Group audit tool.

The Chairman asked each group to forward the completed documents to him for inclusion in the minutes of this meeting. He also asked each group to add some free text to the summary highlighting points of interest and importance. The Chairman agreed to issue an amended template adding in some of the ASH quality indicators outlined in the previous discussion.

(see end of minute.)

(vii) Options for reconfiguration

(a) The two centre option – Miss Brown

Miss Brown suggested that this was a strong model if it was based on centres in the east and west of Scotland. It would allow concentration of resources without the disruption caused by relocation to a single site. It would allow adult neurosurgical support to paediatric neurosurgery and to support other specialities on both sites. It would also allow training opportunities to be maintained on two sites.

The disadvantages of this option would be: (i) a loss of concentration of experience (which could be overcome by centralising surgery for certain conditions on each site), (ii) a de-skilling of staff in the more remote centres, (iii) inconvenience to patients and families (although less than a one centre model), (iv) a decrease in elective experience in the remote centres which would affect 'emergency confidence' (of all staff) and (v) out of hours care might have to be provided by non-paediatric specialised surgeons.

All models under discussion would require an increase in the number of WTE neurosurgeons (should be 2 WTE per centre).

(b) A managed clinical network – Miss Myles

Miss Myles outlined the background to the development of the MCN in cleft surgery. Such an MCN would require:

- a management structure
- a database
- a definition of what constitutes a paediatric neurosurgeon or paediatric neurosurgical unit
- set standards of care
- developed protocols
- a decision about who would do what and where
- appropriate allocation of resources

In short, an MCN should be standards-driven. The core centre should meet all of the standards. Work could be further divided into subspeciality areas.. The core centre would need supporting centres (working to the same MCN protocols and taking part in the MCN audit process). An MCN would need a safe and effective transfer and retrieval service and imaging links. It would also need to have defined routes for rehabilitation and follow-up.

(c) A single centre – Mr David Currie

Mr Currie was of the view that the decision regarding which model to choose should be driven by: volume vs quality subspecialisation in neurosurgery

Very few patients currently have to travel far therefore centralisation would inconvenience very few patients in numerical terms. Common sense would dictate that a single centre should be located in Glasgow. This centre should be in a paediatric hospital with the relevant paediatric speciality back-up. It would need a full neurosurgical environment (theatre, wards etc) and would need access to the neurosurgical subspecialities (among adult neurosurgeons).

The choice in Glasgow would seem to rest between the development of such a service on the Yorkhill site, or on a rebuilt children's facility on the Southern General Hospital site. An alternative would be to consider a new centre elsewhere in Scotland. Mr Currie posed the question as to whether we should aim for one centralised PICU for Scotland.

Using either Glasgow option, Mr Currie calculated that no more than four patients per week would have to travel to Glasgow. The single centre would undertake 300-400 operations per year with another 300-600 admissions per year (6-12 per week). The centre would need 2 WTE plus 2 P/T paediatric neurosurgeons allowing 180-250 cases per surgeon. Junior staffing could be on rotation from a national training scheme. Decisions would also need to be made on PICU and neuroradiology staffing.

Transport costs would need to be reviewed. Mr Currie estimated that 100 urgent and 500 elective transfers would be necessary each year.

(d) The status quo – Dr Martin Kirkpatrick

Cons:

- rare operations are currently performed (and would continue to be performed) on four sites.
- there would be no opportunity to develop expertise
- existing practice of shunt surgery being performed by paediatric surgeons as opposed to neurosurgeons would continue to be 'out of line' with most other centres in the UK
- there would be a lack of opportunity for peer review
- single handed specialists would continue to be vulnerable

Pros:

- ease of access for patients
- high proportion of paediatric neurosurgery work is emergency – needs to be done locally to ensure good outcomes
- quality and outcomes may relate not just to neurosurgery but to neurosciences as a whole (which would remain on four sites)
- ease of provision of integrated local services (especially rehabilitation-related)
- benefits of access to local neurosurgical opinion
- will help recruitment and retention in paediatric neurosciences
- PICU requirement is small
- Little evidence of differences in outcome between different models of service provision

A lengthy discussion then ensued about the merits or otherwise of each of the models presented. Dr Eunson wondered whether we were running the risk of destabilising paediatric service provision for the whole of Scotland and that, in doing so, we were doing the politicians' work for them.

Mr Steers expressed concerns about the impact of current developments in training, junior doctors' hours of work, manpower and clinical governance on our discussions. The European working time directive will have a significant impact on Consultant work practices and the new Consultant contract negotiations are also likely to have a similar impact. In 2004/2008 we will need 6 WTE paediatric neurosurgeons to staff such a Unit.

(viii) Option appraisal

The Chairman conducted a brief option appraisal process of all four options. Key discriminators were identified as below and weighted:

Outcome	40
Access	10
Paediatric environment	25
Training/manpower	12
Multidisciplinary care	13

Each option was then appraised and scored +5 to -5. The outcome of this exercise is tabulated below (totals for each cell are in brackets):

		Single Centre	MCN	Two Centre	Status Quo
Outcome	40	+2 (+80)	+3 (+120)	+1 (+40)	0
Access	10	-3 (-30)	+2 (+20)	-1 (-10)	0
Paediatric environment	25	+3 (+75)	+2 (+50)	+3 (+75)	0
Training/manpower	12	+4 (+48)	+1 (+12)	+2 (+24)	-2 (-24)
Multidisciplinary care	13	0	+3 (+39)	0	0
Totals		+173	+241	+129	-24

The conclusion of this quick options appraisal would seem to be that the preferred option should be an MCN.

The Chairman thanked those present for participation in this important exercise. Further work needs to be done to cover a number of other areas before we will be in a position to make our final recommendation.

(ix) Task list review

The task list from the previous minute was reviewed.

Task 1:	agree the remit	achieved
Task 2:	define the problem	still being crystallised
Task 3:	assess the need for change...	started
Task 4:	review current provision	achieved (for the first time ever in Scotland)
Task 5:	future implications etc...	not yet done
Task 6:	communication issues	OK but no nurses on Working Group yet
Task 7:	report back	for later

5. AOCB

There being no further business the Chairman drew the meeting to a close.

6. Date of next meeting

RCS Edinburgh – 12th July, 2001 at 10am

Invitations will be extended to Mr Tom Beattie and Miss Fiona Russell to address A&E issues and to Dr Elaine Simpson and Dr Hamish Wallace to discuss neuro-oncology issues.

Work for next meeting:

Dr's Eunson and Kirkpatrick have been asked to look at the implications of the various options for support services.

Mr Steers has been asked to look at the implications of the various options on manpower and training issues.

Ms Clemenson has been asked to look at the impact of the various options on parents and children.

Meeting 3**SCCCSS****Paediatric Neurosurgery Working Party****Minute of Meeting of 12 July 20001**
RCS Edinburgh**Present**

Professor George G Youngson (Chairman), Consultant Paediatric Surgeon, Aberdeen
 Mr Eric Ballantyne, Consultant Neurosurgeon, Ninewells Hospital, Dundee
 Mr Jonathan Best, Chief Executive, Yorkhill Hospital NHS Trust, Glasgow
 Miss Jennifer Brown, Consultant Paediatric Neurosurgeon, SGH, Glasgow
 Mr David Currie, Consultant Neurosurgeon, Aberdeen Royal Infirmary
 Dr Paul Eunson, Consultant Paediatric Neurologist, RHSCE
 Mrs Sarah Johnston (on behalf of Ms L Cleminson) Action for Sick Children, Scotland
 Mrs Sandra Kerley, Director, Capability Scotland
 Dr Martin Kirkpatrick, Consultant Paediatric Neurologist, Ninewells Hospital, Dundee
 Mr Ken Lindsay, Consultant Neurosurgeon, SGH, Glasgow
 Mrs Winnie Miller, Clinical Nurse Manager, RHSCG
 Dr Neil Morton, Consultant Paediatric Anaesthetist, RHSCG
 Miss Lynn Myles, Consultant Paediatric Neurosurgeon, RHSCE
 Dr R McWilliam, Consultant Paediatric Neurologist, RHSCG
 Mr David Simpson, Consultant Paediatric Anaesthetist, RHSCE
 Mr James Steers, Consultant Paediatric Neurosurgeon, RHSCE
 Dr H Wallace, Consultant Paediatric Oncologist, RHSCE

1. **Apologies**

Apologies were received from Mr Haddock, Professor Hadley, Dr Bashford, Ms Cleminson, Mr Hajivassilliou, Ms Louise Ogilvie (committee members), Dr T Beattie, Dr E Simpson (invited guests).

2. **New Members**

The Chairman welcomed the invited guests and welcomed Mrs Miller to her first meeting of the working party.

3. **Minutes of Meeting**

- 3.1 Amendments to Minute – page 5 middle paragraph – ASH to read ASC.
 Page 8 Item D line 3 – to read “the practice of shunt surgery by paediatric surgeons as opposed to neurosurgeons would continue to be out of line with practice in most centres in the UK”.

Amendments to the INS data in relation to section 8 were made.

4. **Matters Arising** (not elsewhere on the agenda)

- a) Correspondence with Mr Leggatt, Chairman Paediatric subcommittee of SBNS. The Chairman indicated that Mr Leggatt had acknowledged receipt of the information sent as a courtesy of the working party's existence and purpose. He also indicated a willingness to contribute in any way so requested to the working party activities.
- b) Communication with CMO -
 The Chairman indicated that he had informed the CMO of the direction the working party had moved as regards assessment of all potential models of care, and also had written to indicate inclusion of emergency surgery which received the CMO's approval.
 As yet there was no written response in the request for clarification of the status of the original neurosurgical working party report but information from the Department of Health confirmed that this report would not receive publication as such. It was understood that the adult component of the report was being implemented and continued to be discussed but the dissatisfaction with the content of the paediatric section was the prime reason for the working party's existence. Ministerial acceptance of the content of the report was understood and acknowledged by the working party.
- c) Paediatric anaesthesia – standards of care.
 Dr Morton informed the group that this document would soon be available on the Internet and that the paediatric intensive care society had been unwilling to release a draft copy in the interim. He also drew the

attention of the working party to an RCA document concerning standards of care for paediatric anaesthesia which would be an appropriate reference document for the bibliography. The Chairman also indicated that the standards of care document recently published by the British Association of Paediatric Surgeons in line with the content of the RCA publication moved away from strict prescription of practice within certain age ranges but endeavoured to emphasise the quality issues and the responsibilities for clinicians dealing with young children in particular.

d) **SASM**

The Chairman indicated that he had written to Professor Temple, interim Chairman of SASM. SASM was currently under reconfiguration with closure of offices in Aberdeen and Edinburgh. The suggestion of a specific paediatric box in all surgical specialties in Scotland had received support from SASM Chairman but the issue was being taken forward through Mr Peter Stonebridge in the Dundee office.

5. **Matters Arising from the Agenda**

- i) Paediatric intensive care activity. Tabled activity by Dr Simpson highlighted the PICU bed occupancy on the basis of paediatric neurotrauma, paediatric neurosurgery and paediatric neurology. The sum of neurosurgery and neurotrauma comprised 192 days for 50 patients with a range of stays between 1 and 29 days. The location included both PICU and HDU and data was also provided on neurology patients (non-surgical) who occupied 87 such bed days.

The activity in Southern General Hospital, Glasgow for the same time period and included 75 children, 32 of which were non-ventilated. The mean stay was 27.7 hours. The difference between the mean stay in PICU of RHSCE compared to INS was empirically attributed to the difference in the case mix with polytrauma having an undue influence on the Edinburgh data (the mean stay for neurosurgical patients in RHSCE is 2 days).

Ninewells Hospital indicated that their activity was represented by five patients, each with a mean stay of 5 days.

Data was not yet available from Aberdeen but will be presented at the next meeting.

Similarly, RHSCG had been unable to collect data from their computerised dataset and specific interrogation would be necessary. Discussion surrounded the potential inclusion for neurological patients, and it was agreed that these patients did influence the profile of PICU activity, and any reconfiguration would inevitably involve neurosciences in general and not merely surgical patients. Nonetheless, the conclusion was that ventilated bed days in neurosurgical patients alone would constitute a reasonable proxy of the potential impact of reconfiguration on either of the PICU's in Scotland.

Dr Morton undertook to collect the data from all units and provide a picture of pure neurosurgical workload and in addition attempt to identify the similar workload produced by caring for neurological patients.

- ii) Data has now been collected from all surgical units and informed with this, the working party agreed to reconsider the options first described, now putting numbers to each option. It was recognised that, particularly in the managed clinical network option, failure to identify specific core centres for any single or various activities would make this task empiric at best.

6. **Implications of Reconfiguration**

- i) Presentations from Dr Kirkpatrick and Dr Eunson had a common theme; that the specific gains in neurosurgical care achieved through reconfiguration may be marginal (if the premise assumes current neurosurgical care to be at least adequate in all centres, if not at a level of competence substantially higher than this) in comparison to the factors sacrificed in adjacent services to achieve this gain. Moreover, there was a strong belief that the benefits for a few, particularly those with rare conditions, must not be at the expense of the treatment of the majority with common conditions.

The tensions of separating surgical activity to a distant site with the concomitant problems of communication and continuity of care were highlighted, as were the potentially de-stabilising effects on recruitment, staffing, training, transport and assessment outwith this centre. It was suggested that these disadvantages may be mitigated by good outreach/inreach practice, but nonetheless a single centre option may result in a number of downgraded neuroscience centres outwith the single centre such that they become unsustainable and there is loss of locally accessible neuroscience/disability, rehabilitation skills and provision of care.

The issues of training and recruitment were considered to be of substantial importance. See **appendix 2**.

7. **Paediatric Oncology**

Dr Wallace presented the national data in relation to children's cancer activity in Scotland and focused on solid tumours of the central nervous system. A rate of approximately 120 new cancers per year are seen in Scotland and 25% of these are CNS tumours. The incidence of approximately 35 per year with a five year

survival rate of 55% (static) are discussed, as were the models of neurosurgical affiliation with UK CCSG centres in England and Wales. Note was made of the increased registration of all tumours and particular reference was made to the joint working party report published in 1997 by the Royal College of Paediatrics and Child Health which related to the care of paediatric brain tumours. This document characterised the service and emphasised the multi-disciplinary nature with seamless integration, follow-up social support, supporting services and appropriate paediatric environment all being highlighted. In particular, emphasis was made on the particular expertise required for cranio-spinal radiotherapy.

The content of the presentation is seen in **Appendix 3**. Discussion on the presentation included matters of communication, both within the multi-disciplinary team, but the need for quality communication involving other services including physical rehabilitation and palliative care. Questions on the reconfiguration of children's cancer services in Scotland were posed, as were the difficulties currently sustained in provision of paediatric pathology services. It was noted that at this time all paediatric radiotherapy is provided in Scotland off site, being performed in the Western Infirmary in Glasgow, the Western General Hospital in Edinburgh, and Aberdeen Royal Infirmary.

Dr Wallace emphasised the importance of any conclusion from the working party since it would have direct bearing on the configuration of children's cancer services in Scotland, recognising the substantial contribution of CNS tumours to that cohort.

8. **Implications for A & E Services**

Neither of the invited guests was able to attend, but Dr Beattie had forwarded a discussion paper. There was confirmation of the close working relations between most A & E departments and their neurosurgical colleagues, but recognition was made of the important emphasis, given the follow-up for children with presumed minor head injury but in whom there were subsequent educational and behavioural consequences.

9. **Neurosurgery and Rehabilitation Services**

Mrs Sandra Kerley, Director of Children and Young People's Services in Capability Scotland, provided an overview of the current consultation process underway in Scotland.

The ambition is to execute a needs assessment exercise, identifying both the nature of the gap in rehabilitation in children with disability following head injury with a view to developing a specialist 12-bedded unit, and parallel to that a community and education reintegration package delivered within the locality of the child. The consultation process is due for collation in the autumn. This is a self-appointed initiative reporting back to the main board and has not been commissioned by any external agency, nor is there any specific identified funding for implementation. Discussion focused on similarities to the centres in Bath and Tadworth where the average stay of each child is approximately four months. Parallels were also drawn with adult neuro-rehabilitation and emphasis placed on the need for expert assessment being a relatively brief event so that implementation of the neuro-rehabilitation programme can be performed locally, thereby maintaining skills in each neurosciences centre. Difficulties currently are being experienced in getting an accurate view of the likely workload with comparisons being made with the development of hospice care in Scotland and it is likely that any provision would likely be modest in the first instance, but in the fullness of time would no doubt seem to work at full or indeed excess capacity.

The working party was supportive of this initiative and recognised the value of providing a focus for such activity within Scotland rather than having disparate provision on an unconsolidated basis with no real insight into the magnitude of the national need. Mrs Kerley agreed to inform the working party of the conclusions of the consultation findings.

10. **Effect of Manpower Regulations on Future Provision of Services**
(see Appendix 3)

Mr Steers emphasised the pivotal influence of both New Deal and European Working Time Directive on staffing ratios expected for any independent unit. The extrapolation of expansion of doctors at all grades to conform with these directives was at variance with the indicative staffing ratios identified in safe paediatric neurosurgery. The working party agreed that expansion to a minimum cohort of six surgeons at each level within each institution was not only unrealistic but would end in undue dilution and diminution of expertise. The only unit currently possessing an establishment of six was the Southern General Hospital, but this cohort also included adult neurosurgeons and any staffing model would ultimately include a dependency upon adult neurosurgeons for provision of out of hours care.

The committee recognised the insoluble nature of the problems posed by this legislation at this juncture and agreed that it should not unduly influence the recommendations of the working party but that such influence had to be factored into any ultimate decision.

11. **Impact of Options on Family and Children**

Mrs Sarah Johnston spoke to this item, highlighting some of the recognised needs that currently are provided for in variable quality throughout Scotland. These included parent held records, written information, parental support and sibling support. There were gaps in the services in the variety part of Scotland in relation to provision of liaison nurses and the bereavement support for parents and siblings was similarly inconsistent. There was a need for co-ordination for hospital activity when appointments were being sent parents, particularly if travel was involved. It was recognised that parents are perfectly happy to travel significant distances but only if the service obtained is distinctly better than the local clinical care. The financial impact upon families living in hospital was emphasised, as was the need to control parental access such that the wellbeing of the parents was preserved during in-patient stay as well as the wellbeing of the child.

12. **Open Meeting 05 October – Conference Centre, Stirling**

The programme for this meeting was outlined and comprised the following:-

- Introduction – Dr Aileen Keel, Deputy CMO
- Background – review of working party, standards of care chairman
- Options for change of service, Jennifer Brown, Lynn Myles, David Currie, Martin Kirkpatrick
- Paediatric Intensive Care/Paediatric Anaesthesia/Transport Arrangements – Dr Simpson and Dr Morton
- Interface presentations (7 minute presentations, 3 minutes discussion) –
Nurses – Oncology/Maxillo-facial/Accident & Emergency/Rehabilitation
PAMS - Neurology/Radiology
- Lunch
- Manpower implications – Mr Steers
- Group discussion: 4 groups, each led by neurosurgeon – option appraisal exercise
- Feedback from presentations
- Open discussions

- summary and conclusions-? External speaker.

13. **TASK LIST REVIEW**

The group performed a check on the running task list as follows:-

- Task 1 - Agree remit achieved
- Task 2 - Define problem in progress
- Task 3 - Assess need for change in progress
- Task 4 - Review current provision completed
- Task 5 - Future implications in progress
- Task 6 - Communicating with other specialties/agencies in progress
- Task 7 - Consideration of manpower implications achieved

14. **DATE OF FUTURE MEETINGS**

24.08.01
25.09.01
05.10.01
09.11.01

15. **AOCB**

- a) The invited disciplines to the next meeting will be Child Protection and Maxillo-Facial Surgery.
- b) The Chairman indicated to the working party that a preferred model would need to be forthcoming within the next two meetings, that opinion can be given either directly at the meeting or in correspondence to the Chairman such that a presentation at the meeting on 24 September can be made.

made in the light of a prior decision to maintain two PICU's in Scotland. Recognising that there were a significant number of interfaces between neurosurgery in children and other specialities, a number of specialists not represented on the working group had been asked to present at the meetings. Accident & Emergency and Oncology had presented at the last meeting. At the current meeting, maxillofacial surgery and child protection issues were to be discussed.

(a) Maxillofacial surgery (Mr Koppel and Mr Lello)

(i) Mr Koppel gave a comprehensive presentation of the interface between the work of maxillofacial surgeons and neurosurgeons as it related to paediatric practice. The main interaction centres around craniofacial (CF) surgery, although the definition of what constitutes CF surgery is in debate.

Mr Koppel offered his views on the impact of the options being considered for reconfiguration of neurosurgical services on patient care, training, research and audit.

Craniofacial surgery is defined by clinical conditions which include surgery for craniosynostosis, hypertelorism, facial clefts, trauma and tumours (a small group) and some extracranial anomalies which may or may not have an associated intracranial component. In Glasgow, CF surgeons operate across the range of children, adolescents and adults. Scotland's small population base would suggest that one team should look after all age groups. In England, there are currently four supraregional services based around Great Ormond Street in London, Oxford, Alder Hey in Liverpool and Birmingham.

The Chairman indicated that we have to marry paediatric standards and speciality standards. How do the paediatric component parts of these services conform to current standards? Dr Morton asked how many cases there were in the above categories each year.

In Glasgow the CF team was established in the 1970's. Currently, Mr Koppel and Miss Brown were involved in this work – both had been trained in this clinical area, both in the UK and overseas. The team comprises CF, neurosurgery, plastic surgery, genetics (from regional centre at RHSCG), ophthalmology, speech and language therapy, paediatric respiratory medicine (at RHSCG - for sleep apnoea), orthodontics, the adult skull base surgery team, neurology (at RHSCG) and the cleft lip and palate team (at RHSCG). The team holds a monthly combined clinic but patients are also seen at individual speciality clinics as required. The service also has access to a maxillofacial laboratory for prostheses.

Approximately 30 cases/year require subcranial surgery, 25 cases/year required combined intra and subcranial surgery and another 12 cases/year require intracranial surgery alone. Mr Koppel offered to provide a caseload list for the working group.

Research in the Glasgow centre involves both basic science and clinical work. The department has obtained over £1m in grant funding in the past year. In Mr Koppel's view, moving the CF service from Glasgow would jeopardise this important work.. Training for geneticists, orthodontists and speech and language therapists would also be at risk..

For optimal patient care, Mr Koppel was of the view that a single Scottish centre for CF surgery should be established with full access to all relevant specialities. Parents and patients should have easy access to the service, which should provide comprehensive care covering all aspects of the conditions being treated. Two years ago, an application for national funding was made to NCSAG and was rejected on the basis that regional service provision was already in place. Whether the service should be provided in a paediatric hospital or a paediatric setting in an adult neurosurgical unit was not thought by Mr Koppel to be important – what was more critical was that the treatment was provided by the appropriate people.

The Glasgow team regularly contributes to the UK national audit and the European CF Society meeting. Glasgow is the only CF centre from Scotland participating in these two processes.

The Chairman asked how many surgeons currently undertook this work. Mr Koppel is the only surgeon in Glasgow undertaking this work in children at the present time. He also asked whether there were any outcome indicators for the speciality – there are none. Mr Lello indicated that there were a number of papers from the USA recommending the population needed to underpin a successful CF Unit – these papers are not evidence-based but seem to be driven by political considerations.

Dr Simpson asked whether there were any measureable outcomes with respect to cosmesis, airway issues or ENT. Mr Koppel indicated that a number of centres were trying to use 3D imaging and raised intracranial pressure as possible measureable outcomes.

Dr Morton asked about paediatric anaesthesia and PICU. Mr Koppel indicated that there was no dedicated paediatric anaesthetist for this work although Miss Brown disputed this. Dr Simpson asked whether there was dedicated PICU nursing staff looking after these patients. Miss Brown indicated that there were not. Mr Steers indicated that other centres outside the four noted above in England undertook other aspects of maxillofacial surgery.

(ii) Mr Lello agreed with much of Mr Koppel's presentation. He questioned whether the research in Glasgow was not all in maxillofacial surgery rather in CF surgery. He indicated that Edinburgh also undertook audit of their practice and he objected to Mr Koppel's suggestion that care in Edinburgh was in some way inferior to that offered in Glasgow.

He asked the working group to consider the issues in three 'business boxes' – numbers, site and staff.

Numbers - The Glasgow team undertakes more CF work than the Edinburgh team, simply because of the population base in Glasgow and the west. He also indicated that some centres were more aggressive than others in treating certain conditions eg occipital sutural craniosynostosis – this would also impact on numbers of cases reported.

Site – Mr Lello suggested that the Edinburgh situation was optimal for undertaking this work – situated in a paediatric hospital.

Staff – Edinburgh has a full range of paediatric consultants on site. Care is on a shared-care basis. There is a dedicated anaesthetist for this work and trained PICU/HDU nursing and other staff.

The Chairman asked how many transcranial cases were operated on in Scotland each year. Mr Steers indicated that 30-40 cases were operated on each year and approximately five new syndromic cases/year. Mr Koppel added that there was another 1 new complex sutural cases each year and Miss Brown suggested that there were other cases which needed a combined neuro/CF approach to surgery.

Dr Eunson questioned whether surgery was only a small component part of the treatment of these children and suggested that the quality of surgery offered in the two centres was comparable.

Mr Koppel expressed disappointment at the failure of the NSCAG bid for national funding and felt that this had inhibited the development of the service. Mr Lindsay wondered whether with only five syndromic cases divided between two centres it was possible to maintain relevant skills.

Dr Simpson wondered whether we were really looking to develop a service outside a children's hospital. Dr Bashford asked the working group to consider the needs of Scotland's children when deciding on the preferred option.

The Chairman thanked Mr Koppel and Mr Lello for their presentations.

(b) Child protection (Dr Minns)

Dr Minns started his presentation by suggesting that the relevant issue in the interface between Child Protection services and neurosurgery related to non-accidental head injury (NAHI). 54% of all child abuse cases involve physical abuse, head injury is a part of the injury spectrum in 3-5% of all cases and brain injury in <1%.

Children with NAHI can present with the HI but can also present at other times with other symptoms including epilepsy, irritability, lethargy, apnoea and many other non-specific signs and symptoms. Management involves admission to a hospital ward and the acquisition of a place of safety order. Recent publications from Dr Minns' group would suggest that the incidence of NAHI in Scotland is 11.2 cases per 100,000 children under one year (Barlow et al, 1998). A subsequent prospective study suggested that this figure was an underestimate and reported an incidence of NAHI in under 1's as 24.6 cases per 100,000 children (Barlow et al, 2000). The median age of acute admission was 2.2 months with a range of 4 weeks to 8.8 months. 75% of these cases were admitted during autumn and winter with the highest incidence in Glasgow (45.7 per 100,000) and Lothian (43.8 per 100,000). 33% of cases were in the Glasgow area and 18% of cases in the Lothians. Only 24% of children affected by NAHI have a normal outcome; 66% has some sort of motor deficit and 30% have visual problems.

The management of NAHI is undertaken by paediatric neurologists but paediatric neurosurgeons have a significant role to play. Between 95 and 98% of NAHI patients will have a subdural haemorrhage, although not all need surgery. High quality neuro-imaging is essential for optimal management.

Dr Minns finished his presentation by outlining the structure of a NAHI management team – this would include paediatric neurologists and neurosurgeons, paediatric nursing staff and paediatric junior medical staff (to deal with fits, hypovolaemia, etc). A significant amount of time would be taken up by medicolegal work and case conferences. Integrated hospital and community follow-up would be optimal.

The Chairman asked how many cases required neurosurgical input. Dr Minns did not have this data to hand but estimated that 50-60% of cases would require a neurosurgical episode. All cases required a neurosurgical opinion. Dr Bashford suggested that the actual workload (number of patients referred for assessment) which generated this caseload amounted to approximately 6 times the reported caseload. Dr Minns agreed with this suggestion. Over 20 hospitals had been involved in the collection of data for Dr Minns' prospective study. The Chairman asked how many had input from a neurosciences team. Dr Minns indicated that most would be referred on to the regional neurosciences teams in Scotland. Dr Bashford indicated that the centralisation of Child Protection services had driven the site of admission for these cases. Dr Eunson indicated that these children often needed stabilisation at the point of presentation prior to being referred on to the regional centres. Ms Ogilvie asked why the surgeon was not moved to the patient rather than having the patient moved to the surgeon. Mr Steers indicated that stabilisation and resuscitation of the child was more important than the neurosurgery and that moving the surgeon was not appropriate in most cases. Dr Eunson asked whether an adult

neurosurgeon could drain a subdural haematoma in a child. Miss Brown indicated that this was the case. Dr McWilliams also indicated that a competent paediatrician could tap the skull to drain collections in infants.

6. Letter from CMO

The CMO had replied to the Chairman's letter updating him on the progress of the working group. He wondered whether the current favoured option (Managed Clinical Network) was failing to be sufficiently robust and decisive, and a way to avoid taking difficult decisions. No MCN in Scotland is currently working well. The CMO re-emphasised that his objective remained a move to two centres followed by centralisation to one centre within five years.

7. SASM

The Chairman intimated that he had contacted Mr Peter Stonebridge, current Chairman of SASM. He indicated that there was no difficulty in identifying childhood deaths from current submissions. Data would be made available for the next meeting. The SCCCSS needs to ask SASM to identify the status of the primary carer at the time of the child's death eg paediatric practitioner or not. This would be put to the next full meeting of the SCCCSS. Dr Morton asked whether this would not be picked up during the refereeing process. The Chairman indicated that this would probably be the case but that there was nothing in the current system to ensure that this was the case.

8. PICU activity

Mr Ballantyne reported that Table 2 contained 2 years of data from Dundee and not one year as was the case for the other Units. The lengths of stays for INS, Glasgow had been transposed in the table.

The summary table (PICU Neurosurgery and Neurotrauma Activity – Scotland 2000) was then amended in the light of updated data to read:

	SGH	RHSCG PICU	RHSCG Ward 2B (NSICU)	RHSCE PICU+ NSICU	Dundee	Aberdeen	Total patients	Total PICU bed days
Neurosurgery PICU Patient numbers	47	9	4	29	0	6	95	
Neurosurgery PICU, Bed days	41.6	19	23	62	0	12		157.6
Neurotrauma PICU Patient numbers	28	12	0	21	5	7	73	
Neurotrauma PICU Bed days	44.9	32	0	137	25	28		266.9
						Totals	168	424.5

In summary, in the calendar year 2000, 168 paediatric neurosurgery patients occupied 424.5 PICU bed days. The Chairman suggested that the total number of PICU beds needed to serve Scotland's paediatric neurosurgery patients was less than two.

9. PICU report

Dr Neil Morton circulated a copy of the recently published standards document of the Paediatric Intensive Care Society. This is the second edition of this document – it has been extensively updated and extended particularly in the areas of high dependency care and patient retrieval/transport. It recommends standards for staffing, training and accommodation. At present, no PICU in Scotland currently meets all the recommendations.

The Chairman pointed out that the document had been compiled by a narrow speciality group, comprising mainly paediatric intensivists with a few nurses. There was no representation from surgeons or other paediatric clinicians on the group. As such, it would be graded as SIGN level 4 evidence – ie opinion from an expert group only. Dr Simpson responded by indicating that it was not a model for service provision, but a standard of care from an expert group.

Members were asked to familiarise themselves with the content of the document before the next meeting.

10. Programme for open meeting

The Chairman reviewed the outline programme for the open meeting in Stirling. He asked the group to consider who the target audience might be. This was thought likely to include professionals of all disciplines working in the area but also many interest and patient advocacy groups. The information about the meeting is currently on the SHOW website. It was less clear how the other many groups could be made aware of the meeting. Dr Bashford undertook to look into this.

11. Databased option reappraisal

(a) MCN

Miss Myles revisited this option in the light of recent discussion and information. The first task if this option was to be pursued would be to set a series of standards for the MCN. These should include establishing the unit in a paediatric hospital setting with neurosurgeons and other specialists on site. There would need to be a separate rota for paediatric neurosurgical cover but junior staff cover could be by other specialities eg neurology. Research and audit would have to feature prominently. A Chairman and advisory group would need to be appointed and standardised protocols for treatment established. Communications links would need to be established for imaging transfer.

Miss Myles then reviewed the Scottish centres:

- | | |
|-----------|---|
| Glasgow | <ul style="list-style-type: none"> - paediatric neurosurgery services are not currently in a paediatric hospital - there is no room for expansion at the INS - the Unit is unable to take multisystem trauma patients - the logical conclusion to these deficiencies would be to move paediatric neurosurgery to RHSC, Yorkhill and appoint a second paediatric neurosurgeon. |
| Edinburgh | <ul style="list-style-type: none"> - unit is currently in a paediatric hospital - there is spare capacity in theatres and ITU in RHSCE for the increased workload - there are already two paediatric neurosurgeons - but neurosurgical staff are not on site at all times - the suggested way forward here would be to change the contracts of the current neurosurgeons to 1 in 3 in call – this would have a knock-on effect at the WGH. |
| Dundee | <ul style="list-style-type: none"> - currently has no paediatric neurosurgeon and no PICU |
| Aberdeen | <ul style="list-style-type: none"> - too remote to be practical as a main centre for paediatric neurosurgery |

Miss Myles conclusion following this presentation was that the core centre should be established in Edinburgh with three satellite centres with the Glasgow centre moved to RHSC, Yorkhill.

Dr Kirkpatrick questioned whether we were really looking at an all or none phenomenon. Would we not be better looking at complex cases first.

(b) Two centre model

Miss Brown reviewed the case for the establishment of two centres for paediatric neurosurgical care. The establishment of two centres would have a number of benefits. The care of complex 'elective' disorders could be improved without any detriment to the care of more routine types of cases (mainly emergencies). Indeed, emergencies would still have to be done in all four centres regardless of which option is favoured at the end.

Centres in the east and west would have almost equal catchment areas. Approximately 75 cases would be transferred from Aberdeen and Dundee each year if all elective and emergent cases were to be transferred to the other centres. Training would be possible in both centres and rotation of trainees between centres developed.

Miss Brown finished her presentation by commending the benefits of co-location of adult and paediatric neurosurgery services, preferably on an adult site.

Dr Kirkpatrick commented that it was inappropriate to compare Glasgow (no paediatrics on site) and Edinburgh (no neurosurgeon on site).

Miss Brown stated that this view represented a degree of bias in the composition of the working group.

Dr Kirkpatrick stated that the case for the separate treatment of children across all specialities had been well made in the past and was now the standard of care.

Dr Morton asked that any further discussion on a two centre model (and indeed any model) should look at two options for Glasgow – SGH vs RHSC, Edinburgh and RHSC, Glasgow vs RHSC, Edinburgh.

Dr Eunson asked that the final report contained a statement allowing neurosurgeons to operate in any of the four centres if life was at risk. The Chairman indicated that this would be the case.

Dr Morton informed the working group that the transfer of all paediatric accident & emergency services to RHSC, Glasgow should not be overlooked when looking at the options, particularly with respect to which would be the preferred Glasgow option (ie SGH vs RHSC).

12. AOCB

(a) Staffing and technical implications

Dr McWilliams tabled a paper outlining some of the issues that changes in service delivery for neurosurgery patients might raise (paper appended). Neurologists and neurosurgeons would need to work in a complimentary way and there would need to be considerable development of electronic data transfer and imaging protocols. There would also need to be an increased input from nurse specialists.

It was pointed out that maintaining the status quo would also have significant resource implications.

There followed a debate about the role of paediatric neurologists and neurosurgeons in the care of paediatric neurosurgical patients. Different models seemed to be in operation in each centre - from complete shared care in RHSC to primarily neurosurgeon only care in INS, Glasgow.

13. Date of next meeting

Monday 24th September, 2001 at 10am in the Royal College of Surgeons of Edinburgh.

GH 9/2001

SCOTTISH COLLEGES COMMITTEE ON CHILDREN'S SURGICAL SERVICES
PAEDIATRIC NEUROSURGICAL WORKING PARTY
NOTES FROM MEETING 24 SEPTEMBER 2001 RCS EDINBURGH

MEETING 5

Present

Professor G G Youngson, Consultant Paediatric Surgeon (Chairman), RACH, Aberdeen
 Mr Eric Ballantyne, Consultant Neurosurgeon, Ninewells Hospital, Dundee
 Mr Iain Bashford, Senior Medical Officer, Scottish Executive
 Miss Jennifer Brown, Consultant Paediatric Neurosurgeon, SGH, Glasgow
 Ms Caroline Currie (Vice. Lesley Cleminson), Action for Sick Children, Scotland
 Dr Paul Eunson, Consultant Paediatric Neurologist, RHSC, Edinburgh
 Dr Martin Kirkpatrick, Consultant Paediatric Neurologist, Ninewells Hospital, Dundee
 Mr Ken Lindsay, Consultant Neurosurgeon, SGH, Glasgow
 Mrs Winnie Miller, Clinical Services Manager (Surgery/Anaesthesia), RHSC, Glasgow
 Ms Louise Ogilvie, Association of Local Health Councils
 Dr David Simpson, Consultant Paediatric Anaesthetist, RHSC, Edinburgh
 Mr James Steers, Consultant Paediatric Neurosurgeon, RHSC, Edinburgh
 Mr David Currie, Consultant Neurosurgeon, Aberdeen Royal Infirmary
 Professor Donald Hadley, Consultant Radiologist, SGH, Glasgow
 Professor Gillian Needham, Lead Dean in Neurosurgery, Scottish Council for
 Postgraduate Medical and Dental Education, Aberdeen
 Dr Ann Burke, Consultant Anaesthetist, SGH, Glasgow

1. **Apologies**

Apologies were received from Mr Jonathan Best, Miss Lynn Myles, Mr Graham Haddock, Dr Neil Morton, and Mrs Sarah Johnstone.

2. **New Members**

The Chairman welcomed Professor Needham, Caroline Currie, and Ann Burke to the meeting.

3. **Minutes**

Minutes of the previous meeting of 24 July 2001 were accepted with the following amendments:-

Page 2 para 9 line 4 – NCSAG to read NSD.

Page 3 para 3 – to read “reported – this has now been discontinued as current surgical practice.”

Para 6 line 4 – “Weas” to read “was”

4. **Matters Arising Not on the Agenda**

Dr Bashford confirmed that the target audience for the open meeting required further clarification and apart from support groups and non-medical personnel the Department of Health had undertaken to contact all units potentially involved in Paediatric Neurosurgery.

5.

SASM

Data on paediatric deaths in the post-operative period in Scotland were received from the SASM office from Mr Stonebridge.

In summary, the accumulated two year total of post-operative childhood deaths comprised 55 deaths with 23 of the 55 relating to diseases or treatment on the central nervous system.

It was not possible to identify from the data whether those cases where an adverse incident was highlighted related to the CNS deaths and although useful data this did not deflect the need for a detailed database in Paediatric Neurosurgery.

6. **Interface with Other Specialties**

Professionals Allied to Medicine

Due to a last minute communication breakdown Miss Crampton was unable to attend the current meeting but is expected at the Open Day presentation.

Postgraduate Education

Professor Gillian Needham addressed the working group, highlighting the mismatch between consultant numbers required for implementation of the European directive and the current numbers of SpR's in training in General Neurosurgery. It was recognised that all SpR's receive a minimum of six months in Paediatric Neurosurgery but specialist Paediatric Neurosurgery requires a further one year attachment and there were no such SAC approved posts in Scotland, with only four SpR's in Paediatric Neurosurgery within the entire UK.

It was apparent that a single centre model might well meet the requirements for a Specialist Registrar in Paediatric Neurosurgery within Scotland. Nonetheless, a current training pattern was recognised as adequate but could definitely be improved in a variety of ways, most of the tension in training coming from the split site nature of the current centres. Scottish training is currently fortified with liaison with hospitals abroad, notably Toronto Sick Children's and Paris, and this collaboration facilitated succession planning for Scottish Paediatric Neurosurgery. At the present time only five consultants in the United Kingdom have a pure Paediatric Neurosurgical practice, whereas 19 consultants belong to the British Paediatric Neurosurgical group.

Mr Steers agreed to supply the Chairman with a breakdown of supply and demand, recognising that the demand equation is currently ill defined, but that by the year 2011 the current supply would result in substantial shortfall.

Other influences, including utilisation of mid grade staff needing to change and the current saturation of training capacity, were highlighted by Professor Needham. Although there are 180 consultants in the United Kingdom in General Neurosurgery and the current supply and demand in Scotland is sufficient, it was felt that training would benefit from a single site conclusion from the working party.

7. **PICU ANALYSIS**

In the absence of Dr Morton, Dr Simpson spoke to the data previously presented, indicating that this data needed to be factored by capacity considerations and that a mean bed occupancy of 60% was considered the norm. As such, therefore, the expected bed usage for Paediatric Neurosurgery in Scotland comprised a total of 672 bed days. It was recognised, however, that although this was approximately three beds per year in Scotland this constituted significant throughput of work and hence significant ongoing training opportunities and investment in skill mix for both nursing and medical staff, given the high demand on care that such patients require.

8. **SWOT ANALYSIS OF CURRENT CENTRES**

Members of the working party presented their view of the relative advantages and disadvantages from their own centre.

DUNDEE: ERIC BALLANTYNE

Strengths	Weaknesses
<ul style="list-style-type: none"> Neurosurgery and Neurology in Paediatric environment within an adult hospital. Adjacent radiotherapy and imaging facilities. Good air/rail travel routes 	<ul style="list-style-type: none"> Only three consultant neurosurgeons No paediatric intensive care unit Neuropathology offsite General radiology – no specialist paediatric neuro-radiology
Opportunities	Threats
<ul style="list-style-type: none"> Expansion on large green field site 	<ul style="list-style-type: none"> Already low volume practice – loss of volume may result in closure of paediatric activities.

ABERDEEN

Strengths	Weaknesses
<ul style="list-style-type: none"> Single campus – all specialties/imaging/trauma centre status Good air ambulance Established practice in telemedicine Strong paediatric anaesthesia service with good linkages into other sub-specialties, e.g. endocrinology Established outreach practice Paediatric hospital with co-located adult hospital Transferrable skills from adult practice 	<ul style="list-style-type: none"> Size of unit (three consultants) – no PICU and adult ITU diffident concerning care of young children Separation of Children's Hospital and adult hospital (soon to be rectified with new Children's Hospital) Paediatric caseload intermittent No paediatric neurology on site General paediatric nurses look after complex neurosurgical problems No specialist paediatric neurosurgeons
Opportunities	Threats
<ul style="list-style-type: none"> Networking with a Scottish Paediatric institute with improved arrangements in communications 	<ul style="list-style-type: none"> Loss of status Recruitment/retention Adverse impact on viability of other services, e.g. Oncology Loss of elective throughput adversely affects emergency skills Adjacent services often single handed (Oncology)

INSTITUTE OF NEUROSCIENCES (SGH)

Strengths	Weaknesses
<ul style="list-style-type: none"> • Volume • Neurosciences environment • Imaging • Telemedicine • Nursing (paediatric ward and outreach nurse) • Medical Cover (no split site cover – all staff in house, specialist midgrade staff) • Neuro-anaesthesia and supporting services • Links with paediatrics and medical specialties • Capacity on site • Good family services • Contribution to national audit • Preferential access for children within an adult system 	<ul style="list-style-type: none"> • No paediatric intensive care unit • Paediatric practice in Glasgow split between Yorkhill and INS – of particular concern in the case of multi-trauma • Laboratory services • Shunt care on two sites
<u>Opportunities</u>	<u>Threats</u>
<ul style="list-style-type: none"> • Reconfiguration of paediatric services within Glasgow/?future of Yorkhill site: relocation of ENT from Victoria Hospital and Maxillofacial Surgery from Canniesburn 	<ul style="list-style-type: none"> • Loss of expertise of current elective load and failure to utilise existing expertise if service relocated

EDINBURGH

<u>Strengths</u>	<u>Weaknesses</u>
<ul style="list-style-type: none"> • Environment • Close working of Neurology and all medical specialties with Neurosurgery • PICU/HDU and retrieval services • Full clinical services for children • Seamless pathway of care • Three paediatric neurosurgeons • Follow-up multi-disciplinary • Good research record (head injury, non-accidental injury, shunts and hydrocephaly, epilepsy, movement disorder) • Multi-disciplinary Neuro-Oncology team covering South-East Scotland • Paediatric Neuro-Radiology, MR/CT on site • Links with paediatric orthopaedic spintal surgery • Specialist paediatric neuro nurses and PAMS 	<ul style="list-style-type: none"> • Neurosurgical consultants based at WGH only one day a week when consultant is not at RHSC • No neurosurgical trainees on site although attend for ward rounds • Angiography not on site • Radiotherapy at WGH • Age location of hospital • Neurosciences – only 12 beds • Population base in central belt
<u>Opportunities</u>	<u>Threats</u>
<ul style="list-style-type: none"> • Possible move to new site • University campus also move to new site with academic collaboration • Spare capacity in ITU • Increase in activity would allow SpR training 	<ul style="list-style-type: none"> • European working time directive • Viability of PICU • Threatened viability of other tertiary services • Loss of major cases would be de-skill unit

ROYAL HOSPITAL FOR SICK CHILDREN GLASGOW

Strengths	Weaknesses
<ul style="list-style-type: none"> • Strong paediatric infrastructure • Medical Cover • Links with paediatrics and medical specialties • Comprehensive paediatric neurology service and rehabilitation services on site including physiotherapy, speech and language therapy and combined care initiative team • Community care integrated with secondary, tertiary and primary care in this Trust • On-site comprehensive multidisciplinary child and family centred care environment • The only centre recognised for paediatric intensive care training in Scotland • Specialist paediatric nursing including specialist paediatric and neonatal intensive care trained nurses. • Imaging • Telemedicine • Paediatric and neonatal anaesthesia and supporting services • Capacity on site to expand theatre, intensive care and high dependency care • Excellent family services and accommodation specifically designed for families on site • Contribution to national audit • Shared care already exists for tumours including endocrine tumours • Strong specialist paediatric pain management service • Chronic pain, palliative care and symptom control services on site 	<ul style="list-style-type: none"> • No paediatric neurosurgeons on site • Paediatric practice in Glasgow split between Yorkhill and INS – of particular concern in the case of multi-trauma • Shunt care on two sites, with the Yorkhill shunt surgery carried out by paediatric general surgeons • Radiotherapy is offsite in the Beatson Oncology Centre
<u>Opportunities</u>	<u>Threats</u>
<ul style="list-style-type: none"> • Provision of comprehensive neurosurgical care for elective and emergency work including perioperative care, surgery, intensive care, high dependency care, rehabilitation would be possible with capital investment in theatre, PICU/HDU which are already being planned to open in the next 2 years • Joint appointments in neurosurgery, anaesthesia, intensive care and radiology would allow transfer and development of neurosurgical service within a specialist Children's hospital within 5 years whilst maintaining contact with the adult neurosciences environment. The proviso for any such appointments would be a commitment to move paediatric neurosurgery to Yorkhill and to develop the service into the envisaged single centre model. 	<ul style="list-style-type: none"> • Multiple injured patient with a head injury would have to be transferred. • Development of a children's service outwith a specialist children's hospital goes against all current guidelines

The Chairman went on then to present a SWOT analysis of a one or two centre model. It was accepted, however, that irrespective of the numbers of lead centres that the future service should be within the overarching structure of managed clinical network and all that that entails, viz.:- named lead clinician, annual report, identified standards, protocols for referral and practice, improved communication, robust data collection.

There was discussion over the particular problems of two centres immediately adjacent within one city, i.e. Yorkhill and Southern General Hospital with the difficulties of split site working for the neurosurgical staff, having to attend neurosurgical patients within the Yorkhill environment, and conversely the difficulties faced in transferring patients from Yorkhill to Southern General for neurosurgical care, particularly following polytrauma. It was acknowledged that this dilemma is being addressed within Glasgow at the present time. It was also, however, equally acknowledged that the working party report may have a role in facilitating such a change.

MCN WITH TWO CENTRES (RHSCE AND ONE UNIT IN GLASGOW)

<u>Strengths</u>	<u>Weaknesses</u>
<ul style="list-style-type: none"> • Managed aspect of MCN allows identification of outcome/standards • Retains existing expertise in current locations • Would improve training • Maintains two PICU's 	<ul style="list-style-type: none"> • Does not address split site working in Glasgow or Edinburgh • Reduces numbers in each centre • Manpower and staffing problems • Reduplication of resources • Fails to optimise training opportunities
<u>Opportunities</u>	<u>Threats</u>
<ul style="list-style-type: none"> • Improved transfer arrangements • Allows disease specific treatment plans • Improves skill mix in existing centre 	<ul style="list-style-type: none"> • Two autonomous units • Disables two small volume sites and results in no substantial change in service

MCN WITH ONE LEAD CENTRE

<u>Strengths</u>	<u>Weaknesses</u>
<ul style="list-style-type: none"> • Optimises critical mass • Allows good outcome and standards analysis • Optimal manpower utilisation • Optimal training opportunity • Optimal resource utilisation 	<ul style="list-style-type: none"> • Loss of available skills in unused centre • Travel for approximately 100 operations and 200 patients • Dislocation of adjacent services (Oncology/Neurology)

<u>Opportunities</u>	<u>Threats</u>
<ul style="list-style-type: none"> • Research and development • Intensive development of skill mix 	<ul style="list-style-type: none"> • Alienation/elitism • Inadequate capacity • Medical hazards of centralisation, e.g. MRSA infection in one unit, disabling entire national service • Sustainability of two PICU's (depending upon location)

The Chairman then asked the committee to discuss these issues but in preparation highlighted the current operative activity in Scotland extracted from data provided by the working party members.

<u>Diagnosis</u>	<u>RHSCE</u>	<u>RHSCG</u>	<u>SGH</u>	<u>Aberdeen</u>	<u>Dundee</u>	<u>Total</u>
Tumours,	20	-	20	5	3	48
Trauma	31	-	15	5	8	59
Hydrocephaly	64	76	65	12	18	235
Cranio-facial	25	-	12(37)	1	-	38↑
Epilepsy	6	-	3	-	-	9
AVM	3	-	3	-	1	7

There was a total, therefore, of 394 cases. There was discussion of the apparent disparity between craniotomy for trauma in the west of the central belt and the east. It would appear the figures from the Southern General Hospital are an under estimate and probably relate only to the need for emergency craniotomy.

The more important points, however, are that cases concerning trauma care, hydrocephaly management, cranio-facial surgery, epilepsy and AVM are unlikely to change in a substantial way numerically irrespective of the model of reconfiguration chosen.

It is recognised that emergency paediatric neurosurgery will need to be implemented at local sites if life threatening haematomas require evacuation. Similarly, the current pattern of neonatal intensive care is such that closure of spinal defects and shunt surgery is likely to continue on site although resolution of the two site practice in Glasgow was again discussed.

Cranio-facial surgery requires deliberation outwith the context of paediatric neurosurgery and the continuation of small volume epilepsy and AVM surgery benefits from the transfer of adult skills and does not per se require to be transferred outwith Scotland to a larger supra-specialist centre.

In essence, the difference numerically between a single site and double site MCN is restricted to a small proportion of operative cases including all tumours and some of the complex trauma and hydrocephaly work. It was emphasised, therefore, that the gain in reconfiguration must not exceed the cost of such relocation in terms of quality of existing practice. T

The Chairman indicated to the group that, whilst intuitively a single centre has appeal, the profile of activity of a single centre from the current arrangement is not as different as may be apparent at first sight. The working party in general agreed that the presence of a two site model conferred little advantage over current practice, and in particular Aberdeen and Dundee did not favour as an intermediary step for fear of the potential that the process would in due time fail to translate into a one site option. Whilst this was a view expressed it was not a unanimous view of the working party.

The episodic nature of neurosurgical care was once again emphasised as often constituting an isolated episode of care in an otherwise complex multi-disciplinary care pathway, and the need for an holistic approach to neurosurgical care was emphasised by Dr Eunson.

9. **NURSING CONSIDERATIONS**

Mrs Miller intimated the results of her contact with the Scottish Paediatric nurses dealing with children throughout Scotland. There were a number of areas of concern. The predominant points were as follows:-

- Difficulty in achieving a match between paediatric skills and specialist neurosurgical skills.
- The intimidating environment of a specialist intensive care unit for an RSC intake out of a ward situation in order to meet the standards of RSC and presence in recovery/X-ray/PICU.
- The skill mix similarly was extremely difficult to obtain and there is a noted deficiency in training courses. The centralisation of paediatric neurosurgery may allow development of such but currently there is little collaboration between centres and no academically accredited courses within Scotland.
- Competence – Nurses expressed a sense of vulnerability in issues concerning child protection, drug administration (when in a non-paediatric centre) and paediatric resuscitation when non-paediatric nurses are requested to look after children. It was noted, however, that RSCN's cover in excess of 90% of patients currently cared for in Scotland in a paediatric neurosurgical setting.

10.

TASK LIST REVIEW

The Chairman identified the task list completed.

- Remit completed.
- Problem definition completed.
- Need for change completed.
- Current provision completed.
- Implications for change ongoing.
- Communications with the relevant specialties completed.
- Consideration of manpower implications completed.

Remaining tasks –

- Decision and outcome.
- Recommendations.
- Preparation of draft report. This will be circulated by the Chairman on 19 October with responses requested by either e.mail or hard copy return, highlighting amendments by 02 November. Corrected version to be redistributed by 23 November and a final document ready for meeting on 26 November in Glasgow.

11.

ARRANGEMENTS FOR OPEN MEETING

The Chairman confirmed the final arrangements for the open meeting, noting that neither Mr Glen Lyle nor Mr Tom Beattie had responded. Dr Roslyn Wilkie will make a presentation on Oncology on behalf of Dr Hamish Wilson.

12.

DATE OF NEXT MEETING

26 November in Glasgow – This will be the final meeting with discussion on the report.

GEORGE G YOUNGSON, PhD FRCS
Professor in Paediatric Surgery
Chairman SCCCSS

GGY/MKG/SCCSS
25 September 2001

Meeting 7

Minutes of Paediatric Surgical Working Party Meeting of 26th November, 2001
Held In The RCPS of Glasgow

Present:

Mr Eric Ballantyne - Consultant Neurosurgeon, Ninewells Hospital, Dundee
Mr Iain Bashford - Senior Medical Officer, Scottish Executive
Mr Jonathan Best - Chief Executive, RHSC, Glasgow
Miss Jennifer Brown - Consultant Paediatric Neurosurgeon, SGH, Glasgow
Miss Lisa Crampin - Speech Therapist, Glasgow Dental Hospital, Glasgow
Dr Paul Eunson - Consultant Paediatric Neurologist, RHSC, Edinburgh
Mr Graham Haddock - Consultant Paediatric Surgeon, RHSC, Glasgow
Professor Donald Hadley - Consultant Radiologist, SGH, Glasgow
Mrs Sarah Johnstone - Area Co-ordinator, Dundee
Dr Martin Kirkpatrick - Consultant Paediatric Neurologist, Ninewells Hospital, Dundee
Mr Ken Lindsay - Consultant Neurosurgeon, SGH, Glasgow
Miss Lynn Myles - Consultant Paediatric Neurosurgeon, WGH, Edinburgh
Dr Neil Morton - Consultant Paediatric Anaesthetist, RHSC, Glasgow
Ms Louise Ogilvie - Association of Local Health Councils
Mr David Simpson - Consultant Paediatric Anaesthetist, RHSC, Edinburgh
Mr James Steers - Consultant Paediatric Neurologist, RHSC, Edinburgh
Professor George G. Youngson - Consultant Paediatric Surgeon, Aberdeen (Chairman)

Introduction

The Chairman welcomed everyone and indicated that we would go through the agenda as previously intimated. Thereafter, we would go through the draft report on a page by page basis.

Apologies

Mrs Winnie Miller - Clinical Nurse Manager, RHSC, Glasgow and Mr David Currie - Consultant Neurosurgeon, Aberdeen Royal Infirmary, Aberdeen

Minutes of the Previous Meetings

A. Meeting of 24th September 2001

A SWOT analysis of the Royal Hospital for Sick Children, Yorkhill has been added to the minutes.

Item 11 Amend to read Mr Glen Lello.

Otherwise, the minute was deemed to be accurate. The Chairman made the meeting aware that the SASM data on paediatric deaths would be available for members to take away at the end of the meeting.

The Chairman asked the meeting to validate the paragraph that immediately follows the RHSC, Yorkhill SWOT analysis. Miss Brown initially dissented from this statement but subsequently accepted that the phrase "and all that entails" broadened the sense of the paragraph to her satisfaction. Professor Hadley asked whether we should add in a statement about the possible cost of running a managed clinical network to this paragraph. The Chairman referred the group to the CMO's clear remit which had not changed, namely that the working party should look to a two centre model for the provision of paediatric neurosurgical care moving to a one centre model and that this move should be resource neutral. We have previously indicated to CMO the difficulties associated with this expectation.

Section 8 - 2nd Last Paragraph

Dr Kirkpatrick re-emphasised the Dundee and Aberdeen view of the lack of advantages of the intermediary step before achieving the one centre model.

B. Notes from the Stirling Meeting - 5th October 2001

The Chairman indicated that he had received correspondence from various sources following this meeting. The aim of the meeting, which had been to extend discussion to other interested groups, had not been achieved and the Chairmanship of the meeting had been criticised. Some of this criticism was levelled at a feeling that discussion had been stifled. There was also a perception that some of the presentations were lacking in accuracy. The neutrality of the working party has also been challenged. As such the Chairman felt that this meeting did not fulfil the working group's

expectations.

Review of Draft Report

Page 1. Accepted Page 2 The order of the contents of the report have been changed. Conclusions / Recommendations now appear at the end of the report. Page 3 Accepted Page 4 The Chairman was keen to include the diversity of opinion in this section. Another group will have to look at the implications of this and take the work forward. Mr Lindsay requested that the group re-emphasise that any change would not be resource neutral. The Chairman agreed to add this sentiment to the end of the last paragraph on this page.

Page 5 - Paragraph 2

Dr Morton indicated that the intensive care beds in the Southern General Hospital were not nationally funded and asked that this be highlighted. The Chairman referred to the recommendation of the SPICA report of 24 PICU beds for Scotland. The DOH has accepted that there is a need for 25 PICU beds per million children in the population. At the present time only 10 beds are funded centrally. The SCCCSS parent committee is planning to formulate an application to NSD for national funding for all PICU beds in Scotland. The Nursing Board of Scotland has been asked to input into this process. 25 beds for Scotland equates to 90% cover and is based on two PICU's and not three PICU's as at present. Mr Haddock reminded the group that two of the beds at the Royal Hospital for Sick Children in Edinburgh were currently double funded following the transfer of cardiac surgery services to Glasgow. This funding would fall in the spring of next year. Alternative funding would have to be sought to maintain these two beds in RHSC, Edinburgh.

Page 6 - Bullet Point 2 (Bottom of Page) It was suggested that the Middle-Grade cover referred to in this sentence was a training issue rather than a service issue although it seems clear that Middle-Grade Staff occasionally operate on teenagers unsupervised in Glasgow when they reach an appropriate level of expertise.

Page 7

The Chairman indicated that he had deliberately kept reference to other documents limited. Page otherwise accepted.

Page 8 - 2nd Paragraph

The term "Professor of Oncology" should be replaced with "Clinical Oncologist".

Page 8 - 3rd Paragraph

Dr Morton made the group aware that the outreach anaesthetic provision for the Beatson Oncology Centre was currently resourced separately by the Greater Glasgow Health Board.

Page 8 - Final Paragraph

The words "Emergency" and "Elective" should be transposed and in the second last sentence the word "none" should be replaced with "three". Dr Eunson asked how many paediatric anaesthetics would need to be administered to be regarded as maintaining paediatric anaesthetic skills. Dr Simpson indicated that current recommendations were that the anaesthetist should perform one paediatric list per week as a minimum but that the Royal College of Anaesthetists' guidelines have recently been widened to be more flexible. Miss Brown indicated that in the Southern General there were two paediatric operative lists and one paediatric imaging list per week which allowed the three anaesthetists concerned to maintain their skills.

Page 9 - 2nd Paragraph

Mr Best made the group aware that paediatric ENT would be unlikely to be moving to the Southern General Hospital but would be more likely to revert to the Royal Hospital for Sick Children in Glasgow. He indicated that this was a consequence of the visit of the Child Health Support Group and pressures from anaesthetic professional groups. The decision however has not yet been finalised. The term "Craniofacial" should be replaced with "Maxillofacial".

Page 9 - 3rd Paragraph Miss Myles informed the group that she had recently changed her job plan to allow her to undertake two further sessions at the Royal Hospital for Sick Children in Edinburgh which leaves only two half days uncovered.

Dr Eunson asked that the word "expose" in the 3rd last sentence in paragraph 3 be changed to "maintain". Dr Bashford suggested that the phrase "continuing vulnerability" would be more appropriate.

Page 10

Accepted

Page 11 - Section 6

The 1st sentence should read "there are several relevant issues prevailing on the NHSiS which will force a review of current practices and patterns of work as we currently know them".

Page 12

Table at the bottom of the page is inaccurate. The figure 27 in the RHSCG column relates to neonates. The total number

of patients should be nearer 80. Mr Haddock undertook to clarify this and pass the accurate data to the Chairman. The heading in the last column of this table was to be changed.

Page 13

There was a lot of discussion in the group on the implications for Scottish Paediatric Intensive Care Units. The Chairman reminded us that we had been asked to preserve the viability of two PICU's when taking our decision. Dr Simpson indicated that moving neurosurgery to Glasgow would reduce PICU activity in Edinburgh by 25%. Dr Morton indicated that bringing ventilated bed bays upto 300 per year had implications for training recognition.

Page 14

The word "troughs" should be removed from the first line.

Page 15

Accepted

Page 16

Accepted

Page 17

Dr Kirkpatrick questioned the correctness of the sentence relating to a disease-based network. The Chairman undertook to change this.

Page 18 - Paediatric Neurology Section (Last Paragraph) The word "into" should be replaced with the word "the". The definition of "complex" with respect to Craniofacial surgery is not clear therefore the numbers are not clear. The team at Glasgow undertakes an average of 12 complex cases per year. Edinburgh undertakes 2 syndromic cases plus an unclear number of other complex cases per year. Miss Myles undertook to clarify this number for the Chairman. Dr Morton summarised this by indicating that this equated to one to two cases per month in Scotland.

Page 19 - Child Protection Section (4th Paragraph)

Re-write to read "reflects a lower morbidity than seen elsewhere in the United Kingdom" and the following sentence should read "having a motor deficit" and not a "water deficit".

Page 19 - Nursing Section

There was some discussion about the effect of nurses having to work out of their own environment. Many nurses find this intimidating. It was also suggested that nurses are less likely to move when services of this nature relocate. Dr Morton reminded the group of governance issues relating to asking nurses to work in an unfamiliar clinical area. The Action for Sick Children recommendations were reaffirmed at this point - in other words children should be nursed at all times by qualified children's nurses. Dr Simpson suggested that an adult ITU with an RSCN in attendance may not provide the necessary skill mix to adequately care for a child. The Chairman suggested that it might. Dr Morton then suggested the supervision of such a nurse should be a PICU RSCN Nurse.

Page 19 - Last Sentence

This should read "head trauma" and not "a head". The word "in" should also be removed.

Page 20

Accepted

Page 21

Capability Scotland has apparently gone back to the drawing board with respect to their own plans. Radiology and Pathology are under considerable pressure in terms of recruitment at the present time and it was hoped that the report would help with this. The impact of changes on PAMS services should not be underestimated. It was also made clear that any PAMS enrolled in the care of children should be paediatric to be trained in paediatric work. Mr Ballantyne wondered whether the statement about paediatric pathology was spurious. An adult neuropathologist does all neuropathology in kids. It was agreed to remove this sentence.

Page 22

Accepted

Page 23

Dr Kirkpatrick challenged the last sentence in the penultimate paragraph. He wondered where we balanced the benefits verses deficiencies in centralisation for example surgery for AV malformations and epilepsy would benefit from centralisation but for other conditions this does not seem to be clear. For immediate trauma care there does not seem to be any benefit of centralisation and all four centres will need to keep up adequate skills to allow this to continue. Secondary trauma care would benefit. Tumour surgery would benefit. For surgery for Hydrocephalus there was not thought to be any benefit. The number of cases of AVM and Epilepsy going to surgery were so small that no one person would gain enough experience across Scotland. AVM's may present as an emergency with bleeding. Mr Haddock wondered whether the skills of adult neurosurgeons in this area would be easily transferable to children

and the neurosurgeons in the group agreed that this was the case. The last sentence in the last paragraph was removed.

Page 24 - Conclusions

1. Accepted.
2. Decision was deferred until later in the discussion
3. Accepted with an additional comment about on-going training and experience.
4. Accepted.
5. Accepted but only if the 3 ICU beds were on a single site.
6. Accepted.
7. Accepted.
8. Accepted.
9. Accepted.
10. Remove the first sentence.
11. This recommendation to be deleted.
12. The word "research" to be removed from this conclusion and the sentence "that may benefit research" to be added.
13. Add "co-located with an adult site and clinical governance under the auspices of the European Directive on Working Time" and the word "most" to be added-in before "effectively".
14. Accepted.
15. Add "Paediatric Neurology".

Page 25 - Recommendations

1. Deferred following further discussion.
2. Deferred following further discussion.
3. Add-in co-location with an adult service.
4. Accepted.
5. Accepted.
6. Accepted.
7. Accepted - The section on SASM should be expanded.
8. Remove the word "life-threatening" and reword.
9. Accepted.
10. Accepted.
11. This should be changed to indicate there might be some benefit to neurosurgery.
12. Accepted
13. Paediatric Neurology to be added-in.

The Chairman then asked each member of the group to indicate their preference for a single site, a two site, an MCN or a status quo model. He also asked the members of the group to consider where the single centre should be if this was their preference. Mr Lindsay - one site co-located with an adult unit. The centre, which co-locates first, should be asked to undertake the national role. Professor Hadley - one site. Miss Brown - maintain the status quo with all four sites maintained. Mrs Sarah Johnstone - one site. Louise Ogilvie - one site. She suggested that we should move directly to this model. Paul Eunson - one site in Edinburgh but was not keen to do the politicians work for them. Mr Ballantyne - managed clinical network. Neil Morton - one site based in a children's hospital. Dr Simpson - one site. Mr Steers - one site co-located with an adult service. Paul Eunson - managed clinical network with one lead site. Miss Myles – managed clinical network with lead site. Jonathan Best - managed clinical network. Graham Haddock - managed clinical network with RHSC, Glasgow as the lead site.

The Chairman attempted to summarize this by suggesting that the majority were of the view that a single centre should be the long-term goal but there was no consensus on the interim step. Further work on models of managed clinical network will require firm management. The effects of this will have an impact across many services in Scotland. The deferred conclusions and recommendations were then accepted with no alterations.

Item 5 The Chairman indicated that the final draft of the report would go to the Chief Medical Officer initially and then to the Scottish Colleges Committee on Surgical Services and the Academy of the Scottish Royal Colleges. Copies would be sent to the Presidents of the Royal Colleges and the Royal College of Paediatrics and Child Health. The next stage would be the establishment of an implementation steering group with a view to establishing a managed clinical network as an interim step. A clinical lead would require to be appointed with an early appointment of managerial support.

The Chairman then thanked all those present for their work. He acknowledged that this process had been rather difficult and undertook to circulate the amended conclusions and recommendations to the group for final consideration.

Appendix 3

Current activity Data

Template used for data collection

(based on Scottish Paediatric Neurosurgical Services Survey)

1. Zoning of Children	a) In a Children's Hospital	Yes	No
Inpatient Beds for Children	General Paediatric Ward Designated Neurosurgery Dedicated Neuro ITU		
	b) In a General Hospital		
	General Paediatric Beds As part of Neurosurgical unit No specific Paediatric Provision ITU Paediatric Availability RSCN's at all sites treating children		
2. Availability of other specialties on site of inpatient paediatric beds			
		Yes	No
Paediatric Medical Neurology			
Paediatric Anaesthesia			
Paediatric Oncology			
Paediatric Radiology			
Paediatric Neuropathology			
Paediatric Orthopaedics			
Paediatric Surgery			
Paediatric Plastic Surgery			
Paediatric Maxillo-facial Surgery			
Genetics Service			
3. Neurosurgical Staffing			
		Yes	No
Paediatric Neurosurgeons Full Time			
Paediatric Neurosurgeons with combined adult practice			
Neurosurgeon no elective paediatric practice on call cover			
Neurosurgical Trainee opportunity			
Arrangements for SpR/SHO cover			
Neurosurgical SpR			
Paediatric SpR			
Neurosurgical SHO			
Paediatric SHO			
4. Case Load			
		Number	
Admissions /year			
Operations/year			
5. Operative Case Mix			
		Number	
Hydrocephalus	EVD/Access Device Endoscopic ventriculostomy Primary Shunt Insertion Shunt Revision Theco-peritoneal Shunt Shunt Other		
Trauma	Extradural Haematoma Acute Subdural Haematoma Intracerebral Haematoma Chronic Subdural Haematoma/Hygroma		

Depressed Fracture
Growing Fracture
ICP Monitoring

Tumours

Supratentorial
Infratentorial
Stereotactic Biopsy

Infection

Intracranial Abscess
Spinal Abscess

Spinal

Dermal Sinus
Meningocele
Myelomeningocele
Tethering Syndromes
Tumours
Stabilization Procedures

Craniofacial Surgery

Single Suture Synostosis
Syndromic Synostosis
Anterior Encephaloceles

Functional

Epilepsy
Spasticity

Vascular

AVM
Aneurysm
Cavernoma

6.Head Injury Policy

Admit all head Injuries
Admission based on presence or absence of
Depressed Fracture
Defined Haematoma
Conscious Level (GCS)
Neurological Deficit

Yes

No

7.Hydrocephalus Policy

Treat all cases in referral Area
Treat Selected Patients
No input to cases from outside neurosurgical unit

Yes

No

8.General Issues

If the paediatric unit is remote from the adult unit, allowing for the Working Hours Directive and regulations for Junior Doctor's Hours

Yes

No

Can a single on call team manage cover for out of hour's activity?
Require separate consultant cover for both hospitals
Require separate middle grade cover for both hospitals
Require an increase in Paediatric Neurosurgical Consultant Staff

Opportunities to attend Meetings of
BPNG
ESPN
ISPN

Unit contributes to
Shunt Audit
UKCCSG Registry
Cranio-facial Audit

Child and Family facilities

Y

N

Overnight accomodation for parents

Overnight accommodation for siblings

Parental access to anaesthetic room

Parental access to recovery room

Pre-admission programmes

Special facilities for adolescents

Dedicated paediatric list

Do you have a schoolroom

Do you have a full time teacher

Are your play workers qualified hospital play specialists

Is there play preparation for theatre day

Paediatric Neurosurgical Services Survey
EDINBURGH RHSC

2. Zoning of Children YES

Inpatient Beds for Children	a) In a Children's Hospital -	YES
	General Paediatric Ward -	NO
	Designated Neurosurgery –	YES - Ward 7 (Dept of Paediatric
	Neurosciences, jointly with paediatric neurologists)	
	Dedicated Neuro ITU -	YES
	RSCN's at all sites treating children -	YES
	b) In a General Hospital - NO	
	General Paediatric Beds	
	As part of Neurosurgical unit	
	No specific Paediatric Provision	
	ITU Paediatric Availability	

2.Availability of other specialties on site of inpatient paediatric beds

	Yes	No
Paediatric Medical Neurology	✓	
Paediatric Anaesthesia	✓	
Paediatric Oncology	✓	
Paediatric Radiology	✓(MRI &CT)	
Paediatric Neuropathology		✓at WGH (but frozen section service available by taxi)
Paediatric Orthopaedics	✓	
Paediatric Surgery	✓	
Paediatric Plastic Surgery	✓	
Paediatric Maxillo-facial Surgery	✓	
Genetics Service	✓	

3.Neurosurgical Staffing

	Yes	No
Paediatric Neurosurgeons Full Time		✓
Paediatric Neurosurgeons with combined adult practice	✓x 3	
Neurosurgeon no elective paediatric practice on call cover		✓
Neurosurgical Trainee opportunity	✓	
Arrangements for SpR/SHO cover –NB. We have a consultant led service with paediatric neurosurgeon consultant first on call for paediatric emergency referrals.		
	Yes	No
Neurosurgical SpR	✓	
Paediatric SpR	✓	
Neurosurgical SHO		✓
Paediatric SHO	✓	

Ward 7 at RHSCed is a joint neurology/neurosurgery ward (called Dept of Paediatric Neurosciences). Children are admitted under the care of a neurologist and neurosurgeon jointly. There is a 24hr a day 7 day a week consultant neurosurgeon on call. In addition to this there is a consultant neurosurgeon in the hospital all day Monday, Tuesday afternoons, Wednesday afternoons and Fridays. There are neurosurgery wards rounds each day. There are joint neurology/neurosurgery teaching ward rounds on Mondays and Fridays which everyone attends. In addition there are neuro -oncology meetings and neuroradiology meetings. If activity was to increase at RHSCed we would have to increase our sessions to provide a neurosurgery consultant in the hospital 9-5 each day plus on call. We would still find it an advantage to admit the children jointly with a neurologist as we find that this improves the quality of the general paediatric care these children receive and leads to seamless neurorehabilitation provision. (Rehab is provided by one of the paediatric neurologists).

4.Case Load

No. Admissions /year	1999 – 300 neurosurgical cases 2000 – 342 neurosurgical cases
Operations/year	1999 – 122 cases 2000 – 147 cases

5.Operative Case Mix

		Number
Hydrocephalus	EVD/Access Device	21
	Endoscopic ventriculostomy	3
	Primary Shunt Insertion	10
	Shunt Revision	28
	Theco-peritoneal Shunt	2
	Shunt Other	0
Trauma	Extradural Haematoma	3
	Acute Subdural Haematoma	6

	Intracerebral Haematoma	1
	Chronic Subdural Haematoma/Hygroma	2
	Depressed Fracture	4
	Growing Fracture	1
	ICP Monitoring	14
	Tumours	
	Supratentorial	12
	Infratentorial	6
	Stereotactic Biopsy	2
	Infection	
	Intracranial Abscess	3 (including subdural empyema)
	Spinal Abscess	1
Spinal		
	Dermal Sinus	0
	Meningocele	1
	Myelomeningocele	2
	Tethering Syndromes	3
	Tumours	2
	Stabilization Procedures	2 (1 halo fixation)
	Craniofacial Surgery	
	Single Suture Synostosis	22
	Syndromic Synostosis	3
	Anterior Encephalocele	0
	NB: PRIMARY C-F PROCEDURES, NOT INCLUDING TRAUMA	
	Functional	
	Epilepsy	6
Spasticity	11 (not including botulinum injection)	
Chiari		2
	Vascular	
	AVM	2
	Aneurysm	0
	Cavernoma	1
Misc		12

6.Head Injury Policy

	Yes	No
Admit all head Injuries		✓not into the neurosurgical ward
Admission based on presence or absence of (protocol)		
Depressed Fracture	✓	
Defined Haematoma	✓	
Conscious Level (GCS)	✓	
Neurological Deficit	✓	

All head injuries are admitted and treated in the RHSC but are dealt with according to an agreed protocol. Minor head injuries are admitted to a general surgical ward. Severe head injuries will be admitted to ITU/HDU under the care of a neurosurgeon. All head injuries with a fracture even if GCS15 are seen and assessed by a consultant neurosurgeon.

7.Hydrocephalus Policy

	Yes	No
Treat all cases in referral Area	✓	
Treat Selected Patients		✓
No input to cases from outside neurosurgical unit	N/A	

8.General Issues

	Yes	No
If the paediatric unit is remote from the adult unit, allowing for the Working Hours Directive and regulations for Junior Doctor's Hours		
Can a single on call team manage cover for out of hour's activity?		✓
Require separate consultant cover for both hospitals	✓	
Require separate middle grade cover for both hospitals	✓	
Require an increase in Paediatric Neurosurgical Consultant Staff	✓	
Opportunities to attend Meetings of BPNG	✓	all 3 paed surgeons are members of the BPNG
ESPN	✓	

Unit contributes to	ISPN	✓
	UK Shunt Audit	✓
	UKCCSG Registry	✓
	Craniofacial Audit	✓

Other facilities (Action for Sick Children)

	Yes	No
Overnight accommodation for parents	✓	
Overnight accommodation for siblings	✓	
Parental access to anaesthetic room	✓	
Parental access to recovery room	✓	
Preadmission programmes	N/A	
Special facilities for adolescents		✓ but newly appointed nurse
Dedicated paediatric list	specialist to look at facilities for adolescents across the trust.	
Do you have a schoolroom?	✓ 2/week (soon to be 3) + CEPOD lists for emergencies	
Do you have a full time teacher?	✓ each ward has its own multipurpose play / school room	
Are your playworkers qualified play specialists?	✓	
Is there play preparation for theatre day?	✓	
RSCN at all treatment points	✓	

**Paediatric Neurosurgical Services Survey
: Glasgow, INS Data**

1. Zoning of Children

	Yes	No
Inpatient Beds for Children		
a) In a Children's Hospital		N/A
General Paediatric Ward		
Designated Neurosurgery		
Dedicated Neuro ITU		
b) In a General Hospital		
General Paediatric Beds		No
As part of Neurosurgical unit	Yes	
No specific Paediatric Provision		No
ITU Paediatric Availability	Yes (Mixed adult + paed)	
RSCN's at all sites treating children		
Not exclusively, esp. theatre; nurses from children's ward available for support, eg accompany children in recovery room pre and post op		

2. Availability of other specialties on site of inpatient paediatric beds

	Yes	No
Paediatric Medical Neurology consultation available from Y'hill by request		notregularly,
Paediatric Anaesthesia	yes	
Paediatric Oncology	yes	
(weekly ward round at INS, combined neuro oncology clinic @ Y'hill)		
Paediatric Neuroradiology	yes	
Paediatric Neuropathology	yes	
Paediatric Orthopaedics		no
Paediatric Surgery		no
Paediatric Plastic Surgery		no
Paediatric Maxillo-facial Surgery	yes	
(present each week, combined craniofacial clinic)		
Genetics Service		no
(combined craniofacial clinic along with paediatric speech therapist)		

Services not present at SGH can come to INS on request from Y'hill.
Paediatric Neuroendocrinology normally shares care of craniopharyngiomas.

3. Neurosurgical Staffing

	Yes	No
Paediatric Neurosurgeons Full Time	yes (1)	
Paediatric Neurosurgeons with combined adult practice	yes (2)	
Neurosurgeon no elective paediatric practice on call cover	yes	
Neurosurgical Trainee opportunity	yes	

A four to six month intensive exposure to paediatric neurosurgery for senior SpRs has recently been established. This gives them confidence in opening the immature skull and exposes them to a variety of congenital conditions including complex hydrocephalus, gives a more concentrated experience in 'anatomical' tumours of the CNS, and allows them protected time for paediatric outpatient clinics. This intensive experience is passed on to more junior trainees at handover rounds and should improve the paediatric sensitivity of the whole body of trainees with time. The goal of this training period for the individual, is to reach competence in paediatric neurotrauma and hydrocephalus in line with SAC guidelines and the recommendation of Safe Paediatric Neurosurgery that all consultant neurosurgeons should be competent to manage these in emergencies..

Arrangements for SpR/SHO cover	
Neurosurgical SpR	yes, resident at all times
Paediatric SpR	yes, from SCBU @ SGH
Neurosurgical SHO	yes, resident at all times
Paediatric SHO	yes, from SCBU @ SGH

4. Case Load

	Number
Admissions /year	410
Operations/year	200

5. Operative Case Mix – see tables

6. Head Injury Policy

	Yes	No
Admit all head Injuries		no

Admission based on presence or absence of	
Depressed Fracture	yes
Defined Haematoma	yes
Conscious Level (GCS)	yes
Neurological Deficit	yes

Service supports tertiary referrals from Y'hill and secondary referrals from SGH and DGHs outwith greater Glasgow Health Board.

7. Hydrocephalus Policy

Treat all cases in referral Area	Yes	No
Treat Selected Patients	yes	no
No input to cases from outside neurosurgical unit		no

Consultation from paediatric surgeons re possible endoscopic treatment, complex shunts, and shunt patients leaving the paediatric age group is common. There is support on both Glasgow sites for the idea of a joint appointment to facilitate continuity of care for these patients and with a view to neurosurgeons taking on more (?all) of this work. At the same time neonates from SCBU @ SGH have sometimes been referred to the group at Y'hill if surgery is required before a minimum weight of 4kg is reached.

8. General Issues

If the paediatric unit is remote from the adult unit, allowing for the Working Hours Directive and regulations for Junior Doctor's Hours

-N/A

Can a single on call team manage cover for out of hour's activity?	Yes	No
Require separate consultant cover for both hospitals		
Require separate middle grade cover for both hospitals		
Require an increase in Paediatric Neurosurgical Consultant Staff		
Opportunities to attend Meetings of	BPNG	yes
	ESPN	yes
	ISPN	yes
Unit contributes to	Shunt Audit	yes
	UKCCSG Registry	yes
	Cranio-facial Audit	yes

Child and Family facilities

Y N

Overnight accomodation for parents	yes
Overnight accommodation for siblings	no
Parental access to anaesthetic room	yes
Parental access to recovery room	yes
Pre-admission programmes	yes

Teaching begins in out patients clinic which is staffed from the pool of RSCNs from the ward. Children are usually admitted Friday afternoon for surgery Monday. This allows them an opportunity to meet ward nurses and play leaders, and anaesthetists. Blood work is done at this stage and final consent discussed with parents and children of suitable age. Nursing staff go over perioperative procedures with parents and children of suitable age. Children in early teenage years are given a choice of adult (side room) or paediatric ward accomodation. Most children then go home for the weekend although those from remote regions may stay in hospital, going out during the day if they wish.

Special facilities for adolescents	no
Dedicated paediatric list	yes, 2/week
Do you have a schoolroom	no
Do you have a full time teacher	no
Are your play workers qualified hospital play specialists	yes
Is there play preparation for theatre day	yes

Children requiring prolonged in patient rehabilitation are few but this can be done by transfer to Y'hill or a paediatric ward at a DGH. We have a paediatric outreach nurse who is an invaluable liason with schools and community resources. She facilitates rehabilitation in the

community and makes home visits which may prevent the need for repeated trips back to hospital and may facilitate early re evaluation if there are concerns in the post operative or post injury period.

Paediatric Neurosurgical Activity 1996-2000

Table I: Procedures under General Anaesthetic

Age Group	1996	1997	1998	1999	2000
< 1 year	33	20	33	33	29
1-2	16	25	31	31	17
2-5	33	42	51	48	46
6-10	49	59	48	73	47
11-16	34	50	51	61	49
Total	165	196	214	246	193

Table II: Summary of Operative Procedures

Procedure	1996	1997	1998	1999	2000
Tumour	12	20	20	24	19
Trauma	15	11	13	13	16
Hydrocephalus	31	59	70	63	68
Complex synostosis *	11	12	14	12	12
other major	95	77	77	71	27
minor †	33	37	40	88	51
Total	165	196	214	247	193

* excludes single suture synostosis

† burr holes, EVD, tracheostomy etc

Table III: Detail of Operative Procedures

	1996	1997	1998	1999	2000
Hydrocephalus	31	59	70	63	68
Shunt Insertion	7	21	25	27	26
Shunt Revision	16	33	31	27	28
Endoscopic	8	5	14	9	11
Supratentorial Craniotomies	32	26	42	40	32
Infection	0	1	4	5	3
Tumour	4	11	14	17	10
Head Injury	13	9	9	10	16
Vascular	9	2	2	2	1
Arachnoid Cyst	2	1	5	2	2
Epilepsy	2	0	4	1	0
Craniosynostosis	32	28	22	18	14
Single Suture	21	16	8	6	2
Complex	11	12	14	12	12
Posterior Fossa	9	12	8	7	8
Tumour	8	9	6	7	5
Other	1	3	2	0	3

Spine	6	11	7	6	10
Dysraphism	1	4	5	0	5
Tumour	2	2	1	3	2
Other	3	5	1	3	3
Other Operations	22	23	25	25	16
Depressed skull fracture	16	12	11	8	0
Dermoid	2	2	1	0	2
Cranioplasty	1	4	4	6	2
Stereotactic Biopsy	0	2	4	4	4
Growing skull fracture	0	0	1	0	0
Chronic Subdural	3	3	3	2	1
Trans sphenoidal	0	0	1	1	1
Encephalocele	0	0	0	0	1
Chiari	0	0	0	0	2
Trans nasal biopsy	0	0	0	1	0
Laparotomy	0	0	0	1	0
Anterior fossa repair	0	0	0	1	0
Mastoidectomy	0	0	0	1	0
Antral washout	0	0	0	1	0
Tympanotomy	0	0	0	0	1
Minor Procedures (includes ICP, EVD)	33	37	40	88	49
Annual Totals	165	196	214	247	193

Imaging under General Anaesthetic 2000

Angiography	2
CT scan	33
MRI scan	80
Total	115
General Anaesthetics (Total)	308

Admissions, 2000

Ward	336
Intensive Care Unit	
elective	15
urgent	15
emergent	44
Total ITU	74
Total Admissions	410

Out Patient Appointments

Routine	99	new
	334	return
Craniofacial Clinic	165	
Neuro Oncology Clinic	59	
Total Outpatients	557	

Table IV: ITU Admissions by Age, 2000

Age Group	2000
<1	13
1 - 2	11
2 - 5	14
6 - 10	13
11-16	23
Total	74

**Scottish Paediatric Neurosurgical Services Survey
RHSC, Yorkhill, Glasgow**

3. Zoning of Children		<u>Yes</u>	<u>No</u>
Inpatient Beds for Children	a) In a Children's Hospital		
	General Paediatric Ward	Yes	
	Designated Neurosurgery		No
	Dedicated Neuro ITU		No
	ITU Paediatric Availability	Yes	
	RSCN's at all sites treating children	Yes	
	b) In a General Hospital		
	General Paediatric Beds		
	As part of Neurosurgical unit		
	No specific Paediatric Provision		

2. Availability of other specialties on site of inpatient paediatric beds

	<u>Yes</u>	<u>No</u>
Paediatric Medical Neurology	Yes	
Paediatric Anaesthesia	Yes	
Paediatric Oncology	Yes	
Paediatric Radiology	Yes	
Paediatric Neuropathology		No
Paediatric Orthopaedics	Yes	
Paediatric Surgery	Yes	
Paediatric Plastic Surgery	Yes	
Paediatric Maxillo-facial Surgery	Yes (visiting)	
Genetics Service	Yes	

3. Neurosurgical Staffing

	<u>Yes</u>	<u>No</u>
Paediatric Neurosurgeons Full Time		No
Paediatric Neurosurgeons with combined adult practice		No
Neurosurgeon no elective paediatric practice on call cover		No
Neurosurgical Trainee opportunity		No
Arrangements for SpR/SHO cover	Yes	
Neurosurgical SpR		No
Paediatric SpR	Yes	
Neurosurgical SHO		No
Paediatric SHO	Yes	

(Shunt work etc done by General Paediatric Surgeons and their trainees who live in when on-call)

4. Case Load

	Number
Admissions /year	Ward 2B= 13 new neural tube defects (average for last 10 years)
	= 14 neonatal hydrocephalus (average for last 10 years)
Operations/year	= 13 neural tube closures
	= 14 primary shunt placements
	= 62 VP shunt revisions (average over last 9 years)
	= total of 89 'neurosurgical' cases each year

5. Operative Case Mix

	Number
Hydrocephalus	EVD/Access Device
	None
	Endoscopic ventriculostomy
	None
	Primary Shunt Insertion
	14
	Shunt Revision
	62
	Theco-peritoneal Shunt
	None
	Shunt Other
	None
Trauma	Extradural Haematoma
	Very few – are transferred
	to Neurosurgical Unit at
	Southern General Hospital
	Acute Subdural Haematoma
	Intracerebral Haematoma
	Chronic Subdural Haematoma/Hygroma
	Depressed Fracture
	Growing Fracture

	ICP Monitoring		
Tumours	Supratentorial Infratentorial Stereotactic Biopsy		10-20 per year – are all transferred to Southern General Hospital for Treatment and return to RHSC for chemo- and Radiotherapy
Infection	Intracranial Abscess Spinal Abscess		Very few – are transferred as above
Spinal	Derma Sinus Meningocele + Myelomeningocele Tethering Syndromes Tumours Stabilization Procedures	14	None None None None
Craniofacial Surgery	Single Suture Synostosis Syndromic Synostosis Anterior Encephaloceles		None
Functional	Epilepsy spasticity		None
Vascular	AVM Aneurysm Cavernoma		None

6.Head Injury Policy

	<u>Yes</u>	<u>No</u>
Admit all head Injuries		No
Admission based on presence or absence of		
Depressed Fracture	Yes (but would be discussed)	
Defined Haematoma	Yes (but would be transferred)	
Conscious Level (GCS)	Yes	
Neurological Deficit	Yes	

7.Hydrocephalus Policy

	<u>Yes</u>	<u>No</u>
Treat all cases in referral Area	Yes	
Treat Selected Patients		No
No input to cases from outside neurosurgical unit		No

(All neonatal cases are treated at RHSC by General Paediatric Surgeons. Neurosurgical input is sought on very few neonatal cases at the present. Neurosurgical input is more common in older children.)

8.General Issues

If the paediatric unit is remote from the adult unit, allowing for the Working Hours Directive and regulations for Junior Doctor's Hours

	<u>Yes</u>	<u>No</u>
Can a single on call team manage cover for out of hour's activity?		
Require separate consultant cover for both hospitals		
Require separate middle grade cover for both hospitals		
Require an increase in Paediatric Neurosurgical Consultant Staff		
(This question is not relevant to our current situation.)		

Opportunities to attend Meetings of	BPNG ESPN ISPN	No No No
-------------------------------------	----------------------	----------------

Unit contributes to	Shunt Audit UKCCSG Registry Cranio-facial Audit	Yes Yes No
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Child and Family facilities

	<u>Yes</u>	<u>No</u>
Overnight accomodation for parents	Yes	
Overnight accommodation for siblings	Yes	
Parental access to anaesthetic room	Yes	
Parental access to recovery room	Yes	
Pre-admission programmes	Yes	
Special facilities for adolescents	Not really	
Dedicated paediatric list	Yes	
Do you have a schoolroom	Yes	
Do you have a full time teacher	Yes	
Are your play workers qualified hospital play specialists	Yes	
Is there play preparation for theatre day	Yes	

Narrative

There are eight general paediatric surgeons at RHSC Yorkhill who undertake 'neurosurgical work'. This comprises closure of neural tube defects and the treatment and follow-up of primary and secondary hydrocephalus. Three surgeons only undertake placement of shunts in neonatal cases in an attempt to focus the work on a small group of 'experts' (Mr Fyfe, Mr Carachi and Mr Hajivassiliou). Seven of the surgeons would close a neural tube defect if necessary (not Mr Azmy), although, increasingly, this work is also being done by the group of three noted above. All eight surgeons would revise a blocked shunt if the patient presented in an emergency. An increasing number of more complex shunt-related cases have been transferred to the Southern General Hospital for management in recent years. This practice is likely to increase.

Scottish Paediatric Neurosurgical Services Survey

Aberdeen

4. Zoning of Children	Yes	No
Inpatient Beds for Children a) In a Children's Hospital	***	
General Paediatric Ward		
Designated Neurosurgery		
Dedicated Neuro ITU		
b) In a General Hospital		***
General Paediatric Beds		
As part of Neurosurgical unit		
No specific Paediatric Provision		
ITU Paediatric Availability		
RSCN's at all sites treating children		

2.Availability of other specialties on site of inpatient paediatric beds

	Yes	No
Paediatric Medical Neurology	***	
Paediatric Anaesthesia	***	
Paediatric Oncology	***	
Paediatric Radiology		***
Paediatric Neuropathology		
Paediatric Orthopaedics	***	
Paediatric Surgery	***	
Paediatric Plastic Surgery	***	
Paediatric Maxillo-facial Surgery	***	
Genetics Service		

3.Neurosurgical Staffing

	Yes	No
Paediatric Neurosurgeons Full Time		***
Paediatric Neurosurgeons with combined adult practice	***	
Neurosurgeon no elective paediatric practice on call cover		
Neurosurgical Trainee opportunity	***	
Arrangements for SpR/SHO cover		
Neurosurgical SpR	***	
Paediatric SpR	***	
Neurosurgical SHO	***	
Paediatric SHO	***	

4.Case Load

Admissions /year (some admitted under Paed. Surgery or Neurology but may have required some neurosurgical intervention)	Number 31 (year 2000)
Operations/year	28

5.Operative Case Mix year 2000

		Number
Hydrocephalus	EVD/Access Device	2
	Endoscopic ventriculostomy	1
	Primary Shunt Insertion	7
	Shunt Revision	2
	Theco-peritoneal Shunt	0
	Shunt Other	0
Trauma	Extradural Haematoma	1
	Acute Subdural Haematoma	0
	Intracerebral Haematoma	0
	Chronic Subdural Haematoma/Hygroma	1
	Depressed Fracture	3

Growing Fracture	0
ICP Monitoring	1
Tumours	
Supratentorial	2
Infratentorial	3
Stereotactic Biopsy	0
Infection	
Intracranial Abscess	0
Spinal Abscess	0
Spinal	
Dermal Sinus	2
Meningocele	0
Myelomeningocele	1
Tethering Syndromes	0
Tumours	1
Stabilization Procedures	0
Craniofacial Surgery	
Single Suture Synostosis	1
Syndromic Synostosis	0
Anterior Encephaloceles	0
Functional	
Epilepsy	0
Spasticity	0
Vascular	
AVM	0
Aneurysm	0
Cavernoma	0

6.Head Injury Policy

Admit all head Injuries	Yes ***	No
Admission based on presence or absence of		
Depressed Fracture		
Defined Haematoma		
Conscious Level (GCS)		
Neurological Deficit		

7.Hydrocephalus Policy

Treat all cases in referral Area	Yes ***	No
Treat Selected Patients		***
No input to cases from outside neurosurgical unit	***	

8.General Issues

If the paediatric unit is remote from the adult unit, allowing for the Working Hours Directive and regulations for Junior Doctor's Hours

Can a single on call team manage cover for out of hour's activity?	Yes N/A	No
Require separate consultant cover for both hospitals		
Require separate middle grade cover for both hospitals		
Require an increase in Paediatric Neurosurgical Consultant Staff		
Opportunities to attend Meetings of BPNG		***
ESPN		***
ISPN		***

Unit contributes to	Shunt Audit UKCCSG Registry Cranio-facial Audit	*** ***	***
Child and Family facilities		Y	N
Overnight accomodation for parents		***	
Overnight accommodation for siblings		***	
Parental access to anaesthetic room		***	
Parental access to recovery room		***	
Pre-admission programmes			***
Special facilities for adolescents			***
Dedicated paediatric list			***
Do you have a schoolroom		***	
Do you have a full time teacher		***	
Are your play workers qualified hospital play specialists		***	
Is there play preparation for theatre day		***	

Paediatric Neurosurgical Services Survey
Ninewells Hospital Site, Dundee

Zoning of Children	Yes	No
Inpatient Beds for Children a) In a Children's Hospital	No	
General Paediatric Ward		
Designated Neurosurgery		
Dedicated Neuro ITU		
b) In a General Hospital	Yes	
General Paediatric Beds	Yes	
As part of Neurosurgical unit	No	
No specific Paediatric Provision		
ITU Paediatric Availability	No	
RSCN's at all sites treating children	Yes	

Paediatric neurosurgical patients are admitted under the joint care of a neurosurgeon, paediatrician, and intensivist.

2.Availability of other specialties on site of inpatient paediatric beds

	Yes	No
Paediatric Medical Neurology	Yes	
Paediatric Anaesthesia	Yes	
Paediatric Oncology (shared care with RHSCeD)	Yes	
Paediatric Radiology		No
Paediatric Neuropathology		No
Paediatric Orthopaedics	Yes	
Paediatric Surgery	Yes	
Paediatric Plastic Surgery	Yes	
Paediatric Maxillo-facial Surgery		No
Genetics Service	Yes	

3.Neurosurgical Staffing

	Yes	No
Paediatric Neurosurgeons Full Time		No
Paediatric Neurosurgeons with combined adult practice		No
Neurosurgeon no elective paediatric practice on call cover	Yes	
Neurosurgical Trainee opportunity	Yes	

There is a Consultant with a Paediatric Interest. The definition of a Paediatric Neurosurgeon with combined adult practice is not given.

Arrangements for SpR/SHO cover	
Neurosurgical SpR	Yes 1:5 non-resident
Paediatric SpR	Yes resident
Neurosurgical SHO	Yes resident
Paediatric SHO	Yes resident

4.Case Load

	Number
Admissions /year	~ 70 (shared care with paediatric neurology)
Operations/year	35

5.Operative Case Mix (1999)

Hydrocephalus		Number
EVD/Access Device		3
Endoscopic ventriculostomy		
Primary Shunt Insertion		6

	Shunt Revision	9
	Theco-peritoneal Shunt	
	Shunt Other	
Trauma	Extradural Haematoma	2
	Acute Subdural Haematoma	
	Intracerebral Haematoma	1
	Chronic Subdural Haematoma/Hygroma	1
	Depressed Fracture	1
	Growing Fracture	
	ICP Monitoring	3
	Tumours	
	Supratentorial	1
	Infratentorial	
	Stereotactic Biopsy	2
	Infection	
	Intracranial Abscess	
	Spinal Abscess	
	Spinal	
	Dermal Sinus	
	Meningocele	
	Myelomeningocele	
	Tethering Syndromes	1
	Tumours	
	Stabilization Procedures	
	Lumbar microdiscectomy	1
	Craniofacial Surgery	
	Single Suture Synostosis	
	Syndromic Synostosis	
	Anterior Encephaloceles	
	Functional	
	Epilepsy	
	Spasticity	
	Vascular	
	AVM	1
	Aneurysm	
	Cavernoma	
	Miscellaneous	
	Cranioplasty	2
	Nerve Biopsy	1
	Wound revision	2

6.Head Injury Policy

Admit all head Injuries	Yes	No
Admission based on presence or absence of	Yes	
Depressed Fracture		
Defined Haematoma		
Conscious Level (GCS)		
Neurological Deficit		

Minor head injuries are admitted under the paediatricians and reviewed by the neurosurgical Consultant.

7.Hydrocephalus Policy

Treat all cases in referral Area	Yes	No
Treat Selected Patients	Yes	
No input to cases from outside neurosurgical unit	Yes	

8. General Issues

If the paediatric unit is remote from the adult unit, allowing for the Working Hours Directive and regulations for Junior Doctor's Hours

Paediatric beds and Neurosurgical Unit are in the same building

Yes No

Can a single on call team manage cover for out of hour's activity?]

Require separate consultant cover for both hospitals]

N/A

Require separate middle grade cover for both hospitals]

Require an increase in Paediatric Neurosurgical Consultant Staff]

Opportunities to attend Meetings of BPNG

Yes

ESPN

ISPN

Yes

The Consultant with an interest in Paediatric Neurosurgery is an associate member of BPNG and has attended ISPN meetings.

Unit contributes to

Shunt Audit
UKCCSG Registry

Yes (currently)
Yes (via links with
RHSCEd)

Cranio-facial Audit

N/A

Child and Family facilities

Y

N

Overnight accommodation for parents

Yes

Overnight accommodation for siblings

No

Parental access to anaesthetic room

Yes

Parental access to recovery room

Yes

Pre-admission programmes

No

Special facilities for adolescents

No

Dedicated paediatric list

Yes (as required)

Do you have a schoolroom

Yes

Do you have a full time teacher

Yes

Are your play workers qualified hospital play specialists

Yes

Is there play preparation for theatre day

No

Appendix 4 –**Reconfiguration Options**

Paediatric Neurosurgery: Models for Scotland

A: The Two Centre Model

The ideal is to discuss models separately from specific geographical considerations, however, a two centre model would certainly consist of one centre for the West of Scotland and located in Glasgow and another centre for the East of Scotland. The latter might be in any of the existing centres or might consist of a Managed Clinical Network for the East. These two centres would have approximately equal catchment populations.

I. Advantages

1. This model would afford an opportunity for some concentration of resources and expertise with less disruption of existing services than a move to a single site model.
2. The cost of reconfiguration would be expected to be less for a two than for a one centre model. The move to one centre would involve a great deal of duplication of resources including medical and paramedical personnel, imaging facilities (including anaesthetic cover for imaging), and operative facilities. A one centre model would require an enormous infusion of resources while a two centre model would require less duplication of existing resources.
3. Some might argue that only a completely consultant delivered service with one centre for all of Scotland would allow the degree of subspecialty service and the increase in quality to warrant any reconfiguration. This model works well in concentrated large populations (about 10 million population within two hours of the service). For a smaller population dispersed over a larger catchment geography, the practicality is that however the service is reconfigured, out of hours cover will depend to a degree on middle grade cover and cover by adult neurosurgeons. A service completely delivered by paediatric neurosurgical consultants on a single site would require about seven or eight consultants. The volume of work (?400 cases per year) does not warrant this number of surgeons. As a result, these eight consultants would each have a small operative load, in the realm of fifty cases per year and an even smaller volume of complex elective work. This would allow them to perform a large volume of non operative work currently done by registrars. It would be difficult to maintain surgical skills in this scenario. Thus the large infusion of resources required to create this type of service might not bring the hoped-for increase in quality but might in fact, result in deterioration in quality. The same argument would hold true for other staff such as paediatric neuroanaesthetists. The provision of emergency paediatric neurosurgery services by middle grade and adult neurosurgeons supported by paediatric subspecialists was felt to be acceptable practice in Safe Paediatric Neurosurgery. This pattern is likely to continue in Scotland for the foreseeable future. A two centre model would provide paediatric neurosurgery support for adult neurosurgeons covering out of hours on both coasts. A single site for paediatric neurosurgery would make this support inaccessible to neurosurgeons covering much of Scotland's population. If the single site chosen is isolated from adult neurosurgical services, the problem would be particularly severe.
4. The two centre model would maintain access to paediatric neurosurgical subspecialty advice for related specialities (paediatrics, paediatric neurology, paediatric trauma services, and adult neurosurgery) on both coasts. Loss of paediatric neurosurgery from any site would be detrimental to these other fields of clinical practice at that site. An analogy to paediatric cardiac surgery, which has been concentrated on a single site for Scotland has been made. This analogy should be viewed with caution as 60% of paediatric neurosurgery is emergent whilst paediatric cardiac surgery is largely elective work. Any detrimental effect on clinical practice will not just be the inconvenience of a more remote elective subspecialty service: it may have grave consequences for individual patients.
5. The two centre model would also maintain the training opportunity in paediatric neurosurgery in both of the existing higher surgical training rotations. Currently operative numbers in the West about double the 100 cases per year recommended for paediatric experience during general neurosurgical training. Concentration of paediatric neurosurgery on a single site in the East would be expected to result in a similar workload.

II. Disadvantages

1. There is a perception that the opportunity to improve quality of care might not be fully realised in a two versus a one centre model. This objection might be overcome to a large extent by concentrating specific rare, elective pathologies in one or the other centre. This strategy could be used to concentrate the experience in dealing with entities such as complex craniofacial anomalies, paediatric spinal pathology, spasticity, and epilepsy. These highly specialised services should be accorded national funding.
2. Access to paediatric neurosurgical services will be decreased for patients living outwith the two chosen centres and there may be a lay perception of different standards of care for regions of the country near versus those more remote from these centres, especially if both centres are located in the Central belt. This objection is untrue for patients currently requiring a significant journey by road or air transport to reach any of the neurosurgical centres but would affect patients living close to a currently available service fated to close. The number of individuals affected would be greater in a single site model.
3. Inconvenience to families and patients and families would persist in period of follow up as many paediatric neurosurgical conditions will require ongoing management over a period of years or possibly a life time. This inconvenience would follow any reconfiguration of services and would be greatest in a single site model.
4. Decreased elective experience in centres closed to elective work would decrease confidence if not ability to deal with emergency cases. This may be true of nursing, anaesthetic and ITU staff to a greater degree than for surgeons. Is this a real change? Is there sufficient volume of elective paediatric neurosurgical work currently in the smaller centres to provide staff with confidence in emergent care and to protect these centres against potential criticism of emergency care delivered?
5. Delivery of surgical care, especially out of hours would continue to rely on individuals who do not do elective paediatric work. An objection might be made that this is no better than the current situation. The advantage over the current situation is the concentration of children in institutions that deal with a significant volume of paediatric neurosurgery and where the culture and protocols to deal with this work are in place. Not only surgeons, but also

nursing, anaesthetic, and ITU staff should be accustomed to paediatric neurosurgical work in order to provide safe perioperative care. Increased numbers of paediatric neurosurgeons to provide paediatric subspecialty support to adult neurosurgeons covering out of hours could increase the potential for improvement over the current situation.

III. Resource Implications: Safe Paediatric Neurosurgery

1. All models under consideration would require increased numbers of paediatric neurosurgeons to provide an optimum standard of care. There are currently 2 0.5 WTE in Edinburgh and 1 WTE in Glasgow, in both cases supported by adult neurosurgeons with an extensive paediatric experience. Safe Paediatric Neurosurgery recommended 2 WTE per centre. The requirement would be even higher to achieve a consultant delivered rather than a consultant led service (7-8 WTE).
2. A population of more than 0.5 million should not be more than two hours from neurosurgical care by surface transport. Increased transportation for both emergent and elective care would decrease the perception of inequitable access. It may not be possible to achieve this two hour standard using surface transport in Scotland. This implies that an infusion of resources to provide for air transport might therefore be required. A single centre model would require even greater resources.
3. Dedicated middle grade cover should be available, not necessarily resident on call, but not to be covering adult practice on a separate site simultaneously. This requirement may be difficult or impossible to achieve in light of new junior doctors' hours of work except where paediatric and adult neurosurgery are colocated.
4. Increased paediatric ward, theatre, ITU, and outpatient capacity and staffing would be required in any centre with a significant increase in catchment population due to reconfiguration.
5. Increased imaging facilities would be required to deal with increased catchment population as above. This includes anaesthetic support for imaging. Telemedicine links may need to be increased to facilitate referral from new catchment areas.
6. National funding should be made available for subspecialty services concentrated on a single site.

B: Managed Clinical Network

Q. What is a managed clinical network?

Q. What is the evidence that MCN's are effective?

Q. How could it be applied to paediatric neurosurgery in Scotland?

Managed Clinical networks consist of groups of specialists (multidisciplinary) involved in the care of a particular disease or group of diseases who work together under agreed protocols and guidelines in an evidence based way. Specialists are defined as having extended training in the specialty. They participate in group audit and research and hold regular review meetings. Record keeping is standardised.

Under agreed protocols certain conditions will be managed by designated people (and not necessarily by the whole group) – usually technically complex, small volume cases.

MCN's in cardiology, oncology and cleft lip/palate

Clefts

Audit 1991-1992 most surgeons treating <10 cases/yr

Clinical Standards Advisory Group 1995 – national study

59 cleft teams in UK, 7 in Scotland – only 2 teams had stopped operating

18 new referrals per surgeon/year (1-60)

1996 RCS published "Recommendations for Minimum Standards of Management of Cleft Care"

30 new cases/year as cut off for recognised cleft specialist plus recognised training.

- Named member of team able to give feeding advice to parents of newborn with cleft
- Parents visited within 24hours of the birth
- Counselling available after antenatal diagnosis
- Longitudinal treatment protocols
- Information sent to national database
- Access to a psychologist and geneticist
- Existence of a database
- Protocols for record keeping

In 1995 not one unit in UK could be designated as a training unit for clefts ie. supporting 2 major cleft surgeons and one trainee

In Scotland the Scottish Assoc for Cleft Lip and Palate was formed in 1989 (SCALP). Clinicians grouped into 6 major teams – Aberdeen, Ayr, Dundee, Edinburgh, Forth Valley, Glasgow.

4 core members in each team – cleft surgeon, ENT surgeon or audiologist, orthodontist and speech therapist.

Replaced in 2000 by a MCN (CLEFTSiS)

- Provide high quality care close to patients home
- Surgical treatment conforms as closely as possible to CSAG recommendations
- Cleft surgeons reduced from 6 to 4 working at 3 sites – Aberdeen, Edinburgh and Glasgow. Planned reduction to 3 surgeons.
- Follow up care nearer patients home through the CLEFTSiS network
- Responsible to the Common Services Agency for standards of care – report through a lead clinician annually (including patient satisfaction questionnaires)

CLEFTSiS management structure:

- Lead Clinician
- 0.8 WTE Administrator funded by National Services Division
- Chairman of SCALP
- Lay representative (CLAPA)
- Conveners of the Specialty Groups (6) – cleft surgery, speech therapy, orthodontics, audiology, audit, research and “associated specialties group” (paeds, genetics, psychology, dentists, hygienists, radiographers)

No hard evidence that MCN's are better but some publications to support their use:

N Boon (1999) Cardiac Services: Bigger and Better, But Managed Clinical Networks are Best.

Scottish Medical J. 44(4):101-102

Kunkler IH (2000) Managed Clinical Networks: A new paradigm for clinical medicine.

J Royal Coll Phys Lond 34(3):230-233

HOW WOULD A MCN WORK IN PAEDIATRIC NEUROSURGERY?

1. SET UP A MANAGEMENT STRUCTURE
2. SET UP A NATIONAL DATABASE supported by regional databases at individual unit level. Require reporting to UK databases as appropriate eg: UK shunt registry, UKCCSG, BPNG audit
3. SET STANDARDS FOR WHAT WE RECOGNISE AS A “PAEDIATRIC NEUROSURGEON”
 - a. Full member of BPNG
 - b. Period of full time paediatric training in a recognised paediatric neurosurgical centre of excellence on top of basic neurosurgical training
 - c. Major part of working week spent in paediatrics, elective paediatric practice
 - d. Recognition of subspecialty interests
4. SET STANDARDS OF CARE & DEVELOP REFERRAL & MANAGEMENT PROTOCOLS
 - Safe Paediatric Neurosurgery
 - SIGN guidelines, BPNG, SBNS etc
5. DECIDE WHO WILL DO WHAT AND WHERE FOR CERTAIN SUBSPECIALTIES - based on **standards** of care available – numbers should follow
6. ALLOCATE RESOURCES APPROPRIATELY
 - image link facilities etc.

C: The status quo

Cons

- Rare, specialised neurosurgical conditions performed as occasional practice on all 4 sites.
- Little opportunity to maintain/develop expertise in these rare conditions anywhere in Scotland.
- Little opportunity to have appropriately staffed dedicated paediatric neurosurgical unit in Scotland.
- Existing shunt surgery practice in Yorkhill is probably out of line with the majority of UK practice
- Lack of opportunities for wide paediatric neurosurgical peer review
- Single handed specialists who are vulnerable in issues of clinical governance

Pros

- Reasonable equity of access across Scotland to neurosurgery in areas of significant population density

- Emergency component of neurosurgical work is significant. Majority of this work has to be done locally for safe outcome
- Quality of service and outcomes in any one centre are likely to be a function of the paediatric neuroscience service as a whole and not just neurosurgery. This applies both to elective and emergency neurosurgery. The discrepancies in paediatric neuroscience services between the 4 teaching centres are much smaller than those for paediatric neurosurgery.
- Ease of providing an integrated service for children with disabilities (across general paediatrics, education, social work etc.)
- Knock-on benefits of a paediatric neurosurgical input and access to consultant opinion and out-patient service
- Relative ease of recruitment and retention of paediatric neuroscience expertise
- PICU requirement for most paediatric elective neurosurgery is probably small; for those units without PICU facilities, admissions are mostly emergency and often too ill to transfer (especially severe and unstable head-injured children) – for these admission is to an adult ITU but with medical paediatric, paediatric neurology and paediatric anaesthesia support.
- Little evidence of differences in outcomes either factually or anecdotally

Principal issue to be considered in altering the status quo

- For those children who are transferred out we must be able to demonstrate an improvement in quality of care
- For those children who are not/unable to be transferred, we must maintain/improve the existing quality of care.

D: A Single Scottish Centre

LOCATION: - GLASGOW

Why?:-

LARGEST POPULATION;EXISTING SUB-SPECIALIST SERVICE;

Problems:- "SAFE PAEDIATRIC NEUROSURGERY"

WITHIN A PAEDIATRIC HOSPITAL-no

PAEDIATRIC NURSING -no

PAEDIATRIC ANAESTHESIA-no

PAEDIATRIC SPECIALTIES -no

FULL NEUROSURGERY ENVIRONMENT-yes

FULL NEURORADIOLOGY SERVICE-yes

ACCESS TO SUB- SPECIALIST NEUROSURGERY -yes

POSSIBILITIES : REBUILD ON SGH SITE ?/ DEVELOP AT YORKHILL ?/ NEW CENTRE ?/SINGLE NATIONAL PAEDIATRIC ICU

PATIENT NUMBERS

GLASGOW 374 DAY CASES
187 OPERATIONS (27%)

EDINBURGH 113 OPERATIONS

ABERDEEN 31 OPERATIONS

DUNDEE 40 OPERATIONS

TRAVELLING FOR TREATMENT 180 - 200 pa = 4 / WEEK

TOTAL OPERATIONS 380 - 400 pa

EXTRA ADMISSIONS ?300 ? 600 pa 6 - 12/ WEEK

TOTAL ADMISSIONS 900 - 1200 pa

NEW OPTIONS:-

TELEMEDICINE / TELECONFERENCING

STAFFING

CONSULTANT COVER 1: 4 ROTA

2 WHOLE TIME / 2 PART TIME

"SAFE NEUROSURGERY" 180-250 OP/SURGEON

?OUTPATIENT CLINICS EFFECT

SPR ROTATING FROM NEUROSURGERY

SCOTTISH ROTATION

MIDDLE GRADE COVER PAEDIATRIC SURGERY SHOs / REGISTRARS OR MIDDLE GRADE NEUROSURGICAL COVER FROM GENERAL NEUROSURGERY UNIT

PAEDIATRIC ICU CONSULTANTS 1:4 / 1:6 ?

SPR PAEDIATRIC ICU 1:6

PAEDIATRIC NEURORADIOLOGIST

TRAINING AND EDUCATION

CONSULTANT POSTS COULD BE FILLED BY CURRENT CONSULTANTS + 2

SPRS REQUIRES SCOTTISH ROTATION OFFERS FELLOWSHIP IN PAEDIATRIC NEUROSURGERY

PROBLEMS: REDUCED SKILL LEVELS IN OTHER UNITS
 INTERACTION WITH PAEDIATRIC NEUROLOGISTS IN OTHER UNITS LOST
 ACCOMMODATION FOR PARENTS
 OUTPATIENT CLINICS

TRANSPORT ISSUES

EMERGENCY ADMISSIONS /50% URGENT TRANSFER / 100 patients pa /ELECTIVE TRANSFER ?500
 TRAVEL COST ? £18,000 ELECTIVE TRAVEL/ ?£ 35,000 EMERGENCY TRAVEL

ACTIVITY IN OTHER UNITS ?HEAD INJURY BUT LIMITED BY NO PICUHYDROCEPHALUS BLOCKED SHUNTS BUT REDUCED EXPERIENCE

REDUCED EQUIPMENTCOMPROMISE TREATMENTS

MYELOMENINGOCELE

HIGH QUALITY NEONATOLOGY

PAEDIATRIC UROLOGY

PAEDIATRIC RADIOLOGY

PAEDIATRIC ORTHOPAEDICS

ARTERIOVENOUS MALFORMATIONS

INVESTIGATION LOCALLY

REFERRAL OUT OF SCOTLAND

Appendix5

Papers presented / contributed during work of group

REHABILITATION SERVICES FOR CHILDREN WITH AN ACQUIRED BRAIN INJURY - A SCOTTISH SERVICE

PAEDIATRIC HEAD INJURY

PAEDIATRIC NEURO-ONCOLOGY

IMPLICATION FOR RECONFIGURATION ON SERVICES OTHER THAN ITU.

i)Kirkpatrick

ii)Eunson

THE EFFECT OF EUROPEAN WORKING TIME DIRECTIVE ON THE STAFFING OF PAEDIATRIC NEUROSURGERY

PAMS

RADIOLOGY SERVICES IN SCOTLAND

Paper A
**REHABILITATION SERVICES FOR CHILDREN
 WITH AN ACQUIRED BRAIN INJURY - A SCOTTISH SERVICE ?**

Epidemiology of head injury in children

0 - 4 years	150 per 100,000
5 - 14 years	220 per 100,000
15 - 19 years	550 per 100,000

Fatal	5%
Severe	6%
Moderate	8%
Mild	81%

A Lothian study between 1990 and 1993 showed a length of hospital stay varying between one and 159 days (mean = 1.6; standard deviation = 5.73). The longest hospital stays were for children between 6 and 12 years, were most often associated with road traffic accidents and the increase in length of hospital stay was directly related to the severity of head injury and associated motor impairment. It is the smaller group of severe head injuries with which this paper is concerned.

Existing In-Patient Facilities

There are various stages from the admission of a child to an intensive care unit with a severe head injury:

1. *Acute phase* - life threatening. Neurosurgery and intensive care 8-9 days.
2. *Post-acute rehabilitation* - specialist paediatric setting 6-12 weeks.
3. *Rehabilitation* - specialised setting longer term. This service does not currently exist in Scotland.
4. *Home* - continuing support. Very limited service.

As above, dedicated rehabilitation services for children with head injury are extremely limited. For many the only option is a prolonged stay on an acute in-patient paediatric ward where expertise and resource for formal rehabilitation is woefully lacking. Whilst some parents are unwilling to travel, many would go anywhere to ensure that their child received the best possible care to ensure that optimum recovery takes place. The consequences of failing to realise that potential window for recovery are all the more greater for a child and the continuing resources needed, (health, educational, social and economic) of a greater magnitude.

At present only 3 centres in the UK can offer in-patient multidisciplinary neuro-rehabilitation for brain injured children. There are 2 private facilities - Bath Head Injury Unit and Highbank in Manchester and further charitable establishment - Tadworth Court*. Obtaining figures from these units as to numbers of children from Scotland has been somewhat difficult but presumably Health Board ECR data is available. However this is very likely to be a considerable under-estimate of demand.

Numbers Requiring the Services of an In-Patient Rehabilitation Unit

As above there will be some families who are not prepared to travel to a unit elsewhere in Scotland but equally there are significant numbers of families who would very much wish to take such an opportunity. It is difficult to estimate numbers but we calculate that the minimum will be 20 children per year and maximum 60 children per year. All these children would need a relatively prolonged period of in-patient stay and it is likely that at any one time there would be between 2 and 5 children in such a unit. Such a unit should also be involved in outreach work and the liaison with local services in terms of discharge planning and reintegration into education is of absolutely crucial importance. Such a unit can only be successful if this aspect is carefully undertaken .

Staffing

This type of rehabilitation is highly specialist in nature and requires a wide range of skilled professionals covering doctors, therapists, psychologists, teachers, etc together with occasional input from other hospital specialists and including specialist equipment resources - aids, chairs, hoists, etc.

Outcomes

There is little robust data on outcomes of rehabilitation in children's brain injuries but rather more on adult head injury rehabilitation services. There would be very good reasons to suppose (experimental evidence on greater brain plasticity in children and the greater adverse consequences of not managing head injury rehabilitation well in a child), that the outcome for children would be rather better.

*As an example, Lee-Anne was an 11 year old pedestrian head injury who spent 40 weeks at Tadworth Court at a cost to Tayside Health Board of £2500 per week. While the distance was far from ideal and the travelling to visit was tiring and expensive to her family

they were more than keen to give their daughter the best chance of recovery. The outcome in this case was good and considerably better than might have been achieved by existing local services. It is now possible that Lee-Anne will be able to pursue independent living with some assistance, a goal which is important to her parents. She was very far from this possibility when she left Tayside.

Martin Kirkpatrick
April 2000

Paper B

Paediatric Head Injury

Head injury in the Paediatric population is common. Brain injury is relatively infrequent. It is important that these 2 statements are taken together as a large number of children will present with head injury but very few will have significant brain injury.

A review of "head injuries" at the Royal Hospital for Sick Children has recently been undertaken and the results of this can be made available to you. They are as follows:

Total Head Injury 3,115 = 9.6% of the total A&E attendance

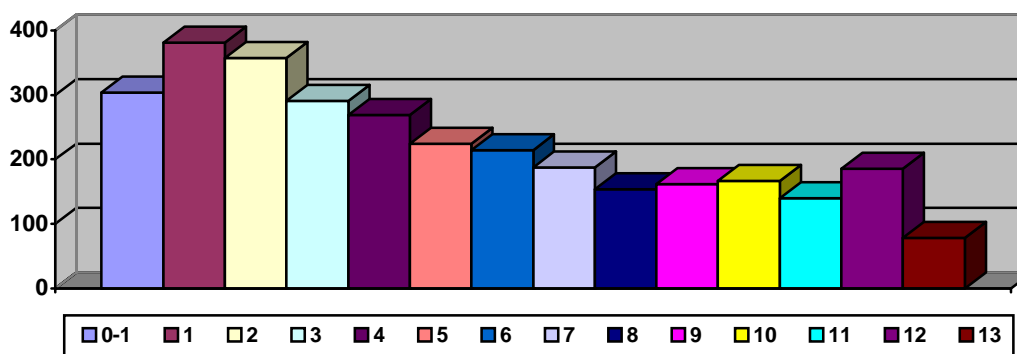
Male: Female ratio 1,970:1,145 (63% male)

Severity is assessed by Triage score on attendance:

(T1 = Extremely serious with life-threatening connotations, T4 = relatively minor) This is not totally objective but relies on a subjective assessment by an experienced nurse taking such things as history, ambulance crew story, appearance of the child on presentation and the likely need for further treatment)

T1 = 12 T2= 35 T3 = 258 T4 = 2,810

Age – the age range is seen in Graph 1. From this it can be seen that there is a very marked under 5 predominance.



The cause of head injury is as follows:

Road Traffic Accident	144
Fall > 1m	382
Fall <1 m	1,274
Other (including collision, hit by foreign object and sporting injuries)	1,315

Outcomes:

Admitted to HDU/ITU	9
Admitted to ward	296
Discharge	2,810

No child died in the Department although a small number died following admission in the Intensive care Unit.

It should be noted that figures of 2,810 in the T4 and the discharge are coincidental, they do not refer to the same group of children.

For the past 2 years we have been working on a "minimal x-ray" policy. An audit 2 ½ years ago revealed that 50% of skull fractures were missed by the junior doctors working in the Accident and Emergency Department. Most of these presented out-of-hours and at weekends. All of these children, without exception, did well. When we phoned to ask about the children, all were well. No problems were encountered. In addition we missed on plain films, 2 quite subtle depressed skull fractures, 1 of them open.

As a result we have moved towards a policy of minimal x-ray. Our guidelines for x-ray are enclosed.

Since this policy has been implemented we may have missed some fractures but we do not believe that we have missed any significant brain lesion. Herein lies the rub – what is “a significant brain lesion”?

Certainly the 9 children admitted to HDU/ITU could be said to have significant brain injury. This is the likely workload from a population of about 120,000 in the Edinburgh area. Children out with this area i.e. in the Borders, St John's and South Fife, will be admitted directly to the Intensive Care Unit, bypassing Accident and Emergency. The figure of approximately 10 has remained steady over the 8 years that I have been in Edinburgh. This is the likely number of children who will need significant Neurosurgical or Neuro-Intensive Care intervention from a population of about 100,000 to 120,000 under the age of 13.

Probably of more concern are the 200 – 300 children admitted for observation. A small number of these will have CT/MRI investigation but most will be admitted for a short period of observation and then be discharged. Systems for follow-up of these children are poor and I don't believe that we are any different from any other area.

Any Neurosurgical development must be able to take account of the 9 that are admitted to High Dependency/Intensive Care but also the other 300 who may well have significant problems such as behaviour abnormalities, learning difficulties and variants on a post-concussional syndrome. One of the benefits of the Paediatric Neurosurgical service would be to put a system in place so that these children would not be missed, that they would have access to clinical psychology, educational support and community paediatric follow-up as required.

I will contend that the ones who get optimal care are the ones who are admitted with significant brain injury but that others need to be equally well thought of.

For the small numbers that die after coming in to hospital, lessons need to be learned with regard to prevention, pre-hospital care, optimum resuscitation and optimum management to try and reduce this mortality in the future. Because the numbers are so small, expertise needs to be concentrated and pooled. I do not have information with regard to the numbers that actually went to surgery for release of haematomas, staunch of haemorrhage or other life-saving Neurosurgical intervention. Above all these children need their Intensive Care optimised in a Paediatric Intensive Care setting.

For the other children, both in the less severe and the very severe categories, lessons with regard to optimum management (including imaging) need to be determined. The presence of a Paediatric Neurosurgical Service cannot be over estimated in sorting this out.

Mr Tom Beattie A&E RHSCE

Paper C

Paediatric Neuro-oncology

Incidence and survival of brain and spinal tumours

- 1 in 2500 children and young people, aged 0-16 years.
- 25% of all cancers of children and young people aged 0-16 yrs.
- 350 diagnosed in UK each year.
- Approx 35 in Scotland each year.
- 5 and 10 year survival rates 55% and 50% respect. Little change over last 10 yrs.
- 85-90% of childhood cancers are registered and cared for within UKCCSG centres.
- UKCCSG brain tumour registrations increased from 40% 1981-84, to 60% 1993-95.
- Patients with brain and spinal tumours recruited to UKCCSG clinical studies. Increased from 23% in 1990 to 37% in 1996.

Guidance for services for children and young people with brain and spinal tumours Dec 1997.

Joint working party of UKCCSG and SBNS

Aim:

- Identify a network of centers with integrated multi-disciplinary teams.
- Improve care.
- Improve registration and entry to clinical trials.
- Improve survival.
- Improve the quality of the survival.
- Encourage audit and research.

Characteristics of a high quality brain and spinal tumour service for children and young people.

Accurate and timely diagnosis.

- Access to CT and MRI

Multi-disciplinary assessment

- Involvement of paediatric neurosurgeon and neurologist in conjunction with paediatric oncology, neuroradiology, neuropathology.
- Paediatric neurosurgeon, substantial commitment to childhood neurological disorders.
- Access to neurosurgical theatres, and specialist equipment.
- Paediatric ITU.
- Paediatric neuro- anaesthesia.
- In-patient areas designed specifically for the care of children and young people staffed by qualified children's nurses.
- Specialised rehabilitation team including physiotherapy, speech and language therapy and OT.

Child family and Social support

- Access to social work support (Sargent)
- Age appropriate psychology services

- Information for parents and children.

Treatment and Follow up

- Age appropriate environment.
- Seamless integration of neurosurgical management, chemotherapy and radiation treatment.
- Specialist neuro-oncology paediatric liaison .
- Trained nursery nurses and play specialists.
- Paediatric surgical expertise for central venous access.
- Safe administration of chemotherapy, including dedicated pharmacy support.
- Multi-disciplinary follow up clinics.
- Paediatric endocrinology expertise
- Safe paediatric radiotherapy.
 - Separate waiting areas
 - Trained radiographers
 - Facilities for safe paediatric anaesthesia and resuscitation with support from specialist paediatric nurses
 - Familiarity with delivery of complex RT fields including craniospinal radiotherapy.

Effective Communication

- Communication with primary and secondary health teams
- Communication within tertiary team
- Multidisciplinary diagnostic review meetings and treatment team meetings
- Written summaries
- Audit of service

Physical rehabilitation

- Close liaison with community services

Summary of specialist facilities

- Age-specific outpatient and day care facilities.
- A neuroradiology suite with cranial ultrasound, CT and MR imaging, and angiography.
- Arrangements for performing scans under sedation or anaesthesia.
- Fully equipped paediatric neurosurgical theatre supported with paediatric neuro-anaesthetists and equipped with operating microscope, CUSA and monitoring equipment.
- Endoscopic and stereotactic instrumentation.
- Radiotherapy facilities should include a minimum of two linear accelerators, simulator, full mould room facilities, computer planning facilities and access to CT scanning and MRI.
- Paediatric ITU facilities with capability for controlled hypothermia, intracranial pressure and cerebral function monitoring.
- Neuropathology laboratory staff with experience in histochemistry, immunocytochemistry and EM.
- Facilities for frozen and fixed tissue storage.

- Access to molecular pathology and cytogenetics laboratory.
- Rehabilitation department with staff experienced in paediatric physiotherapy, OT and speech and language therapy.
- Pharmacy with expertise in paediatric chemotherapy preparation and dispensing.
- Clinical trials support staff and data management facilities.
- Family accommodation.

Paper D

**THE IMPLICATIONS OF A RECONFIGURATION OF PAEDIATRIC
NEUROSURGERY ON CHILDREN'S SERVICES IN THE REFERRING CENTRE**

Continuity of care

- The “disappearing child”
 - repeated investigations
 - decisions made out of context
 - transfer back
 - late, little notice
 - late and/or inadequate summary

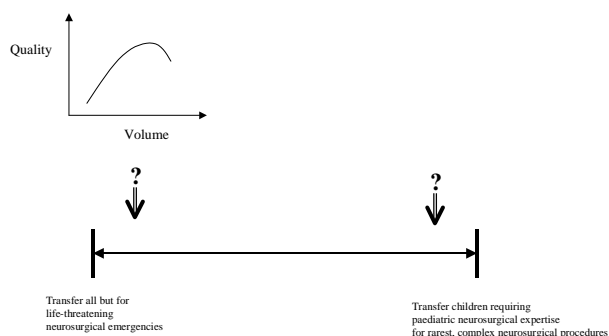
- Later emergency presentation to local centre
- Inadequate local liaison
 - no or late discharge planning
 - Poor integration with education, social work in the context of a disabled child

We can all envisage scenarios of the "disappearing child" in a tertiary or quaternary referral system. At worst this entails a situation where a child is referred to another centre with an established diagnosis and completed investigation work-up. On arrival at the centre these investigations are repeated, the transfer of information is incomplete and decisions are made which take erroneous account of the context of that (disabled) child and their family. There is little or no notice of discharge back to the referring hospital and a discharge summary that lags behind by some considerable time. There has been no opportunity for discharge planning, for discussion with local paediatric services including primary care, education and social services.

In the situation of a child presenting again with a problem relating to the neurosurgical procedure, important details are lacking in the information that is supplied in the discharge summary and in any event the skill base of local services is such that it is unable to cope with rapidly emerging problems. For many children who require neurosurgical intervention, this entails a varying number of operative procedures and considerable outpatient follow-up.

Further, the proportion of children with an existing neurological disability is very much higher than in other paediatric surgical sub-speciality and close links with other specialities and other local agencies concerned with the child's disability (in the widest sense) is of considerable importance. This scenario will apply to any reconfiguration.

Skill maintenance in referring centre



If a volume/quality relationship exists, it is self evident that the less exposure professionals have to a range of clinical problems, the harder it will be to maintain skills, and experience will progressively decline. This applies as much to tertiary paediatric neuroscience

specialities, including paediatric neurology, paediatric neuroradiology, paediatric neurophysiology etc, as it applies to paediatric neurosurgical practice. In the event of any reconfiguration it is already accepted that some neurosurgery will have to continue to be provided in each centre. We would not wish, at the end of this review, to have improved the care of a small fraction of the paediatric neurosurgical population requiring highly specialised procedures, only to have significantly disadvantaged the care of larger proportion of children who are unable to be transferred. In order to maintain a safe level of neurosciences skills and experience for those children who are unable to be transferred, where is the dividing line to be drawn between universal transfer and universal local provision?

- **Recruitment**
 - small specialities
 - domino effect
- **Retention**
 - culture of moving
 - clinical governance issues
- **Training**
 - training accreditation e.g. paediatric neurology
 - general paediatrics - head injury, early recognition of brain tumour, shunt dysfunction etc.
 - nursing and paramedical training

Recruitment and Retention

There may be major impacts on tertiary paediatric neurosciences services in a referring centre. Recruitment in these small specialities is already difficult and the domino effect is real. Retention of paediatric neurosciences staff in small units is already difficult and being compounded by emerging clinical governance agendas. A major reduction in paediatric neurosurgery would compromise this further.

Training (not including neurosurgical training)

Training and experience in the pre-operative assessment and post-operative management of children undergoing a neurosurgical procedure is part of the training programme for a paediatric neurology trainee. While these issues could be addressed for paediatric neurology through rotational training arrangements, this is rather more problematic for general paediatric training.

Mitigation of consequences

- **Communication**
 - local work-up and investigation
 - decision making in consultation with referring unit
 - early transfer back
 - follow-up in referring unit
- **“Out-reach” and “In-reach” working**
 - Sessional working for referral **and** referring units
 - careful consideration of Human Resource issues
- **A Scottish Service**
 - [4 to 3] or [4 to 2] is worse than [4 to 1] for Scotland as a whole
 - networking of all 4 centres must be the solution

How can these adverse consequences be mitigated?

1. Sessional working and communication

The principles should be that:

- (a) In consultation with the referral unit/ the diagnosis and detailed investigation work-up should be done locally in the referring unit wherever possible.
- (b) The decision making process regarding a neurosurgical intervention should be made in consultation with the referring unit.

- (c) The child and family should be away from their referring unit area for the shortest possible time. Early transfer back should be the norm.
- (d) The major proportion of follow-up should be done in the referring unit.

Most would agree that it is easy to fulfil these principles in a mediocre way but harder to do well. Achievement would be considerably assisted by significant alteration in sessional commitments both in the referral unit and the referring unit. There would therefore be a combination of "out-reach" and "in-reach" practice. This kind of more flexible working can only function with close and trusting professional working relationships amongst paediatric neurosciences personnel across wide geographical areas. In turn this can also only be achieved through the attention to cross-Trust and cross-Health Board human resource issues. Reconfiguration to a single referral unit is the only practical way of structuring this out-reach/in-reach service.

2. A Scottish Service

Looking at Scotland as a whole it is likely that the detrimental impact on any one individual centre will be greatest in a move of 4 to 3 or 4 to 2 centres rather than a move from 4 centres to one. In terms of recruitment and retention, the latter arrangement would ensure that, at the very least, 3 centres in Scotland were equally attractive. The alternative is to have a situation where one or 2 centres in Scotland are effectively downgraded with the formation of a 2-tier tertiary neurosciences service in Scotland, and in the longer term their paediatric neuroscience service would be unsustainable. The way forward in squaring the circle of a single centre for paediatric neurosurgery without severely compromising services in the other 3 centres is to set this in the scene of a Managed Clinical Network.

Paper E

Implications of Single Centre (SC) and Managed Clinical Network (MCN) Paediatric Neurosurgery Services on wider child health services including rehabilitation.

Field1	Field2	Field3
	Single Centre	Managed Clinical Network
Structure of Services	hasten concentration of expertise. Diminish retention of specialist services elsewhere	if the template is well structured, the quality of services in centres will be maintained.
Staffing	increase in medical, nursing and therapists in centre - cost implications (6FTE paed. neurosurgeons according to EEC)	numbers may increase, but more of a realignment of roles with identification of designated staff
Liaison	poor unless new cadre of specialist nurses established with local counterparts	should be enhanced - again a role for specialist nurses
Access	children will have to travel but not an issue if quality assured	not an issue (very few children will have to travel fro very specialised treatments)
Continuity of care	a big concern in the post-acute phase	the major benefit of an MCN
Governance/ Peer Review	might be enhanced - but no formal strucure imposed (centre - specific)	should be enhanced. Supports single handed neurologists (if they are allowed to exist!) Formal structure will be imposed

Recruitment/ Retention	staff will be attracted to such a unit	will encourage retention of current staff. Would assist with recruitment for Aberdeen
Paediatric Neuroscience	will enhance quality of services in that centre, but may diminish elsewhere	would support continuity of tertiary neuroscience in 4 centres and encourage MCN in other areas such as muscle disorders
General paediatrics	knock on effect on A+E services, the child with a minor head injury, multiple trauma, non-traumatic brain injury	neutral
Rehabilitation	major implications for accommodation, therapy services, liaison, review	ideal opportunity to promote acceptable standards throughout Scotland
Outcome	will it be any better than what already exists?	at least we could measure outcome

Issues for consideration

Paediatric Neurosurgical cases only account for a small fraction of children requiring paediatric neurology, paediatric intensive care, and neurorehabilitation

The nursing care of children in the post-ITU setting of children with head injuries is very similar to the care of children with non-acquired brain injury, status epilepticus, meningitis

Therapists caring for children in the rehabilitation phase of TBI have gained their skills from a wide range of childhood neurological problems. To maintain expertise in seating, splinting, Botulinus Toxin, ng and gastrostomy feeding, augmented communication devices, they will need to work with a broad range of children with neuro-disability.

20-40% of children with mild to moderate TBI show symptoms of their head injury 3 months later (Danish experience)

Is the outcome from the severe TBI group related to:

severity of initial injury

severity of secondary brain insult

skills of neurosurgeon

skills of ITU staff

quality and quantity of rehabilitation

family structure and expectations
school

Are children who are referred to “national” units (head injury, epilepsy, cerebral palsy, behaviour etc) referred because the outcome will be better, or because their pathology and symptoms are so severe that they cannot be managed at home?

Training

5 out of the last 6 paediatric neurologists appointed in Scotland were trained in Scotland. There is not currently an SpR in Scotland training as a paediatric neurologist. If numbers of consultant are to be expanded, and specialists in paediatric Neurodisability are to be appointed at at least regional level, concentrating too many specialist tertiary services in one centre will inhibit our ability to train people who will then work in Scotland. It will have a detrimental effect on research in paediatric neuroscience in the three other centres.

However, rotation of trainees between centres for specific training will avoid some of the negative effects of single centre neurosurgery.

It is likely that as this review progresses, it will be apparent that there are deficiencies in the wider services we offer children with neurological problems. It would be unethical to ignore these whilst we create a Rolls-Royce neurosurgical services for a small group of patients.

Paper F

The New Deal and Working Time Directive Implications for Scottish Paediatric Neurosurgery

Introduction

The New Deal for doctors in training and the Working Time Directive will when combined with the changes likely to be introduced in the new consultant contract significantly effect hospital working practice

The New Deal has already been implemented for PRHO and SHO levels who will require to be band two compliant from august 2001. Where these changes have already been introduced there have been identified difficulties of maintaining training and service commitment.. These changes are going to be very much more significant with the SpR level. SpR's will require to be compliant by December 2003.

The changes to practice, which will inevitably occur, will impact on Consultants and through that the impact on them of the Working Time Directive. This is legislation that is already statute.

The New Deal

The New Deal essentially limits the weekly working time for doctors in training to an average of fifty-six hours over a four-week period. It also places limits on the intensity of work, and the introduction of the concept of compulsory periods of rest.

A recent option appraisal undertaken by the SBNS and SAC for neurosurgery identified possible, but not necessarily achievable solutions to maintain the levels and standards of training and to minimise disruption to the provision of service.

The minimal number of trainees required to run an independent rota is six. This would only allow a partial shift system with all its major problems. Full shift systems and "conventional " type rotas require eight to ten or more persons depending on the intensity of work particularly out of hours. It follows that the thinner the cover the higher the potential intensity of work.

No Scottish Neurosurgical unit as currently staffed can sustain a satisfactory workable middle grade out of hours rota except Glasgow using a partial shift system.

It will certainly not be possible to sustain a separate middle grade out of hours rota or indeed complete cover during the working day for a paediatric neurosurgical service, particularly as it is based on a separate site at York Hill

There will therefore be a need to revisit some of the tenants of "Safe Paediatric Neurosurgery" with particular reference to considered adequate or appropriate levels of junior staffing. One solution to this might be to combine the rotas for paediatric neurology and neurosurgery a situation that could be of potential benefit to both groups.

The most easily achievable solution is to separate training from service. This accepts that trainees will be there to train but of course does not mean that they do not have to gain experience of patient management and on call management of emergencies. To achieve this for paediatric neurosurgery would not be very different from the current situation. It is already largely a consultant delivered service, and the effects are more likely to be felt with changes to consultant practice.

The concentration of paediatric neurosurgery on a limited number of sites would enable trainees to use the more limited amount of time available to them to a maximum potential for learning experience. It would not be illogical to suggest that one site would be better than two from a training perspective. It would also be appropriate to look at training methods and how best to exploit every clinical situation as a training opportunity.

The Working Time Directive

Introduced in 1998 as Health and Safety Legislation from the EEC, it will limit working time for all workers, to an average of forty-eight hours per week. The only exceptions are those with autonomous decision making powers and this group does not include consultants. It also introduces limits on continuous hours of work to a maximum of eleven hours in any twenty-four hour period time off after a night on call and compulsory holidays. It is possible to derogate from this and indeed this should already have been done to practice the hours currently undertaken by the majority of consultants. It will probably require a minimum of six to eight consultants to maintain an independent rota if the WTD was to be fully introduced and every consultant to work forty eight hours with the compulsory rest periods, time for issues of clinical governance and the increased time that would be required for training.

The implications of this for the provision of experienced paediatric neurosurgical consultant cover are considerable. The original recommendation of safe paediatric neurosurgery was for two whole time equivalents and this would now be wholly insufficient and require to be doubled. It would probably be best achieved with two whole time and four part time paediatric neurosurgeons a level difficult to justify on more than one site. This would also raise issues of governance with maintenance of expertise and operative experience.

The working Time directive is to be wholly introduced in 2008.

References

- 1 Impact of the New Deal and Working Time Directive on Planning Clinical Services
AJW Steers Safe Neurosurgery 15 06 01
- 2 Working Time Regulations: Implementation in the NHS
NHSMEL(1999)1
NHS Circular:PCS(DD)1999/13 Junior Doctors Hours, The Working Time Directive
- 3 Implications for Training and the Provision of Service for Neurosurgery-A Discussion Paper
A.J.W.Steers D.G.Hardy
- 4 A Health Service for all the Talents
5. New Consultant Contract (when agreed and published)

Paper G

PAMS

SLTs, Physios, OTs and dieticians from various centres in Scotland were given the opportunity to give me their views. They are four separate professions and although they work closely they have different training, professional structures etc.

Different involvement of therapists depending on clinical area; Craniofacial surgery, Neurological conditions, Trauma. They work in in-patient, hospital out-patient or community out-patient teams.

Most comments refer to neurological conditions or trauma. The effects of a change in site to craniofacial work would be manageable by therapists.

- no national forum to discuss standards of care and service delivery
- multidisciplinary working is essential
- liaison between neurologist and neurosurgeon needs to be good
- ideal if surgery and rehab teams are on same hospital site
- children should always be treated by therapists specialising in paediatric care especially in ICU
- dietetics have IP input but there is an extreme shortage of community dieticians
- rehab exists in hospital and community and may be ongoing in the community after hospital contact stops
- what is outcome? May be different for different professions – therapists may be looking at child 5 years later in school, in social environment etc
- outreach work needs more time/travel
- discharge planning needs to be followed through
- it takes time and effort to establish good links and don't want to lose good links that already exist
- feel meeting wasn't advertised well to therapists, hope this isn't indicative of how decisions will be made
- Edinburgh and Glasgow feel one site would be difficult- obviously feel loyal to their own service but building up new links, resources, experience would be difficult and time consuming

Comments were different depending on whether referring to planned surgery or trauma

Some of these issues are relevant whether or not there is a change in sites

Any change would require an increase of resources

Managed Clinical Network

- structure for Scottish wide collaboration already existed and the cleft network is smaller
- there is no money for clinical time
- time consuming as lots more meetings

PAPER H

Clinical Radiological Aspects**Current situation:****Site****Clinical Radiologists with responsibility for N'Surg patients**

Aberdeen

Nx2, Px1

Dundee

GR

(P&N)

DCN, Edinburgh

Nx4

Royal Hospital for Sick Children, Edinburgh

Px3

INS, Glasgow

Nx5

Maternity Hospital, SGH, Glasgow

O&Neonat

Royal Hospital for Sick Children, Glasgow

Px4

For paediatric neurosurgery there is therefore direct involvement of Neuroradiologists with a subspecialist interest and training in paediatrics only in Aberdeen and the INS, Glasgow.

Examinations Required to be Undertaken – both diagnostic and therapeutic:

- Plain radiography
- Contrast radiography
- Screening radiography
- US
- CT
- SPECT / PET
- MRI / MRS
- Angiography

Training - Royal College of Radiologists

Recognised as subspecialties

- Paediatric radiology

- Neuroradiology

There is no Paediatric Neuroradiology subspeciality but Neuroradiologists in training undertake a module of paediatrics in their fifth and sixth years and Paediatric radiologists would have undertaken some Neuroradiology in their SpR rotations. There are training programme in US for Obstetricians, Paediatricians, Radiologists/Radiographers.

Relevant Societies are also involved in Training and Standard setting eg BSNR

Other essential members of the Clinical Radiology Team :

Radiographers: placement in paediatrics and neuro during training
further in house training when appointed
Nurses: paediatric
Anaesthetists: paediatric
Neuro – with experience in CT, MRI/S and angiography

A very specialised service needs to be delivered and it is essential that these anaesthetists have extensive neurosurgical experience as well as being paediatrically trained.

Equipment:

Size & type of all radiological equipment (eg supports, restraints, table tops, MRI/S coils) is required to cover the age range from a premature neonate to a 16 year old man. This means a certain amount of redundancy and higher capital costs in each examination room
Patient friendly environment required for this age range
Monitoring equipment
Resuscitation equipment
Anaesthetic equipment

Coverage around Scotland:

Site	Clinical Radiology not available for N'Surg patients
Aberdeen	limited angiography
Dundee	no SPECT/PET/angiography
DCN, Edinburgh	no SPECT/PET
Royal Hospital for Sick Children, Edinburgh	no SPECT/PET/angiography/low field MRI / no MRS
INS, Glasgow	no PET
Maternity Hospital, SGH, Glasgow	(only has PF and US rest shared INS/RHSC)
Royal Hospital for Sick Children, Glasgow	no SPECT/PET/angiography/no MRS

The essential Neuroradiology equipment and ancillary staff to support Neuroradiology for paediatric neurosurgical patients on one site is only available at the INS, Glasgow.

Interventional Angiography:

Although this is one of the least common procedures it is one of the most invasive and is set to become commoner over the next several years. Expertise has to be concentrated in a few clinical radiologists who are routinely carrying out similar adult work. At present patients are treated in INS, Glasgow where the staff and expertise is available with occasional patients being treated in DCN, Edinburgh.

Summary:

- 1) **Edinburgh:** The lack of onsite Neuroradiology, angiography, SPECT and / or PET, high field MRI or MRS is a serious shortcome of RHSC, Edinburgh. Shared clinical meetings with the Neuroradiologist from DCN (1/week)

help to a limited extent but obviously do not cover the emergency situation. Patients have to be transferred to DCN if these examinations are required or they have suboptimal radiological investigation prior to any surgery.

- 2) **Glasgow:** The full gamut of investigative Neuroradiological equipment and paediatric trained staff are available 24 hours, seven days a week at the INS, Glasgow.
- 3) **Aberdeen:** All investigations can be carried out except specialist angiography. A PET scanner is available from the University for NHS use (the only centre in Scotland). Neuroradiological staff are enthusiastic but lack the high throughput to maintain experience in many routine and specialist procedures.
- 4) **Dundee:** There is no on site Neuroradiologist but a single general radiologist takes an interest in paediatric Neuroradiology. There is considerable enthusiasm but angiography, MRS, and SPECT and / or PET is not available. The lack of a high throughput and the single handed nature of the practice mean that it is impossible to maintain experience in many routine and specialist procedures and the work is not covered at all times.

Appendix 6

PAEDIATRIC NEUROSURGERY WORKING PARTY
OPEN MEETING
HELD AT
STIRLING MANAGEMENT CENTRE
ON
FRIDAY, 5TH OCTOBER, 2001

PROGRAMME

- 09.30: Coffee and registration
- 10.00: Introduction - Dr Aileen Keel, Deputy CMO
- 10.05: Review of Working Party Remit - Professor G Youngson, Chairman Working Party
- 10.35: Options in Service Reconfiguration -
- Miss Jennifer Brown, Consultant Paediatric Neurosurgeon, Institute of Neurosciences, Southern General Hospital, Glasgow
 - Miss Lynn Myles, Consultant Paediatric Neurosurgeon, Royal Hospital for Sick Children, Edinburgh
 - Mr David Currie, Consultant Neurosurgeon, Aberdeen Royal Infirmary
 - Dr Martin Kirkpatrick, Consultant Paediatric Neurologist, Ninewells Hospital, Dundee
- 11.15: Paediatric Intensive Care, Paediatric Anaesthesia and transport consideration in Children's Neurosurgery -
- Dr David Simpson, Consultant Paediatric Anaesthetist, Royal Hospital for Sick Children, Edinburgh
 - Dr Neil Morton, Consultant Paediatric Anaesthetist, Royal Hospital for Sick Children, Glasgow
- 11.45: Coffee/Tea
- 12.05: Interface Presentations -
- | | |
|-----------------------|--|
| Paediatric Radiology: | Professor Donald Hadley, Institute of Neurosciences, Glasgow |
| Paediatric Oncology: | Dr R Wilkie, Consultant Paediatrician, Ninewells |
| PAMS: | Ms L Crampton, Speech & Language Therapist, Dental Hospital, Glasgow |
| Nursing: | Mrs Winne Miller, Clinical Nurse Manager, Yorkhill |
- 12.05: Interface Presentations - (cont'd)
- | | |
|---------------------------|--|
| Action for Sick Children: | Mrs Sarah Johnston, Dundee |
| Maxillofacial Surgery: | Mr David Koppel, Consultant Maxillofacial Surgeon, Glasgow |
| Paediatric Neurology: | Dr Paul Eunson, Consultant Paediatric Neurologist, Edinburgh |

- 1.15: Coffee and sandwiches
- 2.00: Manpower Implications and Future Staffing Considerations -
Mr James Steers, Consultant Neurosurgeon, Edinburgh
- 2.10: Group Discussion/Option Appraisal
Group Leaders: Mr Eric Ballantyne, Consultant Neurosurgeon
Dundee
Miss Lynn Myles, Consultant Paediatric
Neurosurgeon, Edinburgh
Mr David Currie, Consultant Neurosurgeon,
Aberdeen
Miss Jennifer Brown, Consultant Paediatric
Neurosurgeon, Glasgow
- 3.00: Group Feedback
- 3.30: Open Discussion
- 4.00: Summary and Conclusions
Professor K Woods Lindsay Chair in Health Policy and
Economic Evaluation, Glasgow University

Attendees at Open Meeting Stirling October 5th 2001

NAME	JOB TITLE	LOCATION
Mr Eric Ballantyne	Consultant Neurosurgeon	Ninewells Hospital, Dundee
Dr Ian Bashford	Senior Medical Officer	St Andrew's House, Edinburgh
Mr Philip Barlow	Consultant Neurosurgeon	Southern general hospital, Glasgow
Mr Jonathan Best	Chief Executive	Royal Hospital for Sick Children, Glasgow
Miss Jennifer Brown	Consultant Paediatric Neurosurgeon	Southern General Hospital, Glasgow
Ms Shona Buntain	Staff Nurse	South Glasgow University Hospitals NHS Trust
Dr Anne M. Burke	Consultant Anaesthetist	Southern General Hospital, Glasgow
Mr Peter Campbell	Clinical Nurse Manager	Royal Hospital for Sick Children, Edinburgh
Ms L Crampton	Speech & Language Therapist	Dental Hospital, Glasgow
Mr David Currie	Consultant Neurosurgeon	Aberdeen Royal Infirmary, Aberdeen
Ms Irene Dewar	Senior I Physiotherapist	Southern General Hospital, Glasgow
Dr Paul Eunson	Consultant Paediatric Neurologist	Royal Hospital for Sick Children, Edinburgh
Mrs Shona Forsyth	Neuropaediatric Outreach Nurse	Southern General Hospital, Glasgow
Mrs Isabel Gray	Hospital Play Specialist	Southern General Hospital, Paisley
Ms Margaret Greville	Sister	Southern General Hospital, Glasgow
Professor Donald Hadley	Consultant Neuro-Radiologist	Southern General Hospital, Glasgow
Mrs Mairi Hall	Senior Staff Nurse	Southern General Hospital, Glasgow
Dr Sarah Jackson	Consultant Anaesthetist	Southern General Hospital, Glasgow

Mr Robin Johnston	Consultant Neurosurgeon	Southern General Hospital, Glasgow
Mrs Sarah Johnston	Area Co-ordinator	Dundee
Dr Aileen Keel	Deputy Chief Medical Officer	St Andrew's House, Edinburgh
Ms Sandra Kerley	Director of Children and Young People's Services	Capability Scotland, Edinburgh
Ms Valerie Kennedy	Senior Physiotherapist	Royal Hospital for Sick Children, Edinburgh
Mr David Koppel	Consultant Maxillofacial Surgeon	Glasgow
Mr James Miller	Divisional General Manager	Southern General Hospital, Glasgow
Mrs Winnie Miller	Clinical Nurse Manager	Royal Hospital for Sick Children, Glasgow
Dr Neil Morton	Consultant Paediatric Anaesthetist	Royal Hospital for Sick Children, Glasgow
Miss Lynn Myles	Consultant Paediatric Neurosurgeon	Western General Hospital, Edinburgh
Mrs Catherine McGee	Neuro Speech & Language Therapy	Southern General Hospital, Glasgow
Ms Jan McIntosh	Scottish Executive Health Department	St Andrew's House, Edinburgh
Dr Robert McWilliam	Medical Consultant	Royal Hospital for Sick Children, Glasgow
Ms Louise Ogilvie	Local Health Councils	
Miss Cheryl Paris	Scottish Executive Health Department	St Andrew's House, Edinburgh
Dr Janet SS Pollock	Consultant Anaesthetist	Southern General Hospital, Glasgow
Mrs Alison Rae	Head Occupational Therapist	Southern General Hospital, Glasgow
Mrs Catherine Robertson	Head Occupational Therapist	Southern General Hospital, Glasgow
Ms Joan Saunders	Charge Nurse	Royal Hospital for Sick Children, Edinburgh
Mr Will Scott	Scottish Executive Health Department	St Andrew's House, Edinburgh
Dr David Simpson	Consultant Paediatric Anaesthetist	Royal Hospital for Sick Children, Edinburgh
Dr Peter Smail	Clinical Group Co-ordinator	Royal Aberdeen Children's Hospital
Ms Lynn Smith	Staff Nurse	South Glasgow University Hospitals NHS Trust
Mr James Steers	Consultant Neurosurgeon	Western General Hospital, Edinburgh
DR R Wilkie	Consultant Paediatrician	Ninewells Hospital, Dundee
Ms Fiona Wilson	Staff Nurse	Southern General Hospital, Paisley
Professor Kevin Woods	Lindsay Chair in Health Policy & Economic Evaluation	University of Glasgow
Professor George Youngson	Consultant Paediatric Surgeon	Aberdeen Royal Infirmary, Aberdeen

Legends to Tables and figures

Table 1	Centre based activity on patient numbers, operative load, and intensive care patients for year 2000
Table 2	Distribution of operative cases by condition throughout existing Scottish centres
Table 3	RHSCE PICU activity for neuro science patients
Table 4	PICU activity Southern General Hospital
Table 5	PICU activity Aberdeen
Table 6	PICU Neuro-trauma, and Neurosurgical activity Scotland 2000-all centres
Table 7	Option appraisal key discriminators
Table 8	Option appraisal table
Figure 1	PICU outcome RHSCE
Figure 2	Age related incidence of head injuries Lothian

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Abbreviations

RHSCE:	Royal Hospital For Sick Children Edinburgh
RHSCG:	Royal Hospital For Sick Children Glasgow
INS:	Institute Of Neurosciences, Southern General Hospital Glasgow
RACH:	Royal Aberdeen Children's Hospital
ARI:	Aberdeen Royal Infirmary
SGH:	Southern General Hospital
SpR:	Specialist Registrar
PAMS	Professions Allied to Medicine