TITLE

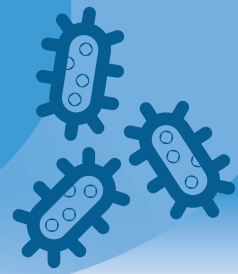
Paediatric Sepsis: General Practice Update

AUTHORS

Andrea Fitzgerald, Ellen Hayes, Michael Barrett, Emmanuelle Fauteux-Lamarre, Emer O'Brien, Michael O'Dwyer

PUBLISHED

November 2025



OVERVIEW

This General Practice Update (GPU) is a collaboration between the Health Service Executive (HSE) National Clinical Programme for Sepsis and the Irish College of GPs. This document is intended for use in a primary care setting only. In this document, the term 'parent' refers to a child's parent, legal guardian or caregiver.

This document is applicable only to infants (including neonates) and children under 16 years old. The detection of sepsis in pregnancy and in persons 16 years and over is identified by different physiological parameters, symptoms, and signs to those of children and is beyond the scope of this document.

AIMS OF DOCUMENT

This document is intended to support general practitioners (GPs) in their clinical decision making. It is not intended to replace clinical judgement.

It aims to:

- Increase awareness of paediatric sepsis and post sepsis syndrome as it applies to general practice.
- Highlight infection prevention measures such as vaccination as the most effective means to prevent sepsis.
- Assist GPs in the detection, assessment and early management of suspected sepsis.

SUMMARY

- The most effective way to reduce morbidity and mortality from sepsis is by **prevention of infection,** for example through vaccination.
- Think **'could this be sepsis?'** if a child presents non-specifically unwell or with symptoms or signs that indicate possible infection, even if their vital signs are normal.
- Sepsis assessment should consider the **risk factors** for sepsis.
- Use a combination of **history, examination, vital signs and clinical judgement** when assessing a child for suspected sepsis.
- **Take parental concerns seriously**: determine what is normal for the child and why they are concerned.
- **'Do not delay' if sepsis is suspected**; transfer to an acute hospital urgently and consider sending a pre-alert.
- **Use the words 'suspected sepsis'** when communicating with other healthcare professionals. Provide a written handover with examination findings, vital signs and likely source of infection.
- **Safety net** patients where there is no current suspicion of sepsis. Be mindful of parents' language needs and health literacy.
- Recognise the possible short- and long-term **sequelae of sepsis** and the implications these can have for a child and their family.

JUMP TO...

Paediatric Sepsis: General Practice Update – EVIDENCE UPDATES

CITING GENERAL PRACTICE UPDATES

Irish College of GPs. Paediatric Sepsis: General Practice Update. General Practice Updates (GPU). Dublin: Irish College of GPs; 2025 [cited mm/yyyy]. Available from https://www.irishcollegeofgps.ie

DISCLAIMER AND WAIVER OF LIABILITY

This General Practice Update (GPU) has been developed on behalf of the Quality and Safety in Practice (QSiP) committee following a careful review of the evidence available at the time of publication. The purpose of this update is to set out evidence based current practice in this area and does not replace clinical judgment. This update is an education tool to assist the GP in providing care for their patient. This is a general update, and it is acknowledged that there will always be particular circumstances where it may be neither possible nor appropriate to follow this document, for example due to resource availability. GPUs are not policy documents. Every effort has been made to ensure the accuracy and updating of the content; however errors and omissions may occur, especially as the evidence changes and clinical practice evolves.

EVIDENCE SUMMARY

GPUs are produced after a review of the literature of the relevant topic area. The aim is to summarise the best available evidence in the context of Irish General Practice. Systematic review evidence is presented where possible.

ICGP QUALITY & SAFETY IN PRACTICE COMMITTEE

AUTHOR AFFILIATIONS

Dr Andrea Fitzgerald: General Practitioner; HSE / Irish College of GPs Clinical GP Lead for Paediatric Sepsis

Dr Ellen Hayes: General Practitioner; HSE / Irish College of GPs Clinical GP Lead for Adult Sepsis

Dr Michael Barrett: Consultant in Paediatric Emergency Medicine, Children's Health Ireland; Chair, National Paediatric Mortality Register, NOCA; Clinical Professor, School of Medicine, UCD

Dr Emmanuelle Fauteux-Lamarre: Consultant in Paediatric Emergency Medicine, Cork University hospital

Dr Emer O'Brien: QSIP Clinical Lead, Irish College of GPs; Senior Lecturer, Department of General Practice RCSI

Dr Michael O'Dwyer: Consultant in Anaesthesiology and Intensive Care Medicine, St Vincent's Healthcare Group; Clinical Lead HSE National Clinical Programme for Sepsis

CORRESPONDENCE

Please direct any queries to the following email address: *qip@icgp.ie*

ACKNOWLEDGEMENTS

This resource has been funded by the HSE National Clinical Programme for Sepsis.

The authors would like to thank the HSE Library and the Irish College of GPs Library, particularly Patricia Patton, for their assistance.

The authors would also like to thank Dr Scott Walkin, Dr Sarah Taaffe, Dr Kathy Hughes and Ms Nuala Clarke, for their insights, expertise and support.

LIST OF ABBREVIATIONS

AMRIC	Antimicrobial Resistance and Infection Control
APLS	Advanced Paediatric Life Support
AVPU	'Alert, responds to Voice, responds to Pain, Unresponsive'
BP	Blood pressure
CRT	Capillary refill time
ENT	Ear, nose and throat
GP	General Practitioner
GPU	General Practice Update
HSE	Health Service Executive
ICTS	Irish Children's Triage System
NHS	National Health Service
NICE	National Institute for Health & Care Excellence
PEWS	Paediatric Early Warning Score
RCPCH	Royal College of Paediatrics and Child Health
WHO	World Health Organisation

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 Background

Children commonly present to GPs with acute infections,[1] with febrile illness being a particular concern for parents.[2] Sepsis is a life-threatening organ dysfunction caused by a dysregulated host response to infection.[3] While rare, sepsis disproportionately affects children due to their maturing immune system and unique comorbidities.[4] It remains a leading cause of morbidity, mortality and healthcare utilisation for children worldwide.[5] Outcomes in sepsis are determined by the interaction between patient factors and the pathogen, and accessibility to health care.[4]

Along with mortality, sepsis places greater economic, medical and education burdens on survivors of paediatric sepsis and their families, when compared to survivors of sepsis in adulthood.[3] Sepsis in childhood may also be the first presentation of a serious underlying condition such as immunodeficiency or a metabolic disorder.[4]

From 2020 to 2024, 3,550 cases of paediatric sepsis episodes were reported in Ireland. 78% of these were in infants under one year.[6] The mortality rate was 3.8%.[6] The true burden of paediatric sepsis in Ireland may be underreported[7] due to heterogeneity in how sepsis has been recorded, difficulties in applying sepsis criteria, and challenges related to sepsis coding.[3, 7]

1.2 Common causes of sepsis in children

Sepsis can be caused by any micro-organism: bacteria, virus, fungus or parasite.[8] The most common sites of infection in children in higher income countries are the lower respiratory tract, combined upper and lower respiratory tract, gastrointestinal tract, bloodstream, central nervous system and urinary tract,[9, 10] with maternal infection being a prominent cause of neonatal sepsis.[11] No source is found in approximately a third of paediatric sepsis cases.[9, 10]

1.3 Risk factors for developing sepsis in childhood

Recognition of risk factors for developing sepsis is an important aspect of sepsis awareness and prevention.

These risk factors are cumulative.

Any person who has an infection is at risk of sepsis. However, some children are at higher risk of developing sepsis due to their age, comorbidities or other predisposing factors. A higher index of suspicion is needed in children with risk factors for developing sepsis.

Risk factors applicable to all infants and children are outlined in **Table 1**. Examples of risk factors specific to neonates are outlined in **Table 2**.

Table 1: *Risk factors for sepsis in all infants (including neonates) and children*

RISK FACTORS	EXAMPLES (*this list is not exhaustive*)
Recent or current infection or breach of skin integrity	• Sepsis within the last three months • Surgery (including dental) / other invasive procedures in the last six weeks • Cuts / abrasions / burns / blisters / skin infections • Intravenous drug misuse • Indwelling lines and catheters
Impaired / unprepared immunity	• Unimmunised / incomplete childhood vaccination schedule • Immunosuppressive medications e.g. biologics, long-term steroids, current chemotherapy • Diabetes mellitus • Sickle cell disease • Post splenectomy • Primary immunodeficiency[4]
Other chronic conditions	• Cardiac or respiratory disease[13] • Neurodisability[13] • Obesity[14] • Malnutrition[4] • Other complex chronic conditions[10]
Other risks due to child or parent factors	• Infants under one year old • Communication challenges e.g. due to disability or language barriers • Severe mental health issues • Socioeconomic deprivation

Examples taken from the National Institute for Health and Care Excellence (NICE) suspected sepsis guideline[12] unless otherwise referenced

Table 2: *Risk factors specific to neonates (infants up to 28 days corrected gestational age[15])*

INFANT AGE	EXAMPLES (*this list is not exhaustive*)
All neonates	• Prematurity
Additional risk factors in the first 72 hours after birth	• Suspected or confirmed infection in a sibling from a multiple birth • Previous sibling with invasive group B streptococcal infection • Maternal group B streptococcal colonisation in this pregnancy • Prolonged rupture of membranes • Maternal intrapartum infection or pyrexia • Chorioamnionitis

Taken from NICE suspected sepsis guideline[12] and NICE guideline: Neonatal infection: antibiotics for prevention and treatment[15]

2.0 SEPSIS PREVENTION

The most effective way to reduce sepsis morbidity and mortality is through prevention of infection.

2.1 Vaccination

Vaccination represents one of the most effective global public health interventions, significantly reducing childhood mortality and adding years of healthy life.[16] Vaccines mitigate the risk of sepsis by directly decreasing the incidence of vaccine-preventable diseases, and also by reducing co-pathogen burden[3, 17] and contributing to herd immunity.[18, 19]

The vaccinations administered to children and pregnant women in general practice are part of a national strategy[20] to protect children from vaccine preventable diseases. See *Appendix 1* for information on the HSE vaccination programmes, and addressing vaccine hesitancy, which is a leading cause of missed childhood vaccines.[21]

2.2 Breastfeeding

Ireland's breastfeeding rates are amongst the lowest in the world.[22, 23, 24] Breastfeeding is associated with a lower incidence of sepsis in premature and very-low-birth-weight infants.[25] Breastfed children demonstrate lower infectious morbidity and mortality.[26, 27] There is an association between infant nutrition via human milk and decreased incidence of conditions that elevate sepsis risk, including common infections, obesity, leukaemia and type 1 diabetes.[27] Both the World Health Organisation (WHO) and the Health Service Executive (HSE) recommend breastfeeding for two years and beyond.[22, 28]

HSE breastfeeding resources can be found *here*.

2.3 Wound management

Any break in skin integrity (e.g. cut, burn, lesion) can provide an entry point for microbes.[12] Promote wound care advice; wounds should be cleaned in a timely fashion, kept clean as they heal and monitored for signs of infection.[29]

HSE wound care guidelines can be found *here*. Wound and ulcer care patient information leaflets can be found *here*.

2.4 Infection control

Infection control measures in primary care include standard precautions (e.g. hand hygiene, aseptic techniques, etc), transmission-based precautions in specific circumstances (e.g. use of personal protective equipment, special handling of equipment etc) and immunisation of staff.[30] Information for GPs including the comprehensive HSE AMRIC guide '*Infection prevention and control for primary care settings in Ireland: a guide for general practice*' can be found *here*.

Encourage measures at home to prevent spread of infection. School / childcare exclusion is advised for certain illnesses as per *this* infographic from the Health Protection Surveillance Centre (HPSC).

2.5 Tobacco and electronic cigarette exposure

Tobacco smoke and electronic cigarette vapour exposure increase a child's susceptibility to infections including meningococcal disease, pneumonia and otitis media.[31, 32] Tobacco smoke exposure in utero can contribute to low birth weight,[33] which also increases sepsis risk.

HSE Quit Smoking information can be found *here*.

2.6 Maternal health

Optimal maternal health can help reduce the risk of preterm birth, low birth weight, and antenatal and perinatal infection,[33] which are all risk factors for neonatal sepsis.[11, 15]

Potentially modifiable maternal risk factors for neonatal sepsis include extremes of weight, vitamin D deficiency, infection e.g. urinary tract infection and vaccine-preventable disease (Covid-19, influenza), tobacco exposure and poorly controlled diabetes mellitus.[11, 33]

Infants born to mothers in the most disadvantaged socioeconomic groups have the highest risk of low birthweight and all-cause mortality.[34]

2.7 Public awareness

All clinicians, including general practitioners have a key role in sepsis education.

Increased public awareness about sepsis is a national priority.[6] Delayed recognition of sepsis by parents contributes to late presentations and adverse outcomes.[35, 36, 37] Increasing public awareness of sepsis risk factors, signs and symptoms are critical to save lives.[36]

GPs can help increase sepsis awareness through giving specific *safety netting* advice using the term 'sepsis',[38] by displaying a poster (*see here*) or providing *sepsis patient information leaflets* in the surgery. Practices with a website might consider directing parents to *HSE sepsis information* and this *HSE Quality and Patient Safety (QPS) talktime webinar*.

3.0 PATIENT ASSESSMENT IN GENERAL PRACTICE

The challenge in primary care is distinguishing the small proportion (<1%) of children who are seriously unwell among the large number who present with acute infections.[39]

A definitive diagnosis of sepsis is established in secondary care via a combination of history, examination, investigations and laboratory tests.[40] Currently, no single diagnostic test exists, and no such investigations are available within primary care settings, where the clinical presentation may be subtle. Consequently, patient assessment in general practice necessitates a thorough history and physical examination, evaluation of sepsis risk factors, and documentation of vital signs.

3.1 When to suspect sepsis

Think 'could this be sepsis?' if an infant/child presents non-specifically unwell or with symptoms or signs that indicate possible infection.

Have a higher index of suspicion when:

- **Parents are very concerned that their child is very unwell, or that 'this illness is different.'** Parental concern is superior to early physiological markers of deterioration in some studies.[41, 42]
- **Your clinician 'gut feeling' causes you to suspect that the child could have sepsis**, even if signs and symptoms are suggestive of minor illness; trust your instincts.[39, 43]

Carry out and document a thorough history to identify risk factors for sepsis, markers of illness severity and level of parental concern

3.2 History

Consider specific points in the history that might identify *risk factors* for sepsis, illness severity, unexpected or rapid deterioration, or other cause for parental concern.[12]

Try to ascertain source of infection if possible, and markers of organ dysfunction that might signal sepsis. Ask specifically about:

- Altered behaviour, including an acute deterioration in functional ability
- Poor feeding in infants.
- Reduced frequency of micturition in the last 18 hours
- Skin changes (e.g. cool peripheries, mottling or a non-blanching rash)
- Sudden deterioration in mobility
- Severe or disproportionate pain/distress
- Fever or rigors
- Any recent presentations to a healthcare provider (including GP, emergency department, GP out of hours, walk in centres or advice lines) with symptoms or signs that could indicate sepsis
- Level of parental concern

3.3 Examination

Carry out and document a thorough clinical examination looking for the potential source of infection and for signs of acute physiological deterioration.

Children may present more than once during the course of an illness, and sometimes to different healthcare services.[10] Clinical examination, including assessment of vital signs, aids both acute evaluation and tracking of physiological changes throughout the illness trajectory.[44]

3.4 Vital signs

Paediatric vital sign interpretation can be challenging for a variety of reasons; vital signs should be interpreted in context.[45] Accurate measurement can be difficult because:

- children may struggle to cooperate due to age or cognitive ability,[46]
- children with complex medical conditions may have baseline readings that differ from age-related norms,[45]
- vital signs can be normal even in sepsis,[46, 47]
- vital signs can be abnormal for reasons other than sepsis.[45]

Vital signs charts: Commonly used vital signs charts, for example those found in Advanced Paediatric life support (APLS),[48] Irish Children's Triage System (ICTS)[46] and Paediatric Early warning score (PEWS)[45] provide similar, but not identical, age-related normal values for heart rate, respiratory rate and blood pressure. While one standardised chart would be ideal, there is no agreed cut off constituting a 'red flag' for each value in children who may have sepsis.[49] Commonly used vital signs charts in Ireland are ICTS and APLS. See *Appendix 2* for examples of vital signs charts.

NICE advises measuring these vital signs in children with suspected sepsis in primary care:[12]

- Conscious level
- Capillary refill time
- Heart rate
- Respiratory rate
- Temperature
- Oxygen saturation*
- Blood pressure*

** if appropriate age-related equipment is available and taking the measurement does not delay assessment or treatment*[12]

Vital sign measurement should not delay emergency management;[12] the priority if sepsis is suspected is emergency transfer to hospital.

Conscious level

The *AVPU* score (*'**A**lert, responds to **V**oice, responds to **P**ain, **U**nresponsive'*) can be used to quickly assess level of consciousness.[50] Anything below 'A' is abnormal. Behavioural changes are a more subtle sign of organ dysfunction and may be apparent before decreased consciousness is seen.[12] Early signs of neurological compromise can be more difficult to detect in infants and young children; parental input is important here.[45]

Capillary refill time (CRT)

A prolonged CRT can indicate decreased perfusion in sepsis.[47] It is quick and easy to perform: press on the sternum for five seconds and then release to assess CRT. In the correct environmental and examination circumstances **a CRT of more than three seconds is associated with worse outcomes in children with sepsis**.[51] CRT can be normal or brisk in some children with sepsis[40] so should – like other vital signs – be used as a 'rule in' rather than a rule out marker for serious illness and risk of death according to one systematic review.[52] CRT is affected by age, environmental temperature, skin temperature, technique, location pressed, and ambient light.[51] Central (i.e. sternum) CRT may be less affected than peripheral (fingertip) CRT and so is recommended by some guidelines.[53]

Heart rate

Measure heart rate with a stethoscope or pulse manually or with an age-appropriate pulse oximeter.[54] **Tachycardia and bradycardia can both indicate sepsis**.[12, 55] Children with pyrexia may have an increased heart-rate of 8–12bpm per 1°C rise in temperature.[56] Marked and persistent tachycardia, including high normal in the absence of drivers such as fever or pain can be a feature of sepsis.[40] Manual pulse assessment may reveal a thready or bounding pulse, both of which can indicate sepsis.[40]

Respiratory rate

Observe respiratory rate by chest / abdominal movement. Respiratory rate can increase with respiratory tract infections, anxiety, pain, dehydration, and sepsis.[57] Respiratory rate does not significantly increase due to fever alone.[56]

Temperature

For accurate assessment, *NICE* recommends using an axillary thermometer in infants under four weeks of age, and either an axillary or tympanic thermometer in older infants and children.[47] Abnormal body temperature—whether fever or hypothermia—does not confirm or exclude sepsis, nor does a normal temperature; therefore, clinical assessment should always consider additional features of serious illness.[12] Temperature abnormalities reported by parents at home, including rigors, fever, or hypothermia, are as clinically significant as those recorded in the clinical setting and should not be disregarded[47, 58]

Although temperature alone is a poor predictor of sepsis, certain abnormalities should heighten clinical suspicion. These include hypothermia (temperature <36°C) and pyrexia in specific contexts.[12] The height of fever is generally not a strong predictor of sepsis, except in infants under three months of age.[59] However, a decision tree validated in Belgium suggested that **a temperature of 40°C or more** in a child in a general practice setting conveyed a higher risk of serious bacterial infection and sepsis.[39]

- **Fever in infants under three months:**
  In infants under three months, fever is a stronger predictor of sepsis than in older age groups[59] **All infants under three months old with a temperature of ≥38°C, whether measured at home or during clinical assessment, should be referred to hospital**.[12, 50] The only exception is a transient, uncomplicated fever occurring within 24 hours of vaccination.[60]
- **Fever in infants aged three to 12 months:**
  Infants aged 3–12 months old remain at increased risk of sepsis compared with older children, though the risk is lower than in younger infants.[61] In this age group, fever ≥38°C alone does not reliably predict sepsis and does not necessarily warrant hospital assessment.[62, 63] However, **temperatures ≥39°C in infants aged 3–6 months may indicate sepsis** and should prompt a higher index of suspicion, particularly when accompanied by red flags or additional risk factors.[12, 64]

Oxygen saturation

Measure if you have an age-appropriate pulse oximeter and in accordance with device instructions. An incorrectly sized or placed probe can over or under-read pulse and oxygen saturation.[12, 54] Patient, device and environmental factors such as movement, skin tone, nail polish, device battery level or ambient light and temperature may decrease the accuracy of pulse oximetry.[65] NICE advises not to measure oxygen saturation in general practice if it will delay assessment and treatment of a child.[12]

Blood pressure

Blood pressure is usually maintained until the late stages of sepsis in children[55] and rarely presents without other abnormal vital signs and so may be a less useful measurement in sepsis assessment in a GP setting.[46] Younger children may struggle to cooperate, leading to incorrect measurements.[46] NICE guidelines suggest BP measurement if the correct cuff size is available, and – in children under 12 years old – measurement will not delay assessment and treatment.[12]

3.5 Other examination points

Along with vital sign changes, other examination points (Table 3) may also increase suspicion of sepsis. These findings can be subtle or absent. The below list is not exhaustive but meant as a guide.

Table 3: *Other examination points which might indicate sepsis in children.*

CATEGORY	SIGNS / SYMPTOMS
Abnormal behaviour	• Changes can be subtle in early sepsis.[66] • Any unusual or abnormal behaviours, including:[12, 40] ~ Very lethargic, difficult to rouse or does not stay awake as expected when roused. ~ Acute deterioration in functional ability ~ Irritable / distressed / agitated ~ Infants may have a weak or high-pitched cry, or poor feeding
Skin changes	• Cold extremities[12] • Colour changes: ~ Mottling, pallor or cyanosis[12] ~ Flushed skin or a generalised erythematous rash[40] ~ In skin of colour abnormalities may be more easily seen on the palms of hands, soles of feet, roof of mouth and mucus membranes.[67] • Non-blanching rashes: petechiae and purpura[12] • Signs of skin or wound infection[12]
Neurological signs	• Focal neurological signs • Neck stiffness • Bulging fontanelle • Focal or generalised seizures[64]

CATEGORY	SIGNS / SYMPTOMS
Increased work of breathing	• Sign of respiratory tract infection[47] or increased respiratory drive due to sepsis.[68] • Particular breathing patterns that might indicate sepsis include: ~ Grunting[47] ~ Apnoea in infants – observed or reported[47]
Pain	• Pain scoring systems for different ages are available, e.g. *Irish Children's Triage System P15–17*[46] • Features of pain that may indicate sepsis include:[12] ~ Level of pain/distress higher than expected for illness or injury (including post-operative state) ~ Leg pain ~ Decreased mobility due to pain
Localising signs of infection	• Chest signs • ENT infections • Acute abdomen • Rashes (e.g. cellulitis) • Painful/swollen joint • Signs of meningitis • Wound infections

4.0 RISK STRATIFICATION

Use clinical judgement along with risk stratification criteria when considering sepsis risk in children.

The incidence of serious illness among children presenting to general practice is low, less than 1% of cases.[69] Both under- and over-diagnosis of sepsis carry potential harms,[55] requiring a careful balance between the severe consequences of delayed diagnosis and the risks associated with unnecessary investigations or interventions. As discussed in the examination section above, **clinical judgement is important.** Currently available risk stratification tools such as **Paediatric Early Warning Score (PEWS)** have not been validated for use in primary care and evidence suggests that they lack sufficient sensitivity and specificity to replace clinical judgment.[69, 70–72] One decision tree has demonstrated improved sensitivity as a 'rule-in' tool in primary care, although further validation is required.[39] Ideally, a single standardized risk stratification chart would guide practice; however, there is currently no consensus on cutoff values for 'red flag' vital signs in children at risk of sepsis.[46]

The NICE sepsis *Guidelines Development Group (GDG)* stated the evidence supporting the use of vital signs to detect sepsis is of very low quality and emphasized that **no single symptom or sign is sufficient to establish a diagnosis in isolation**.[47] NICE recognised that sepsis can progress rapidly and overwhelmingly, often with few early clinical indicators.[47] National and international pre-hospital and acute care guidelines do acknowledge that certain signs, symptoms and underlying risk factors increase the likelihood of sepsis, and stratify patients into low, moderate and high risk of sepsis accordingly.

Table 4 below presents a synthesis of risk factors identified across established guidelines and other evidence sources, structured within a 'traffic light' framework to visually convey the evidence update undertaken for this GPU. **Table 5** presents widely accepted thresholds for moderately and severely elevated respiratory rates and heart-rates, and is for use alongside Table 4.

Table 4: *Risk stratification*
Criteria in the table are based the *NICE Suspected sepsis guideline*[12] unless otherwise referenced

CRITERIA	LOW RISK 'GREEN FLAG'	MODERATE TO HIGH RISK 'AMBER FLAG'	HIGH RISK 'RED FLAG'	
GENERAL	• Looks well • Parent is not concerned and GP not concerned	• Parent is concerned[13] • GP is concerned	• Looks seriously unwell to a healthcare professional • Parents are very concerned	
NEUROLOGICAL/ BEHAVIOUR	• Awake and alert • Normal behaviour for developmental stage • Not crying, appropriate/ normal sounding cry • Consolable	• Child is behaving differently to usual according to parent • More sleepy/lethargic than usual • Not responding normally to social cues	• Decreased conscious level • Does not stay awake when roused • Irritable • Inconsolable crying/distress • Very abnormal behaviours/ mental state	• No response to social cues • Neck pain[73] • Neck stiffness[73] • Bulging fontanelle[73] • Photophobia[73]
CARDIOVASCULAR	• Normal colour • Normal heart rate for age** • Capillary refill time <2 seconds	• Moderate tachycardia for age** • Has not passed urine in 12+ hours • Persistent tachycardia or high-normal pulse in the absence of drivers e.g. fever/pain [40]	• Severe tachycardia for age** • Bradycardia (HR <60) in children aged 0–11 years • Capillary refill time >3 seconds	
RESPIRATORY	• Normal respiratory rate • No increased work of breathing	• Moderate tachypnoea for age** • O_2 sats <92% in air • Accessory muscle use	• Severe tachypnoea for age** • Grunting/apnoeic • O_2 sats <90% in air	
SKIN		• Signs of skin or wound infection	• Petechiae or purpura • Skin mottled/cyanotic/pale/cool to touch	
TEMPERATURE (at home or GP)[61]	• Normal temperature for age	• ≥39°C in children age 3–6 months • Rigors • >40°C in children >6 months[39]	• <36°C • ≥38°C in infants <3 months	
OTHER	• No red or amber flags • No risk factors for sepsis	• Leg pain • Recurrent vomiting • Known risk factors for sepsis (see also red criteria)	• Two or more 'amber' criteria • Decreased immunity plus one amber criteria	

** See Table 5: Moderately/severely elevated respiratory/heart rate values

LOW RISK 'GREEN FLAG'

If no red or amber criteria are present, the risk of sepsis at the time of assessment is low.[12]

Manage infections as appropriate and provide clear, specific **safety net advice**, including expected course of illness, follow-up if needed, and explicit advice about what to do if the child's recovery deviates from that expected – as per *Section 5.2 management* if sepsis is not currently suspected.

MODERATE TO HIGH RISK 'AMBER FLAG'

If any 'Amber' criteria but no red flag criteria are present, consider whether the child is safe to be managed at home with appropriate safety netting. This might depend on factors such as whether there is an obvious source of infection, underlying risk factors for sepsis, cumulative 'amber flags', distance to hospital and other psychosocial considerations.[12]

If safe to do so, manage infections and provide specific **safety net advice** as per low-risk criteria above. If not safe to manage at home, treat as per high risk section below.

HIGH RISK 'RED FLAG'

If any 'Red' criteria are present consider immediate, emergency transfer to hospital and management as per *Section 5: Management of suspected sepsis in general practice*.

Table 5: *Moderately/severely elevated respiratory/heart rate values.*

AGE (YEARS)	TACHYPNOEA		TACHYCARDIA	
	SEVERE	MODERATE	SEVERE	MODERATE
<1 years	≥60	50–59	≥160	150–159
1–2 years	≥50	40–49	≥150	140–149
3–4 years	≥40	35–39	≥140	130–139
5 years	≥29	27/28	≥130	120–129
6–7 years	≥27	24–26	≥120	110–119
8–11 years	≥25	22–24	≥115	105–114
>12 years	≥25	21–24	≥130	91–130

Table from Sepsis Trust NZ Prehospital Paediatric Sepsis Screening and Action Tool[13] based on NICE suspected sepsis guideline.

5.0 MANAGEMENT OF SUSPECTED SEPSIS IN GENERAL PRACTICE

5.1 Management if sepsis is suspected

'Do Not Delay' – If sepsis is suspected the child must be transferred URGENTLY to an acute hospital.

Sepsis is a time-dependent medical emergency requiring secondary care diagnosis and management to prevent significant morbidity or death. If sepsis is suspected in primary care prompt transfer to hospital – with communication to the receiving team if possible – are the priority.

Identify

Identify children with suspected sepsis using history, examination and clinical judgement.

Stabilise

Additional measures may be appropriate for some children before transferring to hospital.

Administer oxygen if needed to keep O2 saturation > 92%.[12] If O2 saturation monitoring is not possible consider high-flow oxygen.

If meningococcal disease is suspected, i.e. fever plus petechial or purpuric rash, administer IV or IM benzylpenicillin or suitable alternative, if this does not delay transfer to hospital.[74] In cases of penicillin allergy, the priority is emergency hospital transfer.[73] Emergency antibiotic doses can be found *here*.

Antibiotics in suspected sepsis where meningococcal disease is not suspected: there is currently insufficient evidence to recommend the routine use of pre-transfer antibiotics in a general practice setting.[75] The priority remains recognition of suspected sepsis and urgent transfer to hospital for acute assessment and management. As in all situations, this guidance does not replace clinical judgement.

Transfer without delay

Transfer all patients to hospital immediately by the most appropriate route.[12]

Communicate

State 'suspected sepsis' clearly to the ambulance service. Inform them of the immediate and critical nature of the transfer.[73] Offer relevant assessment findings e.g. red flags, likely source of infection.

Document 'suspected sepsis' on referral letters to secondary care. Include red flags, vital signs, risk factors, likely source of infection and antibiotic allergies.

Alert 'suspected sepsis' – pre-alerting before arrival in the emergency department (ED) has been found to almost halve the time of in-hospital treatment for patients.[76] If possible, consider contacting the hospital ED to notify a senior clinician that you are referring a child with suspected sepsis.

5.2 Management if sepsis is not currently suspected

If sepsis is not suspected but the child is felt to need secondary care assessment use your clinical judgement to manage and refer as per local pathways.

If the child is clinically well enough and both you and the child's parents are confident in their ability to manage care at home, ensure that the following measures are in place:

- **Identify source of infection if possible** – explain the diagnosis, expected illness trajectory and your expectations to the parents, including any diagnostic uncertainty
- **Manage the underlying infection** – appropriate treatment may include supportive measures only. Be mindful of good antimicrobial stewardship.
- **Include *safety net advice* in the management plan.**

5.3 Antimicrobial stewardship

Judicious antimicrobial prescribing is a key part of sepsis management.

Good sepsis care requires a high index of suspicion and careful clinical assessment rather than widespread deployment of antimicrobial agents.[36, 75] High rates of antimicrobial prescribing increase antimicrobial resistance, which reduces the number of effective antibiotic options to treat sepsis.[6]

Before prescribing antibiotics for a bacterial infection, consider whether supportive treatment only, or a delayed antibiotic prescription might be appropriate. Both these approaches have been shown to reduce antibiotic consumption.[77] If prescribing an antibiotic, check whether a first-line antibiotic is suitable as per *www.antibioticprescribing.ie*; these are effective, have fewer side effects and are less likely to lead to resistant infections.[78]

5.4 Safety netting

Safety netting is a vital part of sepsis aware consultation.

Challenges in parental recognition of a deteriorating child have been implicated in deaths from sepsis.[35] Providing clear, accessible, and easily understood safety-netting guidance may reduce sepsis-related deaths,[36] reduce inappropriate antibiotic use, and promote more appropriate utilisation of healthcare resources.[38]

Safety-netting advice delivered verbally in combination with an additional format – such as written materials, video, or online resources – has been shown to be more effective than verbal advice alone.[38] Be mindful of parents' language preferences, educational attainment and health literacy.[38] See *Appendix 3* for useful safety netting resources, including a suggested framework for providing safety-netting advice.

6.0 SEPSIS DOCUMENTATION AND CODING

Sepsis coding in general practice enables tracking of episodes and enhanced awareness of future sepsis risk and possible post-sepsis issues. Sepsis coding in general practice relies on accurate discharge summary information. Documentation of sepsis diagnosis on GP discharge letters from secondary care is a HSE patient safety recommendation.[79]

ICD-10 codes for sepsis can be found *here*.

7.0 POST SEPSIS CARE

Sepsis can result in both short- and long-term sequelae for survivors. The risk of subsequent infections and recurrent sepsis is elevated in the months following an initial episode.[40, 80] Post-sepsis syndrome describes a constellation of physical, cognitive, psychological and medical side-effects that persist beyond the acute sepsis recovery phase.[81] Up to a third of children may be affected, and symptoms can last for months or years.[3] New chronic conditions, including respiratory, renal, or neurological disorders, may emerge.[3] Children with pre-existing chronic medical conditions and infants are particularly susceptible to developing new or increased healthcare needs.[81] Chronic cognitive deficits severe enough to impact educational attainment have been reported in up to 44% of children with post-sepsis syndrome.[82]

At the time of writing, Ireland has no formal pathway for the management of post-sepsis syndrome in primary or secondary care. Consider post-sepsis syndrome in children with a history of sepsis who present with new or worsening physical, psychological or cognitive symptoms, and consider referral for specialist or allied health professional assessment if appropriate. Sepsis-specific information and support can help sepsis survivors and their families.[80, 83] Direct parents to post-sepsis resources,[12] such as the *Irish Sepsis Foundation*.

Further post-sepsis information can be found *here* and *here*.

APPENDICES

Appendix 1: Vaccination information

Uptake of childhood vaccinations in Ireland is well below the WHOs 95% target and is declining at the time of writing this GPU.[20] Vaccine hesitancy is of increasing concern; it has been identified as one of the top ten threats to global health by the WHO.[21] Worries about vaccine safety and side effects are the most commonly identified reasons for missed childhood vaccines in Ireland.[21] Promotion of vaccination by GPs and GP nurses, including addressing parental concerns if they arise, can play an important role in reducing vaccine-preventable disease and sepsis risk.

Immunisation Guidance for GPs and patients

Guidance on vaccines for all groups, including **primary childhood vaccines**, **vaccines in pregnancy, health-care workers** and **catch-up vaccines** can be found *here*.

Immunisation information is also available *here*.

Information to help address vaccine hesitancy

The NIO research section of the *HSE immunisation page* has some helpful resources regarding vaccine hesitancy.

HSE guide 'Diseases Vaccines Prevent' has some useful information about vaccine preventable diseases and vaccine side effects which can be used in discussions with parents.

An article for GPs with practical information on addressing vaccine hesitancy: *Shen SC, Dubey V. Addressing vaccine hesitancy: Clinical guidance for primary care physicians working with parents. Can Fam Physician. 2019 Mar;65(3):175–181. PMID: 30867173; PMCID: PMC6515949*

Appendix 2: Vital sign charts

Appendix 2 Table 1. *Examples of available vital signs charts (this list is not exhaustive)*

SOURCE
WHO
Don't Forget the Bubbles (Based on APLS)
Emed.ie (based on ICTS)
APLS
Royal Children's Hospital, Melbourne

ICTS respiratory rate and heart rate values[46]

Appendix 2 Table 2. *Respiratory Rate Values*

Age	≤ - 2 SD	- 1 SD	Normal	+ 1 SD	+ 2 SD	> + 2 SD
0 – 3 months	< 20	21 – 30	30 - 60	60 – 70	70 – 80	> 80
4 – 6 months	< 20	20 – 30	30 – 60	60 – 70	70 – 80	> 80
7 -12 months	< 17	17 – 25	25 – 45	45 – 55	55 – 60	> 60
1 – 3 years	< 15	15 – 20	20 – 30	30 – 35	35 – 40	> 40
4 – 6 years	< 12	12 – 16	16 – 24	24 – 28	28 – 32	> 32
> 7 years	< 10	10 – 14	14 – 20	20 – 24	24 – 26	> 26

SD: standard deviation

Appendix 2 Table 3. *Heart Rate Values*

Age	≤ - 2 SD	- 1 SD	Normal	+ 1 SD	+ 2 SD	> + 2 SD
0 – 3 months	< 65	65 – 90	90 – 180	180 – 205	205 – 230	> 230
4 – 6 months	< 63	63 – 80	80 – 160	160 – 180	180 – 210	> 210
7 -12 months	< 60	60 – 80	80 – 140	140 – 160	160 – 180	> 180
1 – 3 years	< 58	58 – 75	75 – 130	130 – 145	145 – 165	> 165
4 – 6 years	< 55	55 – 70	70 – 110	110 – 125	125 – 140	> 140
> 7 years	< 45	45 – 60	60 – 90	90 – 105	105 – 120	> 120

SD: standard deviation

Note the colour coding and standard deviations are designed for triage categories within an emergency department setting; they have not been validated in general practice. For further information regarding the ICTS chart please see this *ICTS booklet*.

Appendix 3: Safety netting resources

Appendix 3 Table 1. *Safety netting advice suggested algorithm*[38, 84]

SAFETY NET ADVICE
1. Explain the diagnosis + management plan
2. Describe the expected course of the illness if known; share uncertainty
3. Give clear 'red flag' advice verbally
4. Advise where, when and how to seek medical advice should the child's illness course deviate from expected
5. Allow opportunity for questions
6. Reinforce safety net information in another format e.g. written, video, online
7. Document discussion and safety net advice given

HSE Sepsis clinical resources

Resources including a paediatric sepsis information leaflet and sepsis videos.

Antibioticprescribing.ie

Treat Your Respiratory Tract Infection leaflet for adults and children including a QR-code link to illness-specific advice. Designed for respiratory tract infections not needing immediate antibiotics. Contains sepsis safety net advice.

When Should I Worry? *Website*

UK resource: *patient information booklets* on the management of respiratory tract infection in children and babies over three months old in several languages.

NHS Minor Illnesses Playlist *on YouTube*

UK resource: *videos* with subtitles with advice on various minor illnesses, in English.

NHS / RCPCH Healthier Together *0–18 safety netting and parent information sheets*

UK resource: *downloadable information sheets and safety net advice* for parents on various symptoms and conditions, translatable into several languages in written and audio form. Some of the pages have linked videos.

REFERENCES

1. Craven EM, Luck G, Whitney D, Dodhia H, Foster S, Stanke C, et al. Why do children under 5 years go to the GP in Lambeth: a cross-sectional study. *BMJ Open*. 2024 May 23;14(5):e082253.
2. Kelly M, Sahm LJ, Shiely F, O'Sullivan R, de Bont EG, Mc Gillicuddy A, et al. Parental knowledge, attitudes and beliefs on fever: a cross-sectional study in Ireland. *BMJ Open*. 2017 July 9;7(7):e015684.
3. Watson RS, Carrol ED, Carter MJ, Kissoon N, Ranjit S, Schlapbach LJ. The burden and contemporary epidemiology of sepsis in children. *Lancet Child Adolesc Health*. 2024 Sept;8(9):670–81.
4. Carter MJ, Carrol ED, Ranjit S, Mozun R, Kissoon N, Watson RS, et al. Susceptibility to childhood sepsis, contemporary management, and future directions. *Lancet Child Adolesc Health*. 2024 Sept;8(9):682–94.
5. Weiss SL, Peters MJ, Alhazzani W, Agus MSD, Flori HR, Inwald DP, et al. Surviving Sepsis Campaign International Guidelines for the Management of Septic Shock and Sepsis-Associated Organ Dysfunction in Children. *Pediatr Crit Care Med*. 2020 Feb;21(2):e52–106.
6. HSE. National Sepsis Report 2024. 2025; Available *here*.
7. NOCA. 2025 [cited 2025 Oct 20]. National Paediatric Mortality Register Annual Report 2025 Improving Patient Care With National Clinical Audits. Available *here*.
8. WHO. Sepsis [Internet]. 2024 [cited 2025 Oct 20]. Available *here*.
9. Weiss SL, Fitzgerald JC, Pappachan J, Wheeler D, Jaramillo-Bustamante JC, Salloo A, et al. Global epidemiology of pediatric severe sepsis: the sepsis prevalence, outcomes, and therapies study. *Am J Respir Crit Care Med*. 2015 May 15;191(10):1147–57.
10. Queensland Family and Child Commission | Queensland Paediatric Sepsis Program. Queensland paediatric sepsis mortality study: Incidence of, and factors associated with, sepsis-related child deaths, Queensland 2004–2021 [Internet]. 2024. Available *here*.
11. Araújo BC, Guimarães H. Risk factors for neonatal sepsis: an overview. *Journal of Pediatric and Neonatal Individualized Medicine*. 2020 Oct;9(2):e090206.
12. NICE. Suspected sepsis: recognition, diagnosis and early management [Internet]. NICE; 2016 [cited 2025 Oct 20]. Available *here*.
13. Sepsis Trust NZ. Prehospital paediatric sepsis screening and action tool [Internet]. Available *here*.
14. Zhong X, Ashiru-Oredope D, Pate A, Martin GP, Sharma A, Dark P, et al. Clinical and health inequality risk factors for non-COVID-related sepsis during the global COVID-19 pandemic: a national case-control and cohort study. *EClinicalMedicine*. 2023 Dec;66:102321.
15. NICE. Neonatal infection: antibiotics for prevention and treatment [Internet]. NICE; 2021 [cited 2025 Oct 20]. Available *here*.
16. Shattock AJ, Johnson HC, Sim SY, Carter A, Lambach P, Hutubessy RCW, et al. Contribution of vaccination to improved survival and health: modelling 50 years of the Expanded Programme on Immunization. *Lancet*. 2024 May 25;403(10441):2307–16.
17. Geraghty K, Rooney D, Watson C, Ledwidge MT, Glynn L, Gallagher J. Non-specific effects of Pneumococcal and Haemophilus vaccines in children aged five years and under: a systematic review. *BMJ Open*. 2023 Dec 14;13(12):e077717.

18. Zhou F, Jatlaoui TC, Leidner AJ, Carter RJ, Dong X, Santoli JM, et al. Health and Economic Benefits of Routine Childhood Immunizations in the Era of the Vaccines for Children Program – United States, 1994–2023. *MMWR Morb Mortal Wkly Rep*. 2024 Aug 8;73(31):682–5.
19. Corcoran M, Vickers I, Mereckiene J, Murchan S, Cotter S, Fitzgerald M, et al. The epidemiology of invasive pneumococcal disease in older adults in the post-PCV era. Has there been a herd effect? *Epidemiol Infect*. 2017 Aug;145(11):2390–9.
20. HSE National Immunisation Office. National Immunisation Office Strategic Plan 2024–2027. 2024; Available here.
21. Marron L, Ferenczi A, O'Brien KM, Cotter S, Jessop L, Morrissey Y, et al. A national survey of parents' views on childhood vaccinations in Ireland. *Vaccine*. 2023 June 7;41(25):3740–54.
22. HSE. Breastfeeding in a Healthy Ireland: Health Service Breastfeeding Action Plan 2016–2021 [Internet]. 2016 [cited 2023 Apr 5]. Available here.
23. Beatha B, O'Sullivan L. National Study of Breastfeeding Support in Ireland Reveals Gaps in Health Service [Internet]. Technological University Dublin; 2022 [cited 2025 Oct 20]. Available here.
24. World Breastfeeding Trends Initiative (WBTi). World Breastfeeding Trends Initiative (WBTi): Assessment Report Ireland 2023 [Internet]. 2023. Available here.
25. Parker MG, Stellwagen LM, Noble L, Kim JH, Poindexter BB, Puopolo KM, et al. Promoting Human Milk and Breastfeeding for the Very Low Birth Weight Infant. *Pediatrics*. 2021 Nov;148(5):e2021054272.
26. Murphy S, Carter L, Al Shizawi T, Queally M, Brennan S, O'Neill S. Exploring the relationship between breastfeeding and the incidence of infant illnesses in Ireland: evidence from a nationally representative prospective cohort study. *BMC Public Health*. 2023 Jan 20;23(1):140.
27. Patnode CD, Henrikson NB, Webber EM, Blasi PR, Senger CA, Guirguis-Blake JM. Breastfeeding and Health Outcomes for Infants and Children: A Systematic Review. *Pediatrics*. 2025 July 1;156(1):e2025071516.
28. WHO. Infant and young child feeding [Internet]. 2023 [cited 2025 Oct 21]. Available here.
29. HSE. HSE National Wound Management Guidelines 2018 [Internet]. 2018. Available here.
30. HSE. Infection prevention and control (IPC) for primary care settings in Ireland: a guide for general practice [Internet]. 2025. Available here.
31. Martinón-Torres F, Salas A, Rivero-Calle I, Cebey-López M, Pardo-Seco J, Herberg JA, et al. Life-threatening infections in children in Europe (the EUCLIDS Project): a prospective cohort study. *Lancet Child Adolesc Health*. 2018 June;2(6):404–14.
32. Zima K, Bogucka A, Wojtas M, Zabielska-Kaczorowska M. Immunological Effects of Electronic Cigarette Use: A Review of Current Evidence. *Clin Rev Allergy Immunol*. 2025 Feb 1;68(1):9.
33. NHS England. NHS England » Saving babies' lives: version 3 [Internet]. [cited 2025 Oct 22]. Available here.
34. Wolfe I, Macfarlane A, Donkin A, Marmot M, Viner R. Why children die: death in infants, children and young people in the UK Part A [Internet]. Royal College of Paediatrics and Child Health and National Children's Bureau; 2014. Available here.
35. National Child Mortality Database (NCMD). Infection related deaths of children and young people in England: National Child Mortality Database Programme Thematic Report: Data from April 2019 to March 2022 [Internet]. 2023. Available here.
36. de Souza DC, Paul R, Mozun R, Sankar J, Jabornisky R, Lim E, et al. Quality improvement programmes in paediatric sepsis from a global perspective. *Lancet Child Adolesc Health*. 2024 Sept;8(9):695–706.

37. Kang KT, Chandler HK, Espinosa V, Kissoon N. Systems for Paediatric Sepsis: A Global Survey. *West Indian Med J*. 2014 Dec;63(7):703–10.
38. Kashyap MN, Roland D, Edwards PJ. Safety netting in primary care: managing the low incidence, high uncertainty of severe illness. *Br J Gen Pract*. 2025 Feb;75(751):52–4.
39. Verbakel JY, Lemiengre MB, De Burghgraeve T, De Sutter A, Aertgeerts B, Bullens DMA, et al. Validating a decision tree for serious infection: diagnostic accuracy in acutely ill children in ambulatory care. *BMJ Open*. 2015 Aug 7;5(8):e008657.
40. Children's Health Queensland. Children's Health Queensland. 2023 [cited 2025 Oct 22]. Sepsis – Recognition and emergency management in children. Available here.
41. Mills E, Lin P, Asghari-Jafarabadi M, West A, Craig S. Association between caregiver concern for clinical deterioration and critical illness in children presenting to hospital: a prospective cohort study. *Lancet Child Adolesc Health*. 2025 July;9(7):450–8.
42. Harley A, Latour JM, Schlapbach LJ. The Role of Parental Concerns in the Recognition of Sepsis in Children: A Literature Review. Front Pediatr. 2019;7:161.
43. Van den Bruel A, Haj-Hassan T, Thompson M, Buntinx F, Mant D, European Research Network on Recognising Serious Infection investigators. Diagnostic value of clinical features at presentation to identify serious infection in children in developed countries: a systematic review. Lancet. 2010 Mar 6;375(9717):834–45.
44. Thompson MJ, Ninis N, Perera R, Mayon-White R, Phillips C, Bailey L, et al. Clinical recognition of meningococcal disease in children and adolescents. *Lancet*. 2006 Feb 4;367(9508):397–403.
45. HSE. Paediatric Early Warning System (PEWS) User Manual [Internet]. 2023. Available here.
46. National Children's Nursing Network Ireland. Irish Children's Triage System [Internet]. 2021 [cited 2025 Oct 22]. Available here.
47. National Guideline Centre (Great Britain), National Institute for Health and Care Excellence (Great Britain), Royal College of Physicians of London, editors. Sepsis: recognition, assessment and early management: final version: Methods, evidence and recommendations [Internet]. London: National Institute for Health and Care Excellence; 2016. 1 p. (NICE guideline). Available here.
48. Advanced Life Support Group. APLS 7e manual updates [Internet]. 2024. Available here.
49. Arias AV, Lintner-Rivera M, Shafi NI, Abbas Q, Abdelhafeez AH, Ali M, et al. A research definition and framework for acute paediatric critical illness across resource-variable settings: a modified Delphi consensus. *Lancet Glob Health*. 2024 Feb;12(2):e331–40.
50. WHO. Pocket book of primary health care for children and adolescents: guidelines for health promotion, disease prevention and management from the newborn period to adolescence [Internet]. [cited 2025 Oct 22]. Available here.
51. Lamprea S, Fernández-Sarmiento J, Barrera S, Mora A, Fernández-Sarta JP, Acevedo L. Capillary refill time in sepsis: A useful and easily accessible tool for evaluating perfusion in children. *Front Pediatr*. 2022;10:1035567.
52. Fleming S, Gill P, Jones C, Taylor JA, Van den Bruel A, Heneghan C, et al. The Diagnostic Value of Capillary Refill Time for Detecting Serious Illness in Children: A Systematic Review and Meta-Analysis. *PLoS One*. 2015;10(9):e0138155.
53. UK Sepsis Trust. The Sepsis Manual [Internet]. 2024. Available here.

54. NHS Improvement. Patient Safety Alert: Risk of harm from inappropriate placement of pulse oximeter probes [Internet]. 2018. Available *here*.
55. Schlapbach LJ, Watson RS, Sorce LR, Argent AC, Menon K, Hall MW, et al. International Consensus Criteria for Pediatric Sepsis and Septic Shock. *JAMA*. 2024 Feb 27;331(8):665–74.
56. Heal C, Harvey A, Brown S, Rowland AG, Roland D. The association between temperature, heart rate, and respiratory rate in children aged under 16 years attending urgent and emergency care settings. *Eur J Emerg Med*. 2022 Dec 1;29(6):413–6.
57. Chisti MJ, Duke T, Robertson CF, Ahmed T, Faruque ASG, Ashraf H, et al. Clinical predictors and outcome of hypoxaemia among under-five diarrhoeal children with or without pneumonia in an urban hospital, Dhaka, Bangladesh. *Trop Med Int Health*. 2012 Jan;17(1):106–11.
58. Mintegi S, Gomez B, Carro A, Diaz H, Benito J. Invasive bacterial infections in young afebrile infants with a history of fever. *Arch Dis Child*. 2018 July;103(7):665–9.
59. Umana E, Mills C, Norman-Bruce H, Mitchell H, McFetridge L, Lynn F, et al. Performance of clinical decision aids (CDA) for the care of young febrile infants: a multicentre prospective cohort study conducted in the UK and Ireland. *EClinicalMedicine*. 2024 Dec;78:102961.
60. Kapur S, Bourke T, Maney JA, Moriarty P. Emergency department attendance following 4-component meningococcal B vaccination in infants. *Arch Dis Child*. 2017 Oct;102(10):899–902.
61. Lane RD, Richardson T, Scott HF, Paul RM, Balamuth F, Eisenberg MA, et al. Delays to Antibiotics in the Emergency Department and Risk of Mortality in Children With Sepsis. *JAMA Netw Open*. 2024 June 3;7(6):e2413955.
62. Hsiao AL, Chen L, Baker MD. Incidence and predictors of serious bacterial infections among 57- to 180-day-old infants. *Pediatrics*. 2006 May;117(5):1695–701.
63. De S, Williams GJ, Teixeira-Pinto A, Macaskill P, McCaskill M, Isaacs D, et al. Lack of Accuracy of Body Temperature for Detecting Serious Bacterial Infection in Febrile Episodes. *Pediatr Infect Dis J*. 2015 Sept;34(9):940–4.
64. NICE. Fever in under 5s: assessment and initial management [Internet]. NICE; 2019 [cited 2025 Oct 22]. Available *here*.
65. Hewett Brumberg EK, Douma MJ, Alibertis K, Charlton NP, Goldman MP, Harper-Kirksey K, et al. 2024 American Heart Association and American Red Cross Guidelines for First Aid. *Circulation*. 2024 Dec 10;150(24):e519–79.
66. Nijman RG, Jorgensen R, Levin M, Herberg J, Maconochie IK. Management of Children With Fever at Risk for Pediatric Sepsis: A Prospective Study in Pediatric Emergency Care. *Front Pediatr*. 2020;8:548154.
67. Child Health BC. Child Health BC Provincial Pediatric Sepsis Recognition and Management Guideline [Internet]. 2024. Available *here*.
68. Mauri T, Spinelli E, Pavlovsky B, Grieco DL, Ottaviani I, Basile MC, et al. Respiratory Drive in Patients with Sepsis and Septic Shock: Modulation by High-flow Nasal Cannula. *Anesthesiology*. 2021 Dec 1;135(6):1066–75.
69. Clark A, Cannings-John R, Blyth M, Hay AD, Butler CC, Hughes K. Accuracy of the NICE traffic light system in children presenting to general practice: a retrospective cohort study. *Br J Gen Pract*. 2022 June;72(719):e398–404.

70. Thompson M, Van den Bruel A, Verbakel J, Lakhanpaul M, Haj-Hassan T, Stevens R, et al. Systematic review and validation of prediction rules for identifying children with serious infections in emergency departments and urgent-access primary care. *Health Technol Assess*. 2012;16(15):1–100.
71. Clark A, Cannings-John R, Carrol ED, Thomas-Jones E, Sefton G, Hay AD, et al. Assessing children who are acutely ill in general practice using the National PEWS and LqSOFA clinical scores: a retrospective cohort study. *Br J Gen Pract*. 2025 Feb;75(751):e98–104.
72. Romaine ST, Sefton G, Lim E, Nijman RG, Bernatoniene J, Clark S, et al. Performance of seven different paediatric early warning scores to predict critical care admission in febrile children presenting to the emergency department: a retrospective cohort study. *BMJ Open*. 2021 May 4;11(5):e044091.
73. Bacterial Meningitis Sub-Committee of the Scientific Advisory, Committee, HPSC. Guidelines for the early clinical and public health management of bacterial meningitis (including meningococcal disease). [Internet]. 2016. Available *here*.
74. NICE. Meningitis (bacterial) and meningococcal disease: recognition, diagnosis and management [Internet]. NICE; 2024 [cited 2025 Oct 22]. Available *here*.
75. Academy of Medical Royal Colleges. Statement on the initial antimicrobial treatment of sepsis [Internet]. Academy of Medical Royal Colleges; 2022. Available *here*.
76. Studnek JR, Artho MR, Garner CL, Jones AE. The impact of emergency medical services on the ED care of severe sepsis. *Am J Emerg Med*. 2012 Jan;30(1):51–6.
77. Spurling GK, Dooley L, Clark J, Askew DA. Immediate versus delayed versus no antibiotics for respiratory infections. Cochrane Acute Respiratory Infections Group, editor. Cochrane Database of Systematic Reviews [Internet]. 2023 Oct 4 [cited 2025 Oct 22];2023(10). Available *here*.
78. HSE. HSE.ie. 2023 [cited 2025 Oct 22]. Antimicrobial Stewardship. Available *here*.
79. HSE. Patient Safety Supplement: Early recognition and treatment of sepsis [Internet]. 2023. Available *here*.
80. Huang CY, Daniels R, Lembo A, Hartog C, O'Brien J, Heymann T, et al. Life after sepsis: an international survey of survivors to understand the post-sepsis syndrome. *Int J Qual Health Care*. 2019 Apr 1;31(3):191–8.
81. Carlton EF, Gebremariam A, Maddux AB, McNamara N, Barbaro RP, Cornell TT, et al. New and Progressive Medical Conditions After Pediatric Sepsis Hospitalization Requiring Critical Care. *JAMA Pediatr*. 2022 Nov 1;176(11):e223554.
82. Minogue J, Keogh S, Schlapbach LJ, Long D. Long-term outcomes after paediatric sepsis: A narrative review. *Aust Crit Care*. 2024 May;37(3):499–507.
83. Middleton NJ, Anastasas K, White J, Pienaar C, Harvey J, Bale T, et al. Postsepsis Care Needs in Children and Families: Single-Center, Codesign Qualitative Research From Western Australia. *Pediatr Crit Care Med*. 2025 Aug 1;26(8):e987–96.
84. Jones D, Dunn L, Watt I, Macleod U. Safety netting for primary care: evidence from a literature review. *Br J Gen Pract*. 2019 Jan;69(678):e70–9.

The Irish College of GPs trains and supports general practitioners in Ireland throughout their career, from initial training to lifelong learning, research and advocacy.

Irish College of GPs, 15 Hogan Place, Dublin 2
Tel: *01-676 3705* Email: *info@icgp.ie* Web: *www.IrishCollegeofGPs.ie*