

British Orthopaedic Association

PATRON: H.R.H. THE PRINCE OF WALES



CHILDREN'S ORTHOPAEDICS AND FRACTURE CARE

Published by the British Orthopaedic Association, July 2006

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This document has been produced by a joint working party of the British Orthopaedic Association (BOA) and the British Society for Children's Orthopaedic Surgery (BSCOS).

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FOREWORD

The British Orthopaedic Association (BOA) welcomes this initiative from the British Society for Children's Orthopaedic Surgery (BSCOS). For too long the surgical treatment of children has not received the attention it warrants, although such initiatives as the appointment by the Government of a 'Children's Tsar' and the introduction of a National Service Framework for children are welcome acknowledgement that children pose specific problems, particularly when they present in Accident and Emergency Departments.

Both the BOA and BSCOS have concerns about the future provision of children's orthopaedic services and this document serves to highlight these anxieties, not least of which is how the service is to be staffed, in the light of falling recruitment into the specialty. Some suggestions for a way forward are presented and we hope that these will be taken seriously by the relevant authorities.

Ian J Leslie MChOrth FRCS Ed FRCS
President

PREFACE

Children's orthopaedics is at a crossroads as orthopaedic surgery moves from a general discipline to a group of subspecialties. This change has created problems in the provision of orthopaedic care for children, a situation which requires urgent attention. This document identifies the problems which confront children's orthopaedic surgery and suggests solutions.

The underlying message is a request for immediate action on what is becoming a crisis. It is important that the specialty of children's orthopaedics receives long-term support because of the special needs of children.

David M Hunt
Past-President

Nicholas M P Clarke
President

British Society for Children's Orthopaedic Surgery
Members of Council, British Orthopaedic Association

EXECUTIVE SUMMARY

- This Blue Book, developed by the BOA in conjunction with the BSCOS, examines the current services provided for the orthopaedic and fracture care of children and discusses changes to make them more effective.
- The method of delivery of orthopaedic services has changed (Table p.12). Previously¹, orthopaedic departments had an average of three consultants. Now the average is 6/7 consultants per department, with the majority undertaking a special clinical interest. The number of children presenting for treatment has increased by more than 40% between 1993 and 2005. However, the number of consultants who provide orthopaedic care for children has not changed. Departments which provide this care have, on average, eight consultants², only one or two of whom are involved in orthopaedic and fracture treatment for children.
- Because of a lack of consultant orthopaedic surgeons trained in children's orthopaedics a fully comprehensive service is not possible. For this reason a system of care is recommended that is based on populations of between 500,000 and one million. The majority of children may be treated locally, with complex problems being referred to regional or national tertiary centres. This is the concept of 'Hub and Spoke', a principle which has been supported by a number of reports into the care of children in the United Kingdom^{3,4}. These arrangements must be agreed by local negotiation.
- The system of 'Hub and Spoke' must evolve over time. Where local arrangements are currently satisfactory, these should continue. However, when a consultant retires, these locally-developed systems may fail unless the local service is renewed by a suitably trained successor. Alternatively, the Hub must provide the local service and funding must be identified for this.
- Seven urgent problems exist and require immediate attention by the National Health Service (NHS) Executive, the Strategic Health Authorities (SHA) and, at a local level, by Trusts:
 1. Approximately 25% of Trusts do not provide routine orthopaedic and fracture care for children.
 2. There are problems with children's anaesthesia in 40% of Trusts. This is largely because of concerns among anaesthetists about anaesthetising young children.
 3. There is an acute workforce problem:
 - There is a lack of orthopaedic trainees who choose children's orthopaedics as their special interest;

- the current average age of retirement from the NHS for consultant orthopaedic surgeons is 57.5 years;
- 16.7% of orthopaedic surgeons who are interested in the care of children are over the age of 55 years.

Unless action is taken, 31 orthopaedic departments will lose their ability to care for children with orthopaedic problems.

4. As greater numbers of patients are being referred, tertiary centres are becoming overwhelmed because of a lack of adequate facilities.
 5. Subspecialisation in orthopaedic surgery has focussed on a single joint or part of the body. This makes many consultants reluctant to treat children, as children's orthopaedics is a global specialty, with exceptions, which is essential to the care of children with musculoskeletal problems.
 6. Standards of care have changed as a result of the Kennedy and Laming reports^{5,6}, and with the introduction of the National Service Framework for children. Special training is required in child communication and in problems such as child abuse. This requirement may increase the reluctance of surgeons without this training to treat children at all.
 7. Because of the special needs of children, the specialty of children's orthopaedics must be supported and not allowed to fragment. Other consultants must be encouraged to continue to treat children, especially those children with fractures, and a suitable environment must be provided for this to happen. We have considered subsuming the specialty into other special interest groups, but have rejected this because of the special requirements for the care of children.
- The system of care proposed has a number of important requirements:
 1. District General Hospital (DGH) Trusts and tertiary centres must agree to set up 'Hub and Spoke' arrangements which are appropriate for local needs, and with agreed indications for referral and transfer.
 2. Trusts with Accident and Emergency (A&E) departments which provide inpatient care for children must provide paediatric, anaesthetic and orthopaedic cover.
 3. The present on-call arrangements, where general orthopaedic surgeons take care of children with common fractures, should continue.
 4. Where a Trust does not admit children, the A&E Department may assess a walk-in case and advise appropriate referral for children with fractures. This must be part of an agreed local protocol.

- The Department of Health and the Strategic Health Authorities must support Trusts to ensure that:
 1. There are adequate consultants within DGH Trusts to treat the majority of children's fractures and to provide a routine outpatient service for their care. This may require, on the retirement of consultants who undertook this work, that the post is reappointed.
 2. Tertiary centres must be adequately funded and staffed to provide fully for the increased workload, both for incoming secondary work and to provide a 'Hub and Spoke' arrangement.
- DGH Trusts and tertiary centres must ensure that local arrangements provide an attractive working environment for consultants so that good quality candidates will apply for posts.
- Good quality training must be provided to make the specialty of children's orthopaedics surgery attractive and rewarding.
- Consideration must be given for an improvement in conditions of service for paediatric orthopaedic surgeons.

INTRODUCTION

History of children's orthopaedic services

The word 'orthopaedia' was devised in 1741 by a Parisian paediatrician, Nicholas Andry, who was also Senior Dean of the Faculty of Physick in Paris. He wrote a book entitled '*Orthopaedia: or, The Art of Correcting and Preventing Deformities in Children*'. It was essentially a self-help book written for parents. In the preface he stated: "As to the title, I have formed it of two Greek words viz Ὀρθοῦς which signifies free from deformity and Παιδίον, a child. Out of the two words I have compounded that of Orthopaedia to express in one term the design I propose which is to teach the different methods of preventing and correcting the deformities of children".

Surgical subspecialisation within orthopaedic surgery only commenced in the 1980s but orthopaedic surgeons continued to treat children, particularly fractures. The European Paediatric Orthopaedic Society (EPOS) was formed in 1981 and the Pediatric Orthopaedic Society of North America (POSNA) in 1984. Children's orthopaedics as a defined specialty started in the United Kingdom with the founding of the BSCOS in 1984 under the leadership of Anthony Catterall, to bring together those whose special interest was the management of conditions specific to children. These developments resulted in better standards of care for children with orthopaedic and fracture problems.

The first BSCOS meeting in the United Kingdom involved twelve orthopaedic surgeons with a particular interest in children's orthopaedics. John Wilkinson became the first President of the Society. From these small beginnings the Society has flourished and now has 181 members who meet twice a year in order to exchange scientific and practical views on the management of children's orthopaedics. Approximately half of these surgeons work in a DGH setting and the remainder in tertiary care. Combined meetings have been held with similar paediatric orthopaedic surgeons from mainland Europe and visiting lecturers have been invited to the Society from throughout the world. These lecturers have then visited centres within the UK in order to exchange ideas on good clinical practice. BSCOS is a member of the Board of Specialist Societies within the BOA.

METHODOLOGY AND DOCUMENTS STUDIED

A thorough review has been undertaken of earlier reports into the delivery of children's orthopaedic services. In addition a BOA Linkman survey was specifically commissioned in 2005, so that up to date data were available for this report. These sources are listed below; see also the other references (p.30).

Children First: a Study of Hospital Services. The Audit Commission 1993.

Service Requirements for Children's Orthopaedics. British Society for Children's Orthopaedic Surgery 1993

Guidelines for the provision of Anaesthetic Services. Royal College of Anaesthetists 1999.

Children's Surgery: A First Class Service. The Royal College of Surgeons of England 2000

Better Care for the Severely Injured. A Joint Report from The Royal College of Surgeons of England and the British Orthopaedic Association July 2000

National Service Framework for children, young people and maternity services. Dept of Health. The Stationery Office Sept 2004

British Orthopaedic Association/ British Society for Children's Orthopaedic Surgery survey 2005.

The increases in the Orthopaedic workforce – Right trajectory but wrong target? Bowyer, G. British Orthopaedic News, Autumn 2005

Postnatal care: routine postnatal care of women and their babies. National Collaborating Centre for Primary Care. NICE Consultation document November 2005

West London Task Force: A review of Paediatric and Child Health Services in West London, The Boyd Report, 1998

London Severe Injury Working Group. Paediatric sub-group 2001

The increases in the Orthopaedic workforce – right trajectory but wrong target? Bowyer, G. British Orthopaedic News Autumn 2005

SECTION 1

1.1 STUDIES ON WORKLOAD

Through the linkmen of the BOA, who work in orthopaedic departments throughout the UK, three surveys have been undertaken to examine the workload related to children's orthopaedics in a DGH for a population of approximately 250,000. The workload was found to be considerable.

1.1.1 The 1993 Review

The first study was in 1993¹, when the following conclusions were drawn:

- In a DGH the degree of special care received by children with orthopaedic problems and fractures was variable. There were no special clinic facilities for children in 22% of DGHs.
- In a typical A&E Department 43,500 new cases were seen each year, of which approximately 11,200 were under the age of 16 years. Of these, 265 required emergency admission. Minor fractures were often seen and treated in the A&E Department and were never seen by an orthopaedic surgeon.
- 65% of children with fractures requiring admission were usually admitted under the 'on-call firm'. 23% of problem fractures, e.g. supracondylar fractures of the humerus, may have been referred to a colleague with a special interest. Minor fractures usually remained within the A&E Department.
- In a typical three- or four-consultant department, common paediatric orthopaedic problems (intoeing, bow legs, flat feet) were usually seen by one or two interested surgeons.
- The less common orthopaedic problems, such as developmental dysplasia of the hip (DDH), clubfeet, leg inequality or scoliosis, were treated by the same surgeons, but may have been referred to a special centre. Only 28% of departments provided in-house treatment for any or all of these conditions.
- Only 43% of units provided screening for problems such as congenital dislocation of the hip and scoliosis. In most units, screening was undertaken routinely by the paediatricians, with some input from the interested orthopaedic surgeon.
- Children with physical and mental handicap received variable treatment. Paediatricians provided this service, with a variable input from a local

orthopaedic surgeon. Only 50% of DGHs provided a service for the disabled child. Specific orthopaedic problems in this group of children (eg the subluxating hip in cerebral palsy and foot deformity in spinal dysraphism) may have been treated locally or referred to a special centre.

- Poor training in children's orthopaedics usually reflects a lack of orthopaedic facilities. Many trainees complete their training with inadequate specific experience in this field, particularly with regard to difficult fractures. Trainees had to go elsewhere, often abroad, to complete this part of their training. Two Fellowships were available for training in children's orthopaedics and fractures for trainees who had undertaken higher surgical training in orthopaedics. Both were recognised by the Specialty Advisory Committee in Trauma and Orthopaedics (SAC).

1.1.2 The 2001 Review

The second review, which involved 214 departments, was performed in 2001. The findings were:

- There continued to be no orthopaedic service for children in 25% of Trusts, although there was a facility for the management of common paediatric fractures. Some hospitals with a children's orthopaedic service believed they would no longer be able to fill a consultant paediatric orthopaedic post on the retirement of the present incumbent.
- There was an increasing reliance on referral to tertiary centres. In the DGH setting children with orthopaedic problems and fractures received variable care. Children with difficult fractures may previously have been treated locally but were increasingly referred to other centres.
- Many minor fractures continued to be followed in the local A&E Department. Common paediatric problems embracing normal variants were usually seen in the DGH by a surgeon with an interest in children's orthopaedic problems.
- The less common problems, such as DDH, clubfeet, leg length discrepancy and scoliosis were usually referred to a tertiary centre.
- Screening for DDH and scoliosis may have involved the paediatricians, with some input from a local interested orthopaedic surgeon, but the emphasis was increasingly on tertiary centres providing the screening facilities and treatment.

- Children with a combined physical and mental handicap also received variable treatment. Community paediatricians and paediatricians with an interest in developmental delay usually led a service with only specific orthopaedic input from interested individuals. Increasingly there was a tendency to refer to a tertiary centre.
- Training in children's orthopaedics was usually confined to tertiary centres and there was an increasing problem with providing adequate assignments within regional programmes because of the rarity of centres which allowed comprehensive training.
- Those who wished to pursue a career in children's orthopaedics usually undertook a Fellowship, either within the United Kingdom or, more commonly, abroad.

1.1.3 The 2005 Review

Through the linkmen of the BOA, a further survey was undertaken in July 2005⁹. The following conclusions were drawn:

- The system for the delivery of orthopaedic care has changed. Previously the average number of consultants in a department was 3.5, whereas in the new survey it was 7.38. For those departments providing a children's service, the average number was 8.1.
- BSCOS has 181 members of whom 117 responded to the survey. When combined with the 115 orthopaedic surgeons with a declared interest in children's orthopaedics, there are only 252 orthopaedic surgeons with an interest in children's orthopaedic surgery. This represents 14.3% of consultant orthopaedic surgeons.
- In a typical seven- or eight-consultant department, common paediatric orthopaedic problems (intoeing, bow legs, flat feet) are usually seen by one or two interested surgeons.
- The less common orthopaedic problems (DDH, clubfeet, leg inequality and scoliosis) were treated by the same surgeons, but may have been referred to a special centre. Only 29% of departments provided in-house treatment for these conditions.
- In 44 of the 181 units (23%) there was no consultant with a children's interest. In many Trusts the A&E Department saw children but referred them to other units for fracture care. The linkmen reported the inadequacies of this type of referral.

- There was an orthopaedic practitioner working in 29% of units.
- Only 43 of 181 units (24%) surveyed had a paediatric intensive care unit.
- There were problems with paediatric anaesthesia in 73 of the 181 units (40%), which was not an identified problem in the 1993 survey.
- In a DGH the degree of special care offered to children with orthopaedic problems and fractures was variable. There were no special clinic facilities for children in 22% of DGHs.
- In a typical A&E Department 67,696 new patients will be seen each year, of whom approximately 16,696 (24%) are under the age of 16 years. Of these, 452 (4.9%) will require emergency admission for treatment. Of 1419 consultants, 875 (61.7%) undertake fracture care for children. Minor fractures continue to be seen and treated in the A&E Department and may never be seen by an orthopaedic surgeon.
- 65% of children who required admission with a fracture were usually admitted under the on-call firm. For problem fractures, eg supracondylar fractures of the humerus, 35% were referred to a colleague with a special interest, but 65% remained under the care of the on-call firm. Only 30% of trusts provided a paediatric on-call rota.
- There was screening for problems such as developmental dysplasia of the hip (DDH) in 52% of units. Most was undertaken routinely by paediatricians, with some input from an interested orthopaedic surgeon. The recent National Institute for Health and Clinical Excellence (NICE) guidelines for postnatal care¹⁰ due for publication in July 2006, suggest that routine screening of children by a paediatrician in the first 24 hours of life should be abandoned in favour of an examination by a specially trained community midwife within 72 hours. The reason given is that waiting for a paediatrician is delaying the discharge of mothers after delivery.
- Children with physical and mental handicap received variable treatment. Paediatricians provide this service with a variable input from a local orthopaedic surgeon. Only 50% of DGHs provided a service for the disabled child. Specific orthopaedic problems in this group of children (the subluxating hip in cerebral palsy and foot deformity in spinal dysraphism) may be referred to a special centre or treated locally.
- Only 31% of departments have their own paediatric orthopaedic ward. These departments had an average of 9.43 consultants. There were problems with paediatric beds in 23% of units.

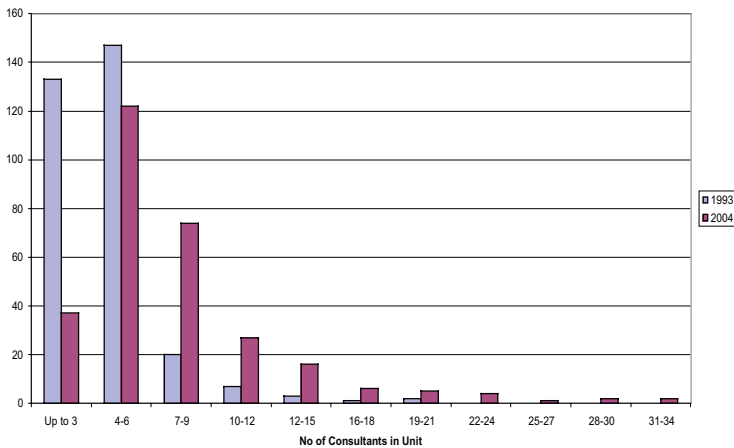
1.2 COMPARISON OF THE SURVEYS

Review of these three studies shows a number of worrying changes:

1.2.1 General Comparisons

- The delivery of orthopaedic care has changed, departments being larger (7.38 consultants compared with 3.5) (Table) and increasingly subspecialised. Children's orthopaedic and fracture care is being undertaken in larger units where the average number of orthopaedic consultants is 8.1. This effective doubling of the number of consultants per unit has not been met by a doubling of the number providing children's orthopaedic care.

Size of Orthopaedic & Trauma Consultant Establishments in 1993 (313 units on 15/3/93) and in 2004 (296 units on 31/12/2004)



- The number of Trusts which do not provide special facilities for children remains at 20%. However a further 21% have either limited facilities or no consultant with a paediatric interest. Thus, 41% of Trusts have either no, or a very limited, children's service.
- In 1993, 84% of consultants treated children's fractures. This has fallen to 61.7%.
- In 1993, 49% of consultants undertook elective orthopaedic care of children. This has fallen to 21%.

- Problems were recorded with paediatric anaesthesia in 73 of the 181 units (40%), which was not an identified problem in the 1993 survey. These problems were more likely to be encountered in the smaller units, but not exclusively so.
- There has been a 55% increase in new A&E attendances. The average number of children under the age of 16 years who attend A&E has risen by 45%, from 11,223 in 1993 to 16,244 in 2005. However, the number of children admitted has risen by 71% (265 in 1993 to 452 in 2005)⁹. It is not clear why this increase has occurred. In many cases the families must travel to another hospital for treatment.
- In 1993, 43% of units provided a screening service to the Obstetric Department. This has risen to 52% in 2005. This is encouraging, especially in the light of changes in screening proposed by the National Standards Forum and now forming part of the NICE guidelines for postnatal care, where the first day check is to be abandoned¹⁰.

1.2.2 Observations and Trends

- While orthopaedic units have become larger, the number undertaking children's orthopaedics has not grown at the same pace, especially for the smaller units. If this trend continues, there will be pressure to send more children to the larger units.
- There is a risk that the smaller units with limited children's facilities, perhaps with no interested consultant, or a consultant working in isolation, will be increasingly threatened. It is alarming that over 40% of Trusts are in this category. There has been a significant decline in the number of surgeons providing a children's orthopaedic service in the last decade.
- The problem of anaesthesia compounds this threat. This is being addressed by the Royal College of Anaesthetists which takes the view that, in establishments where children can be admitted, on-call anaesthetists must be confident to anaesthetise a child who is at least over one year old. To provide this, regular training may be offered at local tertiary centres for anaesthetists in DGHs. This has been established at Yorkhill Children's Hospital in Glasgow.
- The average age of retirement of orthopaedic surgeons from the NHS is now 57.5 years. A recent survey has indicated that 16.7% of consultants interested in the care of children with orthopaedic problems are currently over the age of 55 years. Within BSCOS 35% of members are aged over 56 years. If these surgeons were to retire and were not replaced, 31 units would lose their paediatric service¹⁶.

- Recruitment into the specialty may be at risk. There are indications that the smaller units will have difficulty attracting a consultant who is trained in children's orthopaedic problems, particularly if there is a requirement to work with inadequate facilities and in isolation. This is certainly a problem in North America. In the UK there are an inadequate number of surgeons in training to fill the vacancies in children's orthopaedics. It appears that trainees prefer to practise in joint replacement surgery or sports medicine.
- The increase in the number of children attending A&E Departments, and the number being admitted for injury, is also a concern; this appears widespread and is likely to continue. This is a problem which needs to be addressed by Trusts.
- New figures from the Department of Health suggest that 50% of serious fractures are now managed in tertiary centres, although these centres are inadequately resourced to meet this need.

1.2.3 The Workload for a Population of 250,000

These surveys indicate that a typical DGH serves a population of 250,000 people. Children under the age of 16 years represent 20% of this population. Consequently, a DGH is required to provide children's orthopaedic services for a population of some 50,000.

This population of 50,000 will produce approximately 10,000 attendances in A&E Departments per year. Not all these cases need to be seen by the orthopaedic department, but will nevertheless generate approximately 1000 new fracture clinic appointments and some 2000 follow-up fracture clinic appointments. Approximately 350 children will require admission for emergency treatment.

In addition, data would suggest that this population would generate 1000 new elective paediatric referrals from general practice to the hospital. Assuming an annual birth rate of 2500, 50 children will be born with an abnormal hip and approximately ten will be born with cerebral palsy. These figures do not include children with congenital anomalies or other neuromuscular disorders such as muscular dystrophy or spina bifida. There will be between 10 and 15 children referred to the orthopaedic department with clubfeet or other foot deformities. There are a large number of children under the age of six years who present with benign rotational and angular deformities, including intoeing, bow legs and knock knees.

SECTION 2

2.1 REVIEW OF CURRENT DIFFICULTIES IN THE PROVISION OF ORTHOPAEDIC CARE FOR CHILDREN

2.1.1 Workforce

There has been a significant expansion in service needs and the number of consultants in orthopaedic surgery over the last 10 to 15 years. In addition, the Department of Health has instituted and insisted on targets with regard to waiting times for outpatient and inpatient services, particularly for patients who need joint replacements.

At present, BSCOS recommends that orthopaedic surgeons who wish to provide orthopaedic and fracture care for children should have extended training in paediatric orthopaedic surgery. This should be for at least six months in the fifth or sixth year of training.

The most recent BOA manpower census in 2005 shows that the average age at retirement is now 57.5 years, having fallen from 60.8 years in 1998. Of those consultants with an interest in children, 16.7% are over the age of 55 years compared with 12.5% of general orthopaedic surgeons. This suggests that, in due course, there will be fewer senior consultants who have expertise in the care of children. In 2004, six of 11 consultant paediatric orthopaedic retirements were not replaced by a consultant with a children's orthopaedic interest.

For junior consultants, fewer are likely to be happy to treat children. This was highlighted by a recent study from the British Orthopaedic Trainees Association (BOTA) where only one trainee of 40 interviewed identified paediatric orthopaedics as a career interest.

With the expansion and increasing subspecialisation of orthopaedic surgery, there has been a failure to produce sufficient trainees to fill the demands of all subspecialties. As a result, the Cinderella specialty of children's orthopaedic surgery has been hit particularly badly. Specialist Registrars, on completion of their training, prefer to practise in joint replacement surgery, knee surgery or sports injuries.

The introduction of the new consultant contract makes it difficult for surgeons in a DGH to be involved in a trauma rota for both adult and children's orthopaedic services. The provision of a children's on-call rota is not practical in a DGH setting. There is also concern among trainees that potential litigation is a disincentive, compounded by the Kennedy (Bristol) and Laming (Victoria Climbié) reports^{5,6}.

The demands for care standards and specific training stated in recent reports such as the National Service Framework for Children and from the Healthcare Commission^{8,11}, combined with the possibility of having to undertake a minimum volume of work for recognition and licensing, have applied increasing stress and pressure to this system. Add to this the needs of clinical governance, appraisal and revalidation and it is little surprise that orthopaedic surgeons, unless they are committed on a full or nearly full-time basis, are reluctant to treat children. For example, an established orthopaedic surgeon with more than twenty years experience was recently barred by his Trust from operating on a child with DDH because he commented that he had not performed such an operation for more than a year.

There appears to be a widespread problem related to the appointment of children's orthopaedic surgeons. North America is struggling to fill its Fellowship posts in paediatric orthopaedics, as is the United Kingdom. Recently it has been difficult to fill SAC-approved trainee Fellowships in Sheffield, Great Ormond Street and The Royal National Orthopaedic Hospital with Type I trainees. In North America and Canada a solution to this problem has been to give salary enhancements for paediatric orthopaedics in order to reflect the lack of income associated with a fee-for-service arrangement or private practice.

2.1.2 Anaesthesia

In 1999 the Royal College of Anaesthetists issued a document¹² which suggested that no child under the age of three years should be anaesthetised in a DGH. Subsequently, this statement was withdrawn and the current recommendation is that no neonate (44 weeks of gestation to one year old) or a child under the age of three years with co-morbidities, should be anaesthetised in a DGH. However, it was also stressed that there is a need for appropriately-trained anaesthetists and all back-up staff. The refusal by some anaesthetists to anaesthetise children of this age group has led to a reduction of orthopaedic activity in a number of hospitals and subsequent transfer of this work to tertiary centres. This occurred as a result of the 1999 report and did not change after the report's withdrawal. In addition, a recent report of children's anaesthetic services in north-west London¹³ identified the Chief Executives of certain Trusts as being responsible for failing to ensure that adequate anaesthetic cover was provided for children's acute services.

2.1.3 Workload

If DGHs cannot deliver care then it must be transferred to the local tertiary centres. This causes an increasing workload, particularly in trauma and the treatment of common orthopaedic problems. These changes have occurred insidiously, with no strategic planning to move work from the DGHs to the

tertiary centres. This may be the thin end of a wedge and, as more work is transferred, the DGH consultants will become increasingly deskilled.

2.1.4 Tertiary Facilities

The SHAs have failed in their responsibilities to provide a high-quality complement of paediatric care within an organised framework.

There has been a perceived lack of planning which has resulted in a failure to develop additional capacity because the tertiary centres have not been resourced to cope with the anticipated referral rate. Furthermore, there are no plans to increase staffing in the tertiary centres in order to account for this increasing demand.

The Sheffield Children's Hospital serves a population of more than 500,000. It already treats twice the number of children than are seen in the surrounding DGHs, which serve a population of about 2 million. The Sheffield Children's Hospital does not have the capacity to treat more.

London, with a population of nine million, has only five tertiary referral centres for children's orthopaedics. One such centre has no A&E Department, and at least one has no paediatric intensive care unit (PICU). Meanwhile, the provision of neurosurgery, plastic surgery and cardiac surgery is not necessarily at the same hospital. Not only are these tertiary services unsatisfactory but one tertiary centre for more than a million population is unacceptable.

2.1.5.1 The Problem of the Child with Multiple Injuries

The following statement is taken from "*Better Care for the Severely Injured: a joint report from the Royal College of Surgeons of England and the British Orthopaedic Association*", July 2000¹⁴. Its recommendations are fully supported by this study.

"The majority of injuries from infancy to puberty are simple isolated limb injuries and should be treated in the local hospital. Assessment and care of the severely injured child can place a much greater demand on receiving clinicians. The child presents a different spectrum of potential injuries, a result of its smaller size to absorb impact and its flexible skeleton. Multi-system injury should be assumed despite the dearth of external signs. This, accompanied by the different physiological response to injury and frequent rapid deterioration, is a pitfall for the unwary. The severely injured child is fortunately rare but this, compounded by most doctors' inexperience with small children, often results in indecision and late intervention. There is a

much higher frequency of serious head, chest and abdominal injury than in the adult. There is also the greatest opportunity for salvage. Detection of skeletal injury may be difficult but is also urgent. Fracture intervention after the first few days, particularly with epiphyseal injuries and in the head-injured child with accelerated fracture healing, may be unsuccessful and result in the greatest long-term disability. By necessity, access to paediatric intensive care or specialist paediatric surgical services will require inter-hospital transfer for most children.

2.1.5.2 Recommended Standards of Care

- Any hospital receiving and caring for the severely injured child must have on-site support from paediatricians, paediatric anaesthetists, and a full range of appropriate resuscitation equipment.
- There should be a separate resuscitation area for children in A&E departments.
- A separate on-call response team ensuring the most senior paediatrician involvement must be in place for severely injured children. Although the resuscitation and surgical priorities remain the same, the skills are specific.
- Each receiving A&E department should have a children's nurse available at all times recognising the particular need for holistic care.
- Early advice from a paediatric intensive care unit (PICU) should be sought. Inter-hospital transfer of the critically injured child requires multi-disciplinary consultant involvement and should be managed according to locally agreed protocols. A retrieval team from the PICU should be available for urgent transfer. It is recognised that a local team may affect more rapid transfer.
- Receiving PICUs should have on-site supporting allied trauma specialties available and agree joint reception of the severely injured child.”
- All orthopaedic surgeons undertaking the care of multiply injured children must have training in paediatric life support techniques. Such training is provided at one of the BSCOS meetings each year.”

2.1.5.3 The emergency ambulance must be aware of which local hospitals are able to provide adequate care for the seriously injured child.

2.2 The National Service Framework for Children⁸

The National Service Framework for children began in 2001 as a result of the perception that children in the NHS had been regarded as a component of adult services rather than an entity in their own right. This initiative was made more imperative as a result of the Kennedy and Laming reports^{5,6}. The Framework stresses the importance of the NHS working with education and social services in its provision of services for children. It requires that health care professionals and, perhaps more particularly, managers should plan services specifically for children. The aim is a child-centred service with facilities specifically designed for children, and improved communication and consultation with children and parents. Specifically, this will require appropriate allocation of resources.

For orthopaedic surgeons, the obvious implication is a change in how children are treated within an adult service. Special provision for children must be made in clinics, as well as wards and operating theatres, particularly in those few instances where a separate children's orthopaedic ward still exists. This should be preserved as beneficial to the orthopaedic care of children.

Apart from the provision of special facilities for children, orthopaedic surgeons who treat children must be trained in paediatric resuscitation techniques, communication with children, and childcare, as well as in issues of abuse. Modules for these areas must be included in core curriculum programmes, with updates through orthopaedic courses and at meetings. Paediatric life support training is now provided annually at one of the BSCOS meetings.

SECTION 3

A SOLUTION FOR A SYSTEM OF CARE

3.1 Principles

1. We fully support the concept that, if possible, high quality local care should be available to all children within the UK. Local district hospitals should be able to provide a comprehensive trauma service for children. Emergency ambulance services need to be aware of which local hospitals can and cannot provide appropriate care of the seriously injured child.
2. We fully support the concept of a 'Hub and Spoke' system but this must be an agreed local solution achieved by discussion with the Trusts for populations of between 500,000 and 1,000,000.
3. We accept that any child being admitted for orthopaedic care within a hospital should have the support of qualified paediatricians.
4. Children with co-morbidities should be referred to a tertiary centre because of the need for the back-up of a PICU.
5. The majority of children who present in the evening with a fracture do not need to have their fracture treated out of hours and can be safely admitted for observation; their definitive treatment can take place the following day, when the appropriate anaesthetist is available. However, an appropriate paediatric ward must also be available.
6. Separate child-centred facilities should be available for children in the outpatient department and planning for children to be seen as an outpatient is required to ensure they are not in a mixed clinic with adults.
7. A paediatric ward is required with trained orthopaedic staff, as well as an appropriate area in the recovery area of theatres.
8. Where a Trust does not admit children, the A&E Department may assess a walk-in case and advise appropriate referral for children with fractures. This must be part of an agreed local referral protocol.

3.1.1 Accident and Emergency Departments

It is accepted that certain injuries and orthopaedic conditions should be managed in tertiary centres. The multiply injured child makes special demands, which may only be available by transfer to a tertiary centre. However, any hospital which admits children through an A&E Department

must have adequate facilities to look after those children. This includes appropriately trained anaesthetists to ensure that most of these children can be treated in their local hospital and that the multiply injured child can be resuscitated before transfer to the local tertiary centre.

DGHs which provide an inpatient service for children and yet do not have these facilities must review their service provision in order to provide the necessary training for anaesthetists to give this service. (An example of this is the programme instituted by the Glasgow Health Authority with anaesthetists visiting the Yorkhill Children's Hospital on a regular basis.)

3.1.2 Anaesthetic Requirements

The Royal College of Anaesthetists and the Department of Health are circulating a consultation document on paediatric anaesthetic services. The issue of the anaesthetist in a DGH who does not normally undertake paediatric anaesthesia and yet who is on call for general emergencies is highlighted. It is necessary to establish local networks for referral of cases and training for anaesthetists.

We believe that DGHs should have trained anaesthetists with the appropriate skill to anaesthetise children with common fractures, and for the more routine orthopaedic procedures. If a Trust does not have such specialists, then an appropriate staffing and training programme should be instituted. This will allow the presence of an appropriate anaesthetist on call who may then be involved in the resuscitation and stabilisation of seriously injured children before transfer. There should be a specified 'paediatric anaesthetist' who will then carry out anaesthesia on the majority of children within a Trust.

3.1.3 The Management of Fractures requiring Manipulation

All orthopaedic surgeons in training are exposed to the management of children's fractures in both DGHs and tertiary centres. All orthopaedic trainees are examined in paediatric orthopaedic and fracture problems in the FRCS(Orth) and are thus qualified to treat common children's problems. They are also capable of manipulating common fractures. These common fractures, for example fractures of the forearm, are responsible for 50% of children's orthopaedic injuries¹⁵ and should be treated locally. If there is a children's orthopaedic consultant within the hospital they can take over the management the following morning, but DGHs do not need to have a full-time children's specialist. Some fractures, however, will need to be transferred to the tertiary centre and agreed protocols should be put in place for a smooth transfer of care.

3.1.4 Comment

The solution to these problems will depend on the size of the DGH. For the smaller Trusts the best arrangement would be a 'Hub and Spoke' in which the Hub is the tertiary centre and the Spoke is the DGH. If the catchment population is too small, and it is inappropriate to appoint a paediatric orthopaedic specialist, outreach clinics could be undertaken by the tertiary centres. Minor procedures can be performed as a day case within the Trust while the more complex cases could be seen in the outpatient department in the Trust and then be taken to the tertiary centre for definitive care. It may be possible to supervise the screening and surveillance service for DDH, and to train appropriate personnel to manage patients with clubfoot. Relationships with the community paediatricians, as well as child development centres for the supervision of children with disabilities, must also be provided. A Normal Variants clinic could be arranged and supervised by the visiting consultant and Extended Scope Practitioners. Either physiotherapists or nurses can staff such clinics.

If two small Trusts are geographically close to one another, localising the paediatric practice in one Trust would be sensible. This would increase the mass of patients and, therefore, the likelihood of being able to obtain a trained paediatric orthopaedic specialist.

3.2 Proposals

3.2.1 Principles of the System

Recognising that a lack of resources and manpower means that a full service cannot be provided, it is proposed that a 'Hub and Spoke' arrangement should be introduced in order to resolve the difficulties in providing an adequate children's orthopaedic and fracture service in the United Kingdom. This system depends for its success on local co-operation and flexibility. It is fundamental that adequate resources are allocated to support the creation of such a system where it does not currently exist.

The Hub will be defined as a regional or national centre which provides additional facilities for the management of more complex problems relating to paediatric orthopaedics and paediatric fracture care. It will have a catchment population of between 500,000 and one million people.

It is envisaged that the following will be provided in a Hub facility:

- The centre will have 4-6 specialist children's orthopaedic surgeons providing an On-Call rota for paediatric trauma, with dedicated fracture clinics and trauma lists.

- A clinic providing second opinions for any problem arising within a DGH, which is exempt from pressures of waiting list targets.
- A service for the immediate transfer of the multiply injured child or one with a complex fracture. The facilities available must include a paediatric A&E Department, Paediatric Intensive Care, Anaesthesia and all major specialties including Cardiac surgery, Neurosurgery and Plastic surgery.
- Care of complex orthopaedic problems, including leg length inequality, scoliosis, neuromuscular problems, physical and mental handicap and spinal injuries.
- A diagnostic and assessment service for children who might require revision surgery for failed previous treatment.
- Act as a DGH for the local population.

The Spoke would be a DGH serving a population of approximately 250,000 although smaller hospitals could be combined so that the orthopaedic children services could be rationalised. If the hospital has an A&E department which accepts children, it should be capable of treating those as inpatients, with appropriate paediatric anaesthetic services being available.

There are certain prerequisites as far as the ‘Spoke’ service is concerned:

- It is implicit that certain facilities would be required in this type of hospital. There would be a paediatric ward, with an interested surgeon and an anaesthetist capable of providing basic paediatric anaesthetic services, and a paediatric recovery zone. Children with orthopaedic problems would be treated in a child-centred environment.
- The availability of resources in the ‘Spoke’ hospital could be generated by one of three models:
 1. The ‘Spoke’ would be served by the ‘Hub’ and visited by tertiary clinicians from the ‘Hub’ on a regular basis, with cases taken into the ‘Hub’ for operation as needed.
 2. There could be a combined appointment made between the ‘Hub’ and ‘Spoke’ centres. This has the advantage that a local service could be provided and the more major cases taken the ‘Hub’ with continuity of care.
 3. Alternatively, where there is an interested surgeon at the DGH, a local service would be established. By agreement this surgeon could have sessions at the ‘Hub’ for specialist clinics, or to perform specialist surgery with specialist anaesthetic services for certain cases. This link would also provide regular updating and training for the surgeon at the ‘Spoke’. The DGH would provide a regular clinic dealing with general orthopaedic problems such as flat feet, knock knees and bow legs, together with a specific follow-up for orthopaedic problems which have been treated locally or in the tertiary centre.
 4. In the last two models, the surgeon in a DGH would provide input

into the general care normally supervised by the paediatricians for children with mental and physical handicap, with the option of referring to the tertiary centre.

- Local arrangements for screening for DDH, scoliosis, etc., would be discussed with the tertiary centre.
- Regular teaching in the form of lectures, ward rounds etc., for local Specialist Registrars would be co-ordinated by the local Programme Director.

3.2.2 Detailed Recommendations

1. A 'Hub and Spoke' principle of care should be established. Two levels of service are, therefore, envisaged. The first is undertaken at a DGH and the second in a specific centre, either at regional, sub-regional or national level.
2. Within the DGH at least one orthopaedic surgeon should have an adequate sessional commitment to deal specifically with children's orthopaedic services.

a) *Fractures*

It is desirable that all children's fractures should receive primary treatment in the A&E Department. They should be referred to a fracture clinic the following day, but appropriate further follow-up should be in a fracture clinic dedicated to children. This is particularly important when fractures have required manipulation on an out-patient basis. Fractures requiring admission to hospital will be admitted under the 'on call' firm unless there are enough local surgeons to provide an On-Call rota. For more complex problems, including multiple injuries and growth plate injuries, referral to colleagues with a special interest is recommended.

b) *The child with multiple injuries*

The seriously injured child presenting to a DGH may be treated locally if the necessary facilities are available. Alternatively, after triage and primary resuscitation, they should be transferred to a regional centre for definitive treatment. The ambulance service should be aware of which A&E departments provide this level of care.

c) *General paediatric orthopaedic problems*

There is a need for a regular clinic to deal with general orthopaedic problems in children (flat feet, knock knees, bow legs) as well as the follow-up of orthopaedic problems which have been treated locally.

d) *Children with physical and mental handicap*

Although these children are generally cared for by the paediatricians, there should be a specific input in their care from the local paediatric orthopaedic surgeon, either in a combined or co-ordinated clinic. A co-ordinated clinic is an extension of a general clinic, to which a paediatrician or paediatric neurologist has the right of early referral. Such a clinic should have available physiotherapists trained in the care of the physically handicapped child.

e) *Specific arrangements for screening*

This is useful for the early detection of DDH, scoliosis and related problems and may be carried out in association with paediatric colleagues.

f) *Regular teaching*

This may be lectures, ward rounds and seminars for the training of orthopaedic trainees, as well as nursing staff, physiotherapists and ancillary workers.

g) *Time allocation*

It is envisaged that a minimum of three Programmed Activity sessions per week will be required for those duties: one for outpatient/fracture clinic management, one operating list and one ward round and pre-admission clinic.

3. Regional and national centres will provide the additional facilities required for the management of the more complex problems related to children's orthopaedics and fractures.

a) Special facilities will be provided for second opinions and the referral of any complex cases arising from a DGH. There will also be a diagnostic and assessment service for children who require revision surgery for failed previous treatment.

Complex orthopaedic problems might include leg lengthening, scoliosis, muscular dystrophy, bone tumours, complex physical and mental handicap and the rare spinal injuries.

- b) To act as a local district general hospital for local health authority patients.
 - c) Staffing levels should reflect this type of paediatric orthopaedic practice.
4. It is accepted that, within the 'Hub and Spoke' model and in many DGHs, there may be local expertise which may complement the services provided by a regional centre. These services will reflect the competence, experience and training of the local orthopaedic surgeon. They may also arise as the result of local need. The separation, therefore, between a DGH and a regional or national referral centre is not absolute, although each region should identify the centres which will meet the needs of specific problems (foot, hip, spine and upper limb) encountered in children.
5. In order that the orthopaedic surgeon who is to provide services for the orthopaedic and fracture problems of children has adequate training for these needs, it is essential that they should receive six months of training in children's orthopaedics and fractures during their general training programme. Where possible, further training should be available in the form of working fellowships. These could be recommended as the result of a proleptic consultant appointment or as part of a continuing training process. This subsequent training is essential for surgeons joining special regional or national centres.

SECTION 4

4.1 REQUIREMENTS FOR TRAINING IN CHILDREN'S ORTHOPAEDICS

4.1.1 Introduction

The impact of the new changes within the NHS and the new Consultant contract have had a major effect on the delivery of orthopaedic services and, in particular, the care of children with orthopaedic and fracture problems. It is pertinent, therefore, to examine the training which orthopaedic surgeons require in order to perform general and specialised care for the child. Although most orthopaedic surgeons will still have to cover the generality of trauma and orthopaedics in their consultant practice, the majority now declare a special interest. This is often demanded by Trusts at the time of appointment. Training of our specialist registrars must therefore reflect these two aspects of practice, namely general orthopaedic training and the opportunities to develop special experience.

So often, training in children's orthopaedics reflects a lack of orthopaedic facilities. Many trainees complete their training with inadequate specific experience in children's orthopaedics, particularly with regard to difficult fractures. Until recently trainees had to go elsewhere, often abroad, in order to complete this aspect of their training. However, two Fellowships are now available for training in children's orthopaedics and fractures for trainees who have undertaken higher surgical training in orthopaedics. These are in London and Sheffield, funded by the Postgraduate Deans. Both are recognised by the SAC in Orthopaedics.

4.1.2 Specialist Training

During the first four years of specialist registrar training a total of six months of experience should be spent in children's orthopaedic surgery and fracture management. The aim of this training is to educate the specialist registrar in the common orthopaedic conditions of childhood and, in particular provide experience in the management of children's fractures as may be seen in a DGH. The experience is such that they can pass the FRCS (Orth) Examination and be in a situation to manage these cases as a consultant in a DGH. Experience in the management of children's fractures may be gained while on the trauma rotation, although it is better taught on a dedicated paediatric orthopaedic rotation. The trainee should also be able to recognise those conditions for which more specialised regional or supraregional services are required. In the Hub and Spoke model, a unit of four consultants, with four SpRs, would allow 40 SpRs (ie 2 lots of 4 per year) to receive appropriate training over a 5-year period.

A specialist registrar in a DGH must, in their six months of training in paediatric orthopaedics, achieve the following:

- Be able to diagnose the common fractures of childhood and understand the principles and practice of their management.
- Be able to diagnose and understand the principles of management of the classical orthopaedic conditions of childhood. These include conditions such as the irritable hip, Perthes' disease, slipped upper femoral epiphysis, bone and joint infections, common knee problems such as anterior knee pain and instability of the patella, recognition of bone dysplasias, benign and malignant bone tumours, pes cavus, and the diagnosis and management of the common problems arising in the upper limb and hand.
- Be able to recognise and diagnose complex fractures and growth plate injuries and be aware of their principles of treatment.
- Be involved in screening services for congenital abnormalities such as developmental dysplasia of the hip and congenital talipes equinovarus.
- Recognise and understand the principles of treatment for the disabled child with physical disabilities such as spina bifida and cerebral palsy.
- There should be the opportunity for attendance at joint clinics in physical disabilities such as cerebral palsy, spina bifida, muscular dystrophy, and osteogenesis imperfecta.

During the six months in which the specialist registrar is gaining experience in paediatric orthopaedics, part of the weekly programme should include:

1 orthopaedic and fracture children's clinic
1 ward round and/or pre-admission clinic
1 operating list

4.1.3 Additional and Fellowship Training

Regional centres are situated either within a specialised orthopaedic hospital or a major children's centre. These regional and national centres will provide the additional facilities required for the management of the more complex problems related to children's orthopaedics and fractures

Additional training should be available for a specialist registrar who wishes to practise children's orthopaedics either in a regional centre or as a major part of their consultant practice. The training should be in the form of a six or, preferably, 12-month attachment in their fifth or sixth year of training. It should include:

- Detailed training in the management of the common problems.
- Considerable operative experience in congenital talipes equinovarus, developmental dysplasia of the hip and the rarer forms of hip and foot abnormalities.
- Practical training in the management of leg length inequality, including the surgical techniques of leg equalisation.
- Experience in the management of physical disability, particularly the surgery of cerebral palsy, spina bifida and other neuromuscular disorders. In the UK, spinal deformity is often managed by surgeons with an interest in the spine rather than by children's orthopaedic surgeons. However, children's orthopaedic surgeons may wish to have a major spinal interest, particularly in the younger child, and this will require separate experience in a major spinal unit in the conservative and operative management of spinal deformity in the child and adolescent.
- Time for research and the opportunity to follow up any branch of children's orthopaedics in which a trainee has a particular interest.
- Specific modules on paediatric life support, child communication and consultation and child abuse must be built into training for all orthopaedic surgeons, probably through the core curriculum programme.

4.1.4 For individuals who wish to have a major commitment to children's orthopaedic surgery and fracture management in their consultant practice, advanced training is required in the fifth and sixth years. This should be for a minimum of six months and preferably for one year.

ACKNOWLEDGEMENTS

We are grateful to Anne Meade of the Information Services Department of the BOA for all her hard work and contributions to the investigations in 1993 and 2005.

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