



PAEDIATRICS

A NATIONAL MODEL OF CARE FOR PAEDIATRIC HEALTHCARE SERVICES IN IRELAND

CHAPTER 38: PAEDIATRIC ORTHOPAEDICS



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**ROYAL
COLLEGE OF
PHYSICIANS
OF IRELAND**

TABLE OF CONTENTS

38.0	Introduction	2
38.1	Current Service Provision	4
38.1.1	Normal Variants	4
38.1.2	Specialised Orthopaedic Services	5
38.1.3	Spinal Deformity Surgery	5
38.1.4	Congenital Talipes Equinovarus (CTEV)	5
38.1.5	Developmental Dysplasia of the Hip (DDH)	6
38.1.6	Trauma	7
38.1.7	Musculoskeletal Surgery Activity	8
38.2	Proposed Model of Care	10
38.2.1	Care Bundles	10
38.2.2	Anaesthetic Services	11
38.3	Requirements for Successful Implementation of Model of Care	11
38.3.1	Infrastructure	11
38.3.2	Consultant Staffing	12
38.3.3	Multidisciplinary Team Staffing	12
38.3.4	Education and Training	13
38.4	Programme Metrics and Evaluation	13
38.5	Key Recommendations	13
38.6	Abbreviations and Acronyms	14
38.7	References	14

38.0 INTRODUCTION

Paediatric orthopaedics covers three broad areas:

1. The management of acute trauma and its sequelae
2. The management of normal variation, postural and ‘packaging’ disorders and deviations in musculoskeletal development
3. The provision of highly specialised orthopaedic services to children and young people with congenital conditions (e.g. congenital talipes equinovarus (CTEV), developmental dysplasia of the hip (DDH), limb deformities and bone dysplasia), neurological conditions and neuromuscular conditions (such as cerebral palsy, spina bifida and muscular dystrophies) and acquired musculoskeletal and pain conditions (such as scoliosis, bone and joint infections, growth disturbance, bone and soft tissue tumours and slipped epiphyses, pain amplification syndromes).

There are four levels of paediatric orthopaedic care services, defined according to the complexity of care required:

Level	Description
Level I	<p>A Level I site is predominantly adult-based.</p> <ul style="list-style-type: none"> • The facility is staffed and equipped to manage children presenting to the emergency department/local injury unit* with minor musculoskeletal injuries. This may include the management of strains, sprains, undisplaced fractures and simple displaced fractures, e.g. distal radial fractures. • Simple manipulation of fractures under appropriate anaesthesia may be undertaken whilst in the emergency department. • Paediatric orthopaedic presentations requiring surgery or inpatient care are initially stabilised and transferred to a higher level of service. • No paediatric orthopaedic outpatient clinics are provided. <p>* Securing the Future of Smaller Hospitals: A Framework for Development (DoH/HSE 2013)</p>
Level II	<p>A Level II facility includes and exceeds the characteristics of a Level I site:</p> <ul style="list-style-type: none"> • It has the capacity for managing a wider range of uncomplicated paediatric trauma presenting to the emergency department when compared with a Level I site. • General orthopaedic surgeons provide management for certain paediatric fractures. These include fractures that do not involve potential or actual neurovascular complications or injuries to the growth plate with high risk of growth arrest. • Orthopaedic presentations requiring hospitalisation are admitted to a general paediatric ward/unit. • Elective paediatric orthopaedic surgery is generally not provided. • A Level II site provides a general fracture and orthopaedic clinic, which children may attend. • Includes neonatal DDH screening and management with Pavlik harness

Level III	<p>A Level III facility includes and exceeds the characteristics of a Level II facility, and:</p> <ul style="list-style-type: none">• Provides a general paediatric orthopaedic service to its local catchments population; it has the capacity for managing paediatric trauma where appropriate.• Provides some elective paediatric orthopaedic services for its region/catchment area.• A consultant orthopaedic surgeon who has undertaken recognised fellowship training in paediatric orthopaedics provides such services.• The site is also staffed by a range of health care professionals with paediatric orthopaedic experience.• May have joint paediatric orthopaedic appointments with a Level IV facility.• Formal links with Level IV sites for the purpose of referrals and collegiate networking.• Provides professional leadership within its region. It may have a teaching and research role.• An identifiable general paediatric orthopaedic outpatients and fracture clinic.
Level IV	<p>A Level IV centre has the capacity to provide non-operative and surgical treatment for the full spectrum of paediatric orthopaedic conditions.</p> <ul style="list-style-type: none">• It has a national referral role for paediatric major trauma and for highly complex, low volume elective paediatric orthopaedic procedures.• There is a full-time consultant paediatric orthopaedic presence at all times. The orthopaedic department provides a 24-hour, seven days a week trauma service by consultants and registrars for paediatric orthopaedics only.• The orthopaedic department is staffed by at least three orthopaedic consultants with recognised fellowship training in paediatric orthopaedics who have a substantial fractional commitment to paediatrics (≥ 0.5 WTE).• Paediatric orthopaedic services are provided by a multidisciplinary highly specialised team, which include clinical nurse specialists for complex conditions and advanced nurse practitioners.• It has a designated paediatric orthopaedic ward.• It provides national leadership in service delivery models, teaching and research in paediatric orthopaedics.• It has access to a full complement of co-located paediatric subspecialty services.• It provides a fully integrated paediatric orthopaedic ambulatory care service. It has formal links with Level III services for the purpose of referrals and collegiate networking.

*Adapted from Paediatric Orthopaedics: recent achievements and future directions May 2009
(Victorian Government Department of Human Services, Melbourne)*

Orthopaedic Trauma

The Royal College of Paediatrics and Child Health report Commissioning Tertiary and Specialised Services for Children and Young People (2004) states that 'approximately one in four children each year will attend an emergency department with an injury and a significant proportion of these will require orthopaedic referral and management'. The report goes on to say that there should be an orthopaedic surgeon responsible for the care of children within each district general hospital setting and that colleagues should form a rota to manage the more common children's fractures. It notes that 50% of children's fractures are to the forearm and can be safely managed in a regional or local hospital. The orthopaedic surgeon requires inpatient paediatric support, a separate ward for children, an appropriately trained anaesthetist to administer a safe anaesthetic for the fractures to be treated, appropriately trained nurses on the ward, and an appropriately trained physiotherapist to aid rehabilitation.

The management of uncomplicated paediatric orthopaedic trauma, e.g. sprains, strains and simple fractures, traditionally has been undertaken:

- a. by general practitioners; and/or
- b. by emergency physicians and general orthopaedic surgeons

The management of more severe paediatric orthopaedic trauma is managed at the local Level II/III orthopaedic centres. All orthopaedic surgeons in Ireland are appropriately trained in the management of both adult and children's trauma. Children with multiple injuries requiring paediatric intensive care unit (PICU) beds or children with simple trauma with associated complex co-morbidity are transferred to a tertiary paediatric centre.

International Trends in Paediatric Orthopaedics

Increased pressure on the paediatric orthopaedic system can arise as a result of:

- A trend for general practitioners, and paediatricians—who have traditionally managed many normal variation, postural and 'packaging' disorders and deviations in musculoskeletal development—to refer these children for expert orthopaedic opinion.
- Increased levels of subspecialisation within orthopaedics, meaning that some orthopaedic surgeons now focus on adult patients alone or on specific anatomical areas. In addition, many general orthopaedic surgeons are withdrawing from the care of children.

A Framework for Paediatric Orthopaedic Services (2006) in Australia states that the degree of subspecialisation in the orthopaedic care of children has varied in its history, and recently in Australia (as well as in Ireland and internationally) a shortage of orthopaedic surgeons who are available to care for paediatric patients has been reported. Paediatric orthopaedics at the present time is at a crossroads. The tertiary centres are increasingly receiving referrals from local and regional hospitals which could be treated locally if the appropriate expertise within the orthopaedic and anaesthetic departments were present. Their workload is increasing exponentially and waiting time for outpatients and surgery is steadily increasing.

38.1 CURRENT SERVICE PROVISION

38.1.1 Normal Variants

The assessment of children with normal variants has traditionally been undertaken by General Practitioners (GPs), Area Medical Officers (AMOs) and paediatricians. There has been an increasing trend to refer these patients for a specialised paediatric orthopaedic opinion. The reasons for this are multifactorial including increased subspecialisation of orthopaedic surgeons, reduced orthopaedic training of GPs, increased parental expectation, reduced undergraduate orthopaedic training and changing AMO practice.

Following the success of physiotherapy triage clinics in adult orthopaedics, the Health Service Executive (HSE) introduced the role of an extended scope physiotherapist (ESP) managing an orthopaedic triage clinic in Our Lady's Children's Hospital Crumlin (Crumlin) in 2011. The physiotherapist reviews approximately 800-850 patients per annum, with 94% of normal variant patients being managed independently by the ESP. This has had a positive effect on speed of access for normal variant children to assessment allowing the paediatric orthopaedic surgeon to manage the more urgent complex cases in a timelier manner. The success of the clinic has been such that similar ESP clinics have been developed in Galway, Cork and Limerick. Ultimately the aim would be for these clinics to be established within a community setting as occurs in the UK, and thereby reduce the need for these referrals to be sent to a tertiary referral centre.

38.1.2 Specialised Orthopaedic Services

Specialised orthopaedic care is required for conditions such as:

- Spinal deformity (congenital, idiopathic and acquired)
- Congenital talipes equinovarus
- Developmental dysplasia of the hip
- Limb deformities
- Bone dysplasia
- Neurological and neuromuscular conditions (cerebral palsy, spina bifida)
- Acquired musculoskeletal conditions (scoliosis, bone and joint infections, growth disturbance, bone and soft tissue tumours, slipped epiphyses and orthopaedic consequences of juvenile rheumatoid arthritis)
- Complex pain syndromes

The specialist paediatric orthopaedic services in Ireland are under considerable stress. There are 4.3WTE paediatric orthopaedic surgeons employed between Crumlin and Children's University Hospital Temple Street (Temple Street). Despite annual increasing surgical and outpatient activity, the waiting lists for elective surgery and outpatient appointments remain inappropriately high.

Many general orthopaedic surgeons are withdrawing from the care of children because of a preference to subspecialise in particular areas of adult practice, and a fear of the potential medico-legal consequences of paediatric practice. Less operative work is being performed in the regional orthopaedic centres due to lack of paediatric anaesthesia and lack of theatre resources. As a consequence, children and young people requiring orthopaedic care who previously would have been managed in regional centres are being referred more frequently to tertiary centres with no additional resources to accompany them.

38.1.3 Spinal Deformity Surgery

This includes surgery for scoliosis, kyphosis, spondylolisthesis, and neuromuscular and other complex deformity. Deformity surgery requirements are currently 150-180 paediatric/adolescent cases per annum. The capacity shortfall in Crumlin equates to one extra major spinal deformity list per week to achieve balance in supply/demand, i.e. capacity to perform 50 additional major cases per annum. In the longer term there is sufficient population and demand to plan for at least one dedicated spinal operating theatre at national level with an adjacent theatre also having capability for spine and neurosurgery. The projected volume of spinal deformity and complex spinal pathology requiring surgery for our population on the island of Ireland (in combining orthopaedic neurosurgery and Northern Ireland requirements) would equate to the capacity and throughput equivalent of one dedicated operational spinal/neurosciences operating theatre, 5-6 days per week all year long.

38.1.4 Congenital Talipes Equinovarus (CTEV)

Ponseti manipulation and casting is the preferred method for treating CTEV in all units. Following a national consensus meeting of all Ponseti groups in Ireland, the following guidelines have been established:

- Immediate referral (within two weeks) to the regional or tertiary centre
 - Crumlin / Temple Street
 - Cork University Hospital / South Infirmaries Victoria University Hospital
 - Galway University Hospital
 - Limerick University Hospital
 - Letterkenny General Hospital

These are the current centres that practice the Ponseti method.

- Weekly above knee casting until foot derotated, followed by Achilles tenotomy (under local or general anaesthetic)

- Recast for 3-4 weeks
- Once foot is reduced, hold reduction in 'Boots and Bars' 23 hours per day for 3-9 months
- Night time 'Boots and Bars' until 1-4 years (at discretion of surgeon)

It has been agreed that a unit should perform approximately ten cases per year to maintain skills.

38.1.5 Developmental Dysplasia of the Hip (DDH)

There is a wide spectrum of severity of DDH. At one end, there are infants with unstable dislocated hips where the head of the femur is outside the acetabulum, while at the other there are infants with stable hips with a shallow acetabulum. The clinical examination can by its nature only detect hips that are unstable. Dysplastic hips that are clinically stable cannot be identified at the newborn or subsequent examinations. At the newborn examination two tests are undertaken:

- the Ortolani test examines for a dislocated hip, on abduction the head of the femur returns into the acetabulum with a clunk,
- the Barlows test examines for a dislocatable hip, the head of the femur can be dislocated from the acetabulum by applying lateral pressure.

At age six weeks, Ortolani and Barlow tests are difficult to perform due to tightening of muscles. At six weeks and beyond it is increasingly more important to look for any limitation in hip abduction.

The most important risk factors for DDH are family history and breech presentation. A positive history in a first degree relative (father, mother, brother, sister) increases the risk of DDH fivefold. Breech presentation can increase the risk up to 17-fold. Together the risk factors of positive family history and breech presentation account for 40% of DDH cases. However, the mode of delivery of the breech infant has a significant impact on the likelihood of a hip problem. The current policy of delivering all breech presentations by caesarean has resulted in a more than twofold reduction in DDH.

The approach to infants with a stable hip at newborn examination who have a risk factor is debatable, and practice currently varies in Ireland. While universal screening represents the ideal to reduce incidence of late diagnoses of DDH in infants with no known risk factors, the first priority is the introduction of targeted screening nationally. In addition to careful clinical examination, they should have hip imaging. The two available procedures are a hip x-ray and a hip ultrasound. The hip ultrasound can be reliably performed at six weeks whereas the hip x-ray can only be undertaken when the infant is four months old. In the case of a dislocated hip, the use of an x-ray rather than a hip ultrasound will lead to delays of at least three months duration. The European Society of Paediatric Radiology Task force group on DDH has produced recommendations on hip screening. It recommends selective hip ultrasound screening in infants at increased risk of DDH. The document urges the implementation of:

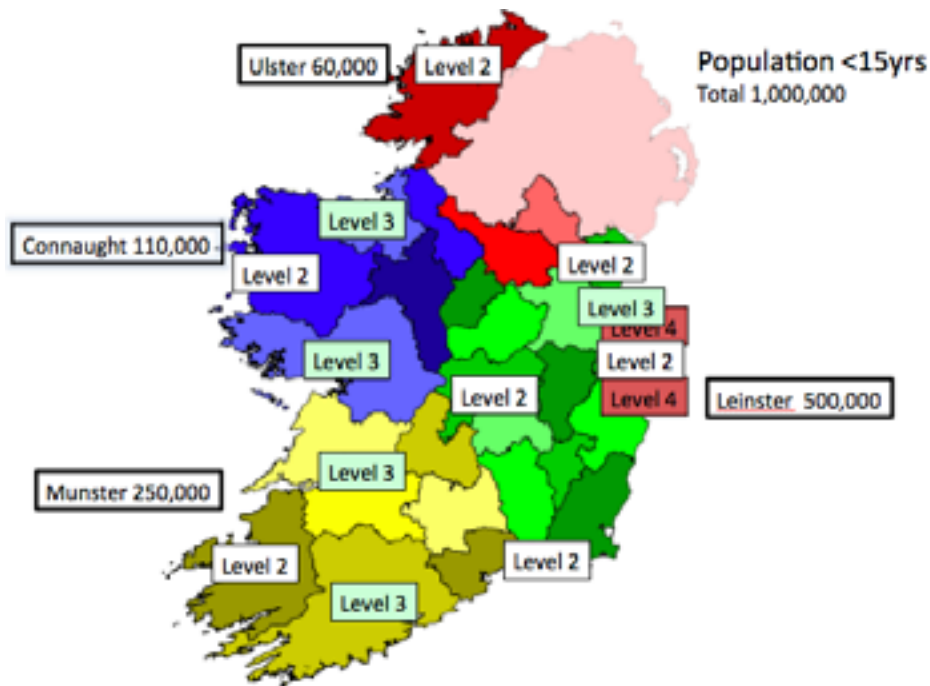
- A standardised ultrasound technique
- A standardised report form
- A feasible screening strategy
- Training and accreditation schedules

All newborn infants should have a clinical hip examination within the first 24 hours. If the hips are stable the infant should be re-examined at six weeks. If the infant's hips are stable but he/she has a risk factor an ultrasound should be arranged. If the imaging test is abnormal an immediate orthopaedic referral is necessary. When identified, all those infants with unstable hips are placed in a Pavlik harness and referred to the orthopaedic surgeon for further management.

Earlier detection and treatment of infants with DDH will improve resource utilisation and reduce costs. When identified in the first two months, most infants require non-invasive abduction splinting only. The early detected group seldom require hospitalisation. A proportion of children with DDH who require treatment do not have any risk factors, and therefore will not be picked up until they are older making their treatment more complicated and costly. Late diagnosis usually required a protracted course of treatment consisting of closed reduction, open reduction or a pelvic osteotomy. These treatments all require hospital admission, theatre time and multidisciplinary care. The long-term outcome for the infant is not as good. There is the disruption to the family caused by the hospitalisations and the travel involved. The other consideration is the saving in relation to medico-legal claims arising out of late or missed diagnosis. The early detection and effective treatment of infants with DDH is an important matter of public health concern. Twenty per cent of infants are in the 'at risk' category which amounts to approximately 15,000 infants per annum.

38.1.6 Trauma

There are 2,850 cases each year nationally. Currently eleven level II/III trauma centres that cater for adults' and children's trauma are in place, in addition to the two children's hospitals in Dublin - a total of 13 centres with a skill set to deal with paediatric trauma. The population under 15 years of age is approximately one million, with geographical spread as follows:



The National Clinical Programme for Trauma and Orthopaedic Surgery recommends the following for paediatric trauma:

- Care is in accordance with the British Orthopaedic Association (BOA) Children's Orthopaedic and Fracture Care.
- There are arrangements within hospitals/networks to treat the complex injured child appropriately. Most injuries will be treated within non-specialist centres.
- There is daily access for children to dedicated orthopaedic emergency theatres.
- Each centre has up to date guidelines available that:
 - Recognises available skills and limitations of the centre
 - Outlines transfer arrangements to specialised paediatric centres within network and nationally.

There is currently no emergency theatre available for the care of children with fractures in Ireland, with most cases being done either out of hours or on an elective list thereby having the knock on effect of cancelling elective surgery for children.

38.1.7 Musculoskeletal Surgery Activity

Paediatric orthopaedic services may be emergency or planned. The following summarises orthopaedic activity for children under 16 years of age for the years 2011 and 2012:

Paediatric Musculoskeletal Surgery Data by Hospital 2011 / 2012										
Hospital Group	2011					2012				
	Emergency Admissions	Elective Admissions	Day Cases	Emergency Admissions	Elective Admissions	Day Cases	Emergency Admissions	Elective Admissions	Day Cases	
	N	Mean LOS	N	Mean LOS	N	N	Mean LOS	N	Mean LOS	N
Children's Hospital Group										
Crumlin	430	2.77	340	5.31	644	393	3.56	358	4.69	647
Temple Street	414	2.12	297	2.71	714	378	2.58	242	2.25	715
Tallaght	335	1.78	24	2.46	265	306	1.53	15	1.07	303
RCSI Hospitals										
Beaumont	2	4.50	1	2.00	10	8	5.38	1	1.00	4
Drogheda	276	1.49	43	1.65	121	179	1.68	13	1.08	71
Cavan					1	1	3.00			
Louth					1					
Monaghan					1					
Dublin Midlands Hospitals										
St. James's	9	2.11	1	2.00	2	11	2.18			5
Tullamore	245	1.42	17	4.06	101	148	1.31	12	1.00	119
Portlaoise	3	7.67			1	3	2.33			
Ireland East										
Mater						1	1.00			
St. Vincent's	15	1.07			11	10	3.00	1	6.00	8
Mullingar	2	1.00			3	5	1.80			1
Kilkenny	2	1.00			1	2	4.00			
Wexford	2	1.00				2	1.00			
Navan			1	1.00	3					3
St. Michaels										2
Cappagh			74	4.00	130			50	3.18	145
Eye & Ear	1	1.00			1					5

South-South West										
Cork University	422	1.66	38	1.37	153	236	1.60	15	1.20	66
Waterford	405	1.23	23	1.04	225	362	1.24	20	1.15	177
Mercy Cork			1	9.00	62			1	1.00	56
South Infirmary	1	1.00			19	2	1.00	23	2.48	76
Kilcreene					3					
South Tipperary	1	2.00			2	1	2.00			
Kerry General Tralee	102	1.72	9	1.11	47	91	1.19	8	1.00	48
Saolta										
University Hospital Galway	376	1.41	26	1.46	129	205	1.37	28	1.36	106
Sligo	84	1.42	15	2.20	81	63	1.51	8	1.50	51
Letterkenny	150	1.39	2	1.00	25	114	1.25	1	1.00	23
Mayo General	76	1.45	4	1.00	27	62	1.90	10	1.10	34
Portiuncula					1	1	3.00			1
UL Hospitals										
Limerick	194	1.89	23	1.43	43	180	1.64	26	1.35	55
Nenagh					3					2
St. John's Limerick										1
Croom			36	1.61	92			41	2.37	123

N = Number of Discharges

Mean LOS = Mean Length of Stay in Days

Challenges in service provision reported by each unit nationally included:

Our Lady's Children's Hospital, Crumlin	Lack of access to theatre (1.25 – 1.5 operating lists per week per consultant – four consultants) Lack of manpower (2.3WTE) Lack of infra-structure to do more clinics Long waiting list OPD and theatre
Children's University Hospital, Temple Street	Lack of access to theatre (0.5 days week per consultant per week – four consultants) Lack of manpower
Cappagh	Lack of support services (blood bank, in-house paediatricians, anaesthesia)
Cork University Hospital	Lack of access to theatre (0.75 days week each per week – two consultants) Issues regarding HDU provision
Galway University Hospital	Lack of manpower (1 part-time paediatric orthopaedic surgeon) Lack of access to theatre (0.25-0.5 days per week) Lack of infrastructure Anaesthesia back up
Croom	Theatre access (1 list per week - one consultant) One consultant with pending retirement Lack of paediatricians / anaesthesia on site

Sligo	Lack of manpower Lack of theatre access Paediatric anaesthesia Volume
Castlebar	Paediatric Orthopaedics OPD by adult surgeons with clear pathway of referral
Waterford	One consultant running paediatric DDH service and referring to Cork / Dublin
Drogheda	Temporary cessation of paediatric orthopaedic service with no clear pathway and no resources allocated to Temple Street
National Children's Hospital, Tallaght	Paediatric trauma transferred to Crumlin with no additional resources
Tullamore	Lack of paediatric anaesthesia for under fives
Letterkenny	No issues reported

38.2 PROPOSED MODEL OF CARE

The objective of a model of care for paediatric orthopaedic surgery is to enable the provision of high quality paediatric services that achieve an optimal balance between access, safety, effectiveness, appropriateness, efficiency and acceptability for children and young people and their families. Providing critical mass of subspecialist care is the most important factor in delivering best outcomes for patients. It has been clearly shown that consolidation of paediatric services leads to reduced mortality rate and improved clinical outcomes. The Bristol inquiry states that “where the interests of secured quality of care and the safety of patients require that there be only a small number of centres offering a specialist service, the requirements of quality and safety should prevail over considerations of ease of access”.

38.2.1 Care Bundles

The care bundles associated with each level of paediatric orthopaedic services are:

Orthopaedic Condition	Level I	Level II	Level III	Level IV
Distal Radius and Ulna Fracture	No	Diagnosis Treatment	Diagnosis Treatment	Diagnosis Treatment
Supracondylar Fracture	No	Grade 1-3? NV compromise	Grade 1-3	Grade 1-3
Tibial Fracture	Undisplaced	Displaced Treatment	Displaced Treatment	As for Level III, plus children with co-morbidity (e.g. cardiac, bleeding disorders)
Developmental Dysplasia of the Hip (DDH)	Newborn screening & refer to level III or IV for management	As for Level 1, plus orthotic management	Diagnosis Orthotic Management Closed & open reduction Osteotomies	As for Level III, plus syndromic conditions and dysmorphic syndromes

Congenital Talipes Equinovarus (CTEV)	Newborn screening & refer	Newborn screening Ponseti method Idiopathic CTEV	Diagnosis Ponseti method	As per Level III, plus non-idiopathic CTEV
Slipped Upper Femoral Epiphysis (SUFE)	Diagnosis & referral	Diagnosis Pinning of stable and mild, moderate slip	Diagnosis Pinning of stable and mild, moderate slip	As for Level III, plus surgical management of high grade slip
Management of Bone Tumours	Diagnose & referral for appropriate management	Diagnosis & referral	Diagnosis & referral	Management
Spasticity in Children with Complex Disabilities	X	X	Botulinum toxin A Muscle-tendon procedures	As for Level III, plus: Bone osteotomies Gait reporting for surgical decision making
Scoliosis	X	X	Diagnosis	Spinal surgery

Adapted from Paediatric Orthopaedics: recent achievements and future directions May 2009
(Victorian Government Department of Human Services Melbourne)

38.2.2 Anaesthetic Services

Anaesthetics should be provided with a safe working environment with adequate and appropriate facilities, drugs and equipment to safely anaesthetise and manage elective, emergency and critically ill children in line with the National Clinical Programme for Anaesthesia Model of Care for Paediatric Anaesthesia (2015).

38.3 REQUIREMENTS FOR SUCCESSFUL IMPLEMENTATION OF MODEL OF CARE

38.3.1 Infrastructure

Two centres currently provide tertiary care for children – Crumlin and Temple Street. The new children's hospital will provide a single centre for tertiary care in the future. There will be two associated satellite centres in Tallaght and Blanchardstown.

There are approximately 3,000 operative paediatric musculoskeletal trauma cases annually. All Level II and III centres currently cater for paediatric trauma including fracture clinics and fracture surgery. Arrangements should be put in place to ensure that paediatric patients are prioritised on operating lists and at fracture clinics, in a child-friendly environment. Appropriate accommodation for children should be provided, separate from adult patients, both in the theatre environment and the wards.

Adequate access to theatre is essential. Theatre equipment and implants must be available that are appropriate in size for the patient profile.

38.3.2 Consultant Staffing

There is a need for a minimum of 10WTE paediatric orthopaedic surgeons to meet service demands nationally. As very little specialist orthopaedic surgery takes place outside of Dublin, the first priority should be to strengthen the paediatric service in Dublin by increasing paediatric orthopaedic surgeon numbers and ensuring adequate theatre availability. The provision of paediatric surgery is also dependent on the availability of anaesthetists with paediatric expertise.

38.3.3 Multidisciplinary Team Staffing

Physiotherapy	<p>Current staffing</p> <p>Crumlin: 2WTE physiotherapists covering inpatient service. For outpatients, 1WTE ESP and 1.1WTE physiotherapists.</p> <p>Temple Street: No designated inpatient service. For outpatients, there is 1WTE clinical specialist MSK physiotherapist and 1WTE senior orthopaedic physiotherapist.</p>	<p>Proposed staffing</p> <p>Crumlin: Additional 1WTE inpatient and 0.5WTE outpatient orthopaedic physiotherapist post due to increased activity from new orthopaedic theatre tackling scoliosis waiting lists. Long term, increased consultant orthopaedic surgeon numbers will require additional physiotherapist posts.</p> <p>Temple Street: Dedicated physiotherapy staffing required for inpatient orthopaedic services.</p>
Occupational Therapy	<p>Current staffing</p> <p>Crumlin: 0.5WTE, with additional support provided by colleagues as current staffing inadequate to meet demands on service.</p> <p>Temple Street: 0.8WTE</p>	<p>Proposed staffing</p> <p>Crumlin: A business case has been submitted for additional 1.5WTE senior and 0.6WTE staff grade occupational therapists to meet immediate needs. Additional workforce planning will be required to determine staffing for the new children's hospital and associated satellite centres. Clinical specialist roles in areas such as paediatric hand therapy require development.</p>
Social Work	<p>Currently 0.5WTE social worker assigned to orthopaedics in Crumlin, with a requirement for an additional 0.5WTE. The social worker manages a large volume of referrals, and is involved in complex child protection cases involving non-accidental injuries as well as multidisciplinary pre-surgical assessments of post-discharge suitability of homes for frames.</p>	
Dietetics	<p>Specialist dietetic input is essential in spinal surgery, as this patient group carry a greater risk of nutritional impairment pre- and post-operatively. Nutrition support via enteral and parenteral routes is often required to maintain weight and nutritional status. In addition, regional units will need access to dietetic services for weight management and associated comorbidities.</p>	

Radiography	Support provided to orthopaedic team through imaging (plain films, CT, MRI, ultrasound, etc.) in theatre, inpatient and outpatient settings. Increased paediatric orthopaedic services will have a consequent effect on radiology services which will need to be considered when planning services.
Music Therapy	Orthopaedic patients require access to music therapy as it has a valuable role in pain management and movement, helping to reduce stress and anxiety for the child.

38.3.4 Education and Training

An online multimedia education module for GPs and public health nurses should be developed. This would support primary care providers in the assessment and management of paediatric orthopaedic conditions is needed to improve the quality, appropriateness and timeliness of referrals to specialist paediatric orthopaedic services.

The education module and resource package will:

- strengthen general practitioners' knowledge of paediatric orthopaedic conditions, and build their confidence and skills in recognising and managing paediatric orthopaedic problems
- empower parents and carers by giving them relevant information at appropriate points in the care process
- improve communication between GPs' and parents and carers
- improve the quality of referrals to specialist paediatric orthopaedic services

38.4 PROGRAMME METRICS AND EVALUATION

Monitoring clinical outcomes and service performance for paediatric orthopaedics will be achieved through the following datasets:

- Analysis and reporting of paediatric orthopaedic data
- Collection, analysis and reporting of more detailed patient and service data from

specialist paediatric orthopaedic services

These datasets will be used as a basis for an audit of paediatric orthopaedic services and for the development of key performance indicators.

38.5 KEY RECOMMENDATIONS

- There are four levels of paediatric orthopaedic care services, with care bundles defined according to the complexity of care required
- A standardised care pathway for the detection and management of DDH should be implemented nationally as follows:
 - All newborn infants should have a clinical hip examination by 24 hours of age.
 - If the hips are stable the infant should be re-examined at six weeks.
 - If the infant's hips are stable but he/she has a risk factor an ultrasound should be arranged at six weeks of age.
 - If the imaging test is abnormal an immediate orthopaedic referral is necessary.
- Paediatric trauma care should be in accordance with the British Orthopaedic Association Children's Orthopaedic and Fracture Care, with arrangements within hospitals/networks to treat the complex injured child appropriately.

- There is a need for a minimum of 10WTE paediatric orthopaedic surgeons to meet service demands nationally, with the first priority being to strengthen the paediatric service in Dublin by increasing paediatric orthopaedic surgeon numbers and ensuring adequate theatre and anaesthetic availability. Multidisciplinary team staffing resources will also require corresponding increase.
- An online multimedia education module should be developed to support primary care providers in the assessment and management of paediatric orthopaedic conditions.

38.6 ABBREVIATIONS AND ACRONYMS

AMO	Area Medical Officer
BOA	British Orthopaedic Association
CTEV	Congenital Talipes Equinovarus (Club foot)
DDH	Developmental Dysplasia of the Hip
DOH	Department of Health
ENT	Ear, Nose and Throat
GP	General Practitioner
HSE	Health Service Executive
PICU	Paediatric Intensive Care Unit
SUFE	Slipped Upper Femoral Epiphysis
WHO	World Health Organisation
WTE	Whole Time Equivalent

38.7 REFERENCES

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