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General Paediatric Surgery

A model of care for Ireland

2024

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Paediatric General Surgery
A model of care for Ireland 2024

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GENERAL PAEDIATRIC SURGERY
A MODEL OF CARE FOR IRELAND 2024

TABLES AND FIGURES

LIST OF ABBREVIATIONS

ANP	Advanced Nurse Practitioner
ATLS	Advanced Trauma Life Support
APLS	Advanced Paediatric Life Support
BMI	Body Mass Index
CAAC	Consultant Application Advisory Committee
CSST	Certificate of Completion of Specialist Training
CHI	Children's Health Ireland
CHO	Community Health Organisation
CSO	Central Statistics Office
CT	Computed Tomography
CUH	Cork University Hospital
EHR	Electronic Health Record
EDs	Emergency Medicine Departments
ENT	Ear, Nose and Throat
GPS	General Paediatric Surgery
GI	Gastrointestinal
GIRFT	Getting it Right First Time
GUH	Galway University Hospital
GSoC	General Surgery of Childhood
HDU	High Dependency Unit
HG	Health Group
HIPE	Hospital In-Patient Enquiry
HIQA	Health Information and Quality Authority
HPO	Health Pricing Office
HSCP	Health and Social Care Professionals
HSE	Health Service Executive
HRs	Health Regions
ICU	Intensive Care Unit
ICT	Information and Communication Technology
IPATS	Irish Paediatric Acute Transport Service
IR	Interventional Radiology
IT	Information Technology
KPI	Key Performance Indicator
LPSF	Local Paediatric Surgical Facility
NAS	National Ambulance Service
NAS-CCRS	National Ambulance Service Critical Care and Retrieval Services
NEC	Necrotising Enterocolitis
NCPA	National Clinical Programme in Anaesthesiology
NCPPN	National Clinical Programme in Paediatrics and Neonatology
NCEPOD	National Confidential Enquiry into Patient Outcome and Death
NCPS	National Clinical Programme for Surgery
NCH	National Children's Hospital (St James's Hospital Campus)
NCHD	Non-Consultant Hospital Doctor
NDTP	National Doctors Training and Planning

NIMIS	National Integrated Medical Imaging System
NMOC	National Model of Care
NOCA	National Office of Clinical Audit
NQAIS	National Quality Assurance and Improvement System
MCN	Managed Clinical Network
MOC	Model of Care
ODN	Operational Delivery Network
PALS	Paediatric Advanced Life Support
PEM	Paediatric Emergency Medicine
PEWS	Paediatric Early Warning Score
PHDU	Paediatric High Dependency Unit
PICU	Paediatric Intensive Care Unit
PICM	Paediatric Intensive Care Medicine
PPPG	Policies, Procedures, Protocols, and Guidelines
RCSI	Royal College of Surgeons in Ireland
RHDU	Regional High Dependency Unit
REO	Regional Executive Officer
RPSF	Regional Paediatric Surgical Facility
SpR	Specialist Registrar
ST	Specialist Trainee
UHL	University Hospital Limerick
UHW	University Hospital Waterford
UK	United Kingdom
UL	University of Limerick
WHO	World Health Organization
WTE	Whole Time Equivalent

GLOSSARY OF TERMS

Within this Model of Care the following definitions apply.

Term	Definition
Paediatric patients	Children up to the eve of their 16th birthday.
Neonatal patients	Infants up to 4 weeks corrected age.
General Paediatric Surgery	Non-specialist surgery that can be undertaken by paediatric surgeons or by surgeons who primarily operate on adults but have appropriate paediatric expertise.
Elective surgery (scheduled care)	Surgery carried out on a planned basis, either day case or inpatient
Acute surgery (unscheduled care)	Emergency surgery, either inpatient or day case.
Managed Clinical Network	Linked groups of clinicians from across a service working together irrespective of geographical or organisational boundaries to ensure equitable, effective and high-quality care.
Children's Health Ireland / tertiary centres	Children's Health Ireland (CHI) was established on 1 January 2019. This saw Our Lady's Children's Hospital Crumlin; Temple Street Children's University Hospital; and paediatric services at Tallaght University Hospital come together and integrate into one organisation to deliver healthcare to Ireland's children. CHI hospitals will eventually come together in the new children's hospital at St James's Hospital. The two Paediatric Outpatient and Urgent Care Centres at Connolly Hospital Blanchardstown and at Tallaght will continue under the governance of CHI. CHI provides specialist paediatric surgery nationally, and general paediatric services for its catchment area.
Regional Paediatric Surgical Facility (RPSF) Model 4 Hospitals	Hospitals which provide 24-hour anaesthetic, surgical, radiology, nursing and related anaesthetic and nursing services to children 7 days a week in relation to the bundle of cases as outlined in this Model of Care. It is acknowledged that at times an RPSF may not have all the necessary staff to fulfil this role (due to leave, etc.) and that in those circumstances referral to the CHI or another RPSF is appropriate. Note: Current RPSF are Cork University Hospital (CUH), University of Limerick Hospital (UL), Galway University Hospital (GUH), and CHI for geographic catchment areas to CHI.
Local Paediatric Surgical Facility (LPSF) – Model 2/3 Hospitals	Hospitals other than CHI or RPSFs that provide care to children. LPSFs currently provide 24/7 surgical, anaesthetic and Paediatric cover. It is acknowledged that at times an LPSF may not have all the necessary staff to fulfil a surgical role (due to leave, etc.) and that in those circumstances referral to the RPSF or CHI is appropriate. Currently there is one LPSF that does not have the cover of paediatricians.
Health Regions (HR)	The Health Service Executive (HSE) is creating six new Health Regions. Each Health Region will provide integrated health and social care services for the people in that area

FOREWORD

As of 2024, some 21 hospitals provide General Paediatric Surgery in Ireland, three of which are Children's Health Ireland (CHI) hospitals in Dublin, which will soon amalgamate to form the new National Children's Hospital on the St James's Hospital site. The remaining 18 hospitals find it increasingly difficult to appoint surgeons who will provide a general paediatric surgical service. The provision of General Paediatric Surgery is challenging due to the growth in subspecialisation within the consultant surgical workforce and the subsequent difficulty in appointing non-specialist or 'general' surgeons to provide a general paediatric surgical service in regional and local hospitals. It should be noted that this problem is not restricted to Ireland alone.

Despite demographic projections indicating future significant growth in the population of Ireland, these predictions also indicate that the proportion of children below the age of 16 years will fall in the coming years. This, however, should not distract from the principles of equity of surgical care, which dictate that children should be offered a high standard of surgical care with appropriate oversight and governance, irrespective of where they live.

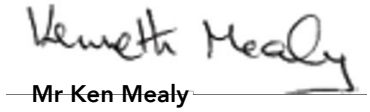
In 2016, the publication Improving Services for General Paediatric Surgery: Policy and Standards of Care for General Surgery in the Republic of Ireland outlined a Model of Care that supported the establishment of Regional and Local Paediatric Surgical Facilities nationally. However, and possibly due to the numerous challenges within the health service during the intervening years, little has changed. Currently, the issues around surgical subspecialisation and consultant recruitment, particularly within the smaller hospitals, continues to be a challenge, with the possibility that without intervention, children within many areas of Ireland will not be able to avail of local or regional general paediatric surgical care.

The purpose of this Model of Care is to place a further spotlight on this issue, as we believe the establishment of the CHI Hospital Group and the HSE Health Regions allows for a fresh approach in addressing the issue of sustainable General Paediatric Surgery nationally. Sláintecare principles of medical care as close to home as possible and capacity issues for the provision of low acuity care envisaged in the new National Children's Hospital also mandate a renewed focus on addressing this issue. It should be noted, however, that the focus of this Model of Care is General Paediatric Surgery and does not address issues around neonatal and specialist paediatric surgical services, which will always be carried out in CHI.

This report has broad consensus and has had input from all relevant specialty groups. In addition, input was sought from the National Director of Surgical Training, Royal College of Surgeons in Ireland, and the Director of the National Doctors Training and Planning Programme to review issues around surgical training and consultant workforce planning.

As chair of the working group of the General Paediatric Surgery Model of Care, I wish to express my sincerest thanks to all those in the working group who were unfailing and generous with their time in providing their respective contributions to this final report. Their commitment to the children of Ireland was very evident.

While this report is relevant to all those who work with children in Ireland, we would urge the respective Hospital Groups/HSE Health Regions governance groups to reflect on the respective needs of children and use this Model of Care as a template to support the future surgical care of children within their communities.



Mr Ken Mealy
Working Group Chair, National Clinical Programme in Surgery

1.0 CORE RECOMMENDATIONS BY PRIORITISATION

1.	All complex paediatric neonatal surgery should be performed in Children's Health Ireland (CHI) hospitals.
2.	Children less than 1 year of age (or a minimum age agreed locally) should only have surgery in the Regional Paediatric Surgical Facilities (RPSFs) if the workforce, skills, and surgical volumes are appropriate.
3.	Acute surgical admissions for children under 2 years of age can be under the care of either a general surgeon or a paediatrician. Admission policies and consultation arrangements must be clearly documented and agreed locally in line with this Model of Care guidelines.
4.	The national standard for paediatric surgery should be set at 2 years of age, where local surgical, medical, and nursing skill mix competencies are in place to ensure safety and equity of access.
5.	It will be necessary to provide General Paediatric Surgery (GPS) through the new Health Regions. Managed clinical networks will require additional paediatric surgeons to be appointed in CHI and appointed locally at the RPSF centres
6.	The staffing in RPSFs and Local Paediatric Surgical Facilities (LPSFs) must be appropriate to perform both the emergency and elective paediatric surgery as defined in their respective 'bundle of cases'.
7.	Defined governance groups with designated lead surgeons and anaesthesiologists in GPS should be identified locally within Hospital Groups/ Health Regions to oversee GPS care and must conduct regular multidisciplinary meetings with analysis and review of surgical outcomes.
8.	Each RPSF will need a minimum of two adult surgeons with a special interest in GPS
9.	Clear clinical pathways are required in RPSFs with core paediatric surgery expertise in urological conditions, as available and agreed locally.
10.	Clear transfer pathways and guidelines between CHI, RPSFs and LPSFs must be in place to facilitate safe care and transfer in the event of unexpected complications. Senior clinicians must be closely involved in any pre-transfer stabilisation within managed clinical networks.
11.	As defined in this Model of Care, IT connectivity between CHI and the RPSFs and LPSFs require development to allow NIMIS and other data sharing, such as single EHR between units.
12.	Outreach network surgeons from the CHI will need to have regular and scheduled access for dedicated paediatric surgery clinics and day surgery in RPSFs.
13.	There will be a variable requirement for additional anaesthesiologists, paediatricians, radiology and interventional radiologists, quality assured laboratory services, paediatric emergency medicine consultants, paediatric sonographers, and nursing and health and social care professionals to support the development of GPS in each of the RPSF sites. These support services should be determined and agreed locally based on workload requirements.

14.	Emergency departments within RPSFs and associated LPSFs that treat children should have access to consultant-led paediatric emergency medicine (PEM) teams.
15.	RPSFs must identify GPS needs when appointing general surgeons to ensure each centre has an adequate number of surgeons with the required special interest in GPS. Such appointments should be highlighted in applications to the Consultant Application Advisory Committee (CAAC).
16.	Newly appointed surgeons with a commitment to GPS taking up posts in RPSFs will need to have undertaken GPS training in CHI of at least 1 year at Specialist Trainee Level 6 (ST6) or above or in an equivalent hospital abroad. Proleptic appointments should be enabled where necessary to support GPS posts.
17.	With the development of surgical services in the RPSFs, a significant portion of low acuity GPS should be redirected to the regions from CHI.
18.	Paediatric Regional High Dependency Units in RPSFs should be developed in keeping with the standards of care outlined in the Paediatric Model of Care.
19.	A HSE National Implementation Strategy will require a gap analysis to be conducted in each Health Region in order to establish whole time equivalents (WTE) and infrastructure requirements to support this Model of Care with oversight from a national accountability group.
20.	The key performance indicator suite should present a visual and easily understood means of presenting the activity in the hospital or health region and may include; number of patients seen and within what timeframe, waiting lists, and average length of stay, readmission rates and morbidity and mortality outcomes.
21.	Each regional hospital undertaking GPS must have one designated lead anaesthesiologist who has a subspecialty interest in paediatric anaesthesia.
22.	For the transfer of the critically ill paediatric patient with time-sensitive surgical conditions, senior clinicians must always consider the logistics of transfer, as any delay needs to be balanced against the advantages/disadvantages of local or regional treatment.

2.0 INTRODUCTION

This Model of Care (MOC) contains recommendations on how service improvements in the provision of General Paediatric Surgery (GPS) could be achieved with the designation of both Regional Paediatric Surgical Facilities (RPSFs) and Local Paediatric Surgical Facilities (LPSFs) providing a 'bundle' of operative procedures appropriate for each site.

In 2016, the Health Service Executive (HSE) National Clinical Programme for Paediatrics and Neonatology (NCPPN) produced the report *Improving Services for General Paediatric Surgery: Policy and Standards of Care for General Surgery in the Republic of Ireland*[1] which set out standards for comprehensive non-specialist paediatric surgery. In the intervening period, however, little progress has been made in implementing the goals of this report. Currently, challenges remain in the delivery of GPS, and in particular emergency GPS, in many units outside of Children's Health Ireland (CHI). This issue has been repeatedly highlighted by the HSE's National Clinical Programmes for Paediatrics and Neonatology, for Surgery, and the National Surgical Training Programme in the Royal College of Surgeons in Ireland (RCSI).

With the opening of the new National Children's Hospital and an emphasis on paediatric surgery workforce planning, an opportunity arises to revisit the challenges around non-specialist general paediatric surgery in Ireland. Additional considerations that need to be addressed are the current and future demographic changes in the paediatric population and the need to satisfy the Sláintecare commitments of treating appropriate patients closer to home whenever possible.

While current demographic predictions indicate a reduction in the paediatric population over the coming 30 years, immigration trends within the last 5 years, with the conflict in Ukraine, for example, distort these predictions, in which Ireland experienced a large influx of child immigration. This figure was 21,000 children in April 2023.

Furthermore, CHI has indicated that capacity issues for GPS in the new National Children's Hospital will arise unless a significant proportion of the low acuity GPS currently performed in CHI is redirected back to regional and local hospitals.

Challenges in the provision of GPS are not unique to Ireland. In the United Kingdom (UK), the GIRFT (Getting It Right First Time) Programme National Specialty Report in February 2021[2] highlighted variations of GPS care in regard to the management of testicular torsion and appendicitis in children in particular. With changes in subspecialty training and the retirement of true 'general' surgeons in many of the smaller hospitals, this report also highlighted the increasing shift of low complexity elective and emergency surgery from local to specialty centres. It is clear that similar trends are evident in Ireland.

This Model of Care sets out to update the original *Improving Services for General Paediatric Surgery*, with an emphasis on workforce planning, training and quality assurance of service provision, and to ensure that all children who require acute or elective GPS are managed in an appropriate environment by staff with the requisite skills and based on the following key principles:

- Assessment of acute GPS cases occurs locally, as this minimises the risks and distress associated with unnecessary transfer.
- Consultant-level senior decision-makers determine the need for transfer to ensure that all transfers are clinically appropriate.
- Children who require transfer to CHI in Dublin are transferred in a timely and safe manner.
- Acute surgery for children provided locally occurs in an appropriate environment.
- Where clinically appropriate, elective procedures are performed locally with the benefits that these bring to children and their families.
- RCSI incorporates appropriate paediatric surgical experience within the general surgery training programme supporting GPS workforce planning for the regional and local general surgery paediatric units.

- Regional general paediatric surgeons doing scheduled lists decide which facility best suits the scheduled care, i.e. RPSF and/or LPSF.
- An audit and peer review process is developed to assure the quality and safety of care.

3.0 BACKGROUND

The sustainability of GPS outside of CHI is being impacted by a combination of factors. These include:

1. Retirement has occurred in the last five years of many consultant surgeons with paediatric surgical skills.
2. The pathway that facilitates referral from local hospitals where surgery is no longer available, as is the case for many of the Model 3 hospitals, leading to direct referral to CHI instead of linking with regional counterparts is contributing to the situation where surgical activity outside of Dublin is being diminished.
3. Currently, there is a lack of interest in GPS among general surgery trainees and it is not a mandatory component of general surgical training. However, specialist paediatric training is available if trainees wish to include it as part of their general surgical training.
4. The increase of subspecialisation is leading to an inability to recruit general surgeons with the appropriate paediatric surgical skills to replace their predecessors.
5. There has been a clear lack of focus on the development of GPS services in the last eight years since the 2016 report *Improving Services for General Paediatric Surgery*. A lack of investment in paediatric services, infrastructure, and facilities at hospitals where paediatric services compete with adult services for resources has resulted in a lack of priority for the building of robust paediatric skill sets within many of the anaesthesiology, radiology, and nursing teams that previously contributed to paediatric surgical care in these hospitals. As a consequence, many individuals have been placed in uncomfortable and unsustainable positions where public expectations are high and service delivery is compromised, leading to increased referral of children for GPS to CHI.
6. It should be noted that the Republic of Ireland has the lowest number of paediatric surgeons per capita in Europe, despite the highest birth rate in Western Europe, as outlined in the *Medical Workforce Report 2021–2022*.[3]

4.0 PURPOSE

This Model of Care promotes a set of standards for general paediatric surgical care and makes a number of recommendations on training.

In addition, as a consequence of current challenges in the delivery of GPS in hospitals outside of CHI, and with the new National Children's Hospital in progress and the establishment of Health Regions, this situation is open to further change. The purpose of this Model of Care is to also place a renewed spotlight on this issue, as we believe the establishment of the CHI Hospital Group and the HSE Health Regions allows for a fresh approach in addressing the issue of sustainable GPS nationally. This Model of Care also makes recommendations on training, which include:

- Safety and governance structures
- Surgery age limits and anaesthesiology standards in RPSFs/LPSFs
- Basket of surgery cases to be performed in RPSFs/LPSFs
- Surgical training requirements for GPS in RPSFs/LPSFs
- Nursing requirements for RPSFs/LPSFs
- Outreach supports, including National Ambulance Service (NAS) transport between the regions and CHI
- Standards for audit and IT recommendations.

5.0 INTERNATIONAL EXPERIENCE

The *Paediatric General Surgery and Urology: GIRFT Programme National Specialty Report* published in the UK in 2021 outlined similar issues in relation to the delivery of GPS in the UK as experienced in Ireland.

This report listed 12 recommendations, which are as follows:

1 Use a newly established Operational Delivery Network (ODN) based Model of Care in children's surgery to ensure that all children requiring surgery are treated by experienced teams with the right infrastructure and support.

2 Reduce the mortality rates in premature babies with necrotising enterocolitis (NEC) by encouraging breastfeeding, use of probiotic nutritional supplements, and rapid surgical review of babies with suspected NEC.

3 Increase the use and scope of day case surgery in paediatric surgery and urology by taking action within Trusts across ODNs.

4 Improve the care of children requiring emergency paediatric surgery for appendicitis and testicular torsion.

5 Reduce unnecessary surgical procedures through ODNs by applying evidence-based surgical decision-making.

6 Provide patients with a clinic review only if necessary, after routine low-risk procedures, without requiring routine outpatient follow-up appointments.

7 Drive improvements in patient outcomes by strengthening how clinical data are collected, shared, and analysed. This includes exploiting innovations in health data analytics by using the National Clinical Improvement Programmes to monitor outcomes at clinician, provider, network, and national level.

8 Take steps to improve the environment of care for children and young people undergoing surgery.

9 Improve how we gather and respond to the experience of children and their families/carers while in hospital.

10 Ensure the children's voice is heard in hospitals by implementing ward-to-board representation of children's services, and by Trusts' active participation in ODNs.

11 Enable improved procurement of devices and consumables through cost and pricing transparency, aggregation and consolidation, and by sharing best practice.

12 Reduce litigation costs by application of the GIRFT Programme's five-point plan.[4]

It was envisaged that implementation of this programme would lead to clinicians in non-specialist centres being better trained to deliver non-specialist general paediatric surgical care. Furthermore, this process would improve quality of care, promote greater efficiency, give rise to financial savings, and reduce litigation.

As regards Northern Ireland, the *Review of General Paediatric Surgery in Northern Ireland (2019)*[5] sets out very clear standards of practice in line with the above points, with additional detail:

- There is a need for formal pathways for paediatric surgical care.
- At least one member of the team on-site should have Advanced Paediatric Life Support (APLS) training.
- The importance of surgical and anaesthesiology consultant volumes was noted.

Formal care and transfer pathways should be in place if there is no paediatric team on-site when day case surgery is being performed. At least one member of the surgical team should have APLS or Paediatric Advanced Life Support (PALS) training and there should be back-up if required.

In December 2013, the Association of Surgeons of Great Britain and Ireland published *Issues in Professional Practice for General Paediatric Surgery*[6] which states that in a typical district general hospital the volume of GPS cases is rarely sufficient for a full-time surgical post and should therefore be carried out by a surgeon as an addition to a standard surgical subspecialty interest.

The National Confidential Enquiry into Patient Outcome and Death (NCEPOD) publication titled *Are We There Yet?* (2011)[7] gives a very detailed analysis of issues arising in surgery on children in the UK over a 5-year period, with salient points including:

- It is important that clinical networks have agreed thresholds for patient transfer and maintain an appropriate skill mix and competencies of health professionals within the network.
- All hospitals operating on children should participate in audit.
- Two-thirds of all paediatric surgical deaths are in infants under 1 year of age.
- Every effort should be made to separate children from adults in the scheduling of elective lists.

6.0 IRISH EXPERIENCE

The 2007 Report of the Children's Surgical Forum of the Royal College of Surgeons of England, titled *Surgery for Children: Delivering a First Class Service*[8] also includes several recommendations.

These include:

- Most complex surgery in children should be centralised to provide the best outcomes.
- All children must be treated by appropriately trained professionals in an environment suitable for their needs.
- Day case surgery should be encouraged as much as possible.
- The clinical governance structure of each hospital providing children's surgery should be multidisciplinary and include anaesthesiologists, surgeons, paediatricians, and paediatric registered children's nurses.

On the basis of reviewing these documents, the Model of Care Working Group is of the view that children under 1 year of age may have their surgery in a RPSF if there is evidence of an appropriate workforce and skill set and that the facility and individual surgeons regularly carry out an agreed volume of surgery on this age group. An older age cut-off may be determined by the RPSF if the hospital's clinical lead for surgery determines, in consultation with the wider surgery team and hospital management, that there is insufficient workforce, skill set, and experience to carry out surgery on younger children. Policies that include transfer arrangements for those children whose surgery would be more appropriately carried out in another hospital will need to be agreed with the transfer hospital.

Recommendation: Children less than 1 year of age (or a minimum age agreed locally) should only have surgery in the RPSFs if the workforce, skills, and surgical volumes are appropriate.

Sláintecare

Current Government health policy is directed through Sláintecare, which aims to achieve a universal single-tier health and social care system providing equitable access to services based on need. An additional major goal is to provide care as close to home as possible.

Sláintecare advocates for a conscious move to implementation and resourcing of more integrated care networks through the establishment of community healthcare networks[9]. Healthcare delivery through these networks would ensure an integrated approach for GPS services. A network approach will also ensure that children are safely treated as close to home as possible and have access to the appropriate level of care, with high-quality resources delivered by the right staff with appropriate skills.

In addition, the 2016 *NCPPN National Model of Care for Paediatric Healthcare Services in Ireland*[10] stresses the importance of infrastructure (urgent and emergency care; inpatient and outpatient facilities); staffing (doctors, nurses, health and social care professionals (HSCP) and others); processes (standardisation of care pathways nationally); and outcomes (developing robust key performance indicators (KPIs) and outcome measures) to provide a high-quality service nationally.

6.0 NATIONAL REVIEW OF PAEDIATRIC SERVICES, 2023

In 2022–2023, hospitals providing paediatric services were visited by the NCPPN clinical leads. Issues raised were found to be similar to those noted in the 2012 NCPPN site visits. These findings included:

- Many sites reported increasing difficulty accessing surgery or surgical opinions for children locally.
- Feedback suggested this was in part due to uneasiness among some recently appointed surgeons regarding their experience of carrying out surgery in children.
- These problems were encountered at both RPSFs and LPSFs, where many of the surgeons have subspecialty interests but cover the general surgery rota for patients of all ages. Some hospitals, however, have made progress in developing care pathways.
- CHI surgeons reported rising numbers of requests to accept non-complex transfers of children.

Persistent issues that require addressing include:

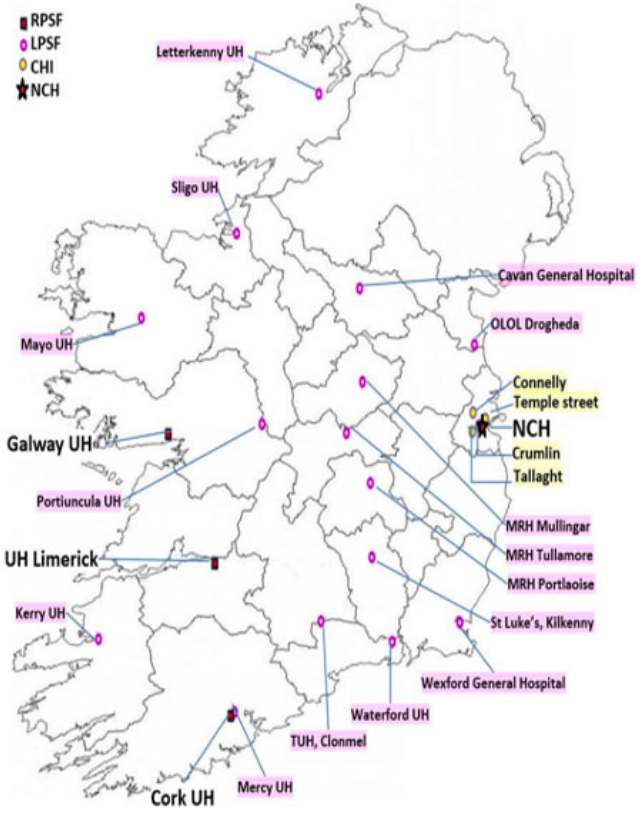
- Most units do not operate on children under 1 year of age; age cut-off varies considerably between units, but in some LPSFs surgery takes place if children are over 2 years of age and, more recently, this has increased to 3 years of age.
- In a small number of hospitals, Orthopaedics; Ear, Nose and Throat (ENT); Ophthalmology; and Dental Surgery take place without on-site paediatric back-up.
- The case bundle of operative procedures for most units is limited to appendicectomy, circumcision, herniotomy, and orchidopexy.
- There is no national audit of children's surgery.

It is apparent that most units have quite limited GPS and would welcome care pathways within a clinical network with CHI in Dublin and the RPSFs. These managed clinical networks (MCNs) and pathways in the new Health Regions should also create stronger links between local and regional sites as the first point of contact to ensure appropriate cases can be managed closer to home. The NCPPN subsequently made recommendations for non-specialist paediatric surgery:

1 Case bundles and age limits for smaller hospitals should be implemented.[11]
2 All surgeons on the general surgical on-call rota at mixed sites will need to maintain core acute paediatric surgical skills as per site bundle requirements.
3 Care pathways for common surgical problems are required.
4 General paediatric surgical audit should be developed nationally. However, at present there is no national surgical audit and hospitals carrying out GPS should therefore audit their individual practice and create arrangements for regional-level review.

Figure 1 shows the geographical location of the RPSFs, LPSFs, CHI, and the National Children's Hospital (NCH).]

Figure 1: Map of paediatric hospital sites in Ireland



Current Regional Paediatric Units and proposed Regional Paediatric Surgery Facilities:

- Galway (GUH)
- Limerick (UHL)
- Cork (CUH)
- CHI hospitals (new National Children's Hospital in time

CHI current hospitals:
Dublin:

- CHI at Crumlin
- CHI at Temple Street
- CHI at Tallaght – Emergency Care Unit
- CHI at Connolly – Urgent Care Centre

RPSFs and associated LPSFs

RPSFs assigned in this Model of Care (MOC) are: CHI*, Cork University Hospital (CUH), University Hospital Limerick (UHL), and Galway University Hospital (GUH).

LPSFs assigned in this MOC are: Our Lady of Lourdes Hospital Drogheda (OLOL), Cavan General Hospital (CGH), Sligo University Hospital (SUH), Letterkenny University Hospital (LUH), Mayo University Hospital (MUH), Portiuncula University Hospital (PUH), University Hospital Kerry (UHK), Mercy University Hospital (MUH), Midland Regional Hospital Mullingar (MRHM), Midland Regional Hospital Portlaoise (MRHP), Midland Regional Hospital Tullamore (MRHT), Wexford General Hospital (WGH), St Luke's General Hospital Carlow-Kilkenny, Tipperary University Hospital (TUH) Clonmel, University Hospital Waterford (UHW).

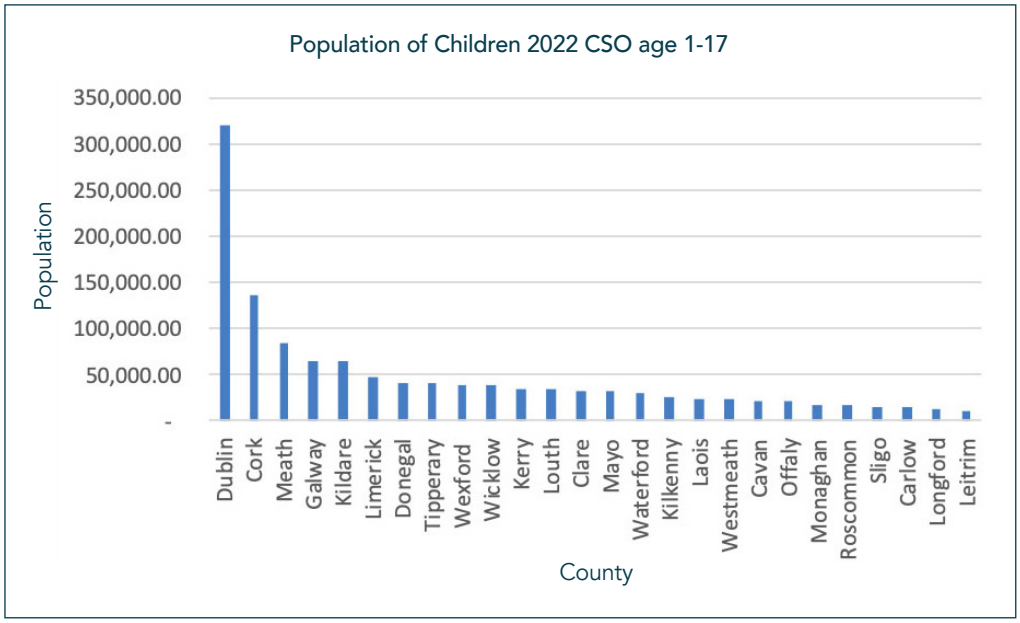
*CHI acts as a LPSF/RPSF for counties in Leinster, Cavan and Monaghan.

CHI will continue to provide RPSF and LPSF services for 54% of the population, which is reflected in the national child age distribution as shown in Figure 2.

Source: Map developed by NCPS

Figure 2 shows the population by county for children aged 1–17 years from the Central Statistics Office (CSO) Census 2022. In total, there were 1.2 million children in the age range 1–17 years.

Figure 2: Population by county for children aged 1–17 years from Census 2022



Source: CSO Census 2022 data[12]

8.0 GENERAL PAEDIATRIC SURGERY DATA ANALYSIS 2023

8.1 Surgical Activity

The 25 most commonly performed elective and acute surgical procedures are shown in Table 1. The data shown are mean GPS annual discharge figures for 2017–2022 for both CHI and the regional/local sites. While CHI performs 58% of elective cases, it should be noted that nationally the majority of acute surgical procedures of low acuity are performed outside of CHI.

Table 1: The 25 most commonly performed elective and acute surgical procedures in RPSFs and LPSFs, 2017–2022

Average Annual Discharge Figure	CHI	Regional	National
Elective Top 25 Procedure	**Total**	**Total**	**Grand Total**
Male circumcision	293.4	569.5	863
Wedge resection of ingrown toenail	114.3	442.5	556.7
Repair of inguinal hernia, unilateral	257.9	46	303.9
Orchidopexy for undescended testis, unilateral	197.4	38.3	235.8
Fixation of testis, unilateral	128.7	32.6	161.2
Excision of lesion(s) of SSCT, other site	31.6	85.1	116.8
Repair of umbilical hernia	46.3	21.8	68.1
Lingual fraenectomy	42.9	23	65.9
Excision of hydrocele	49.9	6.2	56.1
Radical excision of ingrown toenail bed	19.4	30.6	50
Excision of lesion(s) of SSCT, other site of head	15.7	32.3	48
Distal hypospadias, single stage repair	46	0	46
Laparoscopic appendicectomy	31.6	10.5	42.1
Orchidopexy for undescended testis, bilateral	32.7	2.7	35.5
Excision of lesion(s) of SSCT, neck	10.5	22.7	33.1
Division of penile adhesions	23.3	4.5	27.9
Dilation of urethral stricture	25.3	0.2	25.5
Cystoscopy	24.7	0.2	24.8
Exploration of spermatic cord	23.5	0.5	24
Endoscopic removal of ureteric stent	23.8	0	23.8
Excision of lesion(s) of SSCT, leg	5.1	18.3	23.5
Repair of epigastric hernia	16.7	3.6	20.3
Repair of inguinal hernia, bilateral	18.8	1.4	20.1
Orchidectomy, unilateral	17.8	2.4	20.1
Fixation of testis, bilateral	17.4	1.9	19.3
Summary of other procedures not in Top 25	578.1	140.8	718.8
Elective Top 25 Procedure	**2092.7**	**1537.7**	**3630.4**
% Performed in CHI, Regions	**58.0%**	**42%**	

Source: HIPE data 2017–2022

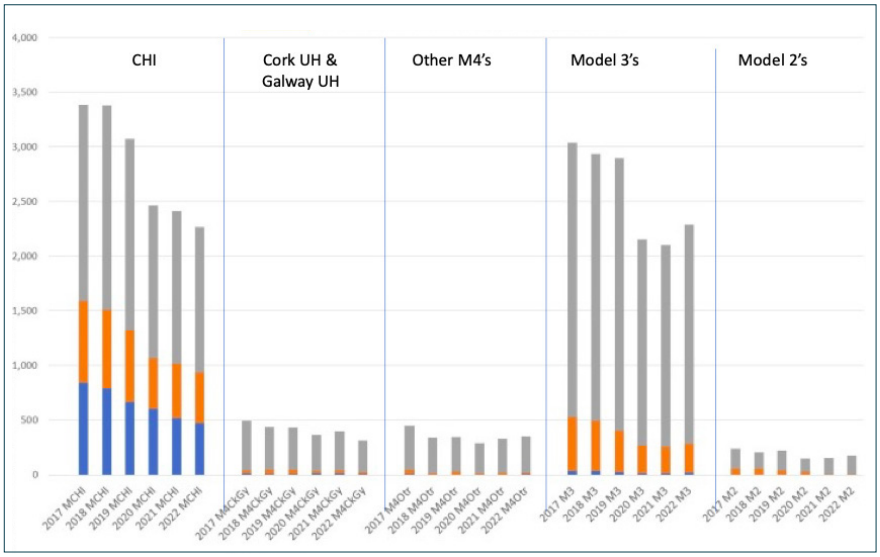
Average Annual Discharge Figure	CHI	Regional	National
Acute Top 25 Procedure	**Dublin**	**Total**	**Grand Total**
Laparoscopic appendicectomy	326.2	1180.2	1506.4
Appendicectomy	89.1	393.1	482.2
Excision of lesion of testicle	27.2	20.1	47.3
Fixation of testis, unilateral	12.2	23.5	35.7
Incision and drainage of abscess of SSCT	5.9	27.9	33.8
Exploration scrotal contents fix testis, unilateral	10.3	22.3	32.6
Pyloromyotomy	31.4	0.5	31.9
Fixation of testis, bilateral	14.2	12.8	27.0
Exploration scrotal contents fix testis, bilateral	10.8	16.1	26.9
Laparoscopy	2.0	24.0	26.0
Exploration scrotal contents, unilateral	11.3	12.2	23.5
Repair wound SSCT, other site superficial	5.2	17.2	22.5
Drainage of perianal abscess	7.8	13.9	21.6
Orchidectomy, unilateral	4.2	10.3	14.5
Repair of inguinal hernia, unilateral	12.8	1.4	14.2
Incision of pilonidal sinus or cyst	0.5	13.2	13.7
Male circumcision	3.0	9.0	12.0
Gas reduction of intussusception	12.0	0.0	12.0
Resection small intestine with anastomosis	7.9	1.7	9.6
Non-excisional debridement skin and SSCT tissue	2.4	6.3	8.6
Division of abdominal adhesions	7.8	0.7	8.5
Laparoscopic ovarian cystectomy, unilateral	4.6	3.7	8.3
Drainage intraabdominal abscess haematoma cyst	4.6	2.7	7.3
Excisional debridement of soft tissue	1.9	4.7	6.6
Removal of impacted faeces	5.7	0.7	6.4
Summary of other procedures not in Top 25	122.2	86.7	208.9
Total	**743.3**	**1904.8**	**2648.1**
% Performed in CHI, Regions	**28.1%**	**71.9%**	

Skin and Subcutaneous Tissue (SSCT)

Figure 3 shows the data for 2017–2022 for acute and elective general surgical discharges in CHI, RPSFs and LPSFs. It should be noted that CHI is the RPSF for Leinster, Cavan and Monaghan, but also has a considerable number of discharges from the region. Surgical discharges from the Model 4 hospitals (RPSFs) in Counties Cork, Limerick, Galway; Model 3 hospitals (LPSFs) in Counties Clare, Tipperary, Waterford, Cork, Kerry, Donegal, Mayo, Sligo; and Model 2 hospital in County Roscommon tend to reflect their geographical catchment areas.

Figure 3: Discharges for elective and acute surgical procedures in CHI, RPSFs and LPSFs, 2017–2022

Year-HspTyP	0-1	2-4	5-15	Total
2017 MCHI	843	747	1,793	3,383
2018 MCHI	791	719	1,871	3,381
2019 MCHI	667	659	1,749	3075
2020 MCHI	602	465	1,396	2,463
2021 MCHI	519	499	1,398	2,416
2022 MCHI	470	470	1,329	2,269
2017 M4CKGY	10	31	451	492
2018M4CKGY	5	39	392	436
2019 M4CKGY	8	38	1386	432
2020 M4CKGY	9	24	328	361
2021 M4CKGY	9	32	354	395
2022 M4CKGY		20	289	313
2017 M4COTR		41	404	449
2018 M4COTR		12	327	341
2019 M4COTR		25	322	348
2020 M4COTR		12	278	292
2021 M4COTR		16	313	330
2022 M4COTR		16	336	355
2017 MB	35	491	2,515	3,041
2018 MB	36	461	2,439	2,936
2019 MB	25	380	2,490	2,895
2020 MB	14	253	1,888	2,155
2021 MB	13	240	1,847	2,100
2022 MB	15	269	2,006	2,290
2017 M2		56	182	238
2018 M2		53	152	207
2019 M2		41	180	221
2020 M2		31	118	149
2021 M2		6	144	152
2022 M2		6	171	177
MCHI as % tot	95.1%	57.9%	34.2%	44.5%
Total	4,092	6,152	27,848	38,092
Age as % tot	10.7%	16.2%	73.1%	



Source: HIPE data 2017–2022
 # – Values under 5 redacted.
NQAIS Clinical uses HIPE data supplied by the Health Pricing Office (HPO) and coded by 31 March 2023. 2021 data >99.5% HIPE coded and 2022 data 2022 data >99.5%. Excludes State-funded activity in private facilities and non-acute Hospital Group data.

Figure 4 shows the acute paediatric surgical discharges by age and hospital type for the 2017–2022 period. It is clear that virtually all children below the age of 1 year are operated on in CHI. It should be noted, however, the high volume of activity recorded in RPSFs and LPSFs, and as expected there has been no obvious COVID-19 effects on acute surgical activity.

Figure 4: Acute general paediatric surgery for the period 2017–2022 by age and hospital type

Year-HspTyP	0-1	2-4	5-15
2017 MCHI	121	58	531
2018 MCHI	115	67	606
2019 MCHI	95	67	578
2020 MCHI	113	45	564
2021 MCHI	102	55	588
2022 MCHI	76	56	465
2017 M4CKGY	#	12	387
2018M4CKGY	#	11	329
2019 M4CKGY		16	327
2020 M4CKGY	#	12	277
2021 M4CKGY	#	18	310
2022 M4CKGY	#	8	221
2017 M4COTR	#	15	322
2018 M4COTR	#	7	263
2019 M4COTR	#	12	280
2020 M4COTR	#	10	244
2021 M4COTR	#	8	277
2022 M4COTR		11	275
2017 M3	#	46	1,318
2018 M3	#	50	1,339
2019 M3	#	44	1,286
2020 M3	#	38	1,186
2021 M3	#	38	1112
2022 M3		21	935
2019 M2			#
2020 M2			#
2021 M2			#
2022 M2			#

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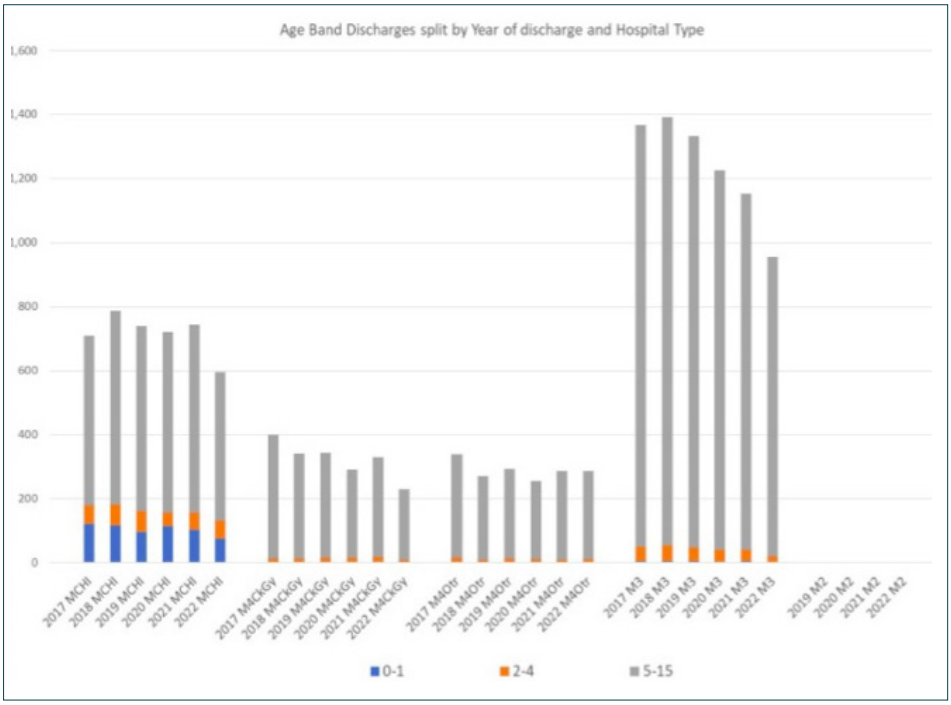

Source: HIPE data 2017–2022
 # – Values under 5 redacted.
NQAIS Clinical uses HIPE data supplied by HPO and coded by 31 Dec 2022. 2021 data >99.5% HIPE coded and Jan–Nov 2022 incomplete at ≈ 94.21%. Excludes State-funded activity in private facilities and non-acute Hospital Group data.

Figure 5 shows the elective paediatric surgical discharges by age and hospital type for the 2017–2022 period. Again, it should be noted the large volume of activity which occurs in the Model 3 and 2 Hospitals which represent the LPSFs.

Figure 5: Elective paediatric surgical discharges by age group and hospital type, 2017–2022

Year-HspTyP	0-1	2-4	5-15
2017 MCHI	472	592	1,044
2018 MCHI	437	560	1,015
2019 MCHI	364	508	955
2020 MCHI	285	364	689
2021 MCHI	262	368	670
2022 MCHI	222	326	632
2017 M4CKGY	9	19	52
2018M4CKGY	#	28	55
2019 M4CKGY	8	19	48
2020 M4CKGY	5	11	37
2021 M4CKGY	7	14	34
2022 M4CKGY	#	11	37
2017 M4COTR	#	26	61
2018 M4COTR	#	5	53
2019 M4COTR		13	35
2020 M4COTR	#	#	23
2021 M4COTR		8	30
2022 M4COTR	#	#	41
2017 M3	30	417	1,108
2018 M3	32	386	1,020
2019 M3	20	316	1,108
2020 M3	10	207	640
2021 M3	9	190	664
2022 M3	11	210	753
2017 M2		54	182
2018 M2	#	53	152
2019 M2		41	177
2020 M2		30	116
2021 M2	#	6	143
2022 M2		6	154

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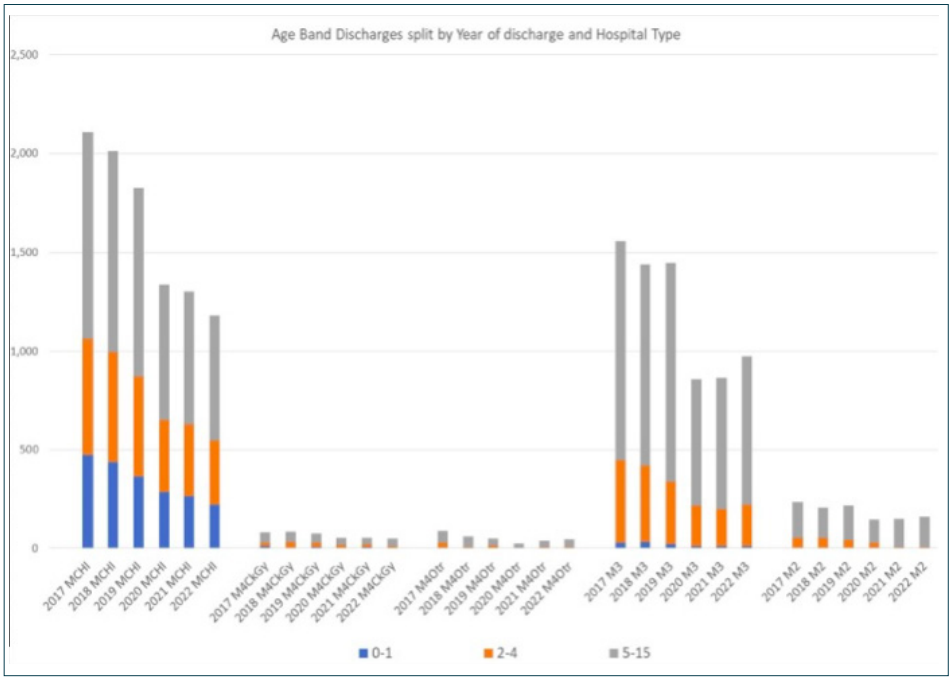


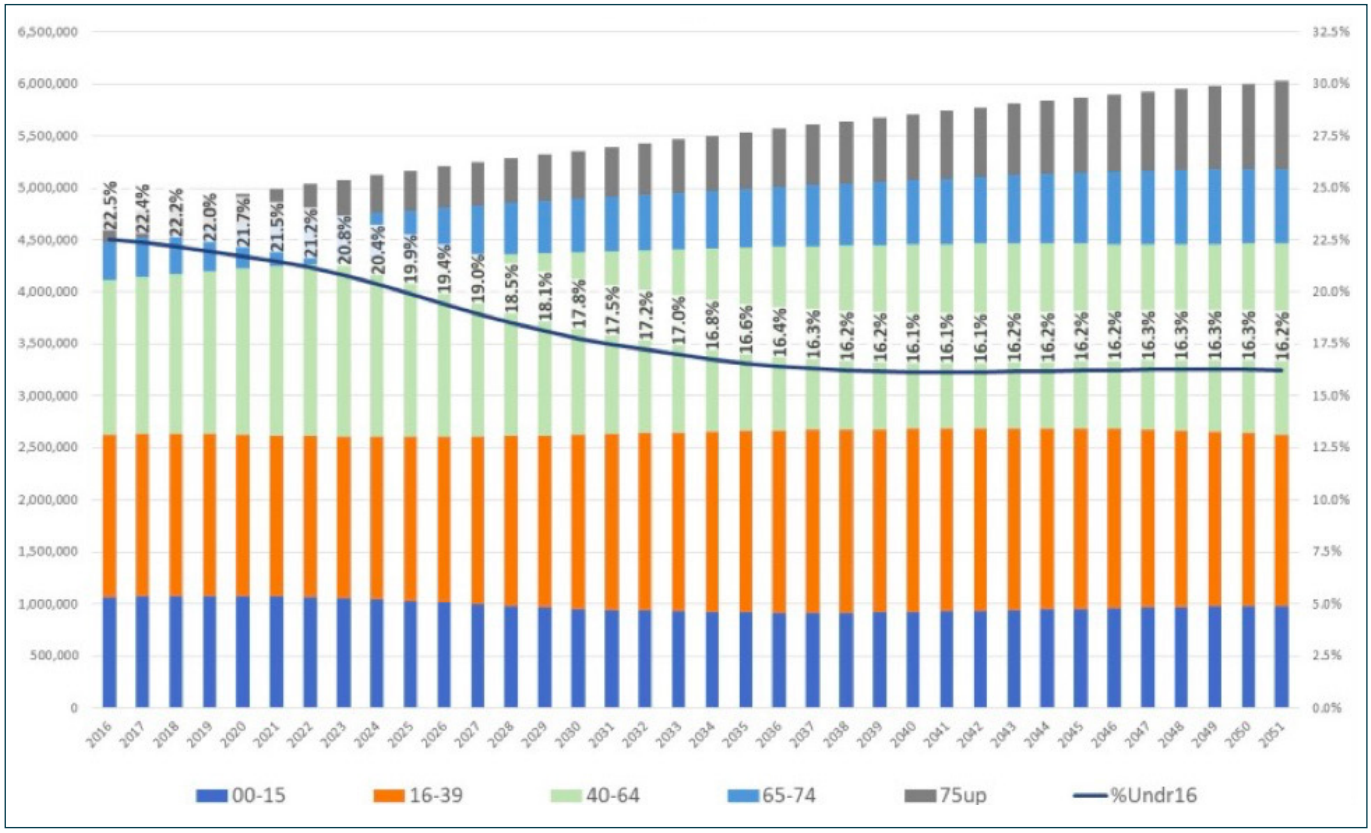
Source: HIPE data 2017–2022

 # – Values under 5 redacted. NQAIS Clinical uses HIPE data supplied by HPO and coded by 31 Dec 2022. 2021 data >99.5% HIPE coded and Jan–Nov 2022 incomplete at ≈ 94.21%. Excludes State-funded activity in private facilities and non-acute Hospital Group data.

Demographic projections for the paediatric population of Ireland

According to Census 2022, children and young people under the age of 16 years currently account for 21% of the population.12 Figure 6 shows the estimated national population by age band/year, with the percentage under 16 years as indicated by the continuous trend line decreasing from 22.5 % in 2016 to 16.2% in 2051.

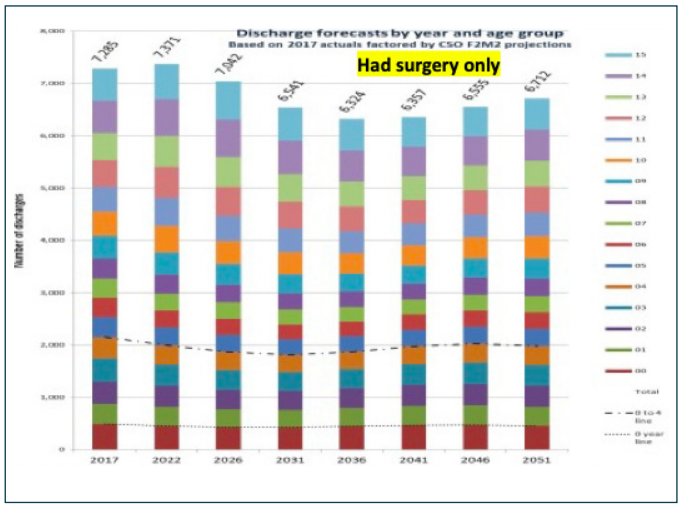
Figure 6: CSO estimated population demographic projections by age band for Ireland from Census 2016 to 2051 by year for percentage under 16

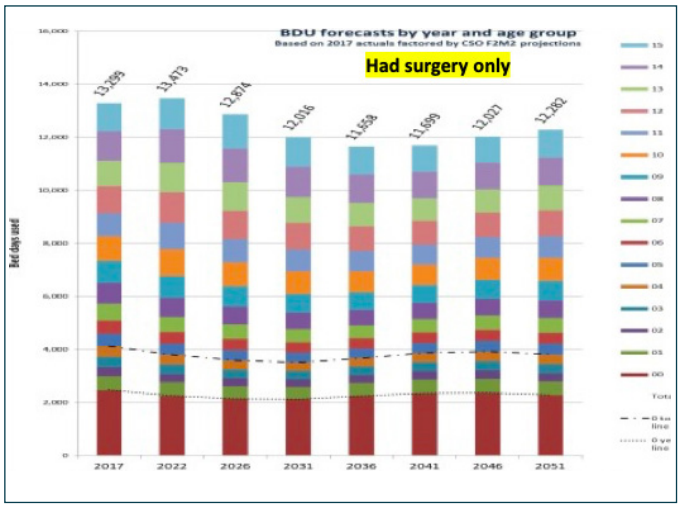


Source: CSO Census 2016 and M2F2 Dublin Inflow forecast.

Reflecting the projected population change, Figure 7 shows the predicted paediatric general surgical discharge numbers and bed day usage from 2023 to 2051 by age group. It should be noted that these projected numbers only refer to patients who undergo a surgical procedure. Current projections indicate an 8% reduction in surgical discharges and bed date usage over this period.

Figure 7: Actual general paediatric surgery for 2017–2022 and 2026–2051; all discharge forecasts for bed days used for volumes, ages 0–15





Discharges Age Band	2017	2022	2026	2031	2036	2041	2046	2051
00	496	454	430	427	451	473	476	459
01	378	360	338	331	347	366	372	361
02	430	405	377	365	378	399	410	401
03	440	406	378	360	368	391	405	398
04	408	373	347	327	328	350	364	363
05	382	341	319	297	295	311	326	328
06	370	320	312	287	282	295	310	315
07	365	327	313	288	279	288	305	312
08	382	359	337	309	295	301	319	330
09	437	427	397	365	344	345	367	382
10	463	503	442	421	393	390	412	431
11	472	539	482	455	420	412	431	453
12	514	592	550	509	468	454	469	495
13	519	592	571	523	480	459	468	496
14	615	704	714	640	588	555	558	592
15	614	667	734	637	608	568	564	594
Total	7,285	7,371	7,042	6,541	6,324	6,357	6,555	6,712
% 0 to 4 yea	29.5%	27.1%	26.6%	27.7%	29.6%	31.1%	30.9%	29.5%
% 0 years	6.8%	6.2%	6.1%	6.5%	7.1%	7.4%	7.3%	6.8%

erages HIPE data supplied by the HPO and CSO supplied 2016 census and M2F2 Dublin in-flow forecast. Da

Bed days used Age Band	2017	2022	2026	2031	2036	2041	2046	2051
00	2,473	2,261	2,145	2,130	2,251	2,357	2,372	2,2
01	527	502	471	462	484	510	518	5
02	339	319	297	287	297	314	323	3
03	385	355	330	315	322	342	354	3
04	408	373	347	326	328	349	364	3
05	462	412	385	359	356	376	394	3
06	505	437	424	391	383	402	422	4
07	635	569	545	501	485	502	530	5
08	767	720	677	620	592	604	641	6
09	842	822	764	701	661	664	706	7
10	937	1,019	894	853	796	790	834	8
11	861	984	880	830	766	751	786	8
12	1,009	1,162	1,079	1,000	920	891	921	9
13	967	1,104	1,063	975	895	855	873	9
14	1,102	1,260	1,277	1,145	1,052	992	997	1,0
15	1,083	1,175	1,294	1,123	1,071	1,000	994	1,0
Total	13,299	13,473	12,874	12,016	11,658	11,699	12,027	12,2
% 0 to 4 yea	31.1%	28.3%	27.9%	29.3%	31.6%	33.1%	32.7%	31.1
% 0 years	18.6%	16.8%	16.7%	17.7%	19.3%	20.1%	19.7%	18.6

ind Same day discharges have an assumed 0.5 day length of stay for AvLOS & BDU calculations.

Source: Leverages HIPE data supplied by the HPO and CSO Census 2016 and M2F2 Dublin Inflow forecast
Day case and same day discharges have an assumed 0.5 day length of stay for AvLOS (average length of stay) and BDU (bed days used) calculations.

8.2 Data Summary Conclusions

- A very significant volume of surgery in children is performed in regional and local sites.
- Nationally, very small numbers of children 0–1 years undergo surgery outside of CHI.
- Population change to the percentage of children under 16 years of age is forecast to decrease from 22.5 % in 2016 to 16.2% by 2051.
- National GPS discharges to 2051 will fall by 8%.
- CHI currently acts as a LPSF/RPSF for 14 of the 26 counties (54%). The data from 2020 show that 15.3% elective and 6.4% emergency CHI discharges come from outside the CHI catchment area (261 elective and 53 emergency children might only be redirected to the RPSF/LPSFs with the implementation of this Model of Care). It should also be noted that the CHI catchment area will increase with the introduction of the new HSE Health Regions due to county realignment.

Acknowledgement: The data were generated by Gerry Kelliher (Business Intelligence Manager, National Clinical and Integrated Care Programmes) from the Hospital In-Patient Enquiry (HIPE) and CSO data.

9.0 MANAGED CLINICAL NETWORKS FOR GENERAL PAEDIATRIC SURGERY

The delivery of care through MCNs would ensure an integrated approach for GPS services. A network approach will ensure that children are safely treated as close to home as possible and have access to the appropriate level of care, with high-quality resources delivered by the right staff with appropriate skills, as described in the 2016 National Model of Paediatric Healthcare (NMOC) and as outlined in Sláintecare Implementation Strategy and Action Plan 2021–2023. MCNs have an important role in the integration of services across the health and local authority sectors by addressing the problems experienced by service users as they move from one provider or partner organisation to the next. These networks will support the delivery of key outcomes from the NMOC through linking multiagency teams and local providers to design and deliver the care each local population requires. This will be further supported through the establishment of six HSE Health Regions (HRs),13 which are intended to permit local autonomy maintain consistent quality of care across the country, and to allow hospitals to deliver joined-up integrated care closer to home. The 2013 report Establishment of Hospital Groups as a Transition to Independent Hospital Trusts14 states that "it is also acknowledged that inter-group working is as vital as the rationalisation of services within groups".HSE Health Regions

The HSE has created six Health Regions. Each Health Region will provide integrated health and social care services for the people in that area. These regions were signed off by Government in July 2019. The HSE vision is that the regions will function as part of a strengthened regional health and social care service, with their own budget, leadership team, and increased local decision-making. The HSE will remain a single HSE organisation with six Health Regions. Services will integrate across hospitals and community organisations in these regions.

Health Regions Geographical Areas

The six Health Regions will cover the following areas:

- HSE Dublin and North East – North Dublin, Meath, Louth, Cavan,* and Monaghan
- HSE Dublin and Midlands – Longford, Westmeath, Offaly, Laois, Kildare, and parts of Dublin South and Wicklow** and CHI
- HSE Dublin and South East – Tipperary South, Waterford, Kilkenny, Carlow, Wexford, Wicklow, part of South Dublin
- HSE Mid West – Limerick, Tipperary, and Clare
- HSE South West – Kerry and Cork
- HSE West and North West – Donegal, Sligo, Leitrim*, Roscommon, Mayo, and Galway

** West County Cavan: A small portion of West County Cavan continues to be aligned with Sligo/Leitrim for health services.*

*** West County Wicklow: West County Wicklow continues to be aligned with Kildare for health services.*

The implementation of the six new Health Regions offers an opportunity to review current structures and resources for the provision of acute and elective GPS care nationally.

The Health Regions will promote sustainable, equitable regional access to high-quality surgical services, while ensuring smoother transitions of care for those children who require complex surgery in CHI.

The provision of GPS outlined in this Model of Care complements other aspects of surgical care provision as outlined in the *RCSI Report of the Short-Life Working Group on the Provision of Emergency Surgery*.[15]

The advantages of managed clinical networks are outlined in Table 2.
Table 2: Advantages of managed clinical networks

Table 2: Advantages of managed clinical networks

Parameter	Advantage
Common standards	· Ensure safe and high-quality care · Pathways of care
Service planning	· Predict trends in patient flow · Match capacity to demand · Resource allocation
Workforce planning	· Maintain high-quality standards · Care close to home if appropriate
Education	· Training to support workforce planning · Maintain competence
Audit	· Measure agreed outcomes

Figure 8 shows a map of the new six Health Regions, outlining the integration of Community Health Organisations (CHOs) and hospital site alignments. The Health Regions are planned for implementation in September 2024.

Figure 8: Map of the new six Health Regions in Ireland

Source: HSE: https://www.hse.ie/eng/about/who/health-regions/

HSE Health Region	CHO Area covered	Countries/LHOs (Local Health Office)	Hospitals (model 4 hospitals in Bold)	Population (Census 2016, rounded)
HSE Dublin & North East	All of CHO 9 Part of CHO 5 (Meath Louth) Part of CHO 1 (Cavan3, Monaghan)	Dublin North Cnetral, North West Dublin, North Dublin, Meath, Louth, Cavan, Monaghan	**Beaumont Hospital** Cappagh National Orthpaedia Hospital Cavan Monagh Hospital Connolly Hospital Blanchardstown Louth County Hosptal, Dundalk **Mater Misericordiae University Hospital** Our Lady's Hospital Navan Our Lad's of Lourdes Hospital Drogheda Rotunda Hospital Dublin	1,080,000
HSE Dublin, Midlands including CHI	All of CHO 7 Part of CHO 5 (Laoise, Offaly, Longford, Westmeath)	Dublin South City, Dublin South West, Dublin West, Kildare/ West Wicklow, Laois/ Offaly, Longford/ Westmeath	Coombe Women and Infants University Hospital Midlands Reginal Hospital Mullingar Midlands Reginal Hospital Portlaoise Midlands Reginal Hospital Tullamore Naas General Hospital **Tallaght University Hospit** **St. James's Hospital** St. Luke's Hospital Rathgar	900,000
HSE Dublin & South East	All of CHO 6 All of CHO 5	Dublin (South East), Dun Laoghaire, Wicklow, Wexford, Carlow/ Kilkenny, Waterford, South Tipperary	Lourdes Orthopaedic Hospital Kilcreene National Maternity Hospital Holles Street Royal Victoria eye & ear Hospital St. Coluncilles Hospital St. Luke's General Hospital Kilkenny St. Michael's Hospital, Dun Laoghaire St. Vincent's University Hospital South Tipperary General Hospital University Hospital Waterford Wexford General Hospital	900,000
HSE South East	All of CHO 4	West Cork, Cork South Lee, Cork North Lee, North Cork, Kerry	Bantry General Hospital **Cork University Hospital** Cork University Maternity Hospital Mallow General Hospital Mercy General Hospital South Infirmary-Victoria University Hospital Cork University Kerry	600,000
HSE Mid-West	All of CHO 3	Limerick, Clare, North Tipperat/east Limerick	Croon Hospital Limerick Ennis hospital Nenagh Hospital St. John's Hospital Limerick **University Hospital Limerick** University Maternity Hospital Limerick	390,000
HSE West & North West	All of CHO 2 Part of CHO 1 (Sligo, Leitrim, Donegal)	Galway, Roscommon, Mayo, Sligo/Leitrim3, Donegal	Galway University Hospital Letterkenny University Hospital Mayo University Hospital Portinuncula University Hospital Roscommon University Hospital Sligo University Hospital	710,000

Recommendation: It will be necessary to provide General Paediatric Surgery through the new HSE Health Regions. Managed clinical networks will require additional paediatric surgeons to be appointed in CHI and appointed locally at the RPSFs centres.

10.0 STANDARD OF CARE FOR GENERAL PAEDIATRIC SURGERY 2023

Both the Paediatric Programme and National Clinical Programme in Surgery support the use of clinical networks to ensure an integrated approach for GPS services. A network approach will ensure that children are safely treated as close to home as possible and have access to the appropriate level of care, with high-quality resources delivered by the right staff with appropriate skills. The 2013 report Establishment of Hospital Groups as a Transition to Independent Hospital Trusts states that "it is also acknowledged that inter-group working is as vital as the rationalisation of services within groups". From September 2024, the Health Regions will be established and will focus on intergroup and intercommunity (CHOs) working holistically.

10.1 Governance Structures

Operational

In hospitals that provide GPS there must be a commitment from the REO of the Health Region and executive team that a high-quality and resourced service is provided. The focus of this governance structure must also include accountability to ensure a consistent and regular GPS service is delivered as intended on commencement.

Recommendation: A HSE National Implementation Strategy will require a gap analysis to be conducted in each Health Region in order to establish whole time equivalents (WTE) and infrastructure requirements to support this Model of Care with oversight from a national accountability group.

Clinical

Robust clinical governance is critical with the identification of a designated lead paediatric surgeon and anaesthesiologist in paediatric general surgery in any unit that accepts paediatric patients. Governance groups should have appropriate administrative support and could report into the standard perioperative governance structures present in all hospital. Such units need to engage in audit/outcome multidisciplinary meetings held on a regular basis and submit data into any future national paediatric audit when available.

Each unit should have agreed written protocols for the management of children with possible surgical emergencies, ensuring clarity of responsibility if a child is transferring between the care of a surgeon and paediatrician with a formal care pathway.

Governance issues should also include:

1 Agreed multidisciplinary network meetings for improvement of services required.
2 Appropriate referral and care pathways for transfer of complex postoperative complications and trauma cases for complicated surgery, including redirection policies back from CHI when appropriate.
3 Engagement with an information-sharing IT system with CHI when available.
4 Review of medical, nursing, and HSCP skill mix and competencies as necessary.
5 Opportunity for children and their parents to give feedback on their experiences or their observations and experiences of the services provided.

Recommendation: Defined governance groups with designated lead surgeons and anaesthesiologists in GPS should be identified locally within Hospital Groups/Health Regions to oversee GPS care and must conduct regular multidisciplinary meetings with analysis and review of surgical outcomes.

National stakeholder engagement in the preparation of this Model of Care identified considerable variation in GPS age thresholds and admission policies, particularly in regard to the lower age limit for general anaesthesiology and admitting consultants for those children below the age of 2 years. The working group advocates that a national standard be set at 2 years of age for surgery, pertaining to the bundle of cases outlined in Section 12.0 for RPSF and LPSFs. This may be challenging and may require staff upskilling.

Surgery for this lower age group will always be subject to satisfactory skill sets and competencies of staff.

Recommendation: The national standard for paediatric surgery should be set at 2 years of age, where local surgical, medical, and nursing skill mix competencies are in place to ensure safety and equity of access.

Understanding this variation, clinical governance must ensure:

1 Development of agreed protocols/pathways regarding admission and transfer policies (see Appendix 2).

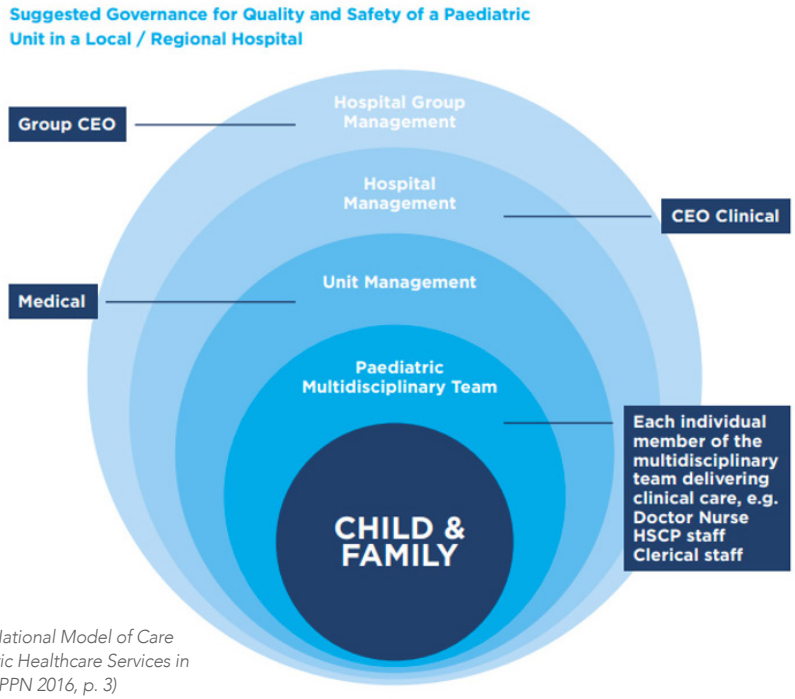
2 A commitment to the standardisation of age limits in anaesthesiology and surgery for GPS in Ireland. While understanding the current challenges that this poses for some centres, RPSFs and LPSFs should endeavour to work towards the minimal age limits as set out in this Model of Care.

3 Identification by RPSFs and LPSFs of the local medical and nursing skill mix and competencies required to achieve safe and equity of access for patient-centred GPS services nationally.

Professional

Surgeons must undertake a sufficient volume of GPS to maintain skills and competence. This is defined as the equivalent of at least one GPS list per month or ideally one per fortnight. Children need to be protected from harm during their medical care, as described in Chapter 7: Governance in the National Model of Care for Paediatric Healthcare Services in Ireland.16 See Figure 9 for the suggested governance for quality and safety of a paediatric unit in a local/regional hospital.

Figure 9: Suggested governance for quality and safety of a paediatric unit in a local/regional hospital



Source: A National Model of Care for Paediatric Healthcare Services in Ireland (NCPPN 2016, p. 3)

10.2 Training Requirements and Implications – Paediatric Surgeons

Currently, only a small minority of the surgical consultants working in the regional centres and local hospitals in Ireland have received formal paediatric surgical experience as part of their surgical training.

Historically on their retirement, they have been replaced by surgeons with no formal paediatric surgery training. This has therefore led to a reduction in GPS being offered by the regions over the last 10 years.

The National Clinical Programme for Surgery recognises the need to encourage and facilitate more adult surgical trainees to rotate through paediatric surgery in CHI in order to enhance trainees' exposure to paediatric surgery. This should occur at Specialist Trainee Level 6 (ST6) and above. A new curriculum across all surgical specialties in the UK and Ireland was introduced in August 2021. The assessment tools used are reflective of the knowledge and skills essential for a day-one consultant in the selected surgical specialty. A training pathway and curriculum has been developed for general surgery trainees who wish to work as non-specialists in general and emergency surgery, which would include GPS. If a trainee chooses this subspecialty interest, entitled Gastrointestinal (GI) and General Surgery of Childhood (GSoC), a portion of the curriculum requires operative and knowledge assessments in GSoC conditions. This change provides a framework for training general surgeons with a special interest in paediatric surgery for the proposed MCNs.

This training pathway would require trainees who signal an interest in GSoC to spend 1 year in CHI to gain adequate exposure into all aspects of management of GSoC conditions. ST6 or ST7 would be the ideal years to spend in CHI. at the end of the year, the general surgery trainees would undergo their Annual Review of Competence Progression (ARCP) with a nominated paediatric surgeon present and be required to fulfil the competencies as stipulated in the GSoC portion of the General Surgery Curriculum.17

Training options required to meet general paediatric service needs in an RPSF are therefore:

a. Proleptic training of 12 months attached to a consultant paediatric surgeon

   or

b. 12 months training in CHI paediatric surgery at ST6 or greater within the new general surgery training programme

   or

c. Equivalent training abroad.

Due to the limited bundle of cases performed in LSPFs, the training requirements for general paediatric service needs in LSPFs are those of any CSST certified general surgery trainee, who as a day-one consultant is considered competent to manage appendicitis, testicular torsion, and circumcisions in children.

To reach this workforce target, there will be a requirement to recruit five additional surgeons to CHI by 2028. This recruitment target allows for replacement of those who are set to leave the workforce between 2023 and 2028 as well as the recruitment of consultants over and above the replacement posts.

Recommendation: Newly appointed surgeons with a commitment to GPS taking up posts in RPSFs will need to have undertaken GPS training in CHI of at least 1 year at a level of ST6 or above or in an equivalent hospital abroad. Proleptic appointments should be enabled where necessary to support GPS posts.

10.3 Surgeons

Each Hospital Group/HSE Health Region should consider the local and regional needs of children's surgery by taking responsibility for the appointment of surgeons with general paediatric surgical skills when considering the breadth of surgical consultant appointments. Anaesthesiology appointments also need to be considered in order to provide sustainable regional paediatric surgical services, as identified in the bundle of cases outlined for RPSFs and LPSFs.

10.4 Urology

It should be noted that in recent years with the expansion of urological surgical services in Ireland many aspects of children's urological needs have been undertaken by urologists. In many RPSFs, paediatric circumcision, orchidopexy, and testicular torsion are already performed by urologists, as referred to in the 2016 Urology: A Model of Care for Ireland.[18]

With the development of urological services, some of the current activity performed by paediatric general surgeons may be provided by specialists in urology in future years.

Urologists and HSCPs also provide expert management (cystoscopies, stent insertion, urodynamics, etc.) of bladder and kidney diseases in children and facilitate the transition of these patients' diseases into adulthood. RPSFs will therefore need to consider these issues in regard to surgical recruitment and allocation of case mix among these surgical specialties.

Recommendation: Clear clinical pathways are required in RPSFs with core paediatric surgery expertise in urological conditions, as available and agreed locally.

The Association of Surgeons of Great Britain and Ireland in its 2013 publication, Issues in Professional Practice: General Paediatric Surgery recommends that GPS should be provided by a surgeon competent in the required tissue-handling techniques and who has competence in communication with, and management of, children and their families. It further states that it matters little whether that surgeon's main specialty lies within general surgery, urology or paediatric surgery, so long as the individual has the required competencies. A surgeon who performs elective GPS should be either a specialist paediatric surgeon (CHI hospitals), or a surgeon appropriately trained in GPS to carry out paediatric surgery in a RPSF, or a general surgeon who is competent to perform the defined bundle of cases described for RPSFs and LPSFs. Day case surgery may be undertaken by senior experienced trainees but only under appropriate consultant supervision.

The surgeon must audit their practice on key outcomes, including but not limited to:

- Mortality
- Unexpected readmission rate
- Complication rate
- Unexpected referral to CHI centres
- Participation in audits involving surgeons in other local, regional, and CHI hospitals
- Implementation of the World Health Organization (WHO) Safe Surgery Saves Lives checklist in their practice.[19]
- Audits signed off by their clinical director
- Maintenance of their skills by participating in continuous professional development (CPD)
- Attendance at events with other paediatric surgeons and designated lead surgeons for GPS, including for advanced resuscitation
- Regular multidisciplinary meetings with anaesthesiologists and nursing staff analysing outcomes and identifying issues as they arise
- Delivery of paediatric surgical care through a MCN with specialist paediatric surgeons (CHI hospital) and RPSFs; GPS can be performed in CHI, regional and local paediatric surgical facilities or within designated Model 2 hospitals

- Introduction of a multidisciplinary 'Risk Huddle' to review quality and risk issues.20 Paediatric surgeons in CHI currently provide local and secondary care to the paediatric population spanning Health Regions; HSE Dublin and North East; HSE Dublin and Midlands, including CHI; and HSE Dublin and South East, in addition to providing complex paediatric surgery. In the context of a MCN, CHI paediatric surgeons are committed to supporting the delivery of GPS care at a national level closer to home through MCNs. Named paediatric surgeons will work as part of a four-surgeon model, with 2 x paediatric surgeons in CHI supporting 2 x general surgeons with a special interest in paediatric surgery in the RPSFs. This will support and maintain local GPS skills and provide a safe and sustainable GPS service.

To support this model, an expansion in paediatric surgeons is required. In the first instance, this model will apply to Cork (CUH) and Galway (GUH); Health Regions: HSE South West, HSE Mid West and Limerick (UHL) and HSE West and North West). Further centres can be considered in the future with appropriate consultant expansion and following a demand/capacity assessment. See Section 27 on paediatric surgery workforce planning. Indeed, some appointments have already taken place.

Note:
Historically, Cork, Galway, and Limerick have provided a GPS service, but it should be noted that University Hospital Waterford (UHW) has a sizeable catchment area and that 15% of the total number of surgical discharges in UHW are paediatric, which include elective and emergency GPS, ophthalmology, ENT, and trauma and orthopaedics. It is recommended that UHW be recognised as a fourth RPSF as resources become available.

11.0 PROVISION OF A NATIONAL GPS STANDARD OF CARE SERVICE

11.1 Features of Regional Paediatric Surgical Facilities

Designated RPSFs should be established based on the following standards:

- 24-hour anaesthetic, surgical, and nursing services for children should be available 7 days a week.
- There should be appropriate paediatric radiology, consultant paediatrician and laboratory service support. This includes: paediatric radiology expertise for provision of ultrasound on-call; air enema for intussusception reduction if more than five intussusception procedures are performed annually, otherwise they should transfer to CHI; upper GI contrast study, etc. – if this is not universally available 24/7 in regional or local centres it is a key reason for transfer to surgery services in CHI.
- There should be radiologists/paediatric sonographers appointed that have paediatric skills to support GPS in RPSFs to support development of paediatric surgery.
- There should be sufficient volume to generate at least one elective paediatric list per week.
- Child and adult lists should be separated, with children prioritised to the morning.
- Pre-assessment clinics should be provided to ensure suitability for surgery at the appropriate location.[21] Some surgeries may require children and young people to attend a pre-assessment service.
- Children and parents should expect to have a senior anaesthesiologist and a nurse-led pre assessment service, with pre-assessment prior to the day of surgery, and the assessment should commence sufficiently in advance to allow medical work-up, psychological preparation, and informed consent.
- The service design should facilitate children to receive the proper level of preparation based on needs, including an assessment tool/questionnaire appropriate for all levels of paediatric pre-assessment.
- Pre-assessment nurses should be appropriately trained and experienced for their role, and the team should include qualified children's nurses.
- On the completion of pre-assessment, there should be an agreed care plan between the child, parent/carer, and the healthcare team.
- The preoperative assessment should facilitate meeting the medical, physical, and emotional needs and appropriate informed consent for anaesthetics in line with the HSE National Consent Policy.[22]
- There should be close links with the CHI paediatric surgeons.
- There should be the ability to operate on a child under 12 months of age if appropriate staff and facilities are in place.
- There should be on-site inpatient paediatric medical units.
- There should be paediatric-trained nursing staff.
- There should be child protection and appropriate training for staff
- There should be non-consultant hospital doctor (NCHD) access to the multidisciplinary team, including clinical nurse specialists and HSCPs, ensuring management of common paediatric illness, i.e. diabetes.
- There should be dedicated paediatric theatres, reception, and recovery with dedicated nursing staff.

Recommendation: The staffing in RPSFs and LPSFs must be appropriate to perform both the emergency and elective paediatric surgery as defined in their respective 'bundle of cases'.

Recommendation: Each RPSF will need a minimum of two adult surgeons with a special interest in GPS.

Recommendation: There will be a variable requirement for additional anaesthesiologists, paediatricians, radiology and interventional radiologists, quality assured laboratory services, paediatric emergency medicine (PEM) consultants, paediatric sonographers, and nursing and HSCPs to support the development of GPS in each of the RPSF sites. These support services should be determined and agreed locally based on workload requirements.

11.2 Features of Local Paediatric Surgical Facilities

Designated LPSFs should be established based on the following standards:

- LPSFs should operate on a limited number of elective and emergency cases reflecting the skill set of the healthcare workforce.
- Paediatric surgical care in LPSFs should be delivered through a MCN with RPSFs and CHI.
- A lead designated surgeon and anaesthesiologist for the provision of general paediatric surgical services should be identified for each LPSF.
- LSPFs units with 24/7 emergency department-accepting children should have surgical teams to clinically assess children of all ages (although they only operate over a certain threshold).
- LPSFs should have access to paediatric radiology expertise for provision of ultrasound on call as a basic requirement and also anaesthesiology and paediatric expertise for paediatric emergencies 24/7.
- On-site inpatient paediatric medical units or access to paediatric consultation should be available.
- There should be trained nursing staff with paediatric and anaesthetic specific competencies.
- Managed care plans should be in place to refer complex cases to the RPSF and CHI centres.
- Acute surgical admission for children under 2 years of age can be under the care of either a general surgeon or a paediatrician. Admission policies and consultation arrangements must be clearly documented and agreed locally.
- At least one member of the team involved in the treatment of paediatric surgical cases should hold an APLS/PALS certificate.
- Child and adult lists should be separated, with children prioritised to the morning.
- Pre-assessment clinics should be provided to ensure suitability for surgery at the appropriate location. On the completion of pre-assessment, there should be an agreed care plan between the child, parent/carers, and the healthcare team.
- There should be NCHD access to the multidisciplinary team, including clinical nurse specialists and HSCPs, ensuring management of common paediatric illness, i.e. diabetes.
- There should be child protection and appropriate training for staff.
- There should be peer review of practice and outcomes.

A hospital that caters for children and young people needs to create a supportive and therapeutic environment for them and their families. In addition to the physical aspects of care, the emotional and psychological aspects of recovery should always be considered. Similar to CHI,[23] the Association of Perioperative Registered Nurses (AORN)[24] advise that "going the extra mile" to make surgery safer and more pleasant for children and young people should have a focus on three key areas:

- Calming measures
- Safety during surgery
- Comfortable recoveries.
- For High Dependency Units (HDUs), see Section 18.

Recommendation: Acute surgical admissions for children under 2 years of age can be under the care of either a general surgeon or a paediatrician. Admission policies and consultation arrangements must be clearly documented and agreed locally in line with this Model of Care guidelines.

12.0 GPS CASES BUNDLES

12.1 Acute Case Bundle for Regional Paediatric Surgical Facility

The acute case bundle for RPSFs includes:

- Appendicectomy
- Acute scrotal pathology
- Emergency endoscopy (if local expertise available)
- Incision and drainage of abscesses
- Suturing of simple lacerations
- Upper and lower GI endoscopy – diagnostic and therapeutic
- Laparotomy for abdominal trauma/acute abdomen (consider consultation with colleagues in CHI facilities where feasible)
- Intussusception (if radiology expertise for air enema is available and if air enema fails)
- Pyloromyotomy (if sufficient throughput, e.g. minimum five cases per year)
- Management of acute surgical abdomen (in consultation with colleagues in CHI where feasible)
- Local pathways should be in place for assessing and managing suspected acute ovarian torsion in adolescent girls.

12.2 Acute Case Bundle for Local Paediatric Surgical Facility

The acute case bundle for LPSFs includes:

- Appendicectomy
- Suspected testicular torsion
- Incision and drainage of subcutaneous abscesses
- Suturing of simple lacerations
- Upper and lower GI endoscopy – diagnostic and therapeutic.

12.3 Elective Case Bundle for Regional Paediatric Surgical Facility

The elective case bundle for RPSFs includes:

- Circumcision/conditions of the foreskin*
- Herniotomy/ligation of patent processus vaginalis
- Surgery for testicular maldescent if the testis is palpable or visible on ultrasound. The current paediatric surgical literature advises surgery for testicular maldescent be performed in the first year of life. While this is currently challenging for RPSFs, this Model of Care acknowledges that the lower limit of age should be determined by local agreement until the local skill mix allows safe surgery for this age group.
- Umbilical hernia repair
- Upper and lower GI endoscopy – diagnostic and therapeutic
- Excision of superficial skin and subcutaneous lesions
- Excision of skin and subcutaneous lesions
- Wedge resection of ingrown toenail
- It is important to highlight that this elective case bundle refers to GPS services only and not RPSF-based subspecialty surgical services, such as orthopaedics, ENT, urology, plastics, etc.

12.4 Elective Case Bundle for Local Paediatric Surgical Facility

The elective case bundle for LPSFs includes:

- Circumcision/conditions of the foreskin*
- Herniotomy/ligation of patent processus vaginalis. Lower limit of age to be determined by local agreement

- Umbilical hernia
- Excision of skin and subcutaneous lesions
- Upper and lower GI endoscopy – diagnostic and therapeutic
- Wedge resection of ingrown toenail or repair of nail or nail bed
- May include: Maldescent of the testis if over 2 years of age and the testis is palpable or visible on ultrasound
- Lymph node biopsies if laboratory pathology support is available
- It should be noted that RPSFs may use LSPFs (Model 2 or Model 3 Hospitals) for elective surgery with appropriate paediatric support services.

***Note:**
Given the changing multicultural and diversity of population in Ireland in 2023, there is a need to have surgery for circumcision and conditions of the foreskin available throughout the country. All elective procedures should be planned as day cases in both RPSFs and LPSFs. While inpatient stay facilities must be provided, day case surgery should be the norm. Children who require observation should be admitted to the local inpatient paediatric unit. While local arrangements may vary between hospitals, all units must ensure that paediatricians in such hospitals are available for consultation in the management of children with surgical emergencies. Each unit should have agreed written protocols for the management of children with possible surgical emergencies, ensuring clarity of responsibility if a child is transferring between the care of a surgeon and paediatrician with a formal care pathway. Transfer of care from surgical team to medical team or vice versa needs to be on a case-by-case discussion between consultants and senior decision-makers, according to the Standards for Children's Surgery.[25]

Day case surgery in RPSFs for ex-preterm infants require preoperative assessment with anaesthesiologists and discussion with Paediatrics as required, prior to admission. These cases are not suitable for LPSFs.

13.0 PROVISION OF PAEDIATRIC SURGERY

13.1 Day Case Surgery

Both RPSFs and LPSFs (designated Model 2 hospitals) should meet the following standards in order to provide day case surgery for children.

Children who are admitted to paediatric wards for day case surgery should be admitted to a designated paediatric day ward where postoperative issues can be managed or to a dedicated location as appropriate for individual sites:

- The surgery should be undertaken by a surgeon experienced in the condition.
- All children/young people scheduled for elective surgery should undergo a pre-assessment process to ensure they are suitable for the proposed procedure in the most appropriate location.
- Surgical day units must be staffed by nurses with competencies in the care of children.
- At least one member of the team involved in the treatment of day cases should hold an APLS/PALS certificate and the other team members must have up-to-date basic skills in paediatric resuscitation.
- A member of the anaesthetic and surgical teams must remain in the hospital until arrangements have been made for the discharge of all patients; however, many units have a nurse-led discharge process.
- Agreed and robust arrangements should be in place for paediatric assistance and transfer if necessary.
- Arrangements need to be made between the CHI outreach surgeon and RPSF adult surgeons with a special interest in GPS/local surgeons for ongoing care/review if the patient requires inpatient admission following day surgery by the CHI outreach surgeon.
- Parents and carers should receive clear instructions on follow-up with written information on arrangements to deal with a postoperative emergency, including out-of-hours telephone numbers.
- Units must develop and implement an acute pain management policy, including advice on pain assessment and management at home and the provision of take-home analgesia with clear instructions for its use.
- Play specialists should be available and the environment should be child and family friendly.
- Day case activity should be audited and regularly reviewed.
- Peer review of practice and outcomes should be undertaken.
- There should be a clear protocol for contact with Paediatric Intensive Care Units (PICUs) (see Appendix 3) and paediatric surgeons in the CHI hospitals to arrange the transfer of patients should complications arise to either a Regional HDU or CHI PICU.
- Anaesthesiology services for children require specially trained clinical staff together with equipment, facilities, and an environment appropriate to the needs of children.

13.2 Inpatient Surgery

Inpatient elective GPS should be undertaken in hospital sites which have:

- Either an on-site paediatric medical unit or access to a consultant paediatrician opinion.
- If no on-site paediatric medical unit is present, then clear pathways of access to a consultant paediatrician opinion and transfer to an inpatient paediatric unit, if required, are mandatory.
- Nurses with skills and competencies in the management of children.
- An anaesthesiologist assisted by dedicated staff (assistants and anaesthetic nurses) with specific paediatric skills and competencies.
- A child-friendly environment.
- Child-only theatre lists, or priority given to children on a paediatric/adult list.
- Peer review of practice and outcomes through formally agreed pathways.

13.3 Comorbidity Assessment

Children with significant comorbidities must be considered for consultation or referral to CHI. These conditions might include:

- Anatomical or functional abnormalities of the airway or history of severe acute upper airway obstruction in the last 3 months
- Cardiac disease which is unstable/symptomatic or not yet investigated
- History of a bleeding disorder
- Children on anticoagulants
- Obesity > 91st centile; BMI > 352
- Previous anaesthetic complication or uninvestigated family history of same
- History of serious learning or behavioural abnormalities to be discussed, or consider transfer to CHI
- Impaired renal/hepatic/endocrine disorders to be discussed, or consider transfer to CHI
- Underlying disorder or syndrome associated with significant anaesthetic risk (advice to be sought from CHI centre)
- Ex-preterm infants in the first year of life
- Sickle cell disease as an underlying disorder or syndrome associated with a specific anaesthetic risk.

13.4 Relative Indications for Referral or Discussion with RPSF/CHI Centre

Children with comorbidities should be considered for consultation or referral to CHI. These conditions might include

- Previous serious surgical complication
- Parental anxiety not allayed by standard discussion
- In the absence of appropriate, trained paediatric medical and nursing staff, children with significant comorbid condition(s) should be referred to CHI.

In the event of an unexpected complication, the final decision on the need to transfer should be taken by a consultant in the local unit in consultation with the consultant surgeon/anaesthesiologist. Consultation should be with the appropriate member of the RPSF or CHI multidisciplinary team.

- Typically, the consultant in the local unit should contact the on-call consultant surgeon with special interest in paediatrics at the RPSF, if available, or on-call paediatric surgeon in CHI to discuss the case and arrange transfer.
- The child's parents must be involved in the decision and be given a clear explanation of the reasons for transfer.
- The ambulance service should be alerted to the possibility of transfer at as early a stage as possible.
- Each hospital should have a protocol for transfer of children, which should be consistent with the recommended pathways for emergency GPS outlined in this policy and the Emergency Admission Decision Framework for Paediatric Patients.

Recommendation: Clear transfer pathways and guidelines between CHI, RPSFs and LPSFs must be in place to facilitate safe care and transfer in the event of unexpected complications. Senior clinicians must be closely involved in any pre-transfer stabilisation within managed clinical networks.

14.0 PROVISION OF TRAUMA CARE IN THE PAEDIATRIC POPULATION

Most hospitals in the country do not have general surgeons with specific training in GPS. If children present at RPSFs and LPSFs with major trauma, basic resuscitation and stabilisation should be performed using standard ATLS (Advanced Trauma Life Support) guidelines and the Paediatric Trauma Manual.26 Trauma care requires the availability of CT scanning 24/7, with a "verbal report from a consultant radiologist within 30 minutes and a formal report within 12 hours".
As for the acute basket of cases, and irrespective of their paediatric expertise, all general surgeons as a day-one consultant (as for emergency department consultants and anaesthesiologists) are expected to have competencies in basic trauma and resuscitation skills for children.
Hence, all surgeons should be able to perform resuscitative surgery in a life-threating situation, and all intensivists/anaesthesiologists should be able to anaesthetise a child who needs emergency resuscitative surgery.

Prompt contact should be made with the appropriate RPSF/CHI for advice regarding ongoing management/transfer. Communications for transfer and admission should be done through the trauma team leader and the trauma coordinator at the major trauma centre.

The provision of trauma services for children has been considered separately by the NCPPN in its National Models of Care and in related documents:

- NCPPN, 2016: *Improving Services for General Paediatric Surgery: Policy and Standards of Care for General Surgery in the Republic of Ireland*
- National Clinical Programme for Trauma and Orthopaedic Surgery, 2015: National Model of Care for Trauma and Orthopaedic Surgery.[27]
- National Clinical Programme for Anaesthesia, 2015: *Model of Care for Paediatric Anaesthesia*.[28]
- Paediatric Trauma Manual.[29]
- National Emergency Medicine Programme, 2012.[30]

15.0 OUTREACH

As with other paediatric CHI specialties, it is expected that the assigned paediatric surgeons in CHI centres will undertake outreach clinics and theatre lists in RPSF hospitals. The service would be undertaken by paediatric surgeons travelling from CHI for a full day once or twice per month, depending on requirements, to the RPSF hospitals.

The visiting surgeon would ideally carry out a morning theatre list with an afternoon outpatient department clinic to deliver a full service to the regional/local hospital. This would also enable ongoing training, education, and support to clinical staff delivering the service on-site.
It is envisaged that each RPSF will be delivering GPS through a MCN of four surgeons (two regional general surgeons with a special interest in paediatric surgery and two CHI network surgeons). With this four-surgeon model, it is expected that there will be at least one dedicated paediatric day surgery list/clinic every week, delivered between the four surgeons. This will not only help maintain the required standards of a RPSF, but also help maintain and develop volume and skill mix of RPSF surgeons and anaesthesiologists for providing GPS.

Surgeons undertaking GPS in the RPSF can also provide an outreach service to LPSFs within their Hospital Group or network (see Figure 10). CHI paediatric surgeons will also be able to support redirection of children to RPSFs from CHI, allowing recovery in regional centres if appropriate. Opportunities should also be available for surgeons and anaesthesiologists to upskill in CHI, which has and will continue to be offered as an option for staff working as part of a network.
A MCN in paediatric surgery would support the establishment of a robust and sustainable RPSF, which is able to deliver a high standard of care closer to home, in the right place at the right time. Once established, LPSFs would be able to access care regionally through the RPSF within a MCN rather than having to refer/transfer all GPS cases directly to the CHI centre.

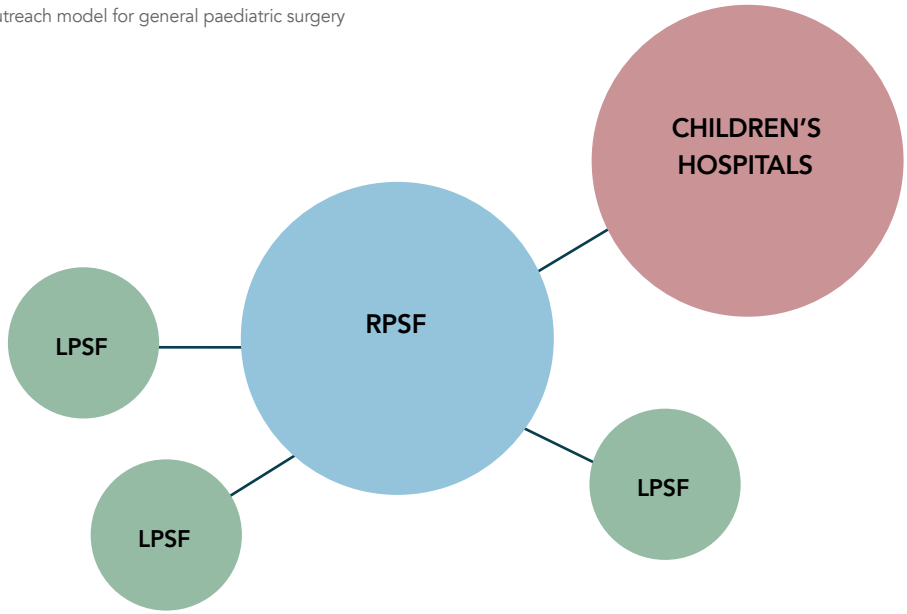
This model of local, regional, and CHI surgeons working together in an enhanced team environment will provide a high-quality, sustainable service and will ensure that there is a coordinated approach to surgical services closer to home. It will also support the emergency management and urgent care requirements of paediatric patients, by developing appropriate resources, communication, and pathways to ensure timely treatment and improved outcomes.

Recommendation: Outreach network surgeons from the CHI will need to have regular and scheduled access for dedicated paediatric surgery clinics and day surgery in RPSFs.

Recommendation: RPSFs must identify GPS needs when appointing general surgeons to ensure each centre has an adequate number of surgeons with the required special interest in GPS. Such appointments should be highlighted in applications to the Consultant Application Advisory Committee (CAAC).

Recommendation: With the development of surgical services in the RPSFs, a significant portion of low acuity GPS should be redirected to the regions from CHI.

Figure 10: Outreach model for general paediatric surgery



Note:
CHI is the RPSF for the Dublin inner catchment area counties of Louth, Meath, Kildare, Wicklow; and the Dublin outer catchment area counties of Monaghan, Offaly, Laois, Carlow, Kilkenny, Wexford, Cavan, Longford, Westmeath is proposed at time of writing.
CUH will be the RPSF for Cork, Kerry, Waterford, and Tipperary.
UHL will be the RPSF for Limerick, Clare, and Tipperary.
GUH will be the RPSF for Galway, Mayo, Sligo, Donegal, Leitrim, and Roscommon.

16.0 ANAESTHESIOLOGY SERVICES

Paediatric anaesthesia services in Ireland should be provided by competent, trained staff in a safe working environment with adequate and appropriate facilities, drugs, and equipment to safely anaesthetise and manage elective and acute paediatric surgery, according to the 2015 Model of Care for Paediatric Anaesthesia. Each regional hospital undertaking GPS must have one designated lead who has a subspecialty interest in paediatric anaesthesia.

The principal requirements for the safe provision of anaesthesia to children in Ireland are:

- There should be compliance with minimal standards of monitoring as recommended by the 2015 guidelines of the Association of Anaesthetists of Great Britain and Ireland (AAGBI).31
- Child and parent-friendly facilities should be available, with children managed ideally in a separate environment from adults.
- There should be guidelines, equipment, and facilities to manage preoperative assessment, equipment checking, drug and syringe labelling, difficult/failed intubations, perioperative upper airway obstruction emergencies, malignant hyperpyrexia, anaphylaxis, local anaesthetic toxicity, unexpected massive haemorrhage, infection control, postoperative care, child protection, and the care and transport of the critically ill child.
- The HSE National Policy and Procedure for Safe Surgery checklist should be in operation.
- Analysis of adverse events and regular audit should take place at a local, regional, and national level.
- Children should be anaesthetised by anaesthesiologists, or senior anaesthetic trainees under supervision, who have regular and relevant paediatric practice sufficient to maintain core competencies.
- Anaesthesia assistants and nursing staff providing care in the perioperative period must be trained and/or be sufficiently competent in the care of children.
- A full range of monitoring and anaesthetic equipment and disposable items for general and regional anaesthesia should be available.
- Resuscitation drugs and equipment, including an appropriate defibrillator, should be available at sites where children are routinely anaesthetised.
- Equipment and facilities for the immediate care, stabilisation, and safe transfer of critically ill children should be in place in both RPSFs and LPSFs.
- There should be an area where parents can be spoken to confidentially near the operating theatres.
- There should be a staffed preoperative assessment and acute pain service where pain scoring is routinely performed and documented, as per the Model of Care for Pre-Admission Units.
- Arrangements should be in place so that RPSFs have HDUs, as per the Model of Care for Paediatric Critical Care.[32]

Facilitated by:

- The lead anaesthesiologist should undertake a sufficient volume to maintain competencies in the perioperative care of children and adolescents.
- All other anaesthesiologists involved in GPS must undertake a sufficient volume of paediatric anaesthesia (which may include ENT, dental, orthopaedics, or other specialty cases) to maintain skills and competencies, as determined in the guidelines elaborated above.
- All anaesthesiologists who provide anaesthetic services for elective GPS must have sufficient training and maintain their skills in paediatric resuscitation to the level of PALS/APLS or equivalent.
- All anaesthesiologists must audit their practice on key outcomes including but not limited to:
  - Complication rate
  - Unexpected readmission rate
  - Unexpected referral to CHI centres

- Quality of service indicators, e.g. postoperative nausea and/or vomiting rates, regional anaesthesia success rates.
- These audits should include anaesthesiologists and other GPS healthcare professionals in local, regional, and CHI hospitals in a network framework.

Recommendation: Each regional hospital undertaking GPS must have one designated lead anaesthesiologist who has a subspecialty interest in paediatric anaesthesia.

Data reported in the National Clinical Programme in Anaesthesiology (NCPA)/HPO annual report for anaesthesiologist services in 2021 for all children 0–16 years gave a national total of 26,742 patients receiving an anaesthetic procedure (see Table 3).[33]

Table 3: Number of patient discharges reporting an anaesthetic procedure(s) in 2021, by age and Hospital Group

Discharge count by age and hospital group							
	Ireland East	**RCSI**	**Dublin Midlands**	**South S/West**	**UL Hospital Group**	**Saolta**	**Children's Group**
Age (years							
Less than 1	0	0	0	81	16	29	1,448
1 - 5	219	246	338	1,430	381	866	5,215
6 - 5	1,073	855	906	3,229	922	1,885	7,603
	1,292	1,101	1,244	4,740	1,319	2,780	14,266
National Total							**26,742**

Source: NCPA/HPO Annual Report 2021

17.0 RADIOLOGY AND LABORATORY SERVICES

In CHI, there should be a fully resourced Paediatric Interventional Radiology service that will support and complement general surgical care by offering minimally invasive techniques where appropriate and allow for collaboration and innovation, with significant benefits to patient.[34]The provision of such a service in the UK was outlined in the Royal College of Radiologists 2023 policy briefing on paediatric interventional radiology[35] and the 2010 joint report Improving Paediatric Interventional Radiology Services by the Royal College of Radiologists and the Royal College of Paediatrics and Child Health.[35]

In the regional centres, with increasing numbers of general paediatric, PEM, and general surgical consultants with an interest in paediatric surgery, there will be a demand and expectation for paediatric radiology. Investment in paediatric surgery around the country will need to be backed up by investment in support of the diagnostic radiology services (GIRFT) to provide an adequate number of trained radiologists and sonographers with an interest in paediatrics.
Likewise, investment and support will be required to ensure that there is access to quality assured laboratory services with turn-around-times that are appropriate to the clinical context. The working relationships between laboratory services in the health regions and specialist services in CHI should be clearly defined.

Paediatric radiographers and radiologists will be aware of the need to minimise radiation doses in children as well as optimising imaging and equipment settings to obtain adequate image quality at a reasonable dose. The radiographers will support plain film and fluoroscopy, and thus be in a position to support the likes of upper and lower GI contrast studies and micturating cystogram studies.

Sonographers with paediatric training bring with them specialist skills in scanning very young infants and children and would be proficient in scanning for intussusception, pyloric stenosis, appendicitis, and ovarian torsion.

If there were adequate numbers of patient presentations per year (i.e. more than five intussusception procedures performed annually), intussusception could be reduced locally; however, the frequency of intussusception has fallen over the last five years, and it is likely that there would not be adequate numbers in regional centres to maintain competency in air enema reduction on-call. These will likely still be referred to CHI.

Pyloric stenosis does not need to be imaged on-call and can wait for a next day scan.
A minimum of three consultant radiologists with a special interest in paediatric imaging, allowed 0.5 clinical time in their job plan to support paediatric imaging, would allow for a reasonable routine paediatric radiology service and cover for annual leave, etc. However, a 1:3 would be an onerous on-call rota. Nonetheless, an on-call provision may not be necessary given the patient cohort being seen in a particular centre. There would be no requirement for dedicated on-call radiology if intussusceptions were being transferred to CHI, and if neonates/infants less than 1 year of age were not being managed by the surgical team in that centre.

Recommendation: All complex paediatric neonatal surgery should be performed in CHI hospitals.

17.1 Radiology Training

Radiologists can undertake 1 year of paediatric training at CHI in their fifth year of Specialist Registrar (SpR) training and be proficient to a standard that supports the majority of paediatric imaging required in a regional centre.

It would be important to promote the use of NIMIS (National Integrated Medical Imaging System), allowing for imaging studies to be shared and reviewed at other regions and in CHI for discussion, second opinions, and double reporting to be sought where necessary.

Currently, CUH and GUH are not on NIMIS, while UHL and UHW are connected to it.

17.2 Radiology Outreach

Liaisons should be established between adult interventional radiology (IR) services in the Health Regions and CHI, where expertise in complex arteriovenous malformations (AVM) embolisation procedures, stroke thrombectomy, and other complex IR procedures are available and should be prioritised until such time as the necessary paediatric IR services are available regionally. Availability of access to paediatric IR is an important component of comprehensive paediatric care.
A paediatric radiology network forum was set up in January 2023 to support newly appointed radiologists who were appointed regionally and had an interest in paediatric radiology. The group meets online for a monthly one-hour session, sharing interesting and challenging radiology cases and discussing particular imaging topics of interest, including non-accidental injury, magnetic resonance enterography, vascular anomalies, trauma imaging, etc. This process should be supported to build and maintain professional relationships with regional colleagues and is an excellent quality improvement initiative.

18.0 PAEDIATRIC INTENSIVE CARE UNITS

High dependency care is described as a requirement for close observation, monitoring or intervention that cannot be delivered in a normal ward environment, but at the same time does not require admission to a Critical Care Unit.

Treatment in Level 1 Regional High Dependency Unit (RHDU) in Model 4 hospitals includes any child requiring close observation, monitoring or intervention that cannot be delivered in a normal ward environment, but at the same time does not require admission to an Intensive Care Unit (ICU). This could include but is not limited to:

- Postoperative care of a child deemed to require close observation and more intensive nursing care and/or pain management.
- Postoperative observation of a child after elective tonsillectomy/adenotonsillectomy stratified as severe obstructive sleep apnoea on preoperative oximetry and/or sleep study.

The type of surgery carried out in RPSFs could be greatly advanced with the back-up of regional Paediatric High Dependency Units (PHDUs) in cases of children requiring close postoperative monitoring without the need to transport them to PICU in CHI.

The establishment of a PHDU facility in UHL is acknowledged as a welcome addition to the paediatric facilities in the UHL Group/HSE Health Region.

All RPSFs and LPSFs must have a clear protocol for contact with the PICUs and the paediatric surgeons in the CHI centres in order to arrange transfer of patients should complications arise (see Appendix 3).

RPSFs should strive to establish a PHDU facility to support local anaesthetic and surgical services for non-complex cases as required.

Following surgery, a back-up plan must be in place for children who decompensate postoperatively or who need short-term monitoring and/or non-invasive ventilation, for example overnight. This should be provided exclusively in ICU.

Recommendation: Paediatric Regional High Dependency Units in RPSFs should be developed in keeping with the standards of care outlined in the Paediatric Model of Care.

Based on the chapter 6 of the Model of Care for Paediatric Critical Care[36] the delivery of paediatric high dependency care in RPSFs and LPSFs should be PHDU/Level 1 RHDU PHDU/Level 1 RHDU in Model 4 hospitals.

19.0 PAEDIATRIC EMERGENCY MEDICINE

The emergency department child attendances for 2022 in the RPSFs of the hospitals CUH, UHL, and GUH are shown in Table 4.

Table 4: Emergency department child attendances, 2022

Site	Total/day	<1 yr/day	1–4 yrs/day	5–15 yrs/day	Total/annum
CUH	53	11	24	19	16,242
CUH	45	8	19	17	16,225
CUH	53	12	20	21	16,345

Source: EDAP Database

PEM consultants are required in RPSFs to support efficient assessment and referral of children for emergency surgery. Workforce numbers should be informed by future Health Regions gap analysis and reference to the *National Doctors Training and Planning 2022–2027* workforce report.[37] In the short-term, while LPSFs are unlikely to have a sufficient workload to support PEM consultants, a Hospital Group/HSE Health Regions network approach should be encouraged, as proposed in the Emergency Medicine Programme (EMP)-NCPPN Guidance paper.[38]

Recommendation: Emergency departments within RPSFs and associated LPSFs that treat children should have access to consultant-led PEM teams.

20.0 CHILDREN'S NURSING – TRAINING REQUIREMENTS AND IMPLICATIONS

Mechanisms are in place to identify nursing staff education and training nee
ds to meet the needs of children and young people requiring emergency, elective or day surgery. Training for nurses caring for children requiring emergency, elective or day surgery in the following areas is recommended:

- Clinical handover
- Paediatric Early Warning Score (PEWS)
- Basic Life Support (BLS)
- PALS or APLS
- All should have completed HSeLanD Safeguarding Children
- Pain management
- Wound care
- Paediatric sepsis
- Medication management
- Non-touch aseptic technique.

Nursing staff can access postgraduate diploma education in the following areas:

- Perioperative Nursing
- Critical Care Nursing (Children)
- Wound Management and Tissue Viability.

Perioperative nurses must maintain updated paediatric perioperative anaesthetic and surgery competencies to care for patients and assist surgeons and anaesthesiologists.

Perioperative recovery nurses should be upskilled and maintain competencies to recover paediatric patients safely and effectively.

There should be promotion of the role expansion of advanced nurse practitioners.

20.1 Role of GPS Children's Nursing Standards

To support the successful establishment of surgical MCNs between CHI and the RPSFs, a team of paediatric nursing staff working across a range of clinical areas would strengthen the network, both in acute locations and across community settings. This could be achieved through a network of clinical nurse specialists (CNS)/ANPs collaborating between sites and across a range of clinical areas, such as colorectal, gastrointestinal, urology, etc. to support integrated care closer to home.

Nursing staff play a central role in the delivery of safe high-quality care to children and young people requiring general surgery. Care is underpinned by a family-centred approach ensuring children and young people are included in all decisions and are partners in care. Nurses provide care across the continuum of care from initial presentation, assessment, both preoperatively and postoperatively, and safe discharge. See Appendix 5 for an outline of nursing standards required to provide a safe effective service and positively impact on children and young person's experiences and outcomes of general surgical care.

21.0 ROLE OF THE GPS MULTIDISCIPLINARY TEAM AND HSCP INCLUSION

Managed clinical networks between CHI, RPSFs and LPSFs will bring opportunities for collaborative working, training, and mentorship to ensure high standards of care are delivered across the network. The MCN would support multidisciplinary team meetings and shared learning through combined multidisciplinary and multiagency teams, joint research opportunities, and audits across the network.

HSCP inclusion and resourcing is vital to the strategic planning and successful implementation of MCNs for a high-quality patient experience and true delivery of patient-centred care.[39]

The full array of HSCPs include dietetics, occupational therapy, physiotherapy, psychology, radiography, and speech and language therapy. In addition, play specialists, through play, help to alleviate the negative effects of hospitalisation. The play specialist prepares children for all hospital procedures, provides distraction during them, and follows up with post-procedural play. They work with children to assist in the preparation for admission to hospital and to enhance the children's understanding of their expected medical/surgical procedures and the treatment they will receive. More detail can be accessed from the Irish Play Therapy Association.[40]

Neonatal index cases, particularly those with congenital diaphragmatic hernia and Tetralogy of Fallot/oesophageal atresia as well as the necrotising enterocolitis cohort, are at high risk of developmental impairment and feeding difficulties. While these children are unlikely to undergo surgery in the RPSFs, access to full specialist multidisciplinary care, including dietetics, speech and language therapy, occupational therapy, physiotherapy, and psychology will be required to optimise developmental and feeding outcomes after redirection to RPSF/LPSFs.

22.0 TRANSFER OF THE CRITICALLY ILL PAEDIATRIC PATIENT

Appropriate arrangements for the transfer of children must be in place for all RPSFs and LPSFs. Local policy on-call rota records of training, including APLS/EPLS (European Paediatric Life Support) or equivalent, arrangements are made for suitable cover of on-call duties for staff carrying out transfers prior to leaving the hospital.

The following are key points from the Royal College of Surgeons of England's 2015 *Standards for Non-Specialist Emergency Surgical Care of Children*[41]

- The most experienced and appropriate member of staff available carries out the transfer. This staff member(s) should be defined within a local policy that also includes details of how their on-call work will be covered during the transfer and how they will be returned after the transfer.
- The referring hospital is responsible for the patient until handover to the receiving hospital has taken place. This should take place within 15 minutes of arrival.
- Parents are kept informed of their child's condition, the care plan, and retrieval or transfer arrangements. This information is updated regularly.
- There is a discussion between professionals and patients and family about the appropriate mode of transfer, whether this includes transfer by ambulance, Irish Paediatric Acute Transport Service (IPATS), private or public transport.
- There is adequate emergency theatre access, which includes the ability to interrupt or cancel elective work to accommodate a paediatric emergency.
- The ongoing care of inpatients/postoperative patients is managed by consultant surgeons, with support from consultant paediatricians where necessary, on children's wards staffed by registered children's nurses and senior surgical trainees, as referenced in the Standards for Children's Surgery.

In Ireland, paediatric intensive care medicine (PICM) services are based at CHI at Crumlin and CHI at Temple Street in advance of the new National Children's Hospital. Access to PICM services outside of these hospitals involves the retrieval or transportation and transfer of critically ill or injured children from peripheral hospitals to specialised paediatric critical care centres. Supports for referring hospitals for documentation, equipment, checklists, and medications are available at Local Team Resources.[42]

The Model of Care for Paediatric Critical Care retrieval in Ireland aims to ensure timely, safe, and efficient transportation while providing high-quality medical care during the transfer process. The National Ambulance Service Critical Care and Retrieval Services (NAS-CCRS) in partnership with CHI staff operate the IPATS. This service is resourced to deliver transport and retrieval on behalf of the HSE to paediatric centres nationally. Transfers outside of the hours of operation of IPATS are managed by the referring hospital. The key components of this key retrieval model are shown in Appendix 4.

Critical time-dependent conditions

The transfer of the critically ill paediatric patient with time-sensitive surgical conditions can be challenging. Senior clinicians must always consider the logistics of transfer, as any delay needs be balanced against the advantages/disadvantages of local or regional treatment. In these difficult circumstances, clinicians must consult widely with colleagues as resuscitation and damage control surgery in cases of trauma and sepsis, for example, are managed locally.

Recommendation: For the transfer of the critically ill paediatric patient with time-sensitive surgical conditions, senior clinicians must always consider the logistics of transfer, as any delay needs to be balanced against the advantages/disadvantages of local or regional treatment.

23.0 NEW INNOVATIONS

With the advancement of minimally invasive surgery in children and use of modern technological innovations, such as robotic surgery, across various surgical specialties, there is future potential for the application of such technological advances in paediatric surgery and urology. With the new children's hospital (NCH) co-located on the site of the largest adult hospital (St James's Hospital, Dublin), the benefit of establishing a shared robotic programme between adult and paediatric services could be seen.

24.0 TELEMEDICINE

Telemedicine is an emerging strategy for healthcare delivery that has the potential to expand access, optimise efficiency, minimise cost, and enhance patient satisfaction. During the COVID-19 pandemic, telemedicine played an important role in the delivery of healthcare, both within CHI and other healthcare providers. Telemedicine is currently used within CHI to deliver healthcare across a range of services, including multidisciplinary clinics between different organisations (e.g. a virtual allergy clinic). Telemedicine could be used to support the national delivery of paediatric surgery and delivery of services within MCNs across a range of clinical areas, such as multidisciplinary clinics, pre-assessment clinics, and transitional clinics for the transition from paediatric to adult care; for example, improving the standard of care of children with kidney disease through paediatric nephrology networks.[43]

Both the current technology within CHI as well as the future digital healthcare technology within the new children's hospital will need to be future-proofed to support telemedicine.

25.0 HEALTH TECHNOLOGY

Quality and patient safety is central to the mission of the HSE and CHI, and thus requires a system to effectively manage the safety, security, and risk of sharing clinical information. The importance of information technology (IT) is widely reported as integral to the success of networks and is frequently reported in national recommendations to assist networks in improving knowledge-sharing and the coordination of services.

The overarching goal of the paediatric networks is to provide care as close to home as possible. This may involve, for example, patients being treated in the NCH and being followed up closer to home at a regional site. To ensure continuity of care between the multiple sites within the network, a robust information and communication technology (ICT)/electronic health record (EHR) must be made available at all touchpoints, in line with the Health Identifiers Act 2014.44 Successful bidirectional communication will support collaborative working across the regions, reduce the duplication of referrals and diagnostic investigations, and in turn will result in an improved patient experience, reduced cost implications, and support waiting list activity.

The network's ICT system will also assist in supporting and encouraging best practice by ensuring accurate policies, procedures, protocols, and guidelines (PPPG) and real-time data. It is also recommended for ICT systems to include a function for web-based audit data capture. As time progresses, there will be multiple MCNs between CHI and regional hospitals involving a range of paediatric specialties working together in a collaborative partnership to deliver child and family centred care as close to the child's home as possible.

The network will establish regional specialist centres for local paediatric units providing outpatient and day case surgery services, thus reducing the need to refer to CHI services. Due to this wide collaboration, the network recommends remote/portal access to the EHR across all sites to enable staff to communicate with one another about their patients. Clinicians with appropriate credentials will need to have the ability to access a patient's clinical record, review, interpret, and aid colleagues with case review and diagnosis in real-time without the need to be on-site at their local hospital. In turn, this will also improve accuracy and safety as it will allow for patient information to be added in real-time, limiting errors caused by retrospective input.

Recommendation: As defined in this Model of Care, IT connectivity between CHI and the RPSFs and LPSFs require development to allow NIMIS and other data sharing, such as single EHR, between units.

From a management standpoint, enabling remote/portal access will also allow the network to effectively audit activity across the sites and identify trends in care as well as assist with appropriate workforce planning. In addition, there is a need for EHRs[45] which have been deemed "essential" in ensuring patient safety and improving the sharing of accurate information between healthcare practitioners. They have been widely adopted in many healthcare settings, including Australia and New Zealand. Use of an EHR in Ireland has been strongly encouraged over the past decade and is a key feature of the Health Identifiers Act 2014.

Benefits have been clearly identified and are aligned with the needs of the network. It is clear from both national and international policies that the adoption of an EHR will have a large impact on reducing the number of potential adverse events, thereby improving patient safety, the quality of care, and ensuring a more positive patient experience. The inclusion of EHRs will also allow the paediatric network to gather large amounts of data to assist with identification of trends and, subsequently, the further development of appropriate patient care pathways and the ability to design and implement evidence-based standards that will foster an environment of continuous quality improvement and collaboration.

26.0 FUTURE DIRECTION

The *National Model of Care for Paediatric Healthcare Services in Ireland* (2016)[46] was developed by the NCPPN, a joint clinical initiative between the HSE and the Royal College of Physicians in Ireland (RCPI). The vision of the model for children's health services is that all children should be able to access safe, high-quality services in an appropriate location, within an appropriate timeframe, irrespective of their geographical location or social background. This requires the development of an integrated clinical network for paediatric services nationally, with CHI at the centre providing specialist care and support, while linking with regional and local units to provide quality care closer to home and to support regional and national governance audit and outcome analysis. This all needs to be developed by CHI.

The Model of Care defines integration in healthcare that is seamless, smooth, and easy to navigate:

- A coordinated service which minimises both the number of steps in an appointment and the number of separate visits to a healthcare facility that are required.
- An integrated care pathway for children and young people that enables them to move from primary to secondary to CHI care as required and back again is the cornerstone of the National Model of Care for Paediatrics.
- The future direction for paediatric surgery in Ireland is the delivery of surgical services for children through an MCN between the new children's hospital and the regional and local paediatric units across the country as well as an integrated network of care between the acute, primary, and community services within the future Health Regions that aligns with Sláintecare's vision to deliver the right care in the right place at the right time.

27.0 PAEDIATRIC WORKFORCE PLANNING REQUIREMENTS

The effective operation of the new children's hospital and the implementation of this Model of Care are critically dependent on the delivery of the paediatric surgeon workforce requirements outlined in this section.

This Model of Care and the national delivery of GPS through a MCN will provide a long-term and sustainable workforce plan for CHI to not only provide an outreach service to the RPSFs but also support equitable GPS provision nationally.

The British Association of Paediatric Surgeons (BAPS)[47] recommends a consultant workforce ratio of 2.4 per 100,000 paediatric population. In Ireland, this would require an expansion of the size of the consultant paediatric surgical workforce from 12 to 24. Towards reaching this target, an expansion of the size of the consultant workforce to 17 by 2028 has been recommended by the National Doctors Training and Planning (NDTP).[48]

To reach this figure, five additional surgeons will need to be appointed in CHI to complement the current 12 WTE-funded posts. The 12 current posts comprise nine general paediatric surgical consultants and three paediatric urologists. In time, it is envisaged that paediatric urology will function as a separate department in CHI with four paediatric urologists; thus, the five additional appointments therefore comprise four paediatric surgeons and one paediatric urologist.

It should be noted, however, that currently the development of paediatric urology as a subspecialty is under consideration and may have implications for on-call and outreach services.

In addition to the CHI uplift, the proposed MCN approach outlined in this Model of Care is based on a four-surgeon model for the three MCNs in Cork, Galway, and Limerick. The four-surgeon model comprises two outreach CHI paediatric surgeons working in tandem with two regional general surgeons with an interest in paediatric surgery. Currently, two surgeons have been appointed to Limerick, whereas Cork and Galway have no formal designation of GPS attached to any of the current general surgeons. There is a need to appoint two general surgeons with an interest in GPS to each of these centres.

It is clear that these regional appointments are required as a matter of urgency to avoid further erosion of regional GPS and to off-set any movement of non-tertiary surgery to CHI, which may occur following the opening of the new children's hospital. It is recognised, however, that any expansion in workforce should take place in a coordinated and incremental manner following consultation between CHI and the relevant Clinical Programmes.

Since the consultation process for this Model of Care commenced, UHW has expressed an interest in being included in a MCN with CHI, similar to that outlined for Cork, Limerick, and Galway. As the South East has a catchment area of 500,000, this should be considered and would have the added advantage of reducing the regional and local catchment population of CHI, and may therefore divert an additional volume of low acute surgery from CHI, further freeing up tertiary capacity. Table 5 outlines the total complement of paediatric surgeons required to support this Model of Care.

Table 5: Proposed demand for consultants to align with the Model of Care for General Paediatric Surgery

Paediatric Surgery Site	Specialist Paediatric Surgeon	Specialist Paediatric Surgeon SI Urology	Specialist General Surgery SI Paediatric Surgery
CHI	13	4	
Regional			6 (8 incl. Waterford)
Local	Staffed by consultants from local centres	Staffed by consultants from local centres	Staffed by consultants from regional centres

Source: SI special interest.

As indicated elsewhere in this Model of Care, there is also a need for adequate workforce planning to support and maintain paediatric anaesthesiology, radiology, nursing, and HSCP support services within the RPSFs. These resources need to be determined locally.

28.0 AUDIT AND QUALITY IMPROVEMENT OPPORTUNITIES

- Non-specialist paediatric surgery should be part of national surgical audit. However, as there is no national surgical audit, units carrying out paediatric general surgery should audit their practice.
- The outcome of appendectomy nationally in paediatrics should be recorded.
- Training audits should be conducted.
- All anaesthesiologists who provide anaesthetic services for elective GPS must audit their practice on key outcomes, including but not limited to:
  - Complication rate
  - Unexpected readmission rate
  - Unexpected referral to CHI centre
  - Quality of service indicators, e.g. postoperative nausea and/or vomiting rates, regional anaesthetic success rates.

Audits should include surgeons, anaesthesiologists, and other GPS healthcare professionals in local, regional, and CHI hospitals, in an MCN framework.

29.0 KEY PERFORMANCE INDICATORS

KPIs should present visual and easy-to-digest means of analysing a hospital or HSE Health Regions activity and may include number of patients seen and within what timeframe, waiting lists, and average length of stay, readmission rates, and morbidity and mortality outcomes.

Recommendation: The Key performance indicator suite should present a visual and easily understood means of presenting the activity in the hospital or health region and may include; number of patients seen and within what timeframe, waiting lists, and average length of stay, readmission rates and morbidity and mortality outcomes.

Current information available through the HIPE reporting system can provide information on the number of discharges, types of procedures, length of hospital stay, discharge destination, survival, and whether admitted electively or as an emergency.

Both Models of Care for acute surgery[49] and elective surgery[50] in Ireland have KPIs. However, as the majority of paediatric surgery is day case, many of the original KPIs will not be relevant.

However, the following could be used as KPIs for paediatric surgery for trend analysis and action:

- Waiting list–data retrieval from the National Treatment Purchase Fund (access to scheduled care)
- Readmission rates
- 'Never events' – Serious Reportable Events that are wholly preventable
- National Office of Clinical Audit (NOCA) – National Paediatric Mortality Register
- RPSF and LPSF activity data
- Access to theatre lists.

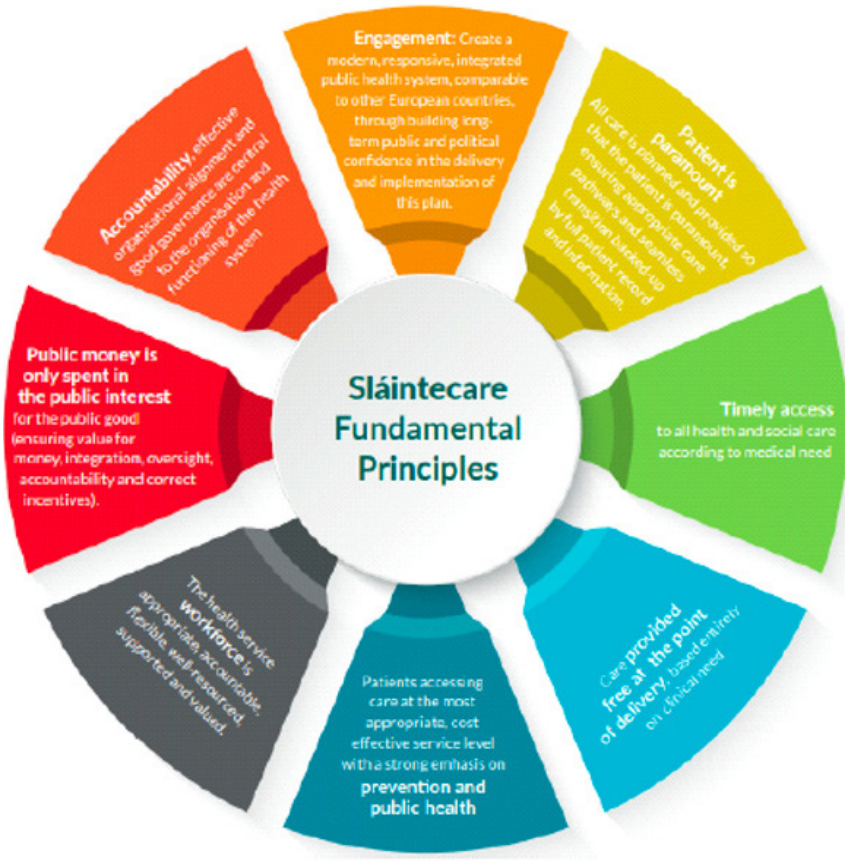
30.0

30.0 REQUIREMENTS FOR SUCCESSFUL IMPLEMENTATION OF MODEL OF CARE

31.1 Implementing the Model of Care

This Model of Care is just the starting point for enhancing the delivery of high-quality GPS surgical care. To achieve its full potential, the Model of Care will require an integrated approach to implementation that is aligned with the fundamental principles laid out in Sláintecare (see Figure 11) Government of Ireland (2021). *Sláintecare Implementation Strategy and Action Plan 2021–2023*. In addition to defining targeted areas for resourcing, the implementation phase must include engagement with patients and staff, define appropriate leadership and governance, and be supported by the use of improvement methodology underpinned by robust measurement.

Figure 11: Sláintecare fundamental principles



Source: Sláintecare Implementation Strategy and Action Plan 2021–2023

Each site gap analysis should understand the resource implications in order to implement the recommendations in this Model of Care. Workforce numbers should be informed by future WTE gap analysis and reference to the NDTP 2022–2027 workforce report.

31.2 Model of Care Recommendations

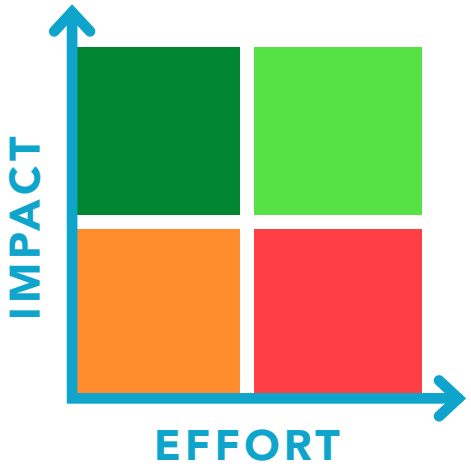
This Model of Care outlines 22 recommendations. Using a prioritisation matrix (see Figure 12), these recommendations have been classified and grouped into the following:

1 Do now (high impact/low effort).

2 Start planning (high impact/high effort).

3 Do when possible (low impact/low effort).

Figure 12: Prioritisation matrix



Implementation Priority

1. Do now (high impact/low effort)

a. All complex paediatric neonatal surgery should be performed in CHI hospitals.

b. Acute surgical admissions for children under 2 years of age can be under the care of either a general surgeon or a paediatrician. Admission policies and consultation arrangements must be clearly documented and agreed locally in line with this Model of Care guidelines.

c. Each RPSF will need a minimum of two adult surgeons with a special interest in GPS.

d. Defined governance groups with designated lead surgeons and anaesthesiologists in GPS should be identified locally within Hospital Groups/Health Regions to oversee GPS care and must conduct regular multidisciplinary meetings with analysis and review of surgical outcomes.

e. Clear clinical pathways are required in each hospital (RPSFs) with core paediatric surgery expertise in urological conditions, as available and agreed locally.

f. Clear transfer pathways and guidelines between CHI, RPSFs and LPSFs must be developed must be in place to facilitate the safe care and transfer in the event of unexpected complications. Senior clinicians must be closely involved in any pre-transfer stabilisation within MCNs.

g. Outreach network surgeons from the CHI will need to have regular and scheduled access for dedicated paediatric surgery clinics and day surgery in RPSFs.

h. RPSFs must identify GPS needs when appointing general surgeons to ensure each centre has an adequate number of surgeons with the required special interest in GPS. Such appointments should be highlighted in applications to the Consultant Application Advisory Committee (CAAC).

i. With further development of surgical services in the RPSFs, a significant portion of low acuity GPS should be redirected to the regions from CHI.

j. Each regional hospital undertaking GPS must have one designated lead anaesthesiologist who has a subspecialty interest in paediatric anaesthesia.

k. For the transfer of the critically ill paediatric patient with time-sensitive surgical conditions, senior clinicians must always consider the logistics of transfer as any delay needs to be balanced against the advantages/disadvantages of local or regional treatment.

2. Start planning (high impact/high effort)

a. PHDUs in RPSFs should be developed in keeping with the standards of care outlined in the Paediatric Model of Care.

b. The key performance indicator suite should present a visual and easily understood means of presenting the activity in the hospital or health region and may include; number of patients seen and within what timeframe, waiting lists, and average length of stay, readmission rates and morbidity and mortality outcomes.

c. The staffing in RPSFs and LPSFs must be appropriate to perform both the emergency and elective paediatric surgery as defined in their respective bundle of cases.

d. The national standard for paediatric surgery should be set at 2 years of age where local surgical, medical and nursing skill mix competencies are in place to ensure safety and equity of access.

e. It will be necessary to provide General Paediatric Surgery (GPS) through the new Health Regions. Managed clinical networks will require additional paediatric surgeons to be appointed in CHI and appointed locally at the RPSF centres.

f. As defined in this Model of Care, IT connectivity between CHI and the RPSFs and LPSFs require development to allow NIMIS and other data sharing, such as single EHR, between units.

g. Newly appointed surgeons with a commitment to GPS taking up posts in RPSFs will need to have undertaken GPS training in CHI of at least 1 year at a level of ST6 or above or in an equivalent hospital abroad. Proleptic appointments should be enabled where necessary to support GPS posts.

h. There will be a variable requirement for additional anaesthesiologists, paediatricians, radiology and interventional radiologists, quality assured laboratory services, PEM consultants, paediatric sonographers, and nursing and HSCPs to support the development of GPS in each of the RPSF sites. These support services should be determined and agreed locally based on workload requirements.

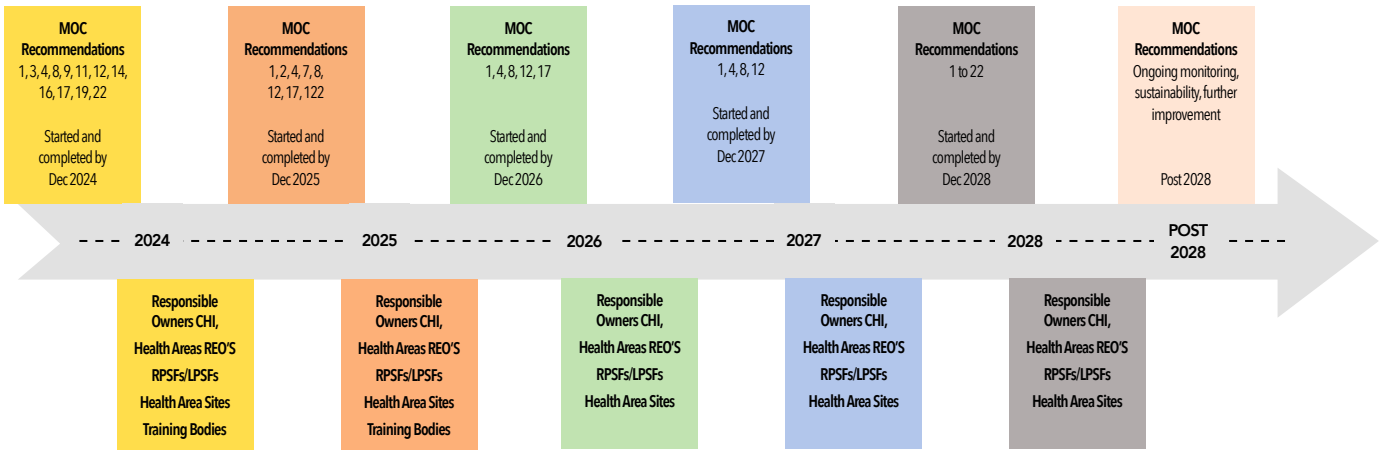
i. Emergency departments within RPSFs and associated LPSFs that treat children should have access to consultant-led PEM teams.

j. A HSE National Implementation Strategy will require a gap analysis to be conducted in each Health Regional to establish WTE and Infrastructure requirements to support this Model of Care with oversight from a national accountability group.

3. Do when possible (low impact/high effort)

a. Children less than 1 year of age (or a minimum age agreed locally) should only have surgery in the RPSFs if the workforce and skills and surgical volumes are appropriate.

31.3 Core Recommendations Implementation Plan and Timeline Summary



MOC: Model of Care; CHI: Children's Health Ireland; REOs: regional executive officers; RPSFs: Regional Paediatric Surgical Facilities; LPSFs: Local Paediatric Surgical Facilities

31.4 GPS MOC Core Recommendations Implementation Plan and Timelines Detailed

1	**Recommendation**	All complex paediatric neonatal surgery should be performed in Children's Health Ireland (CHI) hospitals
	Measurable	5 CHI WTE by 2028
	Rationale	Most complex surgery in children should be centralised to provide the best outcomes
	Action Responsible Owner	CHI Management Recruitment Operations submission to 2024 HSE Estimates and CAAC processes
	Year 1 - 2024	2 x CHI paediatric surgeons recruited and in place to support 1 x RPSFs and its associated LPSFs, e.g. UHL workforce numbers informed by the CHI gap analysis (49) already completed
	Year 2 - 2025	2 x CHI paediatric surgeons recruited and in place to support 1 x RPSFs and its associated LPSFs, e.g. GUH
	Year 3 - 2026	1 x CHI paediatric surgeons recruited and in place to support 1 x RPSFs and its associated LPSFs, e.g. CUH
	Year 4 - 2027	
	Year 5 - 2028	All 5 CHI paediatric surgeons recruited and in place to support RPSFs and LPSFs
	KPI/Audit Opportunity	

2	**Recommendation**	Children less than 1 year of age (or a minimum age agreed locally) should only have surgery in the Regional Paediatric Surgical Facilities (RPSFs) if the workforce, skills, and surgical volumes are appropriate
	Measurable	All children must be treated by appropriately trained professionals in an environment suitable for their needs; Day case surgery should be encouraged; The clinical governance structure of each hospital providing children's surgery should be multidisciplinary and include anaesthesiologists, surgeons, paediatricians, and paediatric registered children's nurses
	Rationale	Children under 1 year of age may have their surgery in a RPSF if there is evidence of an appropriate workforce and skill set and the facility and individual surgeons regularly carry out an agreed volume of surgery on this age group
	Action Responsible Owner	Health Area Management/Recruitment Operations submission to 2025 HSE Estimates and CAAC processes
	Year 1 - 2024	
	Year 2 - 2025	Complete workforce numbers gap analysis for the RPSFs and LPSFs in Health Regions for CHI, CUH, UHL, and GUH; Candidates to undertake GPS training in CHI of at least 1 year at a level of Specialist Trainee Level 6 (ST6) or above or in an equivalent hospital abroad. Proleptic appointments should be enabled where necessary to support GPS posts
	Year 3 - 2026	CHI, Health Regions Management Recruitment Operations submission to 2026 HSE Estimates process and CAAC
	Year 4 - 2027	
	Year 5 - 2028	Workforce, skills, and surgical volumes are appropriate for children less than 1 year of age (or a minimum age agreed locally) to have surgery in RPSFs
	KPI/Audit Opportunity	A National Registry of Children under 1 year of age who had their surgery in a RPSF

3	**Recommendation**	Acute surgical admissions for children under 2 years of age can be under the care of either a general surgeon or a paediatrician. Admission policies and consultation arrangements must be clearly documented and agreed locally in line with this Model of Care (MOC) guidelines
	Measurable	A National GPS Standard of Care Service in place for RPSFs and LPSFs
	Rationale	A 24-hour anaesthetic, surgical and nursing services for children Available 7 days a week with appropriate paediatric radiology and consultant paediatrician support; Admission policies and consultation arrangements must be clearly documented and agreed locally
	Action Responsible Owner	Each RPSF and LPSF MTD to generate clear and agreed protocols for, General Surgeon or a Paediatrician. Admission Policies and consultation arrangements documented and agreed locally
	Year 1 - 2024	Start drafting and complete documentation
	Year 2 - 2025	
	Year 3 - 2026	
	Year 4 - 2027	
	Year 5 - 2028	RPSFs and LPSF to have all documentation in place
	KPI/Audit Opportunity	Audit of RPSF/RPSF documentation for admission policies and consultation arrangements

4.	**Recommendation**	The national standard for paediatric surgery should be set at 2 years of age, where local surgical, medical, and nursing skill mix competencies are in place to ensure safety and equity of access
	Measurable	A national standard be set at 2 years of age for surgery, pertaining to the bundle of cases outlined in Section 12.0 for RPSFs and LPSFs
	Rationale	National stakeholder engagement in the preparation of this MOC identified considerable variation in GPS age thresholds and admission policies, particularly in regard to the lower age limit for general anaesthesiology and admitting consultant for those children below the age of 2 years
	Action Responsible Owner	An assessment and gap analysis led by relevant HA on workforce numbers to be informed by each Health Region gap analysis on local surgical, medical and nursing skill mix competencies
	Year 1 - 2024	Start and complete gap analysis on workforce numbers and skill mix competencies
	Year 2 - 2025	Health Area Management/Recruitment Operations submissions to HSE Estimates process and CAAC process
	Year 3 - 2026	
	Year 4 - 2027	
	Year 5 - 2028	RPSFs and LPSFs to have all workforce numbers and skill mix competencies in place
	KPI/Audit Opportunity	

5.	**Recommendation**	It will be necessary to provide General Paediatric Surgery (GPS) through the new HSE Health Regions. Managed clinical networks (MCNs) will require additional paediatric surgeons to be appointed in CHI and appointed locally at the RPSFs centres
	Measurable	The national delivery of GPS through a MCN will provide a long-term and sustainable workforce plan for CHI to not only provide an outreach service to the RPSFs but also support equitable GPS provision nationally
	Rationale	The implementation of the six new Health Regions offers an opportunity to review current structures and resources for the provision of acute and elective GPS care nationally
	Action Responsible Owner	CHI and Health Regions Management REOs Recruitment Operations submission to 2024 HSE Estimates and CAAC processes
	Year 1 - 2024	Workforce numbers informed by the CHI gap analysis (49) already completed
	Year 2 - 2025	2 x CHI paediatric surgeons recruited and in place to support 1 x RPSFs and its associated LPSFs e.g. UHL; 2 x UHL RPSF paediatric surgeons recruited and in place to support 1 x RPSFs and its associated LPSFs
	Year 3 - 2026	2 x CHI paediatric surgeons recruited and in place to support 1 x RPSFs and its associated LPSFs, e.g. GUH; 2 x GUH RPSF paediatric surgeons recruited and in place to support 1 x RPSFs and its associated LPSFs
	Year 4 - 2027	1 x CHI paediatric surgeons recruited and in place to support 1 x RPSFs and its associated LPSFs, e.g. CUH; 2 x CUH RPSF paediatric surgeons recruited and in place to support 1 x RPSFs and its associated LPSFs
	Year 5 - 2028	All 5 CHI paediatric surgeons recruited and in place to support RPSFs and LPSFs; All 6 (8) paediatric surgeons recruited and in place to support RPSFs and LPSFs
	KPI/Audit Opportunity	

6.		
	Recommendation	The staffing in RPSFs and LPSFs must be appropriate to perform both the emergency and elective paediatric surgery as defined in their respective 'bundle of cases'
	Measurable	All elective procedures should be planned as day cases in both RPSFs and LPSFs. While inpatient stay facilities must be provided, day case surgery should be the norm. Children who require observation should be admitted to the local inpatient paediatric unit. While local arrangements may vary between hospitals, all units must ensure that paediatricians in such hospitals are available for consultation in the management of children with surgical emergencies
	Rationale	The implementation of the six new Health Regions offers an opportunity to review current structures and resources for the provision of acute and elective GPS care nationally
	Action Responsible Owner	An assessment and gap analysis on workforce numbers and informed by each Health Region gap analysis on local surgical, medical, and nursing skill mix competencies led by relevant HAs
	Year 1 - 2024	
	Year 2 - 2025	
	Year 3 - 2026	
	Year 4 - 2027	
	Year 5 - 2028	
	KPI/Audit Opportunity	Monthly reporting for paediatric day case surgery data in the monthly HSE data reports (MDR)

7.	**Recommendation**	Defined governance groups with designated lead surgeons and anaesthesiologists in GPS should be identified locally within Hospital Groups/Health Regions to oversee GPS care and must conduct regular multidisciplinary meetings with analysis and review of surgical outcomes
	Measurable	
	Rationale	To understand variation, clinical governance must ensure: Development of agreed protocols/ pathways regarding admission and transfer policies (Appendix 2); A commitment to the standardisation of age limits in anaesthesiology and surgery for GPS in Ireland;RPSFs and LPSFs should endeavour to work towards the minimal age limits as set out in this MOC
	Action Responsible Owner	Each RPSF and LPSF multidisciplinary team to generate clear and agreed protocols for a general surgeon or paediatrician; Admission policies and consultation arrangements documented and agreed locally led by relevant HAs
	Year 1 - 2024	
	Year 2 - 2025	Surgeons must undertake a sufficient volume of GPS to maintain skills and competence, which is defined as the equivalent of at least one GPS list per month or ideally one per fortnight
	Year 3 - 2026	
	Year 4 - 2027	
	Year 5 - 2028	
	KPI/Audit Opportunity	Monthly paediatrics surgical outcomes; Data Registry by each RPSF/LPSF on: • Activity data • Access to theatre • Readmission rates • Waiting lists

8.		
	Recommendation	Each RPSF will need a minimum of two adult surgeons with a special interest in GPS
	Measurable	The national delivery of GPS through a MCN will provide a long-term and sustainable workforce plan for CHI to not only provide an outreach service to the RPSFs but also support equitable GPS provision nationally
	Rationale	The implementation of the six new Health Regions offers an opportunity to review current structures and resources for the provision of acute and elective GPS care nationally
	Action Responsible Owner	CHI and Health Regions Management Recruitment Operations submission to the 2024 HSE Estimates and CAAC processes
	Year 1 - 2024	Workforce numbers informed by the CHI gap analysis (49) already completed
	Year 2 - 2025	1 x CHI paediatric surgeons recruited and in place to support 1 x RPSFs and its associated LPSFs, e.g. UHL; 2 x UHL RPSF paediatric surgeons recruited and in place to support 1 x RPSFs and its associated LPSFs
	Year 3 - 2026	2 x CHI paediatric surgeons recruited and in place to support 1 x RPSFs and its associated LPSFs, e.g. GUH; 2 x GUH RPSF paediatric surgeons recruited and in place to support 1 x RPSFs and its associated LPSFs
	Year 4 - 2027	2 x CHI paediatric surgeons recruited and in place to support 1 x RPSFs and its associated LPSFs, e.g. CUH; 2 x CUH RPSF paediatric surgeons recruited and in place to support 1 x RPSFs and its associated LPSFs
	Year 5 - 2028	All 5 CHI paediatric surgeons recruited and in place to support RPSFs and LPSFs; All 6 (8) paediatric surgeons recruited and in place to support RPSFs and LPSFs
	KPI/Audit Opportunity	

9.	**Recommendation**	Clear clinical pathways are required in RPSFs with core paediatric surgery expertise in urological conditions, as available and agreed locally
	Measurable	With the expansion of urological surgical services in Ireland many aspects of children's urological needs have been undertaken by urologists; With the development of urological services some of the current activity performed by paediatric general surgeons may be provided by specialists in urology in future years
	Rationale	RPSFs will need to consider these issues in regard to surgical recruitment and allocation of case mix among these surgical specialties led by relevant HAs
	Action Responsible Owner	Workforce numbers informed by gap analysis in year 1
	Year 1 - 2024	
	Year 2 - 2025	
	Year 3 - 2026	
	Year 4 - 2027	
	Year 5 - 2028	
	KPI/Audit Opportunity	

10.	**Recommendation**	Clear transfer pathways and guidelines between CHI, RPSFs and LPSFs must be in place to facilitate safe care and transfer in the event of unexpected complications. Senior clinicians must be closely involved in any pre-transfer stabilisation within managed clinical networks
	Measurable	
	Rationale	Children who are admitted to paediatric wards for day case surgery should be admitted to a designated paediatric day ward, where postoperative issues can be managed or to a dedicated location as appropriate for individual sites; Children with significant comorbidities must be considered for consultation or referral to CHI
	Action Responsible Owner	led by CHI
	Year 1 - 2024	
	Year 2 - 2025	
	Year 3 - 2026	
	Year 4 - 2027	
	Year 5 - 2028	
	KPI/Audit Opportunity	Audit of RPSFs/LPSFs documentation for admission policies and consultation arrangements; Audit data for RPSFs/LPSFs transfer of patients to CHI/RPSFs

11.	**Recommendation**	As defined in this Model of Care, IT connectivity between CHI and the RPSFs and LPSFs require development to allow National Integrated Medical Imaging System (NIMIS) and other data sharing such as single Electronic Health Record (EHR) between units
	Measurable	Quality and patient safety is central to the mission of the HSE and CHI and thus requires a system to effectively manage the safety, security, and risk of sharing clinical information; Aid the development of patient care pathways
	Rationale	Telemedicine is an emerging strategy for healthcare delivery with the potential to expand access, optimise efficiency, minimise cost, and enhance patient satisfaction; Telemedicine could be used to support the national delivery of paediatric surgery and delivery of services within MCNs across a range of clinical areas, such as multidisciplinary clinics, pre-assessment clinics, and transitional clinics for transition from paediatric to adult care; Foster an environment of continuous quality improvement and collaboration
	Action Responsible Owner	Remote or portal access to EHRs across all sites to enable staff to communicate with one another about their patients. Owner CHI to set up.
	Year 1 - 2024	CHI to commence IT development for network sharing with RPSFs in 2024
	Year 2 - 2025	CHI to commence IT network sharing with RPSFs in 2025
	Year 3 - 2026	CHI to commence IT network sharing with RPSFs in 2026
	Year 4 - 2027	CHI to commence IT network sharing with RPSFs in 2027
	Year 5 - 2028	CHI to commence IT network sharing with RPSFs in 2028
	KPI/Audit Opportunity	The network's ICT system will assist in supporting best practice to ensure: • Accurate PPPG and real-time data • IT systems to include a function for web-based audit data • Capture identification of trends • Patient safety outcomes data • Capture adverse events

12.		
	Recommendation	Outreach network surgeons from the CHI will need to have regular and scheduled access for dedicated paediatric surgery clinics and day surgery in RPSFs
	Measurable	Assigned paediatric surgeons in CHI centres will undertake outreach clinics and theatre lists in RPSF hospitals; CHI surgeons working together in an enhanced team environment will provide a high-quality, sustainable service and will ensure that there is a coordinated approach to surgical services closer to home
	Rationale	An MCN in paediatric surgery would support the establishment of a robust and sustainable RPSF, which is able to deliver a high standard of care closer to home, in the right place at the right time
	Action Responsible Owner	CHI to recruit 5 surgeons by 2028 to support outreach surgery to local GPS surgeons. RPSFs to support upskilling of local surgical teams. CHI and HSE HAs are responsible
	Year 1 - 2024	
	Year 2 - 2025	1 x CHI paediatric surgeon recruited and in place to support 1 x RPSFs and its associated LPSFs, e.g. UHL
	Year 3 - 2026	2 x CHI paediatric surgeons recruited and in place to support 1 x RPSFs and its associated LPSFs, e.g. GUH
	Year 4 - 2027	2 x CHI paediatric surgeons recruited and in place to support 1 x RPSFs and its associated LPSFs, e.g. CUH
	Year 5 - 2028	All 5 CHI paediatric surgeons recruited and in place to support RPSFs and LPSFs
	KPI/Audit Opportunity	Audit outreach clinics and theatre lists for CHI Surgeons in RPSFs

13.	**Recommendation**	There will be a variable requirement for additional anaesthesiologists, paediatricians, radiology and interventional radiologists, paediatric emergency medicine consultants, paediatric sonographers, and nursing and HSCPs to support the development of GPS in each of the RPSF sites. These support services should be determined and agreed locally based on workload requirements
	Measurable	Multidisciplinary teams need to engage in audit/outcomes; Hold multidisciplinary meetings on a regular basis and submit data into any future national paediatric audit when available
	Rationale	In hospitals that provide GPS for children, there must be a commitment from the Hospital Group/Health Area board and executive team that a high-quality and resourced service is provided; Health Areas have now a accountability to ensure a consistent and regular GPS service is delivered safely by resourced multidisciplinary skilled and trained teams
	Action Responsible Owner	Governance groups should have appropriate administrative support and could report into the standard perioperative governance structures present in all hospitals. REO- HA responsibility to set up
	Year 1 - 2024	Health Regions to initiate supporting the development of GPS in each of the RPSF sites
	Year 2 - 2025	
	Year 3 - 2026	
	Year 4 - 2027	
	Year 5 - 2028	
	KPI/Audit Opportunity	When available, data submission into any future national paediatric audit must be available as part of a CHI network. Such data should include but not be limited to: • Key outcomes • Complication rates • Unexpected readmission rate • Unexpected referral to CHI centres • Quality of service indicators, e.g. postoperative nausea and/or vomiting rates, regional anaesthesia success rates

14.	**Recommendation**	Emergency departments (EDs) within RPSFs and associated LPSFs that treat children should have access to consultant-led Paediatric Emergency Medicine (PEM) teams
	Measurable	Monitor emergency department child attendances
	Rationale	PEM consultants are required in RPSFs to support efficient assessment and referral of children for emergency surgery
	Action Responsible Owner	Workforce numbers should be informed by future Health Regions gap analysis and reference to the NDTP 2022–2027 workforce report. Led by relevant Has.
	Year 1 - 2024	Initiate Health Region network approach as proposed in the EMP–NCPPN Guidance document[38]
	Year 2 - 2025	
	Year 3 - 2026	
	Year 4 - 2027	
	Year 5 - 2028	
	KPI/Audit Opportunity	Audit emergency department paediatric attendance rates

15.	**Recommendation**	RPSFs must identify GPS needs when appointing general surgeons to ensure each centre has an adequate number of surgeons with the required special interest in GPS.
	Measurable	Opportunities should also be available for surgeons and anaesthesiologists to upskill in CHI
	Rationale	Surgeons undertaking GPS in the RPSF can also provide an outreach service to LPSFs within their Hospital Group or Health Area network; This model of local, regional, and CHI surgeons working together in an enhanced team environment will provide a high-quality sustainable service and ensure there is a coordinated approach to surgical services closer to home
	Action Responsible Owner	Such appointments should be highlighted in applications to the CAAC. Led by relevant HAs.
	Year 1 - 2024	
	Year 2 - 2025	
	Year 3 - 2026	
	Year 4 - 2027	
	Year 5 - 2028	
	KPI/Audit Opportunity	

16.		
	Recommendation	Newly appointed surgeons with a commitment to GPS taking up posts in RPSFs will need to have undertaken GPS training in CHI of at least 1 year at Specialist Trainee Level 6 (ST6) or above or in an equivalent hospital abroad. Proleptic appointments should be enabled where necessary to support GPS posts
	Measurable	A new curriculum across all surgical specialties in the UK and Ireland is available since 2021. The assessment tools used are reflective of the knowledge and skills essential for a day-one consultant in the selected surgical specialty; A training pathway and curriculum has been developed for general surgery trainees who wish to work as non-specialists in general and emergency surgery, which would include GPS. If a trainee chooses this subspecialty interest, entitled 'Gastrointestinal (GI) and General Surgery of Childhood (GSoC)'), a portion of the curriculum requires operative and knowledge assessments in general surgery of childhood conditions
	Rationale	Training options required to meet general paediatric service needs in an RPSF are therefore: Proleptic training of 12 months attached to a consultant paediatric surgeon or 12 months training in CHI paediatric surgery at ST6 or greater within the new general surgery training programme or Equivalent training abroad
	Action Responsible Owner	The National Clinical Programme for Surgery recognises the need to encourage and facilitate more adult surgical trainees to rotate through paediatric surgery in CHI to enhance trainees' exposure to paediatric surgery. Led by relevant RCSI Dept Surgical Affairs.
	Year 1 - 2024	Training bodies to actively promote GPS; Ensure surgeons must undertake a sufficient volume of GPS to maintain skills and competence. This is defined as the equivalent of at least one GPS list per month or ideally one per fortnight
	Year 2 - 2025	
	Year 3 - 2026	
	Year 4 - 2027	
	Year 5 - 2028	
	KPI/Audit Opportunity	

17.		
	Recommendation	With the development of surgical services in the RPSFs, a significant portion of low acuity GPS should be redirected to the regions from CHI
	Measurable	GPS in RPSFs/LPSFs to be competent in surgical procedures as listed in the GPS Bundle of Cases for: Acute Case Bundle for RPSF; Acute Case Bundle for LPSF; Elective Case Bundle for RPSF; Elective Case Bundle for LPSF
	Rationale	It is envisaged that each RPSF will be delivering GPS through a managed clinical network of four surgeons (two regional general surgeons with a special interest in paediatric surgery and two CHI network surgeons). With this four-surgeon model, it is expected that there will be at least one dedicated paediatric day surgery list/clinic every week, delivered between the four surgeons
	Action Responsible Owner	Health Regions to adopt this model of local, regional GPS, with the support of CHI surgeons working together in an enhanced team environment, to ensure timely treatment and improved outcomes for children
	Year 1 - 2024	Each Health Region to facilitate GPS
	Year 2 - 2025	Assess site readiness in UHL, GUH and CUH
	Year 3 - 2026	Enable and facilitate RPSFs and LPSFs
	Year 4 - 2027	
	Year 5 - 2028	
	KPI/Audit Opportunity	Track each RPSF delivering GPS through an MCN of four surgeons; Track and report paediatric day surgery list/clinic every week, delivered between the visiting CHI outreach surgeons and RPSF surgeons

18.	**Recommendation**	Paediatric Regional High Dependency Units in RPSFs should be developed in keeping with the standards of care outlined in the Paediatric Model of Care
	Measurable	RPSFs should strive to establish a Paediatric HDU facility to support local anaesthetic and surgical services for non-complex cases as required
	Rationale	High dependency care is described as a requirement for close observation, monitoring or intervention that cannot be delivered in a normal ward environment, but at the same time does not require admission to the Critical Care Unit. Surgery carried out in RPSFs could be greatly advanced with the back-up of Regional PHDUs in cases of children requiring close postoperative monitoring without the need to transport them to Paediatric Intensive Care Units (PICUs) in CHI
	Action Responsible Owner	All RPSFs and LPSFs must have a clear protocol for contact with the PICUs and the paediatric surgeons in the CHI hospitals in order to arrange transfer of patients should complications arise led by relevant HAs.
	Year 1 - 2024	
	Year 2 - 2025	
	Year 3 - 2026	
	Year 4 - 2027	
	Year 5 - 2028	
	KPI/Audit Opportunity	Audit establishment of PICUs in RPSFs

19.	**Recommendation**	A HSE National Implementation Strategy will require a gap analysis to be conducted in each Health Regional in order to establish WTE and infrastructure requirements to support this MOC with oversight from a national accountability group
	Measurable	Each Health Region to support RPSF and LPSF to provide surgical care closer to home for children and their parents
	Rationale	An implementation strategy is required for the rollout of this MOC
	Action Responsible Owner	In hospitals that provide GPS for children there must be a commitment from the Hospital Group/Health Region board and executive team that a high-quality and resourced service. The REO of relevant HA to create a local implementation plan.
	Year 1 - 2024	Health Region to include GPS as part of the strategy and operation plan from 2025
	Year 2 - 2025	
	Year 3 - 2026	
	Year 4 - 2027	
	Year 5 - 2028	
	KPI/Audit Opportunity	

20.	**Recommendation**	The Key performance indicator suite should present a visual and easily understood means of presenting the activity in the hospital or health region and may include; number of patients seen and within what timeframe, waiting lists, and average length of stay, readmission rates and morbidity and mortality outcomes.
	Measurable	Implement KPIs and audits
	Rationale	KPIs and audits will support the standardisation of a national GPS service
	Action Responsible Owner	Health Areas and CHI to implement the proposed KPI and audits as recommended in this MOC
	Year 1 - 2024	
	Year 2 - 2025	
	Year 3 - 2026	
	Year 4 - 2027	
	Year 5 - 2028	
	KPI/Audit Opportunity	Data reported to the National Monthly Data Reports (MDR)

21.	Recommendation	Each regional hospital undertaking GPS must have one designated lead anaesthesiologist who has a subspecialty interest in paediatric anaesthesia
	Measurable	The lead anaesthesiologist should undertake sufficient volume to maintain competencies in the perioperative care of children and adolescents; All anaesthesiologists who provide anaesthetic services for elective GPS must have sufficient training and maintain their skills in paediatric resuscitation to the level of PALS/APLS or equivalent
	Rationale	Paediatric anaesthesia services in Ireland should be provided by competent, trained staff in a safe working environment with adequate and appropriate facilities, drugs, and equipment to safely anaesthetise and manage elective and acute paediatric surgery as outlined in the Model of Care for Paediatric Anaesthesia 2015
	Action Responsible Owner	National College of Anaesthesiology Training body to continue to support anaesthesiologist competencies to enable GPS in the RPSFs/LPSFs
	Year 1 - 2024	
	Year 2 - 2025	
	Year 3 - 2026	
	Year 4 - 2027	
	Year 5 - 2028	
	KPI/Audit Opportunity	Report on Training Bodies data meeting NDTP programmes objective and recommendations

22.		
	Recommendation	For the transfer of the critically ill paediatric patient with time-sensitive surgical conditions, senior clinicians must always consider the logistics of transfer, as any delay needs to be balanced against the advantages/disadvantages of local or regional treatment.
	Measurable	Supports for referring hospitals for documentation, equipment, checklists, and medications are available at Local Team Resources
	Rationale	The transfer of the critically ill paediatric patient with time-sensitive surgical conditions can be challenging. Senior clinicians must always consider the logistics of transfer, as any delay needs be balanced against the advantages and disadvantages of local or regional treatment, even if these conditions are less than ideal. In these difficult circumstances, clinicians must consult widely with colleagues, as resuscitation and damage control surgery in cases of trauma and sepsis, for example, managed locally, may be preferable to a delayed transfer
	Action Responsible Owner	Ensure there is adequate emergency theatre access, which includes the ability to interrupt or cancel elective work, to accommodate a paediatric emergency. The ongoing care of inpatients/postoperative patients is managed by consultant surgeons, with support from consultant paediatricians where necessary, on children's wards staffed by registered children's nurses and senior surgical trainees as referenced in the Standards for Children's Surgery Led by relevant HAs
	Year 1 - 2024	The National Ambulance Service Critical Care and Retrieval Services (NAS-CCRS) in place for each RPSF/LPSF
	Year 2 - 2025	Health Regions and NAS support in place for GPS critically ill patients
	Year 3 - 2026	
	Year 4 - 2027	
	Year 5 - 2028	
	KPI/Audit Opportunity	Audit the NAS-CCRS transfers for timely, safe, and efficient transportation, while providing high-quality medical care during the transfer process in line with the Irish Paediatric Acute Transfer Service (IPATS)

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APPENDICES

Appendix 1: Paediatric General Surgery Working Group Members

Region	Name	Representing
National	Mr Ken Mealy	NCPS Surgery, Chair
Saolta HG	Mr Sami Abd Elwahab	GUH Paediatric Surgery
Saolta HG	Prof. Alan Hussey	Perioperative Clinical Director, Saolta HG
UL HG	Prof. Annemarie Murphy	UL Paediatric Surgery
UL HG	Dr Siobhán Gallagher	Consultant Paediatrician, UHL / CHO 3, Disability Services Clinical Director, Maternal and Child Health Directorate, UL HG
UL HG	Ms Anne Merrigan	UHL Paediatric Surgery
CUH	Ms Geraldine Barry Murphy	Business Manager, Paediatrics Directorate
	Mr Noel Lynch	Consultant Surgeon, CUH
	Mr Emmet Andrews	Consultant Surgeon, CUH
UHW	Mr Morgan McMonagle	UHW Paediatric Surgery
Regional	Dr Ray O'Connor	CUH Anaesthesiology
National	Dr Robert Ghent	NCPA – Anaesthesiology
National	Dr Dermot Russell Doherty	Clinical Director, NAS-CCRS
National	Dr Orla Healy	National Clinical Director, Quality and Patient Safety Directorate
National	Ms Dervela Gray	National Clinical Advisors and Group Lead (NCAGL) Programme Manager
CHI	Mr Alan Mortell	CHI Paediatric Surgery
CHI	Ms Sinead Hassett	CHI Paediatric Surgery Lead for Surgical Training CHI
CHI	Ms Lisa Edwards	CHI Network Manager
CHI	Prof. Brice Antao	CHI Paediatric Network Care Lead
National	Dr Nuala Quinn	Paediatric Trauma Network Development Clinical Lead
National	Dr Ellen Crushell	NCPPN National Clinical Lead for Children
CUH	Dr Fiachra Moloney	CUH Radiology
CHI	Mr Paul Harding	Assistant Director of Nursing, CHI at Crumlin
CHI	Ms Monica Griffin	Assistant Director of Nursing, CHI at Crumlin
CHI	Ms Louise Greensmith	Assistant Director of Nursing, CHI at Temple Street
Regional	Ms Siobhán Horkan	Director of Paediatric Nursing, Women and Childrens Network, Saolta University HG
Local	Dr Paula Cahill	Local Paediatrician, Portiuncula University Hospital
Regional	Dr David Mullane	Regional Paediatrician, CUH
National	Dr Martina Healy	Clinical Lead Paediatric Intensive Care, CHI at Crumlin
CUH	Dr Rory O'Brien	Paediatric Emergency Medicine Consultant, CUH
National	Dr Cliona Murphy	Clinical Director, National Women and Infants Programme
CHI	Dr Siobhán Hoare	Interventional Radiologist
CHI	Prof. Michael Lee	Interventional Radiologist
National	Mr Gerry Kelliher	Business Intelligence Manager, National Clinical and Integrated Care Programmes
National	Ms Mary Flynn	National Clinical Care Programmes Manager

Appendix 2: Nursing Care Pathways

GPS Children's Nursing Standards

Nursing staff provide care across the continuum of care from initial presentation, assessment, both preoperatively and postoperatively, and safe discharge. Nursing standards required to provide a safe effective service and positively impact on children and young person's experiences and outcomes of general surgical care are available from:
Nursing Care Plans: www.childrenshealthireland.ie/healthcare-professionals/nursing-guidelines-landing/nursing-careplans-library/

Appendix 3: Paediatric Intensive Care Unit (PICU)

Contact details for PICU, CHI at Crumlin and at Temple Street

For advice and/or referral, telephone 1800 22378. There is no email address for this purpose. The above is a bridge number that goes through to a National Emergency Operating Centre. The receiver takes basic details and then puts the call through to the most appropriate PICU. The bridge call facilitates including whatever multidisciplinary team members are required for discussion and decision-making.

Patients not requiring PICU must be accepted for transfer by a consultant in the RPSF and arrangements for transfer made through the relevant hospital patient flow manager or nurse administrator.

CHI AT CRUMLIN, MONDAY TO SUNDAY

- Contact Switch on 01 409 6100.
- Between 07.30 and 19.30, ask for the patient flow manager.
- Between 19.30 and 07.30, ask for the nurse administrator in charge of the hospital.

CHI AT TEMPLE STREET

- Contact Switch on 01 878 4200.
- Between 07.30 and 20.00, Monday to Friday, ask for the patient flow manager.
- Between 20.00 and 07.30, Monday to Friday, ask for the nurse administrator in charge of the hospital.
- Between 10.00 and 20.00, Saturday and Sunday, ask for the patient flow manager.
- Between 20.00 and 10.00, Saturday and Sunday, as for the nurse administrator in charge of the hospital.

Appendix 4: Transfer of the Critically Ill Paediatric Patient

In Ireland, paediatric intensive care medicine (PICM) services are based at CHI at Crumlin and CHI at Temple Street in advance of the new National Children's Hospital. Access to PICM services outside of these hospitals involves the retrieval or transportation and transfer of critically ill or injured children from peripheral hospitals to specialised paediatric critical care centres.

The Model of Care for Paediatric Critical Care retrieval in Ireland aims to ensure timely, safe, and efficient transportation while providing high-quality medical care during the transfer process. The National Ambulance Service Critical Care and Retrieval Services (NAS-CCRS) in partnership with CHI staff operate the Irish Paediatric Acute Transfer Service (IPATS). This service is resourced to deliver transport and retrieval on behalf of the HSE to paediatric centres nationally. An overview of the key components of this model is as follows.

Coordination and communication: A dedicated coordination centre known as 1800-ACCEPT or 1800-222-378 is situated in the National Emergency Operations Centre of the NAS. This is the single and only point of contact for obtaining an unscheduled PICU bed and accessing the IPATS team. It is responsible for coordinating all aspects of the paediatric critical care retrieval process. This includes receiving referrals, assessing the severity of the child's condition, and mobilising appropriate resources. The ACCEPT coordination centre maintains communication with referring hospitals, paediatric critical care units, and transport teams to ensure seamless coordination and timely response. It is the responsibility of the referring consultant to make contact with 1800-ACCEPT to initiate the referral–acceptance–retrieval/transport pathway.

The ACCEPT dispatcher will request the referring, receiving, and retrieval consultants agree and assign a priority category based on the patient's clinical condition.

Clinical governance of retrieval/transport operations

1 The decision to refer a patient is the responsibility of the referring consultant. The referring consultant retains clinical responsibility until care of the patient is handed over in the accepting hospital or to the retrieval team. The adherence to or the application of advice or direction offered by the accepting doctors (or the retrieval team) is the responsibility and at the discretion of the referring consultant.

2 The decision to accept the patient to PICU is the responsibility of the accepting intensivist. The accepting intensivist assumes responsibility for the patient on handover (and sign over) by the referring hospital transport team or the IPATS team.

3 The decision to accept the patient for retrieval is the decision of the IPATS consultant. The IPATS consultant assumes responsibility for the patient on exiting the referring hospital campus. Until that point, the clinical responsibility of the patient is shared from the arrival of the IPATS team at the patient's bedside until departing the referring hospital.

In the event that the IPATS team is unavailable or the patient is unsuitable for IPATS retrieval, the clinical governance remains with the referring consultant until handover in the receiving PICU.

NAS critical care and retrieval: IPATS is a paediatric critical care retrieval team consisting of healthcare professionals with specialised training in paediatric critical care, such as paediatric intensivists, anaesthesiologists and emergency medicine physicians, paediatric ICU nurses, and paramedical staff. The clinical governance of the IPATS service lies with the clinical director of NAS-CCRS and is delegated to the IPATS consultant of the day through the National Lead in Paediatric Retrieval.

These teams are currently available on a 7/7 daytime basis with a plan to go to 24/7-365 basis by the opening of the NCH. They are equipped and trained to manage critically ill children during transportation. They have expertise in various advanced life support techniques, including airway

management, cardiovascular support, and invasive monitoring. In Q3 2023 there will be two teams. The first is the IPATS red team, which is a medically led and provided team with a Level-3 ICU care capability that can respond to Priority 2–4 referrals. A second team (the non-acute team) is due to launch as a nurse-led, consultant supported repatriation team aiming to transfer children from CHI back to their regional paediatric department following completion of tertiary level care. This should greatly improve patient flow and urgent bed availability, particularly during the winter period.

Specialised equipment and vehicles: Paediatric critical care retrieval teams have access to specialised equipment and vehicles designed to meet the unique needs of critically ill children during transportation. This includes advanced monitoring equipment, ventilators, and medications. Critical care ambulances are equipped with appropriate safety measures and can accommodate the medical team, necessary equipment, and the child's family if required. Frontline ambulances may not have the capacity to power complex medical devices, such as high-flow oxygen, or may not have medical air cylinders to allow a titre table mixtures of gases or to drive ventilators that require medical air.

Response and transport: When a referral is received, the paediatric critical care retrieval team triages the child's condition and determine the appropriate level of care required. It responds rapidly to the referring hospital, either by dispatching a retrieval team or coordinating with other available resources. It is the responsibility of the referring clinical team to stabilise the child's condition, initiate necessary interventions, and prepare for safe transport to the designated paediatric critical care centre. It is vital that each regional hospital maintains the ability to transfer children who present with time-critical illnesses, where the additional time required to mobilise IPATS is deemed not in the best interests of the child. Typical clinical examples include the child with a blocked ventriculoperitoneal shunt, volvulus, or a duct-dependent cardiac lesion.
Family-centred care: The Model of Care recognises the importance of involving and supporting the child's family throughout the retrieval process. The retrieval team provides clear and empathetic communication, explains the procedures and interventions being performed, and addresses any concerns or questions raised by the family. It aims to create a supportive environment for the family and ensure their involvement in the child's care whenever possible.

Continuous quality improvement: Paediatric critical care retrieval services in Ireland regularly evaluate and review their performance to identify areas for improvement. This includes analysing response times, clinical outcomes, patient and family satisfaction, and safety incidents. Quality improvement initiatives are implemented to enhance the overall effectiveness and efficiency of the retrieval process.

The Model of Care for Paediatric Critical Care retrieval in Ireland prioritises the well-being and safety of critically ill children during transport, ensuring that they receive appropriate and specialised care throughout the transfer process. It combines skilled retrieval teams, advanced equipment, effective coordination, and family-centred care to optimise outcomes for paediatric patients requiring critical care.

Technical requirements and skill sets which a district general hospital must retain to safely perform paediatric critical care transfer

To safely perform paediatric critical care transfers, hospitals should possess the necessary technical requirements and skill sets. Here are some key aspects to consider:

- In term of equipment and resources, there should be adequate and properly maintained medical equipment capable of delivering paediatric critical care across age and weight ranges. These include advanced monitoring devices, ventilators, and infusion pumps housed on a NAS-compliant critical care trolley.
- All equipment should be packaged in easy-to-access and easy-to-identify modular transport bags. These devices should be routinely checked and practised with as part of a preparedness for a transport-checking schedule.

- All medical devices should be CEN compliant in terms of their fixation points to patient trolleys. Patient trolleys should be able to be locked on a Ferno system of NAS frontline ambulances.
- There should be sufficient supplies of medications commonly used in paediatric critical care, such as emergency drugs, fluids, inotropes, and sedation agents. A drug-checking schedule should also form part of a preparedness policy.
- There should be access to diagnostic facilities, including imaging modalities (X-ray, CT, and ultrasound) and laboratory services for quick test results.
- Transport ventilators should be capable of delivering non-invasive and invasive ventilation modes, and be independent of medical air. Staff should be familiar and competent in the use of patient–ventilator interfaces for invasive modes.
- Devices should have sufficient battery spare capacity to undertake a transport in excess of 200% of the predicted journey time.

Healthcare professionals: Paediatric-trained healthcare professionals, including paediatricians, anaesthesiologists, paediatric nurses, and local NAS frontline ambulance crews should regularly train and practise for transfer of a critically ill child. This should include regular training and updates on paediatric critical care protocols, resuscitation techniques, and transport medicine. Competency in Paediatric Advanced Life Support (PALS) and Neonatal Resuscitation Programmes (NRP) and attendance at critical care outreach education days are essential to optimise outcomes during transport. Knowledge and experience in managing paediatric emergencies is also essential, including airway management, cardiovascular support, and medication administration specific to children.

Collaborative team approach: An interdisciplinary team that collaborates effectively, including doctors, nurses, and support staff (e.g. portering services) is best placed to facilitate a complete paediatric critical care transfer. Suggested skills include:

- Clear communication pathways and established protocols for decision-making, escalation of care, and information transfer between teams
- The ability to work in coordination with paediatric critical care retrieval teams or external services to ensure seamless transfers
- Proper documentation of the child's medical history, medications, allergies, and current condition. Integration with electronic medical record systems to access and share information with the receiving paediatric critical care centre, and
- Ability to provide comprehensive medical handover reports to the retrieval team, including relevant clinical details, interventions performed, and ongoing treatments.

Safety and risk management

- There should be adherence to infection control practices and protocols to minimise the risk of hospital-acquired infections.
- Regular equipment maintenance and quality control processes should ensure reliable functioning during transfers.
- Safety measures should be implemented, such as appropriate securing of equipment during transportation and monitoring of vital signs throughout the transfer process.
- There should be adherence to local and national regulations, standards, and guidelines related to paediatric critical care transfers.

By fulfilling these technical requirements and maintaining the necessary skill sets, referring non-paediatric hospitals can ensure the safe and effective performance of paediatric critical care transfers. Regular training, collaboration with specialist centres, and adherence to best practices contribute to optimising patient outcomes during these critical transfers.

Appendix 5: Children's Nursing Standards for General Paediatric Surgery Care

1. ENVIRONMENT AND EQUIPMENT

- Hospitalisation is a major stressor for children. Fear of separation from their parents, unfamiliar routines of anaesthesia and surgical intervention, and fear of pain and of needles are all sources of children's negative reaction to hospital care.
- The European Charter on Children's Rights (1996) states that "children shall be admitted to hospital only if the care they require cannot be equally well provided at home or on a day basis".
- A guidance document published by the Royal College of Nursing in 2020, titled Day Surgery for Children and Young People, describes the key components of developing a quality service for surgery. It looks at perioperative preparation; child-friendly patient information; supporting parents and carers in the hospital environment; policies and guidelines; postoperative care; and discharge criteria.

https://www.rcn.org.uk/Professional-Development/publications/rcn-guidance-day-surgery-for-children-and-young-people-pub-009330

2. ADMISSION AND ASSESSMENT

- All children attending for assessment via the emergency department must be triaged using the Irish Children's Triage System v.2 (ICTS) to enable swift recognition and management of a critically ill child. https://www.hse.ie/eng/services/publications/clinical-strategy-and-programmes/emp-irish-childrens-triage-system.pdf
- The Paediatric Early Warning Score (PEWS) should be used in any inpatient setting where children are admitted and observations are routinely required. https://www.hse.ie/eng/about who/cspd/ncps/paediatrics-neonatology/paediatric-early-warning-score/
- The PEWS escalation guide should be followed in the event of any PEWS trigger.
- An identity band stating the patient's last name (surname), first name, date of birth, and identifier number (if available) should be attached to an appropriate limb.
- All children and young people should have a systematic assessment of their activities of daily living completed on admission.
- Individualised nursing care plans should be activated.
- Nurses should use their knowledge, skills, and judgement to evaluate care and update care plans accordingly.

3. PREOPERATIVE/INTRAOPERATIVE CARE

Preoperative Care

- All hospitals providing paediatric general surgery require standardised fasting guidelines, which reduce the period of fluid fasting and so improve hydration.
- All children/young persons require a clinical review including completion of informed consent by parent/guardian prior to surgery.
- All children/young persons require an anaesthetic review prior to surgery.
- A preoperative checklist must be completed for every child/young person prior to theatre. One parent/guardian should accompany the child/young person to the operating theatre and stay with them until induction of anaesthesia.
- Appropriate equipment should always be available in theatres for all types of paediatric general surgery procedures and anaesthetics for both scheduled and unscheduled general surgeries.
- The five stages of the WHO's Safe Surgery checklist is implemented to support safe surgery to include: Brief, Sign In, Time Out, Sign Out, and Debrief.
- Operating theatres should have a standard operating protocol for the management of emergency surgery with classification scoring to prioritise children. It should take into consideration the presenting medical condition and comorbidities, associated urgency for surgical intervention, and potential consequences of a delay.
- Initial postoperative care should be delivered in a recovery/post-anaesthetic care unit on a one-to-one basis by designated registered nursing staff with up-to-date nursing competencies and basic paediatric resuscitation training.
- PEWS should commence in recovery directly postoperatively. There must be a minimum of one PEWS assessment completed and documented before the patient leaves recovery.
- As soon as possible, parents should be facilitated to be with their child in recovery. (This may not be possible in all hospitals and will be at the discretion of consultants and nurse management.)
- A detailed clinical handover should be provided from recovery nursing staff to ward nursing staff on collection of the child/young person from the recovery area.

4. POSTOPERATIVE CARE (PAIN, MONITORING AND DOCUMENTATION, WOUND)

Pain Management

- Each hospital caring for children should have a policy on acute pain assessment and management.
- Pain should be assessed and documented at regular intervals using validated pain-scoring tools appropriate to the age and development of the child or infant.
- There should be evidence that a pain care plan was initiated for every child undergoing surgical intervention.
- There should be evidence that a child's pain management is recorded in nursing documentation.
- Evaluation of pain scores should be recorded before and after a pain-relieving intervention.
- Play specialist services should be engaged to distract and minimise the effects of hospitalisation.
- There should be access to appropriate clinical nurse specialists and registered advanced nurse practitioners relative to the service delivered.

Monitoring and Documentation

- The child should be nursed in a safe environment close to oxygen and suction.
- The child's baseline preoperative physiological observations should be assessed, calculated, and recorded using the age-appropriate national PEWS system.
- The child's physiological observations should be reassessed, calculated, and recorded using the appropriate national PEWS system.
- Postoperative observations should be assessed as follows: every 15 minutes for the first hour, every 30 minutes for the second hour, then hourly as the child's condition dictates. Frequency of observations may differ depending on the procedure performed, and specific postoperative instructions should be checked.
- Any deterioration in the child's condition should be documented, with evidence of adherence to the minimum observation frequency as per age-appropriate national PEWS guidelines.
- In the event of deterioration, there should be documented evidence of escalation of the child's care and communication to the medical team using the ISBAR (Identity, Situation, Background, Assessment, Recommendation) Communication Tool as per the age-appropriate national PEWS escalation protocol.
- There should be documentation of the nursing care that has been provided to manage the deterioration in the child's condition (management plan).
- In the event of suspected infection/sepsis, there should be documented evidence of escalation as per the national PEWS sepsis/infection protocol, and the paediatric sepsis form should be completed. https://www.hse.ie/eng/about/who/cspd/ncps/sepsis/resources Paediatric-sepsis-form-2021.pdf
- There should be evidence that a care bundle has been completed for each invasive medical device in use.
- Peripheral intravenous cannula(s) (PIVC) should be assessed at least hourly if continuous intravenous fluids are in progress. Visual Infusion Phlebitis (VIP) scores should be documented once per shift.
- Oral fluids and diet should be recommenced as per postoperative instructions.
- A strict input should be documented into the fluid balance chart until the child is eating and drinking normally.
- It should be documented when the child has passed urine.

4. POSTOPERATIVE CARE (PAIN, MONITORING AND DOCUMENTATION, WOUND)

Wound Management

- There should be documented evidence of assessment of the surgical wound in the postoperative care plan as per the wound care policy. https://healthservice.hse.ie/filelibrary/onmsd/hse-national-wound-management-guidelines-2018.pdf
- The dressing should be left in situ for at least 24 hours or as instructed by the surgical team.
- Wounds that have a delay in healing or are infected should be documented using a children's wound assessment tool.
- The wound should be observed for fresh ooze and local signs of infection.
- The amount of drainage from the wound or drain should be observed and the type of drainage and amount should be documented in the fluid balance chart.

5. POSTOPERATIVE CARE (PAIN, MONITORING AND DOCUMENTATION, WOUND)

- The following should be assessed and documented prior to discharge: PEWS, hydration, intake, urine passed, PIVC(s) removed, and pain score.
- There should be documented evidence of discharge planning.
- There should be documented evidence of involvement of the child and family in the discharge plan.
- Written and verbal post-discharge advice should be given to the child/family. This should include: analgesia, wound care, signs of infection, and when to return to normal activities/school.
- A follow-up appointment should be arranged as required.
- A public health nursing referral should be completed and sent as appropriate.
- There should be documented evidence of parental training and completed competencies as appropriate.

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