European Standards of *Care*

For Children and Adolescents with Cancer

2025

Childhood Cancer International EUROPE

SIOP Europe
the European Society for Paediatric Oncology

Acknowledgement
Our heartfelt thanks to Fondatioun Kriibskrank Kanner for their generously funding the design and layout of the final document. Their support helps us to make the revised version of the *European Standards of Care for Children and Adolescents with Cancer* accessible across Europe.

FONDATIOUN KRIIBSKRANK KANNER

Co-funding
The development of this document was co-funded by the European Union.

Co-funded by the European Union

Co-funded by the European Union. Views and opinions expressed are, however, those of the author(s) only and do not necessarily reflect those of the European Union or the European Health and Digital Executive Agency (HaDEA). Neither the European Union nor the granting authority can be held responsible for them.

About

Childhood Cancer International – Europe
Childhood Cancer International – Europe (CCI-E, or CCI Europe) represents childhood cancer parent and survivor groups as well as other childhood cancer organisations in Europe: more than 63 organisations in 34 European countries are members of CCI-E. CCI Europe works together with all relevant stakeholders for the same goal: to help everyone affected by childhood cancer thrive, free from lasting impact.
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European Society of Paediatric Oncology (SIOP)
The European Society for Paediatric Oncology (SIOPE, or SIOP Europe) is the single united European organisation representing all professionals working in the field of childhood cancers. With more than 2,500 members across 35 countries, SIOP Europe is leading the way to ensure the best possible care and outcomes for all children and adolescents with cancer in Europe.
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Imprint

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Vienna, 2025

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Foreword

Facing cancer is an experience no child or family should endure alone, and every child deserves access to the highest standards of care. In recent decades, remarkable advances in treatment have significantly improved survival rates and quality of life for young people with cancer in Europe. These achievements have been driven by deep collaboration among medical professionals, researchers, patient advocates, and policy leaders. However, too many children across our continent still experience inequities in access to care, resources, and support. →

“Despite significant progress in childhood cancer treatment and survival, disparities in access to high-quality care persist across the continent. It is within this context that the *European Standards of Care for Children and Adolescents with Cancer* initiative emerges as both a timely and essential response.” *Uta Dirksen*

In 2008, the European Society for Paediatric Oncology (SIOPE) launched the first European Standards of Care for Children with Cancer, a pioneering effort to align pediatric oncology services across Europe. Since then, progress in medicine, technology, and patient-centered approaches has underscored the urgent need to update and expand these standards. Together with Childhood Cancer International – Europe, and through the collective expertise of clinicians, nurses, psychosocial professionals, and survivors and families, we have developed the *European Standards of Care for Children and Adolescents with Cancer:* a revised, evidence-based set of standards that reflect the realities of today and the ambitions of tomorrow.

The *European Standards of Care for Children and Adolescents with Cancer* addresses 11 critical domains of care, covering every stage of the cancer pathway: from diagnosis and treatment, to survivorship, palliative care, and cross-border collaboration. These standards are rooted in medical excellence, but also in humanity: ensuring that psychosocial well-being, advocacy, education, and system-wide cooperation are integral to the care experience. Most importantly, the *European Standards of Care for Children and Adolescents with Cancer* is a tool for change, designed not only to guide clinical practice but to shape national policies and reduce disparities in care across borders.

We are proud to present this work as a shared commitment between professionals and patient advocates. It reflects our common vision: that every child with cancer in Europe, no matter where they live, deserves timely diagnosis, comprehensive treatment, and lifelong support.

“The *European Standards of Care for Children and Adolescents with Cancer* was developed in a unique close collaboration between patient representatives and healthcare professionals. This ensures that all aspects of childhood cancer are covered in a holistic manner.”
Anita Kienesberger

This document is both a reflection of what we have achieved and a roadmap for what remains to be done. It calls on all stakeholders, healthcare professionals, institutions, governments, and civil society, to commit to a future where every child with cancer in Europe receives the highest standard of care, every step of the way.

Let ESCALIER serve as a foundation for the next chapter of progress in pediatric oncology, one built on equity, compassion, and excellence.

Uta Dirksen
President of the European Society for Paediatric Oncology (SIOPE)

Anita Kienesberger
Chair of Childhood Cancer International – Europe (CCI Europe)

Table of Contents

Introduction 10

1. Setup of Paediatric Oncology Units 13
1.1 Minimum requirements for paediatric oncology units 14
1.2 Recommended team at the oncology ward 17
1.3 Shared care 19
1.4 Standard operating procedures 20

2. Treatment Delivery and Care 23
2.1 Diagnosis 24
2.2 Treatment 25
2.3 Communication 29
2.4 Cost coverage 30

3. Psychosocial Care 33
3.1 General aspects of psychosocial care 34
3.2 Fatigue 36
3.3 Rehabilitation and resocialisation 37

4. Supportive Care 39
4.1 Introduction 40
4.2 Infectious complications 41
4.3 Haematological support: care and transfusions 43
4.4 Nausea and vomiting during chemotherapy 44
4.5 Gastrointestinal problems 44
4.6 Mouth care, mucositis risk, and its management 45
4.7 Nutritional support 45
4.8 Pain management 46

5. Paediatric Palliative Care 49
5.1 Introduction 50
5.2 The 5 principles of paediatric palliative care 51
5.3 Early introduction of paediatric palliative care 54
5.4 PPC delivery models 56
5.5 Advanced care planning 59
5.6 Choices at end of life 60

6. Survivorship Care and Transition Practices 63
6.1 Introduction 64
6.2 The long-term survivor and long-term follow-up care 65
6.3 Survivorship care plans 67
6.4 Transition 68
6.5 Somatic late effects 69
6.6 Psychosocial functioning 72
6.7 Legislative initiatives 74
6.8 Novel agents 74
6.9 Conclusion 75

7. Role of Patient Representatives and Advocates 77
7.1 Patient advocacy in the field of childhood cancer 78
7.2 Patient organisations and their role 80
7.3 Patient advocacy at all stages 81
7.4 Joint advocacy in action: Examples of successful collaborations among stakeholders 85

8. National Organisation of Networks among Paediatric Oncology Centres 87
8.1 Organisation of paediatric oncology on a national level 88
8.2 National and resulting international network to access novel therapies 91
8.3 Accreditation 93

9. Paediatric Oncology on a National Level 95
9.1 Introduction 96
9.2 Paediatric haemato-oncology societies 97
9.3 Collaboration among patient organisations and NGOs on a national level 99
9.4 National childhood cancer plan 100
9.5 National cancer registries 102

10. Cross-border Care and Research 105
10.1 Why cross-border care? 106
10.2 European Reference Network on Paediatric Cancer (ERN PaedCan) 107
10.3 Treatment processes and challenges 108
10.4 Patient safety, risk and outcomes 109

11. Education and Training in Paediatric Oncology 111
11.1 Educational priorities in paediatric oncology for healthcare professionals 112
11.2 Continuous professional development in paediatric oncology 118
11.3 Educational training opportunities in paediatric oncology 119
11.4 Mentorship and supervision 120
11.5 Meeting the educational needs of children and adolescents with cancer 121
11.6 Training for caregivers 124
11.7 Educational requirements for patient representatives 125

12. References 126

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List of Abbreviations

ACP: Advance Care Planning
CCI-E: Childhood Cancer International—Europe
EoL: End of Life
ERN PaedCan: European Reference Network for Paediatric Cancer
EU: European Union
HCP: Healthcare professional
HSCT: Haematopoietic stem cell transplantation
ITCC: Innovative Therapies for Children with Cancer
LTFU: Long-term follow-up
NGO: Non-profit organisation
PO: Paediatric Oncology
PPC: Paediatric Palliative Care
PRO: Patient reported outcomes
QoL: Quality of Life
SIOPE: European Society for Paediatric Oncology

Map representing all countries where at least one author from this manuscript is based →

Introduction

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Core team of the ESCALIER project

This document is the major result of ESCALIER, a collaborative project between SIOP Europe and CCI Europe. The project name ESCALIER derives its name from the French word for “staircase”, symbolising a journey, much like a staircase that connects two entities, such as professionals and patients, or bridges disparities between the East and West – this document aims to overcome these differences. We are excited to present the outcome of this 4-year project: The revised *Standards of Care for Children and Adolescents with Cancer.*

Significant progress has been made in the treatment of children and adolescents with cancer in Europe. This progress was and is only possible due to close collaboration among different stakeholders involved in paediatric oncology (e.g., HCPs, patient and parent representatives, politicians) within and between different countries. Certain common aspects must be met for these stakeholders to work together and to guarantee equal access to care for children and adolescents with cancer. These include infrastructural, personal, and medical aspects.

In May 2008, the Board of the European Society for Paediatric Oncology (SIOPE) decided to prepare a report on the current state and standards of paediatric oncology centres in Europe. For this purpose, a questionnaire was prepared and sent to paediatric oncologists all over Europe. Based on the results from the survey, the SIOPE Board organised a conference to prepare the “European Standards of Care for Children with Cancer”. Since 2008 many things have changed, and it is time to update these standards of care.

Based on the previous standards of care we defined 11 main fields, which should be covered in the updated standards. Each of these fields is included in a separate chapter in this document. The authoring team of each chapter consists of at least one senior paediatric oncologist familiar with the respective field, one Young SIOPE member, and one patient or parent representative from the European branch of Childhood Cancer International (CCI-E). Each authoring team was asked to provide the key aspects of their topic based on current evidence and guidelines.

This standard of care document is tailored for use by HCPs and patient representatives across Europe, empowering them to advocate with European and national policymakers. Together, they endeavour to eliminate inequalities in care for children with cancer, creating a more equitable landscape for young cancer patients across Europe.

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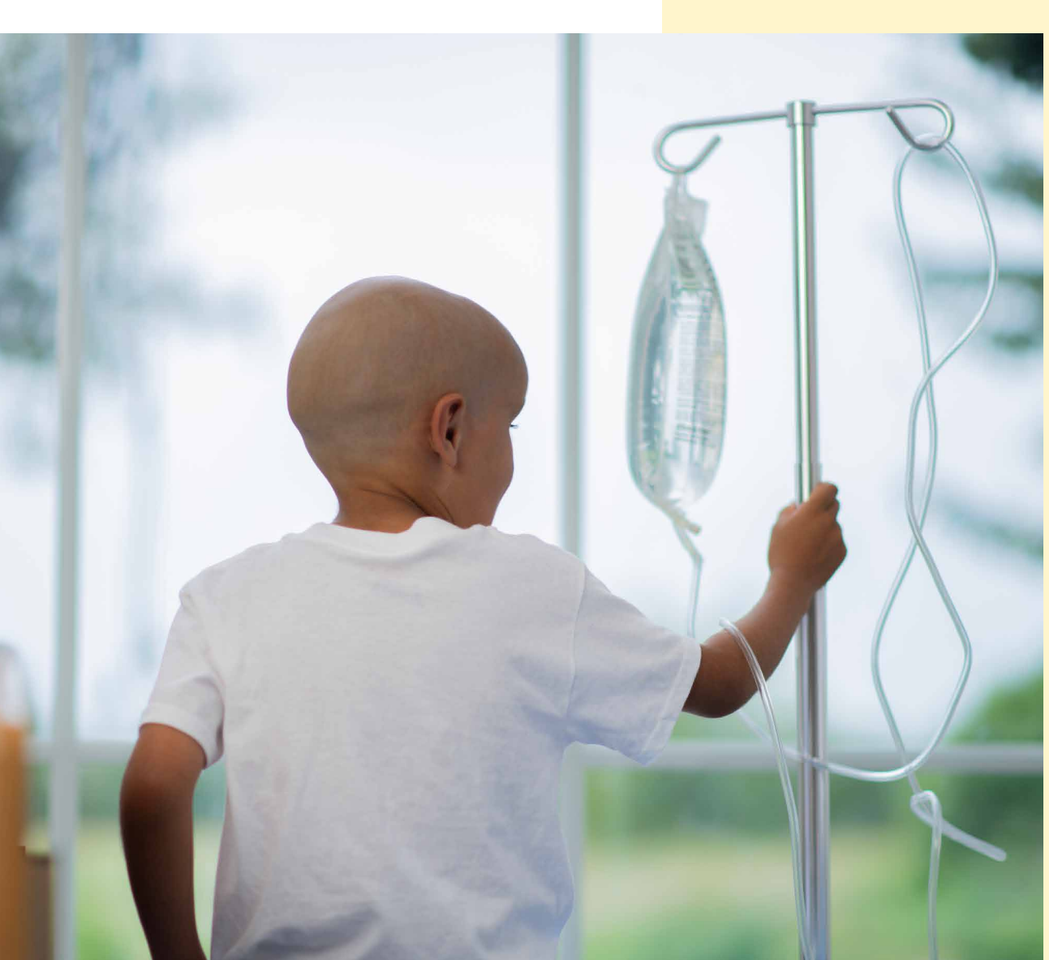

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1. Setup of Paediatric Oncology Units

Key messages

- Every paediatric oncology unit must have appropriate medical and psychosocial services/ facilities in place, alongside an adequate structural setup.
- Multidisciplinary and multiprofessional teams involved in regular exchange and communication (e.g., weekly meetings) are crucial.
- Standard operational procedures must be established to improve and maintain quality of care so specific situations are handled in the same way and based on best current evidence.

1.1 Minimum requirements for paediatric oncology units

A paediatric oncology unit represents a unit where children and adolescents diagnosed with various oncological and malignant haematological diseases are treated and followed-up. Paediatric oncology units may be part of paediatric or adult (oncology) hospitals or can be standalone hospitals solely for paediatric haemato-oncological diseases. The paediatric population is most frequently defined as the population between 0 and 18 years old (1).

Paediatric cancers are divided into three overarching categories: leukaemia/lymphoma, solid tumours, and central nervous system tumours. Expertise in all three categories needs to be present in a unit or provided through collaboration with other national or international units (1, 2).

Minimum requirements in caring for children and adolescents with cancer encompass different domains:

1) Medical (incl. key findings in *Table 1*)
2) Structural (incl. geography, allocated hospital, rooms for patients/families, clean rooms, outpatient care)
3) Psychological and social (incl. relaxation, playgrounds, psychosocial and financial support)

If there is more than one paediatric oncology unit or centre in a country, it is advised to initially choose the department closest to the patient's permanent address, provided it meets all requirements and can deliver the medical care needed. This minimises travel and care costs, both on a family and a hospital level, increases the patient's comfort level, and facilitates higher compliance following treatment. Nonetheless, proximity should not be a compromise to quality of treatment and care—highly specialised procedures, such as haematopoietic stem cell transplantation, should be centralised (1).

Another important aspect includes specific and separate rooms for families, rooms for relaxation, and rooms specifically designed and furnished for adolescents and young adults with cancer.

In terms of patient room setup, rooms should be equipped with a maximum of two patient beds, as well as a private bathroom with toilet. Also, along with each bed allocated to the patient, a bed must be provided for the parent, or, depending on the options, a room for the family, with all the necessary amenities (bed, private bathroom with toilet, etc.). Note that a parent accompanying a patient should be allowed to be with their child at all times (1).

Regarding the setup of the paediatric oncology unit, the period of severe and prolonged immunosuppression (e.g., following haematopoietic stem cell transplantation) must be considered, when special measures are necessary. To comply with the optimal conditions of hygiene and care, separate cleanrooms (e.g., with HEPA filter) must be provided, where only trained and properly equipped medical personnel and parents have access (2–4).

All treatment protocols and plans include in- and outpatient periods. To optimise the performance of day treatment and follow-up care, it is recommended that paediatric oncology units have dedicated offices or spaces specially designed for outpatient care (day clinic) (1–5).

Another important aspect includes specific and separate rooms for families (e.g., offering the option to meet, play, and cook), rooms for relaxation, and rooms specifically designed and furnished for adolescents and young adults with cancer.

Children and their parents should further have access to at least one playground. Access rules might be set for this playground, so that patients can benefit from socialisation time as well as play therapy and psychological support, alone or together with their parents, or even with groups of patients. This is also important for newly diagnosed families, because this way they can easily get in touch with the parent associations, and also get informed and be allocated to parents' houses, when needed (1, 4, 6).

Mandatory services	Requirements	Tasks
Pharmacy	Specially trained in the preparation of cytostatic treatment. At least one clinical pharmacist	Clinical pharmacist participates in the multi-disciplinary team to establish optimal application of treatment (2)
Laboratory/pathology	Must be able to perform special diagnostic techniques: cytological blood/bone marrow examinations, histopathological examination of biopsy samples, immunohistochemistry, cytogenetic, molecular biology, spinal fluid cytology, antibiotic and anti-neoplastic drug concentration, etc. (5)	A single laboratory may not be able to perform all analyses needed for diagnosis and follow-up of the patient's progress. It is essential to establish close collaboration among paediatric oncology departments for sending and processing the necessary samples (4)
Blood transfusion centre	Should include the full range of blood products (red blood cells, platelets, fresh frozen plasma)	Transfusions must be available for planned procedures and for emergencies (2, 4)
Access to related services	Intensive care services, paediatric surgery and anaesthesia (7)	Intensive care services following planned procedures, but also for emergency situations. The surgery services may include neurosurgery and orthopaedics (2, 4)
Imaging services	X-ray, ultrasound, computer tomography (CT), magnetic resonance tomography (MRI) (7)	At the patient's bedside when the situation requires it. For specialised imaging, the paediatric oncology department must work with the nearest centre which can perform them (2, 4)

Table 1: Mandatory services for paediatric oncology units (not exhaustive)

The local and national associations of parents and patients play an important role in the mental and sometimes financial support of patients and their families. These associations aim to contribute to improving the quality of care and life of children and their families. Through their activities, also taking place in the hospitals, they need a dedicated space where they can get set up, talk to the doctors and caregivers of the patients, and be in contact with the health sector they support (4, 6) → SEE CHAPTER 7.

1.2 Recommended team at the oncology ward

To achieve the best quality of care for children and adolescents, there should be a minimum recommended staffing level, depending on average annual activity, represented as a multidisciplinary team (8, 9). A multidisciplinary core team should be available at each paediatric oncology centre during working hours. (2, 8). Multidisciplinary teams must consist of paediatric oncologists, nurses, psychologists, allied HCPs, paediatric surgeons and neurosurgeons, paediatric intensivists and anaesthesiologists, and additional paediatric subspecialties depending on patient needs (8).

Paediatric oncologists and substitutes

A sufficient number of paediatric oncologists and haematologists are needed to achieve all-round care for patients. This includes 24/7 on-call doctors as well as junior doctors, assigned to a ward (2, 8). They are in charge of documenting diagnosis, classification, stage of disease, stratification, and recruitment in clinical trials. They need to enter the child into an appropriate national or international clinical trial and, if one is not available, to establish an individual treatment plan based on maximum scientific proof and expertise → SEE CHAPTER 2. The physician in charge is also responsible for leading communication between patients, parents, and caregivers (2, 8).

Nurses

Adequate and specifically trained nurses are necessary to cover the workload. Depending on the local structure, this may include a link nurse, providing the link between the treating unit, parents, and the local paediatrician or general practitioner (1, 8).

Psychologists
Psychological support and child life specialists are necessary and should be introduced as soon as possible following cancer diagnosis. For adequate psychological care, a team of psychologists (at least two) is necessary (1, 8). → SEE CHAPTER 3

Allied health care professionals
Physiotherapists, occupational therapists, speech and language therapists, dieticians, and pharmacists should be available (1, 8).
→ SEE CHAPTER 3 AND 4

Social workers
Social workers, ward teachers, and activity/play therapy, including music and arts, should be available to help patients and their families find a way to cope with the situation in the best possible manner (1, 8). → SEE CHAPTER 4

Administrative personnel
Medical secretaries and data managers are necessary to help physicians in daily consultations as well as for clinical trials (1, 8).

Rehabilitation specialists
Rehabilitation specialists are necessary for short- and long-term recovery. Patients need to be monitored for potential late effects of cancer treatments, but also for disease recurrence, and survivors need to receive comprehensive support to help them lead healthy and fulfilling lives after the end of treatment (1, 8).

Supportive care team
A paediatric oncology centre must have a functioning supportive care team at its disposal, directed at quality of life and palliative care (1, 8). → SEE CHAPTER 3 AND 4

By pooling the expertise and perspectives of all members of the multidisciplinary team, a holistic approach to care that encompasses medical, psychological, and social aspects can be offered. Regular team meetings, known as tumour boards or multidisciplinary meetings, allow for discussions and consensus on treatment decisions, ensuring that the care provided is evidence-based and in line with the latest guidelines (1, 2, 8).

1.3 Shared care

If a paediatric oncology centre is too far away, there is the option of a shared care centre. A shared care centre is a centre where less complex well-circumscribed parts of treatment can take place under supervision of a paediatric oncology centre. It follows guidelines about when to confer with a paediatric oncology centre about a paediatric oncology patient (4). Shared care centres have the following benefits:

- The child and parents can be treated for parts of treatment closer to home.
- There is fast access to a nearby hospital in case of acute complications, allowing fast initial intervention, which is crucial.
- There is fast access to a nearby hospital in the palliative phase and when travel has practical objections (physical strain, financial, work, commitment of family and/or friends).

It is important for the child and parents to have contact with local professionals in the shared care centres.

1.4 Standard operating procedures

For smooth and standardised implementation of medical activity within a paediatric oncology unit, standard operating procedures (SOPs) must be established for different situations. Thus, a clear picture can be formed on the processes and steps that must be followed so they are performed correctly. An example of an SOP is the management of febrile neutropenia.

The multidisciplinary team dealing with the care of paediatric oncology patients is responsible for formulating and implementing the SOPs. (4) SOPs must be formulated and adapted according to the care protocols used, and the facilities that the paediatric oncology department benefits from. Some examples of required SOPs include initial diagnosis, bone marrow biopsy, administration of blood products, administration of chemotherapeutic agents, medical emergencies and complications (e.g., febrile neutropenia), accommodation for parents, etc. (2)

SOPs must be formulated and adapted according to the care protocols used, and the facilities that the paediatric oncology department benefits from.

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2. Treatment Delivery and Care

Key messages

- Diagnosis must be established quickly and requires confirmation by a centre of excellence or expertise.
- Patients should be enrolled in clinical trials if the option is available; if not, treatment should align with established treatment recommendations.
- All children and adolescents with cancer should have access to essential anticancer medicines.
- Patients and their families should have unrestricted access to supportive care, psychosocial support and palliative care when appropriate. → SEE CHAPTERS 3, 4, 5
- Public health insurance should fully cover treatment for children and adolescents with cancer, including off-label medicines and cross-border care.

2.1 Diagnosis

The diagnosis of paediatric cancer must be made quickly and requires confirmation by a centre of excellence or expertise in paediatric oncology to provide the greatest possible chance for cure and full recovery. The expertise of reference laboratories and pathologies should be used to confirm the diagnosis. Once diagnosis is confirmed, the childhood cancer registry should be updated, if available → SEE CHAPTER 9.

A longer lag time may cause progressive disease or could have a negative impact on patient care and safety. A recently published review reported an association between increased mortality and four-week delay in cancer treatment in adults (10). The impact of lag time between paediatric cancer diagnosis and start of treatment has been the topic of several studies, but is complicated by the heterogeneity within and between the cancer types.

2.2 Treatment

Patients should be enrolled in clinical trials if the option is available; if not, treatment should align with established treatment recommendations. The trials or recommendations should be drawn up by expert teams, taking into account the results of past clinical research, trials, current knowledge of cancer biology, relevant drug pharmacokinetics, and known toxicities in children.

Pathways should be established from smaller to larger treatment centres, staffed with paediatric surgeons, neurosurgeons, anaesthesiologists, and radiation therapists with expertise in paediatric oncological treatment.

Even though not all countries have a National Paediatric Haemato-Oncology Society or Group → SEE CHAPTER 9, each unit should have access to a childhood cancer research network, which should recommend the treatment protocol suitable for each type of cancer and update these recommendations regularly, based on emerging research findings. ERN PaedCan has been founded as a virtual network for making specialised expertise and live-saving paediatric oncology treatment regimens broadly accessible, holding virtual tumour boards and offering support in cross-border healthcare delivery → SEE CHAPTER 10.

For treatment and long-term follow-up care, a multidisciplinary team is required → SEE CHAPTER 1. Essential anticancer medicines, as well as supportive care medicines and blood products, should always be available. Besides the availability of medicines and blood products, a trained team is needed for secure medicine handling. Surgery and radiotherapy are additional crucial treatment modalities in childhood cancer. Pathways should be established from smaller to larger treatment centres, staffed with paediatric surgeons, neurosurgeons, anaesthesiologists, and radiation therapists with expertise in paediatric oncological treatment → SEE CHAPTER 1 AND 8.

Patients and their families should have unrestricted access to psychosocial support and palliative care if needed → SEE CHAPTER 3, 4 AND 5. HCPs should have access to psychosocial support too. Additionally, educational services for children

and adolescents during treatment are needed for easier reintegration into school and society after oncological treatment → SEE CHAPTERS 3 AND 11.

2.2.1 Medication

A European survey showed that 35% of 68 listed and investigated anticancer medicines were administered off-label in Europe (11). The survey additionally showed that only 30 of the 68 anticancer medicines were continuously available in more than 90% of the participating countries (11). Results from this survey and the obvious inequalities resulted in the pan-European Essential Anticancer Medicines Project (12). This project resulted in listing 66 anticancer medicines and 5 supportive-care medicines as essential for the treatment of children and adolescents with cancer. These medicines are part of the current standard first-line or relapse treatment protocols and should be continuously available (12–14). This European list can help facilitate regulatory approval and access to these medicines.

A challenge in paediatric oncology is the high proportion of off-label medicines. The established treatment recommendations contain many medicines which are authorised for adults only and not for children, but have been used successfully in paediatric oncology for many years. Reasons for off-label use can be that administration is not according to the approved formulation or dosing, or general unlicensed use due to missing authorisation for the indication. Medicines are labelled and licensed based on quality, safety, and efficacy. When extrapolating a medicine approved for adults, issues such as different body compositions or metabolising capability and excretion in children must be considered (15). Unfortunately, the paediatric population is often too small and, therefore, not attractive for pharma to perform separate studies.

2.2.2 Other treatment modalities

The treatment of childhood cancer is based on multimodal treatment approaches and supportive care. In addition to chemotherapy, the cornerstones of treatment are radiotherapy, surgery, and, for specific tumours, haematopoietic stem cell transplantation. Due to progress in diagnostic techniques, innovative

treatments such as immunotherapy or molecular targeted therapy become increasingly available as the standard of care. However, these innovative therapies may not be available in all countries. Through collaboration among HCPs, locally unavailable treatments should be accessible through cross-border care for all children and adolescents with cancer, and they should be covered by public health insurance → SEE CHAPTER 10.

Centralisation of care can improve outcomes in single countries. Additional factors that might also influence the outcome include multidisciplinary teams, audits, local or international tumour boards, the use of agreed protocols, or the existence of a formal or informal network in the country and abroad → SEE CHAPTERS 8 AND 10 (16).

2.2.3 Clinical trials

Childhood cancer is rare with an overall age-standardised incidence rate in Europe of 140 cases per million for children aged 0–14 years and 157 per million for children and adolescents aged 0–19 years (17). A key to success in the treatment of childhood cancer has been the national and international collaboration of paediatric haematologists and oncologists and the enrolment of patients in clinical trials. The main aim of these clinical trials is to collect data on treatment, toxicities and treatment-related complications, survival, and long-term outcomes. These collaborations have made it possible to gain greater experience, resulting in improved treatment and development of new treatment strategies and agents. Because of this progress, it is crucial that every child and adolescent diagnosed with cancer is recruited in a clinical trial, treatment optimisation study, or registry at diagnosis.

A key to success in the treatment of childhood cancer has been the national and international collaboration of paediatric haematologists and oncologists and the enrolment of patients in clinical trials.

Most clinical trials are multinational, investigator-driven, and sponsored by academic institutions. All clinical trials adhere to EU guidelines (18), such as:

- General Data Protection Regulation (GDPR) (19)
- Good Clinical Practice (GCP) (20)
- Declaration of Helsinki (21)
- European Directive 2001/20 on clinical trials (22)

These guidelines are integrated into national law (in EU countries), which leads to different strategies.

Most clinical trials are late-phase clinical trials to optimise treatment and are led by national or international study groups. Besides improving treatment outcomes, the aim is to establish less toxic treatments to improve patient survival and QoL. Early clinical trials for developing new medicines are mostly sponsored by the pharmaceutical industry.

To structure paediatric drug development in cooperation with regulatory guidelines and pharmaceutical enterprises, the Innovative for Children with Cancer (ITCC) consortium was founded (https://www.itcc-consortium.org). Databases for private and publicly funded clinical trials are www.clinicaltrials.gov (worldwide) and www.clinicaltrialsregister.eu (European). However, registries are not listed in these databases. In addition, there are national databases, such as the German Registry of clinical studies (Deutsches Register Klinische Studien (DRKS), www.drks.de).

2.2.4 European Standard Clinical Practice guidelines

The European Standard Clinical Practice (ESCP) project is an ongoing collaboration with the European Reference Network for Paediatric Oncology (ERN PaedCan), SIOPE European Clinical Trial Groups (ECTGs) and Childhood Cancer International Europe (CCI-E). The aim of this initiative is to develop clinical recommendations that reflect the evidence-based practices for each common paediatric cancer type and to harmonise delivery of care across Europe. The recommendations are established by European experts in each field with the aim to improve access to the best standard treatments for all paediatric cancer patients if no trial is open in the respective country. They also have the potential to reduce inequalities in survival outcomes among countries. There are more than 20 recommendations already available for SIOPE members, including protocols for acute myeloid and lymphoid leukaemia, different types of brain tumours, and sarcomas (23).

2.3 Communication

Holding regular consultations with patients and their families is essential when diagnosing cancer, starting treatment, and during treatment. The patient's age and level of comprehension must be respected. Communication should be transparent. In the event of uncertainty, the family should be given the option to ask questions. The family should be offered comprehensive information, which should include psychosocial advice besides the medical information. At relevant time points, for example at the start of the treatment or in case of progress or relapse, detailed consultation with the treating doctor, the family, and a member of the psychosocial team is advised.

Ouyang et al. published an integrative review on prognostic communication in paediatric oncology. Parents emphasised open and ongoing communication that includes checking that they understand (24). Mack et al. reported in their survey that most parents wanted information on prognosis. Even if they found it upsetting, it was perceived important for decision-making (25). Even a numeric understanding of prognosis was important for 85% of the parents and most of them (73%) received this information. However, more than one-third wanted more information on prognosis than they had received (25).

Even though parents/caregivers are legal representatives of minors, the severe nature of diagnosis and treatment requires the close involvement of the child/adolescent in the process of information sharing, communication, and decision-making. The General Comment No. 12 of the UN Committee, Convention on the Rights of the Child stipulates: "Children, including young children, should be included in decision-making processes, in a manner consistent with their evolving capacities. They should be provided with information about proposed treatments and their effects and outcomes, including in formats appropriate and accessible to children with disabilities." (26)

2.4 Cost coverage

Each country has a different way of delivering healthcare. In general, either the state itself or social insurance institutions and other funders will need to fully refund the costs connected to the treatment, in accordance with the recommended therapeutic regimen. Since the registration of medicines for patients under 18 years of age has until recently been quite minimal across Europe, the costs of medicines whose use is considered off-label might be difficult to be—and are not always directly—reimbursed by the health insurance. Separate letters and applications from the HCPs to the health insurance may be necessary to get reimbursement. Having access to off-label medicines should be facilitated on a national and international level, for example, by making public health insurance aware of the special issues associated with childhood cancer. If specific treatment components are locally unavailable, the state should cover the cross-border treatment costs associated with such services.

At the annual congress of the International Paediatric Oncology Society (SIOP) in 2016, SIOP and CCI recommended improving global access to childhood cancer medicine, including expanded public insurance coverage for essential childhood cancer medications (27). In their integrative review on socioeconomic status Tran et al. demonstrated an association between survival and insurance coverage (28). In the European survey conducted by Vassal et al., 32% of responding parents reported paying for all or part of the child's treatment (11).

If specific treatment components are locally unavailable, the state should cover the cross-border treatment costs associated with such services.

In addition to comprehensive health insurance coverage, the financial support of families is crucial. The state should provide financial assistance to families of children and adolescents with cancer and cover additional treatment costs, equipment expenses, travel expenses, etc., particularly for middle- and low-income families. Families should also be informed about the available supportive organisations that can provide comprehensive assistance, including financial, emotional, educational, and other forms of support.

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3. Psychosocial Care

Key messages

- Psychosocial care based on international guidelines must be provided by hospitals and/or patient organisations to enhance overall wellbeing for paediatric cancer patients and their families, by addressing emotional, psychological, social, and physical needs.
- Psychosocial care must be an integral part during treatment and follow-up care.
- Psychological distress should be reduced through appropriate support, interventions, and coping skills to promote mental wellbeing.
- Contact with support groups, peer interactions, and school reintegration should be facilitated.

3.1 General aspects of psychosocial care

Receiving a cancer diagnosis is devastating for children and their families, significantly disrupting their daily lives. Therefore, it is crucial to offer support that goes beyond cancer-specific treatment, involving a psychosocial team to ensure a more positive overall experience throughout the patient's challenging cancer pathway and to minimise the risk of psychological and/or social consequences of the disease. The multidisciplinary psychosocial team may include social workers, psychologists, play therapists, and teachers. In certain cases, additional support may be required, such as psychiatrists, psychotherapists, or spiritual counsellors (29).

It is essential to regularly evaluate the type and intensity of psychosocial care needs in patients and their families. Disease-related and disease-independent risk factors, including stressors and resources of patients and their families, must be considered. Most patients and families benefit from a basic, preventive approach, but a small proportion, especially those with pre-existing conditions and many risk factors, require intensified psychosocial care. The goal is to enhance and sustain the necessary support to provide the best possible QoL and overall wellbeing. To achieve these overarching goals, the following needs must be addressed:

- Assessing any pre-existing social and financial challenges and providing information about the available support. Social workers and patient organisations play a crucial role in connecting HCPs with families, assisting with paperwork, facilitating participation in activities, and addressing social problems.
- Assessing psychological/emotional needs, stressors and resources, as well as distinguishing adequate disease-related reactions from psychological disorders. If needed, careful diagnosis is essential to initiate adequate psychosocial interventions. Family-extended psychological therapy and support may be necessary.
- Facilitating spiritually-based interventions to support spiritual wellbeing and diminish the spiritual distress in patients with cancer and their families.
- Promoting clear, developmentally appropriate, and honest communication for patients and family members, to reduce anxiety and empower informed decision-making.
- Supporting patients and families before, during, and after medical procedures through psychoeducation, such as reducing anxiety, trauma, and pain and increasing cooperation, health literacy, and self-efficacy.
- Encouraging children and adolescents to engage in physical activities and sports during treatment.
- Continuously assessing and addressing social engagement and educational arrangements, particularly during the acute phase (e.g., hospital schooling, suitable accommodation for families for long hospital stays) to alleviate the burden faced and create a supportive environment.
- Offering complementary therapies.
- Providing support to patients and families during the terminal phase and after loss for bereaved families → SEE CHAPTER 4.
- Addressing and managing lifestyle restrictions, especially considering the unique needs and challenges faced by adolescents with cancer (e.g., sexual health and privacy) and ensuring that their specific needs are considered.
- Making translators available to overcome language barriers in some situations to ensure by patients and their families have a clear understanding of the management process.

It is essential to regularly evaluate the type and intensity of psychosocial care needs in patients and their families.

3.2 Fatigue

HCPs should be aware of paediatric cancer-related fatigue, both in the acute phase of treatment and during long-term follow-up care, and implement support and prevention measures (30, 31). Greater risk of fatigue has been found in patients who were treated with radiotherapy, or experienced psychological distress, late effects related to cancer, chronic pain, or relapse. A multidisciplinary approach is necessary to implement measures that could reduce fatigue, such as scheduled physical activity, relaxation, and mindfulness. Patients and their families need to be informed about the risk of fatigue during or after cancer treatment and be educated on how to manage their symptoms (30).

3.3 Rehabilitation and resocialisation

Rehabilitation is a crucial component and targets not only those with clear physical or neurological sequelae (e.g., after brain tumour or limb surgery), but should be available to all children and adolescents to regain self-confidence. Starting from the time of diagnosis and all the way through treatment, timely rehabilitation is necessary to minimise the physical effects of interventions. Even after treatment completion, ongoing rehabilitation is important to address long-term toxicity.

Physiotherapists and occupational therapists should be available to minimise the long-term consequences of treatment, using techniques such as gym exercises and aiding in recovery from conditions such as myopathy and neuropathy, or use of prosthetic limbs. Special attention should be paid to the specific rehabilitation needs of children with brain tumours. It is important for each organisation to ensure the availability of funded services. Furthermore, rehabilitation encompasses not only physical assessment, but also psychological and social aspects. As a result, it involves the whole family in the process of reintegration and re-socialisation, which is essential after completing cancer treatment. It is vital to recognise the significance of supporting families during this phase and family-oriented rehabilitation is provided in some European countries.

Starting from the time of diagnosis and all the way through treatment, timely rehabilitation is necessary to minimise the physical effects of interventions.

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4. Supportive Care

Key messages

- Enhance overall wellbeing for paediatric cancer patients and their families by implementing supportive care according to international guidelines.
- Ensure patients have unrestricted access to essential medicines for supportive care, including blood products.
- Ensure rehabilitation is available to all children and adolescents to help reduce physical and psychosocial impacts of the disease and treatment.
- Enhance treatment adherence by addressing potential barriers and providing personalised support.

4.1 Introduction

The ability to mitigate the side effects of cancer treatment plays a pivotal role in the management of children and adolescents diagnosed with cancer. The primary focus of supportive care is to enhance the overall QoL for patients and their families throughout the entire cancer treatment pathway.

It is essential for each paediatric cancer centre to provide a comprehensive and compassionate support system aiming to alleviate treatment-related side effects, manage pain, and improve wellbeing. Additionally, it offers emotional support, helping children and adolescents and their families cope with the emotional challenges that arise during the cancer pathway. By integrating such care into paediatric cancer centres, patients and their families can find comfort and assistance in navigating the difficult aspects of cancer treatment and recovery.

4.2 Infectious complications

Management of neutropenic fever (32)
Neutropenic fever is the most common complication encountered in children and adolescents undergoing cancer treatment. Although many neutropenic episodes are mild, severe and life-threatening complications can arise, jeopardising the patient's wellbeing and treatment progress. The primary objective should be to minimise the occurrence of such complications. Achieving this entails employing a validated risk stratification in patient management and treating each episode based on locally common pathogens, the patient's history of antimicrobial resistance, and national guidelines.

Central line infections (32)
Central lines (e.g., Port-à-Cath, Broviac catheter) are extensively used in paediatric cancer units. Bacteraemia and infections related to central lines are significant contributors to healthcare-associated infections, leading to high mortality rates. The goal must be to prevent, monitor, promptly identify, and swiftly address any suspicions of central line infections. To achieve this, it is imperative for nurses to receive proper training on the correct use, securement, maintenance, and removal of central lines.

When infection is suspected, it is advised to obtain blood cultures from all central line lumens. Additionally, obtaining peripheral cultures increases the likelihood of identifying true bacteraemia in comparison to relying solely on central line cultures. When deemed necessary, the central line should be removed. By adhering to these measures, the risk of infections associated with central lines can be effectively combated, improving patient outcomes.

Clostridium difficile infections (33)

Clostridium difficile infections pose a significant risk to children and adolescents undergoing prolonged hospitalisation, chemotherapy, or antibiotic treatment. According to recent recommendations, non-severe and severe *Clostridium difficile* infections can be treated effectively with oral antibiotics. Individualised patient assessment is essential to determine the severity of the infection, the risk for recurrence, the potential benefit of prophylactic and treatment options, enabling informed discussions about the most suitable course of action.

Role of infection prophylaxis (34, 35)

Guidelines on infection prophylaxis have been developed to reduce bacteraemia and the risk of invasive infections in immunocompromised paediatric cancer patients. Depending on the underlying diagnosis, grade and duration of immunosuppression, antibacterial, antiviral, *Pneumocystis jirovecii* pneumonia, or antifungal prophylaxis may be indicated.

4.3 Haematological support: care and transfusions (36)

In paediatric cancer patients, blood management is crucial to ensure survival.

In paediatric cancer patients, blood management is crucial to ensure survival. The need for blood cell transfusions depends on the cancer type, treatment, patient's background, and local guidelines. Red blood cells, platelets, or plasma can be transfused. The threshold for these types of transfusions depends on patient age, clinical circumstances, and the dynamics of the decrease.

National and international recommendations exist for transfusion practices and preparation of products. White blood cells (granulocytes) had been transfused in earlier decades. Today, granulocytes can be stimulated using a granulocyte colony-stimulating factor. In this case, the use and indication depend on the underlying diagnosis and the clinical condition. For long-term follow-up, the amount (ml/m²) of transfused red blood cells and the resulting ferritin level need to be considered, as this may result in iron overload.

4.4 Nausea and vomiting during chemotherapy

Nausea and vomiting are the most common side effects of anticancer treatment that require action to prevent poorly controlled symptoms, thus improving the patient's QoL and overall experience (37). HCPs should adhere to well-produced clinical practice guidelines, helping them select the appropriate types and doses of antiemetics for the allocated treatment (38). Nausea and vomiting can occur during various phases—before (anticipatory), immediately (acute), and following the treatment (delayed). Symptoms which cannot be controlled are described as refractory. The strength of antiemetic treatment is categorised into minimal, low, moderate, and high, based on the expected emetogenicity of chemotherapeutic agents. It is recommended to use antiemetic drugs during radiotherapy, particularly if the abdomen or brain are irradiated.

4.5 Gastrointestinal problems

Gastrointestinal problems can take various forms, ranging from changes in bowel habits, such as constipation or diarrhoea, to more serious conditions, such as deep anal fissures or bowel obstructions, that need medical attention. These changes can be distressing for both children and their families, as they can significantly affect the child's overall wellbeing.

4.6 Mouth care, mucositis risk, and its management

Oral mucositis is a very common side effect of chemotherapy and/or radiotherapy. Proper management of oral mucositis will improve the patient's overall wellbeing, pain management, and oral feeding, and will lower the risk of bacteraemia. Some prophylactic measures may be discussed to prevent mucositis, such as using intraoral photobiomodulation therapy in the red-light spectrum (620–750 nm) in patients at high risk of mucositis (e.g., haematopoietic stem cell transplantation, head and neck radiotherapy).

4.7 Nutritional support

Good nutritional status is correlated with improved tolerance to chemotherapy, decreased rates of treatment delays and infection, better overall survival and better QoL (39). Nutritional issues (underweight, overweight) are related to cancer itself or its treatment. Perfect harmonisation between the individual risk group and neutropenic diet recommendations could enhance the overall wellbeing in cancer patients. HCPs and nutritionists, in collaboration with parents, should pay special attention by systematically evaluating the patient's individual nutritional risk and status, and offering updated diet recommendations and nutritional support according to the patient's evolving risk group.

There are several options for enhancing nutrition in paediatric cancer patients: oral compliments, enteral nutrition (tube feeding), or parenteral nutrition. Concerning the neutropenic diet in paediatric cancer patients, international guidelines have been developed and are available.

4.8 Pain management

The primary goal of pain management is to enhance QoL. Cancer treatments, including chemotherapy, radiation therapy, and surgery, can cause diverse types of pain and discomfort (40).

- Acute pain—It manifests suddenly, is often linked to medical procedures (e.g., surgery, lumbar punctures, bone marrow aspirations), and is one of the most common pain experiences among cancer patients. Employing appropriate pain management protocols that involve the use of suitable pain medications, such as analgesics, sedatives, and nerve blocks, can effectively alleviate acute pain, while anaesthesia should be considered in some painful procedures (e.g., lumbar puncture, bone marrow aspiration).

- Chronic pain—It is persistent and may stem from cancer itself, the treatment, or other medical conditions. This type of pain can significantly impact both physical and emotional wellbeing. To manage chronic pain effectively, a comprehensive pain management plan should be developed, which could include a combination of medications, physical therapy, psychological support, and complementary therapies, such as acupuncture or relaxation techniques.

- Neuropathic pain—It is often experienced by cancer patients, particularly caused by nerve damage due to treatment (e.g., vincristine neuropathy). It can manifest as burning, shooting, or tingling sensations, and its management can be difficult. Using medications that specifically target neuropathic pain (e.g., certain anticonvulsants or antidepressants) can provide relief and enhance the patient's comfort.

Psychoeducation plays a sigificant role in pain and symptom management. It involves promoting understanding around the nature of pain and symptoms, as well as teaching coping skills.

Psychoeducation plays a significant role in pain and symptom management. It involves promoting understanding around the nature of pain and symptoms, as well as teaching coping skills. Empowering patients with knowledge about their conditions and available management strategies can help them better navigate the challenges they face.

Communication among patients, parents, and HCPs (e.g., oncologists, pain specialists, neurologists, anaesthesiologists, radiotherapists, surgeons, psychologists) is vital to ensure that pain is adequately managed. Understanding the patient's unique experiences of pain enables HCPs to tailor the treatment plan accordingly. Regular assessments and adjustments to the pain management plan based on the patient's response are essential to achieve optimal results.

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5. Paediatric Palliative Care

Key messages

- Paediatric palliative care is the active holistic care of a child or adolescent with a life-threatening or life-limiting condition and their family, and should be introduced early, provided throughout their pathway, and not be limited to end of life care.
- There is no one-size-fits-all model for delivering PPC, and each department should identify which one best suits their needs, resources, and culture.
- Advanced care planning, grounded on communication and trust-building among the healthcare team, the child or adolescent and their family, should be fostered.
- At end of life, every child or adolescent with cancer and their family must be offered choices about intensity of treatment, place of care, and place of death.

The authors thank the members of the steering committee of the SIOPE Palliative Care Working Group (Maria Avillez Martinez, Finella Craig, Benoit Dumont, Ulrike Leiss, and Katrin Scheinemann) for the discussions when preparing the manuscript.

5.1 Introduction

Paediatric palliative care (PPC) is defined as an approach to prevent and relieve the suffering of a child or adolescent with a life-threatening or life-limiting disease, as well as their family, by providing comprehensive and multidisciplinary care for physical, psychological, spiritual, and social needs. Palliative care is explicitly recognised as a human right by the World Health Organization (41).

In this chapter, we seek to highlight to all stakeholders five key aspects of PPC in the paediatric oncology setting, with the aim to help HCPs in building and spreading PPC services across Europe.

5.2 The 5 principaples of paediatric palliative care

PPC is the active holistic care of a child or adolescent with a life-threatening or life-limiting condition, and of their family, throughout their pathway, and should not be limited to end of life (EoL) care.

The 5 principles of PPC are (42–44):

1) Delivering a holistic and multidisciplinary approach, mainly focusing on QoL and death, in the broadest sense.
2) Supporting the entire family system, with attention to cultural background.
3) Focusing on improving pain and symptom management.
4) Fostering communication between HCPs and families.
5) Promoting advance care planning (ACP).

To be effective, PPC requires a multidisciplinary team approach—coordinated and comprehensive—and should include the family.

HCPs must have the necessary knowledge, skills, and the appropriate attitude to support children and adolescents and their families with these five principles in mind.

To be effective, PPC requires a multidisciplinary team approach—coordinated and comprehensive—and should include the family. This team can include paediatric oncologists, general practitioners, nurses (hospital, homecare, hospice), specialised PPC physicians and/or nurses, psychologists, social workers, family members, pastoral care / spiritual welfare. This list is not exhaustive as team members depend on resources, needs, and the families' wishes (43, 45).

Each child or adolescent and their family should be assigned a case manager; an HCP who coordinates PPC delivery from diagnosis and who is their first point of contact. The case manager organises meetings between the team members and the family, creates the connection between care at home and in-hospital, when appropriate, and coordinates all aspects of PPC delivery.

PPC delivery implies that all aspects of care—not limited to the medical issues—are addressed. As such, HCPs should pay attention to 4 major areas:

Pain/symptom relief (43, 44)

- Integrate patient-reported outcomes in daily care to assess and monitor symptoms. This can help HCPs identify and address symptom burden and side effects effectively, and assist in shared decision-making, by incorporating the user's values, preferences, and goals (44).
- When prescribing medication/treatment, provide information about realistic expectations, time to improvement, possible side effects and how to address them.
- Give advice on self-care, and on complementary and alternative interventions (e.g., diet, relaxation, breathing exercises, aromatherapy).
- Evaluate and measure pain adequately, using scales if available (e.g., faces scale, FLACC scale).
- When prescribing chronic pain medication, not forget to include rescue doses and give advice on how to manage the most frequent side effects of opioids (constipation, nausea and vomiting, somnolence, etc.).
- Introduce a pain specialist, when available.

Psyc hological/spiritual needs (44, 46, 47)

- Not presume as an HCP that you know better and, foremost, do not make assumptions about the decisions of patients and their families.
- Be open to the fact that patients and their families have the right to "deliberately not wanting to know" but do offer space if they want to know more.
- Explore whether the child/adolescent or their family would like to talk to someone else about their beliefs and values.
- Discuss with patients and their families whether their religious or philosophical beliefs need to be considered in their care, particularly when deciding about treatment options.
- Be aware that in many cultures the mental wellbeing of a child/adolescent is more important than the truth, and that for religious reasons it can be difficult for parents to agree to discontinue treatment.

Trust and communication (44, 45, 48)

- Introduce the PPC team members early in the cancer pathway, as it helps in building a trusting relationship with patients and their families.
- Ensure that all team members must be experienced and trained in delivering bad news (diagnosis, relapse, life-threatening event, incurability), as communication is one of the strongest tools of the PPC team.
- Be aware that certain terminology and unclear statements can lead to misunderstandings. The use of open, honest, clear, and simple language is recommended, as well as non-verbal communication, such as active listening, and showing compassion and support.

Shared decision-making (43, 44, 49)

- Remember that mutual trust forms an important foundation for shared decision-making and is especially important in the EoL and terminal phases.
- Clearly explain the advantages and disadvantages of possible treatment options when making treatment decisions.
- Include the option of "wait and see", and the option of no longer pursuing curative or life-supporting treatments, rather fully focusing on comfort and QoL.
- Give patients and their families the opportunity to ask questions about all options, and share their ideas, experiences, wishes, and expectations.
- Ask children/adolescents and the families about their preferences and, if requested, also explain your preference.
- Understand that this is not a one-session process. It may require several encounters. Meetings should preferably be held in person, and only exceptionally by digital means.

5.3 Early introduction of paediatric palliative care

A paediatric cancer diagnosis always implies uncertainty, burden, and suffering, and early introduction of PPC can help deal with these.

PPC should be introduced alongside curative or life-prolonging treatments as early as possible after a diagnosis of a life-limiting or life-threatening condition (42, 43). Initiating PPC support at an earlier stage has been shown to improve QoL and decrease symptom burden. It has been associated with shorter hospital stays, reduced intensive care, and fewer overall hospital admissions. Caregivers seem to report higher satisfaction and reduced anxiety or depression. Early integration of PPC also fosters a more trusting relationship between HCPs and families, thereby enhancing the decision-making process throughout the course of the illness (43, 48).

A PPC approach can start at the very beginning. After diagnostic disclosure, the paediatric oncology team can have a discussion aiming to explore the family's concerns, hopes, expectations, and psychosocial aspects. This will help to align the patient's treatment and care with the family's goals and values, throughout the treatment pathway. If a dedicated PPC team exists, this discussion will ultimately help set the stage for its involvement (49).

Barriers that hinder the early introduction of PPC most commonly include (46, 48, 50):

- Local cultural beliefs and misconceptions that associate PPC solely with EoL care, both from the aspect of parents and of HCPs. The term "palliative care" is usually associated with suffering and death. At the same time, cultural, spiritual, and religious backgrounds may challenge PPC integration, especially in cases when talking about death remains a taboo.

- Lack of PPC specialists and limited HCP training on PPC, including insufficient awareness of potential benefits and communication skills. A positive correlation between knowledge and attitude towards PPC does exist, but specific national educational curricula in PPC in paediatric oncology are widely lacking.

PPC should be introduced alongside curative or life-prolonging treatments as early as possible after a diagnosis of a life-limiting or life-threatening condition.

To address these problems, local and national initiatives are encouraged to support social information dissemination, and to raise awareness and positive attitudes among patients, parents, and families regarding the role and objectives of PPC in paediatric oncology as an integral part of treatment (46, 50). It should also include investigations from paediatric oncology departments or National Paediatric Haemato-Oncology Societies (NaPHOS) on how different ethnicities, religious, and cultural values influence referral to and/or acceptance of PPC. For instance, the local PPC team can be introduced to the patient and family as the "symptom control team", "supportive care team" or "paediatric comfort care team", to highlight its role in maximising comfort and QoL (46, 48).

More training, in particular communication training, for HCPs is necessary. This should include interactive learning among professionals from various disciplines and nationalities, to improve collaboration and patient wellbeing, incorporating different social and cultural perspectives (42, 43, 50).

5.4 PPC delivery models

There is no one-size-fits-all model for delivering PPC in paediatric oncology and each department should identify which one best suits their needs, resources, and culture.

Local and/or national policies and guidelines are encouraged to set referral criteria and workflows, and reduce inequalities and fragmented services across each country (50). Setting eligibility criteria for PPC referral in children/adolescents with cancer may aid in guaranteeing that appropriate care is provided to those who require it most. It also helps the centres in identifying the specific services required and in properly allocating financial and staff resources (43). Paediatric oncology centres are highly encouraged to use the "green lights" criteria *(Table 1)* to identify when dedicated PPC services should be sought (43). Other dedicated tools, such as the Paediatric Palliative Screening Scale (PaPaS) or the ACCAPED scale, can assist in evaluating the complexity of needs and determining the appropriate level of PPC intervention (51, 52).

These tools should not substitute the individual assessment of the specific needs of each child/adolescent and their family, such as intensity of symptom burden, treatment duration, care coordination, and personal wishes and preferences.

At diagnosis	During illness	Related to complex needs
– Life-threatening illness (e.g., extended brain glioma) or advanced-stage cancer (e.g., stage IV neuroblastoma; solid metastatic tumour). – Diagnosis of a tumour with an event-free survival rate estimation <40% with current therapies.	– Progressive metastatic disease. – Recurrent or resistant diseases, also after organ failure. – Major toxicity during treatment. – In case of prolonged hospitalisation (>3 weeks) or prolonged admission to intensive care unit (>1 week) without signs of improvement. – In case of three or more unplanned hospitalisations for serious medical issues within a 6-month period.	– Difficulties in symptom management, in particular of pain. – Major psychosocial stress or limited social support. – Introduction of new devices (gastrostomy or tracheostomy) requiring complex care during the transition from hospital to home. – Difficulties in decision-making or communication processes.

Table 1: Suggested criteria for PPC referral in children with cancer ("Green Lights Criteria"—used with permission from *Benini F, et al Pediatric Palliative Care in Oncology: Basic Principles. Cancers 2022)*

When delivering PPC, institutions need to distinguish between integrating PPC principles (primary PPC) and providing sub-specialty PPC consultations. These two are not mutually exclusive, and they can be integrated across different complexity levels throughout the disease trajectory. Accordingly, three models of PPC delivery in paediatric oncology are widely recognised *(Figure 1)* (42, 43, 53):

1) Basic Care model—All HCPs can explore PPC-related issues, such as hopes, fears, support, and understanding, with patients and their families. Paediatric oncologists, nurses, or psychosocial professionals can conduct this assessment, allowing for early identification of family needs. This first model can be successfully implemented even if resources are limited.

2) Embedded Expertise model—HCPs who have received dedicated training in PPC act as a link between the paediatric oncology team, the patient, and the family. This approach ensures that PPC is seamlessly incorporated into the overall treatment plan. However, the limited number of paediatric oncology HCPs with dedicated PPC training may pose challenges in implementing this model widely.

3) Integrated Care model—Specialised PPC is provided by an interdisciplinary team in a dedicated setting, which is the "ideal world" approach. Both teams (PPC and paediatric oncology) work collaboratively to provide an extra layer of support and expertise in managing the complex symptoms, psychosocial challenges, and decision-making faced by patients and their families. The PPC team conducts regular assessments and offers ongoing guidance and support.

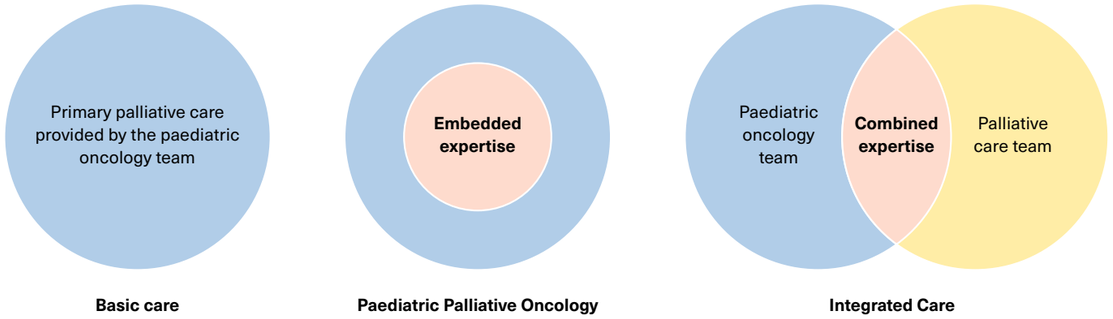

Figure 1: Possible models of PPC delivery in paediatric oncology (used with permission from *Lacerda A, et al., Embracing paediatric palliative care in paediatric oncology from diagnosis onwards. Ped Blood Cancer 2023).*

Whenever feasible, suitable and appropriate, telemedicine consultations should be offered. Telemedicine might enhance the availability and accessibility of PPC and further contribute to address social health inequities, through overcoming the barriers of distance, transportation, and financial struggles. It could also reduce the need for hospital visits and readmissions, minimising disruptions to the patient's daily routine, and ultimately enhancing their overall QoL (53, 54).

The holistic care of paediatric oncology patients should be extended to parents, siblings, and all significant family members. Early introduction of psychosocial services for parents and siblings should be an integral aspect of family-based care, continued through bereavement if the child/adolescent dies (44, 47).

National and/or local paediatric oncology and PPC groups need to select a model that strikes a balance between the advantages and challenges specific to their organisation, acknowledging their national and institutional norms, resources, and culture (53). Whichever model is chosen, it must work to promote the early integration of PPC (42).

5.5 Advanced care planning

Advanced care planning (ACP) grounded on communication and trust-building between the healthcare team and the child/adolescent and their family, contributes to excellent care in paediatric oncology.

ACP should be a standard feature in paediatric oncology, as it enables patients and parents to formulate their values, goals, and preferences for future care, and to timely discuss these with clinicians and relatives (43, 45, 48). It is a continuous and dynamic process, which requires repeatedly discussing and adjusting the values, goals, and preferences when necessary (42).

Providing the time and space for multiple ACP meetings from diagnosis onwards helps to build trust and improve QoL or quality of EoL care. The results of these sessions should be recorded in the medical file and the plan (and all its future versions) shared with all HCPs involved.

ACP should be a standard feature in paediatric oncology, as it enables patients and parents to formulate their values, goals, and preferences for future care.

5.6 Choices at end of life

At EoL, every child/adolescent with cancer and their family must be offered choices about intensity of treatment, place of care, and place of death.

EoL care can be provided in various settings, including home, hospitals, ambulatory care, or paediatric hospices. The choice of care setting should align with the clinical severity and complexity of needs, while also considering the preferences of patients and their families, and the available resources (43). It is important to ultimately let the families feel free to change their choices, even in the very last moments (42).

Home-based care should be considered, as it may better align with the family preferences, causing fewer disruptions to daily activities, and increasing family involvement and personalised care delivery (42, 43, 48).

Where available, paediatric hospices create a child-friendly and family-centred atmosphere, and may alleviate the family burden. However, these facilities are still scarce in Europe (43, 53).

It is important to ultimately let the families feel free to change their choices, even in the very last moments.

Following the death of a child, it is imperative to provide appropriate support to the bereaved family. A meeting with the PPC and/or the paediatric oncology team, should be scheduled at the family's will and convenience, enabling them to share their thoughts, discuss the evolution of the child's disease, the EoL care, and any questions or regrets they may have. This post-death support contributes to the family's healing process and provides an opportunity for them to process their emotions and find closure (42, 44).

To pave the way for better PPC integration and as a potential resource for HCPs and families, SIOPE created a PPC Working Group (https://siope.eu/SIOPE-Palliative-Care-WG), which aims to increase awareness among all stakeholders, create educational opportunities, promote the best possible quality of care for children with cancer in all settings, support PPC related research, and foster communication and collaboration among PPC providers in paediatric oncology across Europe.

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6. Survivorship Care and Transition Practices

Key messages

- Follow-up care must be provided throughout the survivors' life-span due to the risk and burden of late effects.
- Every patient has the right to obtain a treatment summary (including cumulative doses) at the end of the treatment, or when leaving the paediatric oncology setting at the latest.
- A personalised survivorship care plan must be provided and transition to adult healthcare services must be facilitated to ensure long-term follow-up care following international guidelines.
- Long-term follow-up care as well as the transition process must be holistic, multidisciplinary, coordinated, accessible, and age appropriate.
- Survivors, caregivers and HCPs must be aware of and educated on late effects, health risks, health promotion, and early intervention strategies.
- Paediatric oncologists should not only focus on improving survival rates, but also on reducing the risk of late effects and enhancing the quality of survival; therefore, continuous monitoring and management of late effects across the childhood survivors' lifespan is of utmost importance.

6.1 Introduction

The successes in the treatment and supportive care for children and adolescents with cancer have resulted in an increasing population of survivors; an estimated 300,000–500,000 in Europe, equal to 1 in 1,000. With childhood cancer survival rates reaching 80–90% in countries with highly developed healthcare systems, the focus for their care is on the quality of survival and involves identifying any late effects from the treatment they received. This is crucial because late effects identified early may be amenable to treatment and may have significant implications for subsequent morbidity (e.g., fertility, physical and psychological issues, early mortality). It is thus imperative that the unique needs for this growing population of childhood cancer survivors are understood, recognised, and addressed.

There is a lot of work underway looking at enhancing and standardising the quality of care these survivors receive globally. We have referred to the published evidence-based guidance available to date with the caveat that updated publications are anticipated soon for use.

6.2 The long-term survivor and long-term follow-up care

Most children and adolescents treated for cancer will become long-term survivors and the majority will require long-term if not lifelong follow-up care. Long-term survivors are defined as those at least 5 years after completion of treatment. The fundamental goal of follow-up care is to reduce the burden of late effects by prevention, detection, and early treatment, and to improve the QoL after childhood cancer treatment.

For long-term follow-up (LTFU) care a simple, clinically applicable approach should be applied. The nature of follow-up shall be subject to the tumour type and treatment received. Most countries adopt a risk-stratified approach to guide the type of surveillance and the frequency, considering demographic, current health status, and lifestyle factors.

The team responsible for follow-up care needs to coordinate the care with other specialists (e.g., cardiologists, endocrinologists, reproductive specialists) and there should be clearly defined referral routes to these services.

LTFU care should be delivered by a diverse multidisciplinary team, including clinicians with expertise in paediatric oncology and the management of late effects, nurses or nurse practitioners, psychologists, social workers, and additional specialists based on the childhood cancer survivors' needs (e.g., physiotherapy, fertility specialists, cardiologists, endocrinologists). There should be a clearly defined structure of the follow-up care pathway in each country, from 5 years after completion of treatment until transition to adult services. This needs to be adjusted as soon as knowledge becomes available in an attempt to standardise care, also based on the countries' own healthcare system resources.

Depending on the child's or adolescent's risk of developing late effects, they should be seen at least every one to two years and it should be specified who has ownership of this care according to each country's specific framework. Based on the country and its healthcare system, it can be a primary care model with general practitioners or paediatricians in charge, a model with the cancer centre itself managing the surveillance, or a shared-care model.

Independent of the model, there needs to be collaboration and transparent communication between the professionals to understand and ensure ongoing monitoring. The team responsible for follow-up care needs to coordinate the care with other specialists (e.g., cardiologists, endocrinologists, reproductive specialists) and there should be clearly defined referral routes to these services. In case of follow-up care outside the paediatric cancer centre, ongoing communication and information sharing with the paediatric cancer services must be maintained, as they will provide a backbone advisory role throughout.

Telemedicine may be another format for providing survivorship care. Effective self-management and empowerment is an important component of LTFU care. The Oncompass mobile health intervention is an example of such a tool (https://oncompassmedicine.com/).

6.3 Survivorship care plans

Each long-term survivor should have a detailed summary of their treatment, a so-called survivorship care plan. This plan includes all chemotherapeutic agents and respective doses received, radiotherapy with locations and doses, surgery, bone marrow transplantation, and previous relevant complications. An individualised survivorship care plan should be created at cessation of treatment and at the start of the LTFU pathway.

Different tools to create survivorship care plans exist (e.g., passport for care in the US, SmartCard tool and PanCare Survivorship Passport in Europe, local tools such as from the St. Jude Children's Research Hospital). Independent of the name or country of origin, all these tools have the same content and structure: personal patient information, information on diagnosis and treatment received, list of potential late effects and affected organs due to the treatment received, and resulting recommendations for LTFU care (e.g., frequency of cardiac or renal examinations).

All survivorship care plans aim to assist communication and transparency among HCPs and empower the survivors.

All survivorship care plans aim to assist communication and transparency among HCPs and empower the survivors. The plans should be fully available, online if possible, to all care providers, including adult care teams when necessary, and the survivor themselves, with clear reference to the evidence-based guidelines for monitoring relevant to that survivor.

The care plan should be agreed with the patient, family, and dedicated paediatric oncology care team, and reviewed and modified at each consultation going forward. There should be parallel communication about the risk of relevant late effects with the patient early on, gradually and throughout their childhood cancer pathway. This will assist in successful transition to LTFU and beyond to adult services.

6.4 Transition

Adherence to follow-up care has been shown to decline as time after completion of treatment increases, when monitoring is most imperative, as this is when many late effects are likely to develop (55, 56). These patients deserve an optimal package of care extending into adulthood. Therefore, transition to adult services is a critical time to manage effectively. Transition is defined as an "active, planned, co-ordinated, comprehensive, multidisciplinary process to enable childhood and adolescent cancer survivors to effectively and harmoniously transfer from child-cantered to adult- oriented healthcare systems." (57)

The process of transition should be discussed throughout the survivors' LTFU journey and integrated within their care, so they are informed and prepared for transition.

Due to the variety of healthcare systems and resources available in each European country, a single model of transition is impossible. Consequently, well-planned, defined, and readily available follow-up care to manage and reduce treatment-related morbidity and mortality is paramount. Continuity of care into adult medicine needs to be ensured with appropriate surveillance from experienced teams and with access to specialised treatments in an age-specific setting. Coordination of this care begins at the start of LTFU with involvement of the multidisciplinary team, referral to specialists, communication with primary and secondary care, and later connection and collaboration with adult medicine service (58, 59).

The process of transition should be discussed throughout the survivors' LTFU journey and integrated within their care, so they are informed and prepared for transition. LTFU, and especially transition, depend on holistic care; the complex physiological and psychological needs of the childhood cancer survivor need to be fully explored at the time of transition. Written communication should be readily available to the adult care provider, as well as community-based services in the form of the survivorship care plan. Open communication between the paediatric oncology team and the adult team is crucial (60).

Harmonised transition to adult services is an area in need of improvement with a lot of ongoing research activity. Developments following this, with further guidance are awaited (https://pancarefollowup.eu/).

6.5 Somatic late effects

Late effects are any chronic or late-occurring physical or psychosocial outcomes that develop or persist beyond 5 years from the cancer diagnosis (61). The cumulative risk of any adverse health outcome 45 years from diagnosis ranges from 21% to 69%, depending on the risk stratification (62). Higher doses of therapy typically increase the risk, while longer time since treatment is associated with increased prevalence of late effects. Late effects may be mild to severe and include multiple physical, developmental, behavioural, and emotional conditions.

Late effects may be mild to severe and include multiple physical, developmental, behavioural, and emotional conditions.

The use of standardised and evidence-based guidelines for follow-up care is recommended. We recommend PanCare (63) as a starting point for recommendations and the guidelines from the Children's Oncology Group (COG) and International Guideline Harmonization Group (IGHG) for a more comprehensive overview and management direction (64, 65). Each country may have its own publications. However, in an endeavour to standardise survivorship care in Europe, guidelines accessible to all countries, HCPs, and survivors are essential. Those signposted here are based on systematic reviews of current evidence and are readily obtainable. As previously mentioned, awareness of latest publications is crucial and publications from PanCareFollowUp are anticipated soon.

Late effects can impact every organ system and function. They include cardiovascular disease, endocrine abnormalities, impaired fertility, neurocognitive deficits, respiratory dysfunction, ototoxicity, and subsequent malignant neoplasm. They are not limited to physical health problems. Psychological, behavioural, social, educational, and vocational difficulties can be equally burdensome and must be assessed and addressed (61). Common effects are discussed below.

Fertility
All children and adolescents diagnosed with cancer should receive fertility counselling and/or fertility preservation prior to start of cancer treatment, if an appropriate and validated method is available. These are sensitive discussions and remain an area with much uncertainty. We are unable to be definitive about reproductive potential for each survivor, but the risk can be assessed and timely referral to a reproductive specialist is vital. There are COG guidelines and IGHG guidelines for women (66, 67) and men (68, 69) available to guide clinical decision-making.

Radiation-induced late effects
These affect the organs located in the irradiation field in a dose-dependent way (65). Examples include breast cancer screening after radiotherapy involving the chest, subsequent neoplasms and hormonal dysfunction after cranial radiotherapy, differentiated thyroid carcinoma after radiation to the thyroid gland or therapeutic 131I-MIBG (64, 70).

Treatment-related cardiotoxicity
Survivors exposed to anthracyclines (daunorubicin, doxorubicin, mitoxantrone, idarubicin, epirubicin) and/or chest radiotherapy are at risk of cardiomyopathy and other cardiovascular events (arrhythmia, hypertension, valvular disease, coronary artery disease, etc.). Regular screening in a risk-stratified approach is recommended by IGHG and COG (64, 65).

Growth and endocrine toxicity
All childhood cancer survivors should undergo a physical examination and overall wellbeing assessment annually at each LTFU consultation. Their height and weight should be measured and plotted on appropriate WHO growth charts until they reach final height (64, 65). At the start of LTFU care, each survivor should have their pubertal and nutritional status assessed, documented, and tracked.

Survivors at highest risk of growth hormone deficiency are those who were treated before reaching adult height, received radiation to the brain or spine (especially doses >30 Gy), total body irradiation (TBI) and brain surgery, particularly to the suprasellar region (71). For all these children growth must

be monitored at regular intervals. If a child demonstrates impaired growth velocity, they should be referred to a paediatric endocrinologist for full hypothalamic-pituitary axis assessment.

Survivors who have received radiotherapy to the neck, spine, brain, TBI or those who have received high doses of MIBG should have their thyroid function (TSH, T4) checked along with neck palpation after treatment completion and at least annually thereafter for life, since thyroid problems typically occur many years later. Female survivors at risk of thyroid problems should be informed and educated about the need for close monitoring before and during pregnancy (65, 72).

Depending on the treatment received, deficiencies in aspects of the endocrine axis other than growth hormone and thyroid function can occur and need to be monitored.

Metabolic syndrome
Survivors of childhood cancer, particularly those who have been treated with high doses of steroids (e.g., acute lymphoblastic leukaemia), irradiation of the pancreas, heart, or carotid region, are at higher risk of cardiovascular complications and the development of metabolic syndrome. Education and empowerment should be given to these survivors concurrently with their LTFU care regarding a healthy lifestyle, which includes avoiding additional risk factors such as smoking. The typical features of a raised BMI may not be present in this group, particularly if their treatment involved a bone marrow transplant (65). An IGHG recommendation is under development.

Second cancers
Depending on the treatment received, especially after radiotherapy, childhood cancer survivors are at increased lifelong risk of developing a subsequent primary cancer. Therefore, education is crucial, along with a high index of suspicion and lower threshold for investigation by HCPs.

6.6 Psychosocial functioning

Nearly one third of survivors and their families report personal, family, and social difficulties affecting self-esteem, interpersonal relationships, academic achievement, and employment. Nevertheless, these psychosocial late effects are often less recognised. History of a brain tumour, CNS-directed therapy, and radiotherapy are known risk factors for poor psychosocial outcomes.

Mental health problems
Many survivors describe psychological wellbeing as more important than physical QoL. They experience emotional isolation, adjustment difficulties, and distress, not only during active treatment, but often after they return to normal life. Survivors suffer lower psychological wellbeing, heightened behavioural problems, anxiety and depression, and some significant post-traumatic stress symptoms, even suicidal ideation.

Neurocognitive deficits
Deficits such as attention and memory deficit, perceptual organisation, etc. predominantly affect survivors of brain tumours and those who received cranial irradiation or intrathecal methotrexate, including treatment for acute lymphoblastic leukaemia (64). An IGHG recommendation is under development. Regular neuropsychological screening is thus crucial to monitor these late effects, which may occur at any time after treatment (29). Emotional components such as fear, gratitude, and gaining a positive perspective could influence not only everyday QoL, but also adherence to LTFU care and transition to adult care.

Cancer-related fatigue
This is an issue even years after completion of treatment, with a negative impact on many aspects of life. Periodic longitudinal screening with history-taking and fatigue-scale assessment is recommended. Although effective treatment options are limited, education, physical activity, adventure-based interventions, and relaxation may be of some help (30)
→ SEE CHAPTER 3.2.

Wellbeing
For all childhood cancer survivors, LTFU consultations give the opportunity to advocate for healthy living. The importance of following a healthy diet, engaging in physical exercise, maintaining a healthy weight, not smoking, avoiding recreational drugs, sleeping well, and managing stress should be discussed and emphasised.

Social, employment and educational difficulties
Long-term QoL for survivors is indicated by educational achievements and employment outcomes. Survivors, especially those with CNS tumours, are at risk of academic difficulties, failure to obtain college/university degrees, and unemployment. Therefore, recurrent exploration and discussion at LTFU consultations about the survivors' educational and employment situation is advocated. Monitoring of educational outcomes should begin at diagnosis and continue through LTFU until education is completed. Vocational planning and employment monitoring should begin in adolescence and be emphasised at transition to adult services.

For survivors who report problems, input from psychologists, social workers, educational specialists and/or disability services is required. Special educational programmes, vocational training and job placement assistance can minimise disparities. But, even in the presence of the risk factors and the many difficulties survivors go through, most of them will experience a successful schooling career and professional life.

6.7 Legislative initiatives

Many survivors still face socioeconomic discrimination due to their prior illness. For example, access to financial services (i.e. mortgages, loans, life or travel insurances) can be challenging. Therefore, some countries have adopted a specific legislative Right to be Forgotten initiative, as a successful practice to avoid the risk of discrimination for cancer survivors. This law dictates that after a certain period of time survivors do not need to declare their disease and consequently have the opportunity to access financial services. This is an area in need of refinement and European survivor groups are actively campaigning for legislative support across Europe. Special programmes, with support from politicians and focused on complete social and professional reintegration of survivors to society, should be launched by all EU countries. Written information regarding socioeconomic problems available at the healthcare centres or patient organisations, especially during the transition process, along with open discussions would be most beneficial.

6.8 Novel agents

Today, evidence is lacking on late effects after treatment with novel agents (i.e. imatinib, blinatumomab, dinutuximab, etc.). Therefore, LTFU of survivors treated with these novel agents is needed, not only to determine their effectiveness and toxicity, but also to assess the potential late effects. Research studies are instrumental for this knowledge.

6.9 Conclusion

Paediatric oncologists should not only focus on improving survival, but also on reducing the risk of late effects and enhancing the quality of survival. Continuous monitoring and management of late effects across the childhood survivors' lifespan is of utmost importance. Care should be multidisciplinary, coordinated, accessible, and open to change throughout the different ages with a holistic approach. Survivors and HCPs must be educated on survivorship issues, their unique health risks, health promotion, and early intervention strategies. Excellent communication and collaboration between disciplines and international groups (such as SIOPE, PanCare, CCI-E) is fundamental to strengthening standardisation of practice and ensuring this unique group optimise their long-term health and achieve their maximum potential. Guidelines will be updated regularly with continuous review of latest evidence.

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7. Role of Patient Representatives and Advocates

Key messages

- Childhood cancer advocacy requires a multidisciplinary approach and strong partnerships with all stakeholders.
- Parents/Caregivers, patients, survivors, and patient organisation representatives can act as patient advocates.
- Patient advocates can significantly contribute to all stages: diagnosis, active treatment, and maintenance therapy; follow-up care; cross-border care; national and international regulations and legislation; research and innovation.
- Patient organisations are patient-focused, not-for-profit organisations that focus on capacity building and education for patients and families, providing peer support, contributing to research and development, and influencing policy.
- The diverse cultural, political, and economic background across European countries translates into different challenges that necessitate tailored advocacy efforts to address specific needs relating to supporting families and bringing about change.

7.1 Patient advocacy in the field of childhood cancer

Patient advocacy in the healthcare system means to improve access to better healthcare, and provide support to patients, parents/caregivers, and survivors to express their views and wishes, and stand up for their rights. The role of patient advocates in policy and advocacy includes, but is not limited to, providing the perspective of patients, parents, and survivors, sharing their lived expertise, ensuring they are well represented in the systems, and defending their rights by safeguarding privacy, confidentiality, and access to informed consent. Patient advocates are persons who have the insight and experience to support a larger population of patients living with a specific disease (73). Usually, these are parents, survivors, and professionals who work as patient organisation representatives. There are dedicated training programmes available for patient advocates to enhance their skills and expertise → SEE CHAPTER 11.7.

In the field of childhood cancer, the role of advocacy and patient advocates is very important as it offers the opportunity to patients and parents to bring together their united voice and perspectives based on their experiences and knowledge, and share these for the benefit of all patients and the entire healthcare system. Patient advocates do this by engaging in various healthcare-related forums and public discussions, and raising awareness, by talking to policymakers and regulators, and working with HCPs and other experts in the field of childhood cancer.

Childhood cancer patient advocacy requires a multidisciplinary approach and strong partnerships with all stakeholders. Its primary goals include:

Patient advocates are persons who have the insight and experience to support a larger population of patients living with a specific disease.

- Raising awareness—Increasing public awareness about the impact of childhood cancer on patients and their families (e.g., by disseminating information about childhood cancer types, treatment modalities, importance of early detection, emotional and socio-economic obstacles faced by families and patients).

- Promoting research and funding—Expending efforts that often focus on advocating for increased funding for childhood cancer research and care (e.g., supporting initiatives to develop innovative treatments, improve diagnostics, enhance overall understanding of paediatric oncology), but also meaningfully engaging in research projects (80).

- Improving access to care—Ensuring that children and adolescents with cancer receive timely and appropriate medical care, including access to specialised treatment centres, clinical trials, and supportive psychological and palliative care services.

- Supporting families—Undertaking initiatives that provide emotional support, resources, and assistance to families dealing with childhood cancer. This could include support groups, financial assistance programmes, and educational resources.

- Influencing policies—Engaging with policymakers on a local, national, and international level, to contribute and participate in shaping, introducing, and implementing policies that ensure sustainable resources that will improve the quality of care, research, and access to treatment for children and adolescents with cancer.

- Empowering patients and families—Empowering patients, families, and caregivers to become informed advocates for the patient's health (e.g., by providing appropriate information about treatment options, patient rights, ways to navigate the healthcare system).

- Fostering collaboration—Ensuring patients, parents, and survivors work together with HCPs, researchers, and government agencies to create a unified front in addressing childhood cancer challenges.

7.2 Patient organisations and their role

Patient organisations are patient-focused, not-for-profit organisations. In these organisations, patients, survivors, and/or caregivers (the latter when patients are unable to represent themselves) constitute the majority of members in the governing bodies. They are unique amongst civil society organisations because of the duality in focus and membership. Whereas NGOs in other areas work on behalf of a wider constituency or society, members of patient organisations are very often patients/survivors, their caregivers or other relatives themselves, often working on a voluntary basis. Many patient organisations adhere to guidelines or principles which make them valued and recognised as trusted partners. In particular, the European Patients' Forum defines five criteria which ensure that a certain organisation is "bona fide" (https://www.eu-patient.eu/members/what-is-a-patient-organisation/).

Strong and successful organisations working in the childhood cancer field usually start from groups of committed parents, survivors, or other specialists related to children and adolescents with cancer. These groups mobilise their networks and resources to advocate for change, as well as best-practice and comprehensive treatment and care. Some of the organisations fill gaps in the healthcare system and fund services which would otherwise not be provided (e.g., providing psychosocial support, improving hospital environment, building parent houses, fundraising for certain medications, clinical trials, and specific tests, ensuring social support, helping families get legal consultations, etc.). Other organisations advocate for the rights of children and families, and for improving health policies. Some organisations focus on the local or regional level, while others are active on a national, European, or international level. As independent bodies, such organisations are very active, useful, and impactful at the political level when advocacy is needed for reviewing legislation, changing regulations, fighting for better treatment, improving the healthcare environment, and providing social support (76).

7.3 Patient advocacy at all stages

When it comes to childhood cancer, there are needs and issues all families and patients face. However, the diverse cultural, political, and economic background across European countries results in different national challenges. These varying challenges necessitate tailored advocacy efforts to address specific needs. As a result, there is a wide array of advocacy practices on a local, national, regional, and European level.

7.3.1 Diagnosis, active treatment, and maintenance therapy

Parent/Patient organisations have a crucial role at this first stage. Important advocacy initiatives include the child's right to be with their parents in the hospital, as well as ensuring access to education during treatment and access to information regarding disease and process of treatment, or ensuring pain management and palliative care. Patient organisations working closely with hospitals, HCPs, and patients can properly identify and focus on the specific issues families and patients face in their country and local setting (77). Patient organisations also contribute to improving the healthcare system and meeting needs when the government does not (e.g., improving hospital living conditions, tackling drug shortages, providing psychological and social support, covering for staffing shortages, funding training programmes for HCPs, and donating hospital equipment, medications, and consumables).

7.3.2 Long-term follow-up (LTFU) care

LTFU care is implemented differently across Europe. Well organised LTFU care is crucial for the wellbeing of survivors. Establishing follow-up care programmes requires mutual efforts from all stakeholders, including patient advocates, HCPs, treatment institutions, parents, survivors, and patient organisations.

7.3.3 Cross-border healthcare

Cross-border healthcare can provide better access to standard care treatment for all children and adolescents with cancer, yet it is a complex process affecting many sectors. It requires precise medical expertise, good legislation, financial provision, and adequate partnership among different clinics. In light of this, all interested parties have a role in the proper organisation of this process and must actively participate in its implementation. All patient advocates should work together to refine the criteria and procedures for accessing cross-border healthcare. ERN PaedCan is a good example of how cooperation among all stakeholders can improve access and reduce inequalities → SEE CHAPTER 10.

7.3.4 National and international regulations and legislation

Advocacy through representation and mobilisation enables patients and their representatives to be agents of change in political and practical discourse. This is already acknowledged by policymakers at EU institutions and the World Health Organization (WHO) Europe, explicitly calling for more patient involvement. The European Commission's White Paper "Together for Health: A Strategic Approach for the EU 2008–2013" highlights that the participation and empowerment of citizens and patients must be recognised as a core value in all health-related work at the EU level. Building on this work, community health policy must take citizens' and patients' rights as a key starting point, including participation in and influence on decision-making and competences needed for wellbeing, as well as health literacy (78).

Patient advocates can be active partners and contribute significantly to policymaking as they:

- Understand patient priorities and experience.
- Advocate for the perspective of end-users in health services design.
- Channel the voice of patients consistently in a "Health in All Policies" approach.
- Can contribute to policy development at all stages.

To better promote and stand for patients' rights, patient advocates can join forces and build integrated networks of HCPs, patients, parents, and survivors. When it comes to revising and improving regulations and legislation, joint advocacy—on a national or international level—helps with:

- Collecting, managing, and analysing data, and disseminating knowledge, enabling better access to clinical trials and implementation of international guidelines.
- Securing financial support for research and treatment.
- Developing good practices and fighting for them to be implemented and funded by governments.
- Improving the legal framework to provide for unmet medical needs, developing and maintaining childhood cancer registries, improving access to essential and novel anticancer medicines, ensuring early start for the development of paediatric medicines and first-in-child innovation, fostering cross-border treatment, etc. (79).

7.3.5 Research and development: health & pharmaceuticals

Patient advocates also contribute in multiple ways when it comes to research and development. They can be active research partners, partly through data collection, help navigate regulatory processes, assist in fundraising and financing for research, and raise research issues that are relevant to the patient community. They can further engage in co-designing, developing, applying, and monitoring disruptive innovations for healthcare.

This active role in research can be achieved by implementing the concept of Patient and Public Involvement and Engagement (PPIE) in Research, which was developed by the UK National Institute for Health Research to describe research carried out "with" or "by" members of the public rather than "to", "about" or "for" them (80). The goal is to empower patients so they can actively contribute through their lived experience and knowledge. Apart from the individual patients/caregivers and patient advocates, PPIE also includes patient experts. These are

The goal is to empower patients so they can actively contribute through their lived experience and knowledge.

former patients/caregivers who, in addition to disease-specific expertise, also have technical knowledge in research and development, and/or regulatory affairs through training or experience (73). When discussing childhood cancer, PPIE could be further defined as Patient and Parent Involvement and Engagement, since many of the patient advocates and patient experts are parents of children with cancer (75).

PPIE allows for three different ways to be involved:
(a) participation, i.e. taking part in studies or clinical trials as study subjects, either directly or indirectly through questionnaires, etc., (b) engagement, i.e. disseminating information and knowledge about research, and (c) involvement, i.e. establishing an active partnership between researchers and patient experts, where the latter are full members of the care and research process, from jointly defining research questions to disseminating the results of the collaborative research (80).

It has been shown that PPIE brings multiple benefits (75):
- Improves the translatability of research findings.
- Increases recruitment into studies.
- Ensures that the focus of any research question, trial design, and dissemination of results is patient- and family-centred.

The involvement of patient advocates in the early stages of research and development should be encouraged.

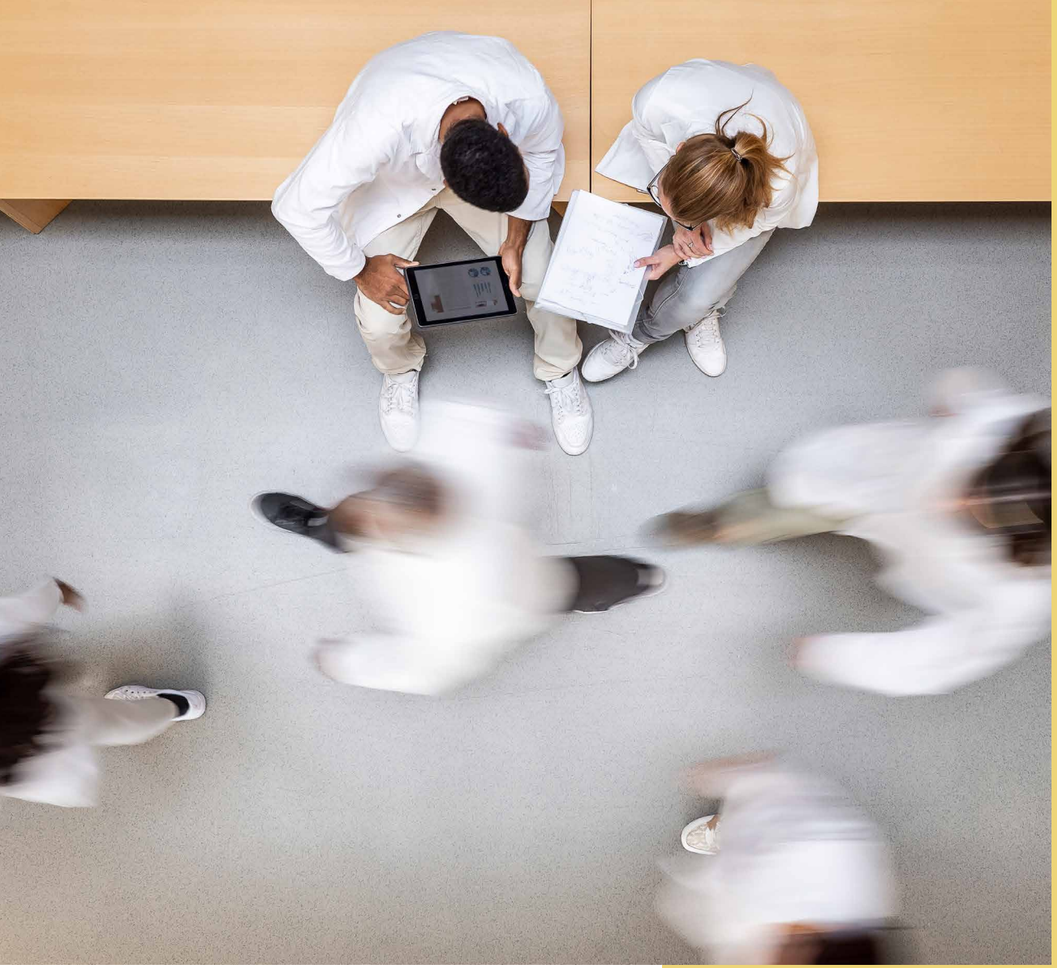
7.4 Joint advocacy in action: Examples of successful collaborations among stakeholders

On a broader European scale, the partnership between CCI-E and SIOPE stands as an excellent illustration of fruitful cooperation, uniting all stakeholders in a pan-European endeavour.

Besides this project to revise the European Standard of Care, several other European projects are dedicated to enhancing treatment and quality of care:
- ERN PaedCan
- OCEAN (Organisation of Care & rEsearch for children with cANcer in Europe)
- EU-CAYAS-NET
- PanCareSurPass
- PanCareFollowUp
- ExPO-r-Net (European Expert Paediatric Oncology Reference Network for Diagnostics and Treatment)
- ACCELERATE (Platform for European Cancer Research)
- ALADDIN

These projects, among numerous others, flourish through close collaboration among patient organisations, HCPs, and academia.

The European Commission's public consultations serve as a successful model for involving patient advocates in policy, law-making, and qualitative changes, and also for implementing a "Health in All Policies" approach, which seeks to create a more holistic and comprehensive understanding of health and to ensure that policies are aligned to support healthier communities and populations.



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8. National Organisation of Networks among Paediatric Oncology Centres

Key messages

- Dedicated, comprehensive childhood cancer infrastructure with shared care should be the goal, considering the national circumstances of a country.
- Within the country, collaboration, exchange, and sharing resources among paediatric oncology centres is crucial and must be strengthened.
- Equal access to innovation, in the home country or abroad, should be guaranteed.
- The gap between the discovery of tumour drivers and the development of potential targeting agents should be addressed, and preclinical models and collaboration should be prioritised.
- A standardisation of care and accreditation of centres providing care to children and adolescents with cancer is warranted.

8.1 Organisation of paediatric oncology on a national level

All types of childhood cancer are rare and for most of them different protocols and treatment strategies exist based on staging, histology, molecular features, and early response to treatment. These aspects and the resulting heterogeneity highly contribute to the complexity of managing children and adolescents with cancer, which can only be delivered through multidisciplinary efforts → SEE CHAPTER 1. The teams dedicated to these patients must be able to gain and maintain up-to-date knowledge and the skills necessary for the treatment of the various types of childhood cancer. Both the complexity and the rarity of childhood cancer challenge the possibility to optimise the quality of care and, therefore, result in the need for dedicated national paediatric oncology centres.

Most European countries have a National Paediatric Haematology and Oncology Society (NaPHOS). The overarching aim of these societies is to pool together all paediatric haematologists, oncologists, and other HCPs working in paediatric oncology. The tasks of the national societies are partially different, but often include developing and maintaining national guidelines or introducing international ones, assigning special treatment modalities (e.g., haematopoietic stem cell transplantation, immunotherapeutic strategies, early phase trials) to selected centres, or structuring detailed educational paths. All European countries have been strongly encouraged to establish a NaPHOS to serve as a common national platform.

Centralisation of care reflects the process of concentrating treatment and decision-making to a group or institution. However, it is crucial to mention that centralisation does not per se refer to the entire spectrum of caring for children and adolescents with cancer but often relates to parts of the treatment (e.g., surgery). It this context, it is more appropriate to refer to them as dedicated comprehensive childhood cancer infrastructures with shared care.

The centralisation of care for complex, rare, or ultra-rare diseases allows to bring together the expertise and the experts to treat these patients, and to increase their knowledge and experience

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The centralisation of care for complex, rare, or ultra-rare diseases allows to bring together the expertise and the experts to treat these patients, and to increase their knowledge and experience, which results in improved clinical outcomes. Centralisation of care further facilitates and enables access to new treatment modalities and trials which cannot be opened in every single centre, results in reduced bureaucratic procedures for the implementation of new treatment protocols, and improves opportunities for training and education. It further leads to an increase in patient numbers with a certain type of cancer.

According to a recent systematic review on quality criteria in paediatric oncology, only few national strategies and publications investigated patient number per centre (8). According to Knops et al., higher volume centres, higher case volume providers, and dedicated centres are associated with better outcomes in paediatric oncology (81). The volume effect seems to be more evident for tumours requiring surgery. Conversely, Wilkes et al. investigated the association between low case volume and mortality or intensive care unit admission in paediatric acute lymphoblastic leukaemia patients and did not report an association between lower numbers and higher mortality or admission rates (82). Similarly, Wolff et al. could not demonstrate a difference in survival rates observed in bigger and smaller centres for paediatric neuro-oncology patients (83).

Today, no uniform minimum or cut-off number for paediatric cancer patients per centre exists and cited numbers have historically grown. Most probably the volume number itself has an impact on treatment outcome, but it is important to consider additional quality parameters too (8). The use and implementation of quality parameters allow monitoring the quality of care in separate centres over time, but also

comparing the quality between centres (8). Both aspects likely contribute to the improvement of care and the use of such parameters is encouraged. Further information on quality parameters can be found in Chapter 1.

Even though centralisation of care or part of it should be the goal, there is no one-size fits all rule. In some countries centralisation resulted, or might result in the future, in one main centre of excellence. Such a strong centralisation of care might be easier to achieve in geographically smaller countries. In larger countries, where large travel distances usually put additional burdens on patients and families, centralisation of care will unavoidably need more than one centre.

However, selected and very special treatment modalities should be centralised (e.g., haematopoietic stem cell transplantation, neurosurgery, orthopaedic tumour surgery, early phase trials). Once the primary treatment or surgery is completed, some less complex components of treatment, supportive care, monitoring, or maintenance chemotherapy could be provided closer to the patients' home, at designated hospitals, in continuous communication with the dedicated centre. In such cases, standards should be pre-emptively defined, and a quality assurance process should be in place. Nonetheless, proximity to healthcare services should not compromise a patient's chance to receive the best possible treatment and care.

8.2 National and resulting international network to access novel therapies

Over the last 20 years, the European Innovative Therapies for Children with Cancer (ITCC) consortium has established a network of expertise for conducting early phase trials evaluating novel therapies for children with cancer (84). Since paediatric tumours are biologically distinct and not completely overlapping with tumours in adults, it is important not only to test novel therapies developed in the adult setting, but to develop first-in-child anticancer therapies. Moreover, there is a need for the development of child-friendly drug formulations (e.g., tablets with lower doses, liquid formulations) and to assess long-term safety data with regard to growth and development (84).

Before tackling the child-friendly drug formulation, the issue of preclinical studies has to be tackled. Identifying the most promising novel agents for early phase clinical trials is highly dependent on a strong setup for preclinical evaluation in paediatric models such as cell lines and xenografts. This should be prioritised and expanded with multi-stakeholder collaborative efforts between the biopharmaceutical industry, academia, and governmental bodies (85).

Since paediatric tumours are biologically distinct and not completely overlapping with tumours in adults, it is important to develop first-in-child anticancer therapies.

In addition, the increasing possibilities in molecular and genetic characterisation of cancer subtypes requires more targeted treatment strategies and results in more patients with conditions eligible for a specific trial. Most trials with new medicines, where only few children and adolescents will be eligible, cannot open in every centre treating children

and adolescents with cancer. Consequently, collaboration between centres and trial inclusion in ITCC centres is mandatory, resulting in patient referral within or across countries.

ITCC is currently available at 62 sites in 17 European countries. Therefore, within- and cross-country mobility of patients is key to providing access to innovative therapies for each child or adolescent with a relapsed/refractory or high-risk malignancy (https://www.itcc-consortium.org/). Each ITCC centre has been selected based on its skills, expertise, and capacity to run early phase trials.

In addition to innovative therapies for children and adolescents with relapsed/refractory or high-risk malignancies, we are still facing an unmet need for less toxic therapies, emphasising the need for continued and expanded collaboration within this field (86).

8.3 Accreditation

There is no common European accreditation process for centres providing care to children and adolescents with cancer today. In some countries, an accreditation process managed by an adult oncology society is possible and also applicable in other countries with the same language (e.g., certification from the German Cancer Society may apply in other German-speaking countries). Such a certification needs standardised quality criteria that meet the needs of children and adolescents with cancer and should not simply be taken from the adult system.

A systematic review summarises the currently published quality criteria for children and adolescents with cancer in the following overarching categories: 1) facilities and networks, 2) multidisciplinary team and other experts, 3) supportive care, 4) treatment, 5) long-term care, and 6) volume and numbers (8).

In addition, certifications exist within specific areas of expertise for paediatric cancer: e.g., certification programme for excellence in supportive care by the Multinational Association of Supportive Care in Cancer; and certification of centres for excellence in nursing by the American Nursing Credentialing Center (ANCC) Magnet Recognition Program®.

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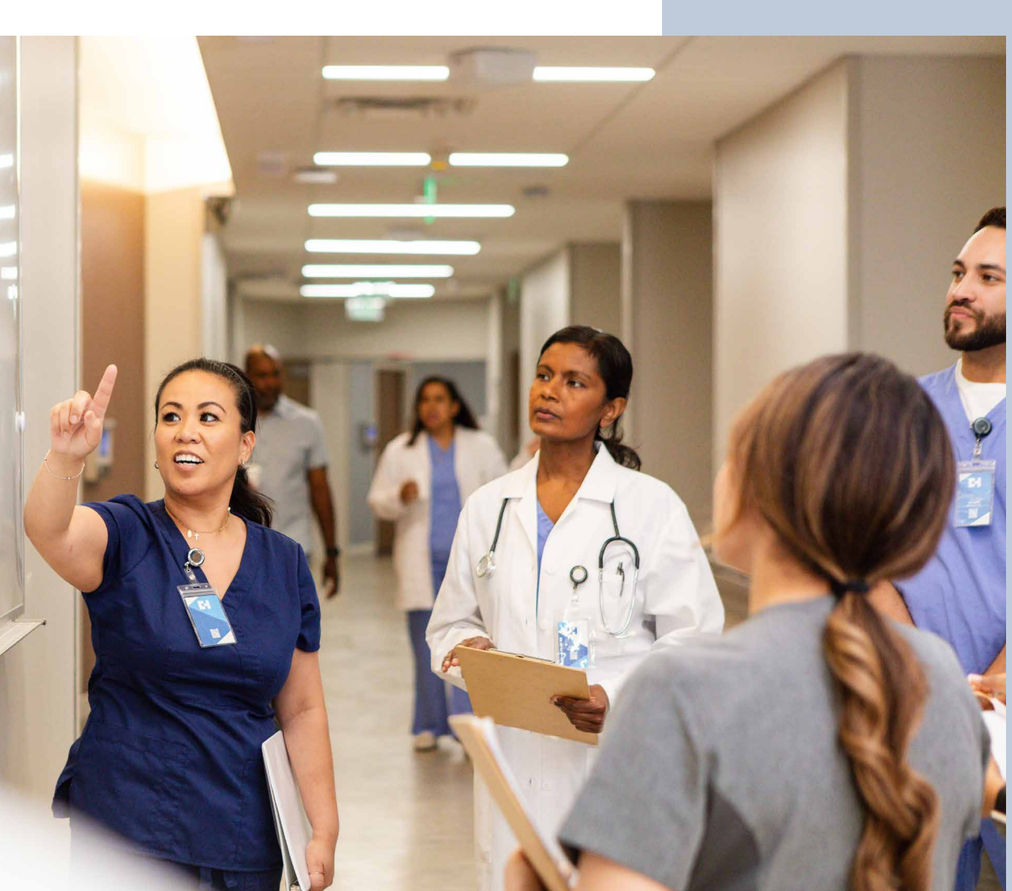

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9. Paediatric Oncology on a National Level

Key messages

- All paediatric haemato-oncology centres must fulfil national standards or certification.
- All European countries should establish a national paediatric oncology society.
- A national paediatric haematology and oncology society should promote educational and clinical goals for the entire interdisciplinary team.
- National collaboration of parents, survivors, patient associations, and any other NGOs involved in childhood cancer together with NaPHOS should be established.
- A national childhood cancer plan must be developed, adopted, and implemented in each country.
- A cancer national registry should be established to collect the data of children and adolescents with cancer.

9.1 Introduction

The low number of children and adolescents with cancer in combination with the diversity of these malignancies underlines the importance of cooperation on a national level. Therefore, all paediatric oncology centres must fulfil the same national standards, mentioned in Chapter 8. This collaboration on a national setting can be carried out in different ways. Initially, the establishment of a national paediatric hematologic and oncologic society should be the minimum requirement in each country. Several benefits can stem from an active society in this field, such as better training for young oncologists and discussion of important cases at national tumour boards. Moreover, a national childhood cancer plan must be established and implemented. Its role is crucial to defining and visualising the essential changes to and goals of the healthcare system in paediatric oncology. Additionally, national cancer registries should be used to collect data from new cases of childhood and adolescent cancer. These points are the milestones for efficient collaboration on a national level.

9.2 Paediatric haemato-oncology societies

National Paediatric Haemato-Oncology Societies or groups (NaPHOS) exist in most European countries. The aim of these societies is to improve the care provided to children and adolescents with cancer, elevate research in this field, support education, and foster advocacy. There are several aspects that must be considered for a structured and productive national society.

The aim of these societies is to improve the care provided to children and adolescents with cancer, elevate research in this field, support education, and foster advocacy.

Membership in Paediatric Haematology and Oncology (PHO) societies should be open to paediatric oncologists, nurses with experience in paediatric oncology, and other HCPs working in this field. Moreover, a well-defined structure is essential. The chair should be an experienced paediatric haemato-oncologist and should be supported by a steering committee, which should consist of people with experience as well as motivation. The crucial role of nurses and other HCPs must be represented in the society and their active participation is highly encouraged. For example, study nurses have a great role in clinical trials and their experience can be beneficial in several projects of the societies (i.e. educational seminars). The importance of communication among the members of the society is the key to success and can be feasible if representatives of all the interested stakeholders have an active role in the society.

The PHO society should offer easy access to all activities and upcoming events for all members. Most of the national societies have accessible websites offering this information. Moreover, annual meetings should form an integral part of the societies, to

give members the opportunity to interact, present challenging cases and results of experimental or clinical trials, and provide information about the current status of ongoing or upcoming clinical trials. Furthermore, virtual meetings could be also hosted for resolving possible issues in clinical practice or coordinating problems on the national level.

Active and motivated young physicians should be encouraged to take initiatives on the national level, under the supervision and support of senior members. Young groups are increasingly represented in European countries. Participating in a group of young paediatric haemato-oncologists enables the young members to share common thoughts and problems. Moreover, this can lead to innovative initiatives and projects. Participation of young members in SIOPE leads to interaction with colleagues on the European level (i.e. in courses and conferences). Education is also an important topic for the national societies, also focusing on specific national aspects. Training on a broader spectrum and on important topics, independent of the country, is also a pillar of SIOPE → SEE CHAPTER 11. Young physicians who participate in conferences, seminars or fellowship programmes abroad are highly encouraged to share their knowledge in their institution after completing such programmes.

9.3 Collaboration among patient organisations and NGOs on a national level

Parent, survivor, and patient associations, as well as any other NGOs involved in childhood cancer should make all efforts to collaborate on a national level. This is especially true when they share common goals in terms of policy-making, research and innovation, or other topics.

Having an umbrella entity, which will speak on behalf of everyone, is recommended. Such an umbrella organisation, but also individual parent, survivor, and patient organisations, on one hand, and PHO societies on the other, should also collaborate at the highest possible level. Through this collaboration they can jointly work on projects and proposals, and have a stronger and more unified voice when pursuing changes in policies, laws, and regulations, and reaching out to government officials and other stakeholders.

9.4 National childhood cancer plan

With the remarkable success in improving the childhood cancer cure rate, and taking into account inequalities and different access to healthcare and medicines, there is a growing need to include paediatric haematology and oncology in the national cancer control plans (NCCP). According to CCI-E and SIOPE surveys, childhood cancer is addressed in national cancer plans or equivalent policy documents in 60–70% of European countries.

The NCCP project by SIOPE was launched in 2022 and aimed to map childhood cancer content in all national cancer control plans. The project further aimed to perform a content analysis of the existing NCCPs (87). Considering the differences among countries, three domains were chosen for further analysis, each aspect was explained, and guidelines were given on how to proceed with the goal of progress.

The first domain is healthcare organisation and quality. Establishing early diagnosis is of utmost importance and the PHO society should raise awareness among the population about the respective symptoms. Treatment should be delivered according to evidence-based medicine and, ideally, centralised care should be implemented, aiming to equalise the level of care at a regional level. Long-term effects and survivorship care, as well as transition to adulthood services and adolescent and young-adult (AYA) care should be included in the NCCP.

The second domain is supportive care and patient needs. It is of crucial importance to consider rehabilitation, psychosocial care, and palliative care → SEE CHAPTERS 3 AND 4. A holistic approach to paediatric patients and their families, including social protection and integration to normal life after treatment, is an important topic, which should be discussed on the national level and introduce guidelines according to resources and possibilities in each country. This domain is often underestimated and that should change.

The third domain includes research, innovation, and data. Inequalities in healthcare availability and access to medications and innovative diagnostics are a major issue in Europe. It is necessary to place it at the top of the priority list. Legislation to participate in clinical trials and administrative burden are sometimes exhausted, and countries with smaller populations cannot not successfully participate. Precision medicine and genetic counselling should be developed and national platforms created, with the aim of implementing preventive programmes to increase diagnostic control of children in risk groups. Data availability, digitalisation, and cancer registries are important in improving quality control of paediatric cancer.

Taking into account inequalities and different access to healthcare and medicines, there is a growing need to include paediatric haematology and oncology in the national cancer control plans

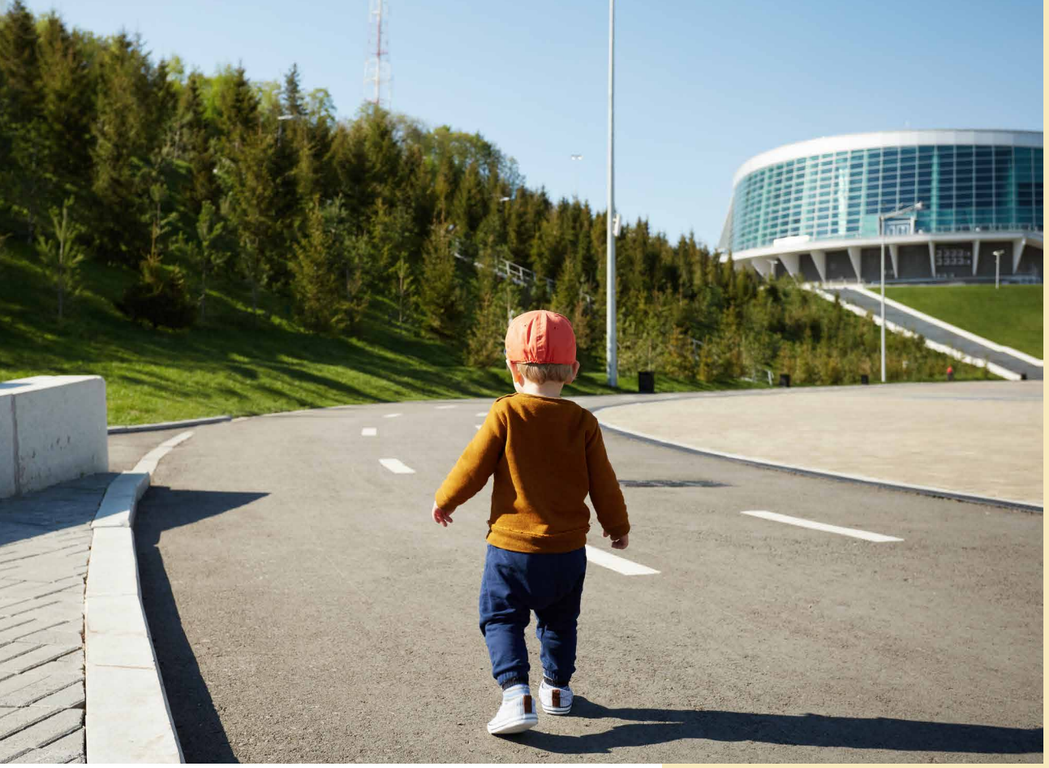
9.5 National cancer registries

The first international data about the incidence of childhood malignancies were published in 1988 (88). Proper collection of the data can only be achieved by using well-organised databases on the national level. Most European countries already have cancer registries in place. In some countries, more than one registry is used, which leads to a non-central collection of the cases. The aim of national cancer registries is to collect data for cancer control, including aetiology of cancer, evaluation of screening programmes, and monitoring of quality, cancer care, and outcomes, such as survival and relapse rates (89). These important goals demonstrate the necessity of registering all cases in these registries.

Once a national database is activated and used in a country, all paediatric oncology centres must be obligated to register their patients after receiving consent from the families. Moreover, the compliance of medical centres to clinical guidelines can be assessed. The national cancer registries could enable evaluation of the need for new treatments at population level and facilitate access to these treatments (e.g., new agents are often recommended for second- or third-line therapy and data about the stage of the disease could be used to evaluate accessibility to this medication in each country).

The national cancer registries could enable evaluation of the need for new treatments at population level and facilitate access to these treatments

A critical aspect of national cancer registries is documentation. To summarise the data of malignancies in childhood and adolescence on a European or international level, the collected information should be harmonised. For example, the classification of malignancies could be registered in many different ways. The WHO launched the 5th Edition of the Classification for paediatric tumours (90). In contrast, in some countries, such as Ukraine, childhood cancer cases are registered using the ICD-10 codes, whilst in others, such as Luxembourg, the registrations are aligned with the Toronto standards (91). Moreover, several aspects arise from the use of these data from a national to a European level. To harmonise data privacy laws across Europe, the European Data Protection Regulation was published and has been implemented since May 2018 (92).



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10. Cross-border Care and Research

Key messages

- Every child and adolescent with cancer has equal right to access state-of-the-art treatment and care.
- Collaboration and cross-border care is crucial in the treatment of children and adolescents with cancer, as not all treatment modalities can and need to be available in every European country, but every child must have access to all modalities.
- International initiatives, such as ERNPaedCan, can drive international collaboration forward.

10.1 Why cross-border care?

International collaboration in the care of children and adolescents with cancer has been a cornerstone in the ongoing development and improvement in paediatric oncology. As all types of cancer in children and adolescents are rare, cooperation across country borders has been crucial for gaining experience and pooling enough similar patients to study effects and outcomes of treatment.

Examples of the international collaboration include:

1) Developing treatment protocols (e.g., AIEOP-BFM protocols for acute lymphoblastic leukaemia, PNET 5 trial for medulloblastoma, INFORM registry to answer biological questions).
2) Researching new treatment modalities, medicines, and their outcomes (including acute toxicities and late effects).
3) Educating HCPs.
4) Providing advanced diagnostics.
5) Evaluating complex patients in expert tumour boards.
6) Providing highly specialised care (e.g., proton irradiation, CAR-T, experimental therapy).
7) Researching and collaborating on long-term follow-up care.

Every European country has a different way on how healthcare is organised and delivered. Regardless of the steady development in healthcare systems, there are major differences in access to diagnostic possibilities and treatment for children with cancer (93). As a result, disparities in survival rates exist among cancer units and among European countries, with up to 20% worse outcomes in Eastern Europe (94). Differences can be influenced by the countries' economic status, geography, number of citizens, and treatment funding (94, 95). Nevertheless, all children and adolescents with cancer should have access to fast diagnosis and the best care available.

To diagnose and treat rare diseases, including childhood cancer and especially the different subtypes, specific infrastructure is needed. Due to the low patient numbers, it is not realistic that every step of the path from diagnosis and treatment could and should be provided in every European country (e.g., proton therapy). Not only the infrastructure and machines need to be available but also trained personnel. Therefore, performing diagnostic steps or treatment abroad can be more economical than providing the care in their own country. Therefore, structuring an impactful and well-functioning international network is pivotal → SEE CHAPTER 8.2.

10.2 European Reference Network on Paediatric Cancer (ERN PaedCan)

European Reference Networks (ERNs) are a European Union initiative that intends to promote cooperation among national healthcare systems. The vision of ERN PaedCan is to reduce inequalities in childhood cancer survival by providing high-quality, accessible, and cost-effective cross-border healthcare, regardless of where in Europe the children and adolescents live. ERN PaedCan aims to bring together specialists across Europe and to facilitate exchange of expertise and knowledge. Some of the prioritised aims include holding virtual tumour boards where medical expertise and knowledge are exchanged rather than patients having to travel, providing guideline documents to HCPs, performing reference diagnostics (e.g., molecular risk grouping, pathology, and imaging), and providing patients access to highly specialised interventions (e.g., complex surgery, proton therapy, and transplantations).

ERN PaedCan aims to bring together specialists across Europe and to facilitate exchange of expertise and knowledge.

Member states can apply to the ERN PaedCan for funding to offer cross-border and highly specialised care to patients (www.paedcan.ern-net.eu).

10.3 Treatment processes and challenges

Travel decisions in medicine need clinical networks and referral pathways, which may include relationships between clinical centres when services are unavailable in a country (96). Although treatment abroad is offered as a possibility by local clinicians, patients or parents may choose not to travel. Cultural conditions, including language and the ability to communicate complex medical issues, are highlighted as a key concern during treatment. These aspects can be a barrier for treatment abroad. Continuity of care and sharing medical information are challenges during treatment. These key aspects must be considered during cross-border care, and a specific and detailed preparation plan between the clinics (clinic in home country and clinic abroad) is of utmost importance. In addition, the complexity of patients returning home after unsuccessful treatment abroad is another challenge. Parenting during oncological treatment abroad can be another challenge.

Travel decisions in medicine need clinical networks and referral pathways, which may include relationships between clinical centres when services are unavailable in a country.

One motivation for patients and parents to travel abroad includes second opinions on diagnosis and treatment (97). Access to treatments unavailable in the home country is another reason. These treatment modalities are either not approved despite being routinely available in other countries or they are experimental or early phase clinical trials.

Three travel possibilities can be identified:

1) individual travellers to treatment centres, drawing upon knowledge of acquaintances, family, and friends;
2) patients formally referred by their treating clinician and healthcare system (for both standard treatments and emerging technologies);
3) those who receive services abroad, typically screening, but for whom treatment is a less primary rationale for travel (97).

Importantly, cross-border care does not always imply that the patient travels abroad. Shipping tumour material for reference examination or having tests not available in the home country performed (e.g., molecular testing, drug testing) are also included in cross-border care. Participation in international tumour boards is part of cross-border care.

10.4 Patient safety, risk and outcomes

Given the time sensitivity of cancer treatment, avoiding local treatment while waiting for travel approval and regulations to continue treatment abroad is a challenge. Treatment disruptions due to travelling, delays during treatment abroad, but also the benefits to the new clinical situation can affect the outcomes negatively or positively. For some countries and centres, it is a challenge to establish long-term or short-term follow-up of patients returning to their home countries following treatment. Continuous exchange between the clinic in the home country and the clinic abroad that provided the care is crucial to gain long-term data and experience (96).

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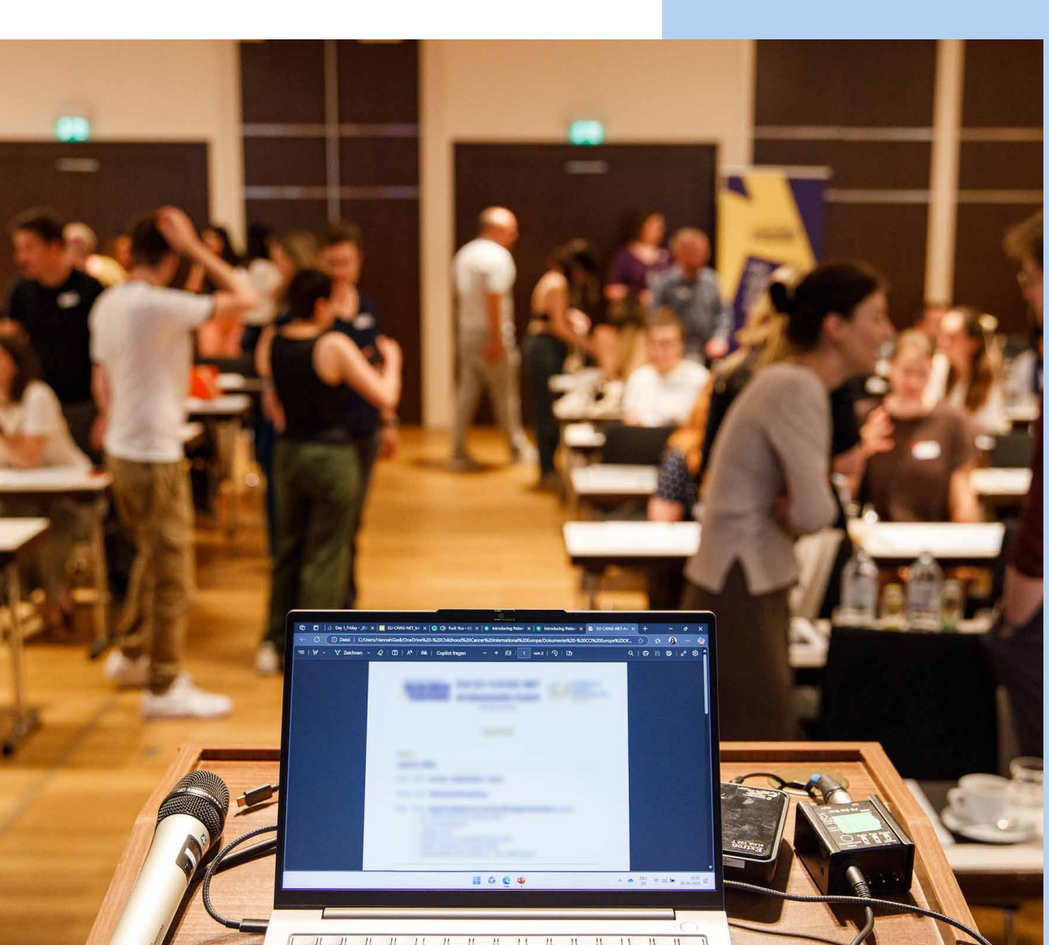

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11. Education and Training in Paediatric Oncology

Key messages

- All children should benefit from a continuing and flexible educational programme in the hospital or at home—it is essential that family, school, and hospital personnel work together.
- Caregivers should receive adequate information and nursing training to safely care for their child at home and adequate education to understand their child's diagnosis, treatment plan, and prognosis.
- Health care professionals and patient advocates must be subject to continuous professional development.

11.1 Educational priorities in paediatric oncology for healthcare professionals

Paediatric oncology is a challenging specialty that not only needs constant education and training, but also multidisciplinary approaches. Treating cancer in children needs to be secured by a multidisciplinary team that is made up of paediatric oncologists, surgeons, radio-oncologists, nurses specialising in paediatric cancer, clinical pharmacists specialising in paediatric oncology, radiologists, pathologists, psychologists, art and music therapists, nutritionists, social workers, and additional disciplines.

11.1.1 Educational requirements in paediatric oncology

The paediatric oncologist is the coordinating pillar of the oncological team. They perform the first consultation, establish the diagnosis, and lead the therapy with the multidisciplinary team. Thus, proper education with constant updating is mandatory. The aim of a training programme should be to form specialists that in time can diagnose and treat cancer in children and adolescents. The first step is to allow access to information and practical skills and the second to allow trainees to practice under supervision, which leads to the third step, i.e. practice paediatric oncology on their own.

Constant updating is of extreme importance to ensure evidence-based and state-of-the art diagnosis and treatment. Accumulation of knowledge should be adapted to the specific diseases. More so, contact with the proper multidisciplinary team should be individualised. Neuro-oncologists or oncologists treating mostly solid tumours need constant education in imaging, radiotherapy, and surgery techniques. Paediatric oncologists must keep contact with geneticists, and laboratory technicians.

Constant updating is of extreme importance to ensure evidence-based and state-of-the art diagnosis and treatment.

The SIOPE educational programme offers a variety of educational programmes for Young SIOPE members (www.siope.eu/activities/education or https://siope.eu/young-siope/).

11.1.2 Educational requirements in paediatric oncology surgery

Paediatric surgery includes surgical care of the growing individual, as well as management, perioperative care, and rehabilitation. Only paediatric surgeons with specific training in oncology may be able to achieve excellence and competence in this area. Due to multiple areas covered by paediatric surgery, even if surgical expertise exists, collaboration with surgical specialties that deal with special needs or rare diseases should be encouraged.

It is further important that surgeons have an understanding of non-surgical management of cancer, comparing surgical options to other local and systemic treatments approaches. According to the UEMS European Training Requirements (ETR) for paediatric surgery, trainees should demonstrate capacity in several areas. Especially in paediatric surgical oncology, trainees should be able to perform entrustable professional activities (EPAs) in procedures such as nephroblastoma, neuroblastoma and teratoma at a competent level (level 3) with indirect reactive supervision (i.e. the supervisor is readily available if necessary). Central review processes guided by the local management committees of the respective study groups are highly recommended to decide upon the best surgical approach in paediatric patients with cancer. Training must be provided by recognised establishments, or groups of establishments, capable of offering specific practice on paediatric oncological surgery in a multidisciplinary environment.

11.1.3 Educational requirements in paediatric radiation oncology

A training programme in radiation oncology should offer the trainee in-depth knowledge of the basic and clinical sciences of radiation oncology to achieve proficiency in this field. The main goal of this specialty is to develop management plans for patients, and implement a treatment strategy and a plan for survivorship. Central review processes guided by the local management committees of the respective study groups are highly recommended to decide upon the best radiation approach.

As per the ETR for radiation oncology supported by the UEMS, a trainee or fellow should be able to show a level 2 degree of proficiency in the area of paediatric and adolescent oncology. This level of competence assumes direct proactive supervision of the treatment technique by a supervisor. Fields included in these EPAs require knowledge of different tumours, e.g., central nervous system tumours, nephroblastoma, neuroblastoma, rhabdomyosarcomas, Ewing tumours, lymphoma, and leukaemia. The assessment system is designated by national societies in accordance with the legal requirements of each country.

11.1.4 Educational requirements in paediatric oncology nursing

The delivery of expert nursing care is crucial to achieving optimal outcomes for children with cancer. According to the WHO State of the World's Nursing Report, the most important actions needed are categorised into three spheres: investing in nursing education, creating new nursing jobs, and strengthening nursing leadership (99).

Specialised nursing education in paediatric oncology is vital for ensuring safe and high quality care, improving outcomes, and strengthening overall health services. Nurses require comprehensive training to effectively manage the complexities of paediatric cancer diagnosis, treatment, and care in diverse healthcare settings, including operating rooms and intensive care units. This entails acquiring knowledge in surgical procedures, radiation therapy techniques, paediatric pharmacology, pain management, palliative care, psychosocial support, and survivorship care. It is important to note that the educational requirements for nurses may vary across countries and healthcare systems. National societies and regulatory bodies play a crucial role in defining specific educational requirements and assessing nurses' competency in accordance with each country's legal requirements (100).

Nurse rotation, where nurses are moved between departments, poses a significant barrier to developing competence and expertise in paediatric oncology nursing. Dedicated paediatric oncology nurses are essential. They should have expertise in administering chemotherapy, monitoring side effects, managing oncology emergencies, and providing patient/family education. Arbitrary nurse rotation results in the loss of valuable knowledge and expertise, impedes retention, and poses a serious challenge, particularly during the current crisis of acute nursing shortages (100).

Collaboration with other HCPs and participation in dedicated training programmes are essential for nurses to meet the educational requirements and provide quality care to paediatric oncology patients. By addressing the gaps in dedicated nursing education and fostering collaboration, healthcare systems can better equip nurses to deliver optimal care and improve outcomes in paediatric haemato-oncology.

11.1.5 Educational requirements for psychosocial aspects (101, 102)

Children and adolescents with cancer and their families face a very difficult time at diagnosis, during therapy, during follow-up care, or at the end of life. An experienced psychologist who can provide constant support to families and patients is of utmost importance in the multidisciplinary team and should be involved in all important conversations of the medical team with the patients and parents.

Building on the respective profession-specific competencies, principles, and recommendations formulated in psychosocial guidelines, psychosocial professionals should be trained in communication skills (a) to support patients and caregivers in

complex conversations about diagnosis, prognosis, and treatment (e.g., “breaking bad news”); (b) to promote cooperation of patients and caregivers through developmentally appropriate psychoeducation about the disease as well as medical procedures; (c) to counter defence mechanisms such as denial, aggression or non-compliance through good conversation; and (d) to generally strengthen the communication skills of the family among themselves, but also of the entire team. Furthermore, they should be trained in crisis intervention and diagnostic skills, to be able to assess the psycho-social risk of patients and caregivers and to be able to initiate early intervention. This also implies differential diagnostic assessment between adequate stress and mental disorders. Training should also include specific cancer-related stresses and late effects, disease-specific intervention methods, and cross-cultural aspects.

11.1.6 Educational requirements in clinical pharmacy

Paediatric oncology patients receive very complex pharmacotherapy. Therefore, this requires in-depth pharmacological knowledge of the mechanism of action and adverse effects of conventional chemotherapy, immunotherapy, cellular therapy, and supportive care medicines.

Pharmacists must be trained to give advice on medication, which includes intravenous compatibility data of drugs, interpretation of pharmacokinetic and pharmacodynamic drug-drug interactions, and therapeutic drug monitoring. Other examples include resolving issues on how to administer drugs via feeding tubes, compounding suitable formulations and dosages adapted to the child’s age or clinical condition when no commercial alternative is available, promoting cost-effective use of medicines, developing and implementing guidelines for pharmacotherapy and supportive care, and educating patients and staff members. In addition, they must be trained to use pharmacovigilance systems and to identify adverse drug reactions and counter them. Furthermore, pharmacists are ideally positioned to be involved in research and clinical trials, where they could bring added value on the perspective of medicines and even undertake the leading research roles.

In Europe, there is no formal or recognised educational programme for paediatric oncology pharmacists, nor for paediatric pharmacists. In most European countries, education and training of paediatric oncology pharmacists is part of basic education (although not taught in all universities or hospitals, and most often only very limited) and training as a clinical or hospital pharmacist, or is based on in-house training by a senior pharmacist colleague. Educational initiatives of national or European oncology pharmacy organisations (e.g., the European Society of Oncology Pharmacy Global), with focus on paediatric oncology and the attendance of conferences with paediatric oncology topics, are an added value in the field. Networking with pharmacist organisations also provides an important platform to share knowledge, especially as not many pharmacists are specialised in the field of paediatric oncology, compared to adult services.

However, what pharmacists require is a distinct educational programme, an official academic specialisation in paediatric oncology, and being part of the multidisciplinary teams. All these aspects could lead to harmonisation and standardisation of educational aspects and practice by aiming to enhance the quality of pharmaceutical services, which would improve the care and lives of patients.

11.2 Continuous professional development in paediatric oncology

Training opportunities should be available for postgraduate professionals, namely young oncologists. Continuous professional development for both young and experienced paediatric oncologists and the junior faculty must be mandatory. Proper funding opportunities for these activities should also be encouraged by institutions, national societies, and European authorities, to strengthen the multi-stakeholder network in paediatric oncology.

Training courses, workshops, and fellowship programmes should be organised at national and international levels, to allow access to expert opinion and experience, so as to achieve basic and clinical knowledge. Continuous professional development needs to be done by participating in national and international conferences and meetings. Furthermore, institutions or local/European societies should encourage participation in training courses held by experts in the field. Courses must be based on advancements regarding diagnosis, treatment, prognosis, and clinical research, but can also be based on experience (e.g., case reports). Funding mobility is a common hurdle and must be encouraged by institutions, local societies, and European authorities. Appropriate resources and time for attendance at training and educational meetings must be built into the programme for all staff members. Parent associations may also help with funding, when healthcare institutions do not allocate funds.

11.3 Educational training opportunities in paediatric oncology

Access to updated information must be available through the local institution for published articles, by providing access to novel treatment protocols and organising educational programmes. These can be organised on a national level (e.g., lectures on national topics, courses to develop practical skills) or a European level (e.g., online interactive webinars, onsite courses).

Clinical fellowship programmes should be offered on a national and international level to ensure higher level of training, give access to a larger range of diseases, and provide the opportunity to work with experienced professionals. Fellowship programmes must give access to the area of interest of the trainee and be individualised. Cross-cultural training programmes must also be an option, as there are many differences in approaching patients and families (103).

SIOPE is committed to continuing valuable collaborative initiatives already established with the European School of Oncology (ESO) (e.g., masterclass, e-learning, fellowship programme), European Society of Medical Oncology (ESMO), ERN PaedCan recommendations or webinars, and other partners seeking similar opportunities. Other educational opportunities may be offered by the International Paediatric Surgical Oncology society (IPSO). IPSO has a forum where residents and fellows can be informed about training opportunities in European centres and has recently provided guidelines for a wide range of paediatric cancers focusing on surgical management (https://ipso-online.org/guidelines-spg/).

11.4 Mentorship and supervision

Career development is an ever-evolving task that does not stop at the completion of formal academic training. Mentorship programmes aim for young physicians to get support from senior peers and experts. Evidence suggests that effective networking and mentorship are fundamental determinants for academic success. Trainees who have reliable and committed mentors are more prone to have higher research productivity and personal development (104). In the US, groups such as COG (Children Oncology Group), and ASPHO (American Society of Pediatric Hematology/Oncology) have now successfully implemented mentorship programmes within paediatric oncology training and are aiming at developing guidelines for prospective mentors to assist mentees towards immediate and long-term success in their career (104). Except for ESO, European countries have not yet consistently established mentorship programmes during paediatric oncology training. Nonetheless, Young SIOPE is currently taking steps to develop such a programme.

11.5 Meeting the educational needs of children and adolescents with cancer

Schooling is important to families and should be an integral part of a child's or adolescent's cancer care (105). Cancer and its treatment are likely to impact school adjustment in three ways: impaired school attendance, physical and cognitive effects, and psychosocial effects (105). Schooling intervention for children and adolescents with cancer is associated with positive effects, including enhanced academic achievement and lowered depression levels for the child with cancer, increased knowledge among peers, and a more positive classroom attitude towards the child with cancer (105).

11.5.1 At diagnosis

Empowering and preparing teachers is helpful for successful schooling and for reducing difficulties in the school environment (106). The school should be informed about the diagnosis and the educational implications of childhood cancer and its treatment, so that they know what to expect and to plan an individualised educational programme, appropriate for each stage of the disease (107). Classmates should be educated about cancer and its implications, so that they can develop empathy (106). This way the child with cancer can have support from the school and avoid isolation and withdrawal behaviours. It is also important for the school to know whom they should contact from the hospital teaching staff, so they can coordinate their efforts (107). The way and extent of information given to the school and classmates should always be discussed and align with the preferences of the child with cancer and their family.

11.5.2 During treatment

All children should benefit from a continuing, flexible educational programme in hospital or at home (107). Hospital classrooms play a key role in the child's developmental process. Playing and communicating with their peers, besides offering education, provide a place to escape and eliminate tensions. The possibility of attending hospital classrooms depends on the immunosuppression, and private tutoring must be offered at the hospital. In addition, all efforts should be made to keep in touch with the child's school. This can be achieved through class assignments including the child with cancer or through group video calls. Moreover, teachers can motivate classmates to keep in touch, through letters, video calls, drawings, photos, text messages, etc.

11.5.3 Returning to school

The child should return to school as soon as possible, and physicians should encourage this, especially when parents are having difficulty letting go. Nonetheless, it is essential that children experience a successful reintegration to school (106). A plan should be established, considering practical factors and specific needs. The plan should also include a monitoring mechanism that will ensure that the child reintegrates smoothly over time. Before returning to school, it is also important to educate families about possible cognitive and school-related challenges associated with treatment, implement screening, and support the children and families in informing the school and addressing any issues (108).

11.5.4 Cooperation among physicians, schools, and families

It is necessary to promote the link between school and cancer units, establishing relationships between both environments, so that children's educational needs are adequately met throughout the treatment pathway (106). Establishing a collaborative learning support team to regularly meet, involving family, school, and hospital personnel, can be useful (107). Associations of parents of children with cancer can also help, advise, and collaborate in any intervention.

Sharing information is important for providing proper support, yet it should also be recognised as an ongoing challenge. All information-sharing should be handled sensitively, respecting confidentiality and the child's privacy, and always taking into account what the child itself knows about their condition. This cooperation should definitely be continued during follow-up care, as some problems only arise later or only become apparent as a result of new developmental tasks. The support measures should subsequently lead to career support.

11.6 Training for caregivers

Being a caregiver to a childhood cancer patient comes with many challenges. Parents often report difficulties with the complexity of information and are overwhelmed, particularly regarding physical care needed at home for their child (109). Providing caregivers with adequate information and nursing training makes them feel more confident and helps them acquire skills to safely care for their child.

Caregivers should receive training in caring for the child (110):
- How to identify medical emergencies and whom to contact.
- What are common side effects and how to effectively treat them.
- How to care for the central line, administer medication (if needed), prevent infections, treat wounds, manage diet, etc.

Caregivers should further receive adequate education to understand their child's diagnosis, treatment plan, and prognosis, and also to employ coping strategies, such as guidance for accessing psychosocial support, etc. (110). Training should start at diagnosis and continue over treatment, always making sure that all information is provided in due time, i.e. before the family needs it. Also, factors, such as the caregiver's emotional state and literacy level should be taken into account when choosing when and how to provide training (110). Information should be explained orally, but should also be available in writing and presented in a simple and comprehensible manner (e.g., booklets describing symptoms and ways to address them).

Providing caregivers with adequate information and nursing training makes them feel more confident and helps them acquire skills to safely care for their child.

11.7 Educational requirements for patient representatives

As patient engagement and involvement gains more ground, it is important for patient representatives to build their capacity to become effective advocates and advisors in all different areas: research and current development in treatment strategies and medicines, policy making, or patient care. Orienting patients to the research process and training them to actively engage and work within a team has been shown to enhance patient engagement. The goal is not to turn patient representatives into researchers, but to equip them with tools to better understand the research process and language and feel more confident participating in discussions (111).

To build their capacity, patient representatives should:
- Attend dedicated courses. Examples include courses provided by EUPATI, Eurordis, the WECAN Academy.
- Be provided with relevant training when participating in research projects, trials, etc. (112).

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