

# PICANet Key Metric Definitions

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## Level 3 Paediatric Critical Care Units

PICANet presents data on five key metrics in relation to Level 3 Paediatric Critical Care Units (PCCUs), the definitions of which are given in this document. Target values for these key metrics come from NHS England’s Specialised Services Level 3 Paediatric Critical Care (PCC) Quality Dashboard 2021/22 (1) and/or the Paediatric Critical Care Society’s (PCCS) Quality Standards, 2021 (2).

The published versions of the Specialised Services Level 3 PCC Quality Dashboard 2023/24 and 2024/25 do not, at the time of writing, include targets therefore targets referenced in this document are based on the 2021/22 Dashboard. Correspondence with NHS England QCRS regarding the lack of more recent targets has led to the Metric Development Team advising to continue to the use the 2021/22 targets unless otherwise advised, at which point this document would be updated and up-versioned.

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# Metric 1a

## Case ascertainment

### What does the metric measure and why is it important?

Case ascertainment is a measure of the proportion of total admissions to paediatric intensive care units (PICUs) that are reported to PICANet.

We present the percentage of admissions reported on the PICANet database out of all PICU admissions. A case ascertainment of 100% would mean that we received information for all admissions to PICUs and this is the target for this metric.

High levels of case ascertainment ensure that we are confident our findings will be representative of the events and care processes that take place in PICUs.

### What is the target for the metric?

The target for case ascertainment is 100% for each unit.

### How is the metric calculated?

Numerator: Number of admissions recorded on the PICANet database.

Denominator: Number of admissions recorded at a PICU.

### History of this metric

In the past case ascertainment was calculated during in-person validation visits via a member of PICANet staff comparing the number of admissions recorded locally to the number of admissions included on the PICANet web database.

In 2020, in-personal validation visits ceased due to the SARS-COV-2 (COVID-19) pandemic and were replaced by virtual validation visits which began in June 2022. This meant there was a period between 2020 and 2022 where case ascertainment was not collected.

Between June 2022 and June 2024, case ascertainment was obtained by asking each individual PICU to undertake a count of admissions covering a period of two month during the new virtual validation visits. These were then cross matched against the number of admissions entered on to the PICANet web database. This ascertainment check was carried out on a yearly basis for each Level 3 PCCU In addition, case ascertainment is a feature of the virtual validation meetings held with each organisation, scheduled to be undertaken every 12 – 18 months.<sup>1</sup>

Since January 2024 this is no longer part of the validation visits. Instead, units/transport teams are asked for 2 months of case ascertainment data as part of

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<sup>1</sup> It was not possible to ask individual PICUs to undertake a case ascertainment check for the production of the 2023 report due to a centralised database outage at PICANet.

every other 6-weekly routine validation email we send, this works out as 2 months checked every quarter.

## **Metric 1b**

### **Timeliness of data completeness**

#### **What does the metric measure and why is it important?**

We measure the timeliness of data collection in terms of how many of the admission events are completed on the PICANet database within two months of discharge – a requirement of the PCCS Quality Standards (L3-702, 2021) (2).

We present the percentage of records completed within two months of discharge; 100% timely data submission would mean that all records had been completed on the PICANet database within two months of discharge.

It is important that data are collected in a timely manner, that data are accurate and that all relevant data are available for analysis.

#### **What is the target for the metric?**

The target for timeliness of data submission is 100% (PIC10a) (1) for each unit.

#### **How is the metric calculated?**

Numerator: Number of admission records completed on the PICANet database within two months of discharge. An admission record is defined as complete when all validation checks relating to PICU admission, discharge and care have been fulfilled (excluding any validation checks on 30-day follow-up).

Denominator: Number of admission records on the PICANet database.

## **Metric 2**

### **Specialist paediatric transport services (SPTS) emergency retrieval mobilisation times**

#### **What does the metric measure and why is it important?**

Some children need to be transported to a PICU in a different hospital for urgent care (non-elective or emergency transports). PICANet calculate how long it takes in minutes for a specialised paediatric transport service (SPTS) to mobilise and start their journey to retrieve a child needing urgent PIC admission once the decision has been made that PIC transport is required.

We present the percentage of emergency retrievals which mobilised in 30 minutes or less with 100% corresponding to all emergency retrievals meeting the target.

Any delay in receiving intensive care could put the sick child at risk, as the referring hospital may not have the resources to look after a critically ill child. It may also add additional pressures on the workforce of the referring hospital. Delays in mobilisation may also serve to highlight pressures on transport organisations such as busy periods during the year, and also insufficient resources or organisational issues that need to be addressed.

#### **What is the target for the metric?**

The Care Quality Commission and the NHS England Specialised Services Quality Dashboard monitor the timeliness of emergency transports and mobilisation times and the current target is that 95% of journeys should start within 30 minutes of the clinical decision that PIC transport is required (PIC14i) (1). Standards for mobilisation time are applied to SPTS in all countries although standards have not been defined for the devolved nations and the Republic of Ireland (ROI).

#### **How is the metric calculated?**

Numerator: the time from the point at which the clinicians agree that the child requires PIC transport to the time the SPTS team set off in the ambulance (or helicopter / plane) for what are called 'non-elective' or emergency transports.

Denominator: Total number of 'non-elective' or urgent transports.

## **Metric 3**

### **Emergency readmissions within 48 hours**

#### **What does the metric measure and why is it important?**

For each PICU we record the frequency of emergency readmissions to the discharging PICU less than 48 hours after discharge. An emergency admission is defined as an unplanned admission where the unit was not expecting or had planned for this admission.

We present the percentage of all admissions to a PICU which were re-admissions within 48 hours of discharge from the same PICU.

Emergency readmission within 48 hours is an undesirable outcome. From an individual child's perspective, it suggests their health has deteriorated in a short space of time and that they require further intensive care treatment. This can cause stress to their child and their carers, and increases demand upon the PICU. This may not be a reflection of the care provided but it is monitored on a regular basis.

#### **What is the target for the metric?**

The current target is for less than 2% of admissions to PICU to be an emergency readmissions (PIC04) (1).

#### **How is the metric calculated?**

Numerator: The number of unplanned admissions to the discharging PICU within 48 hours of discharge.

Denominator: Total number of admissions to the PICU.

## **Metric 4**

### **Unplanned extubations in PICU**

#### **What does the metric measure and why is it important?**

Some children in PICU are attached to a ventilator via an endotracheal tube (ETT). Removal of the ETT tube (extubation) should be a planned clinical decision. An unplanned extubation is when any dislodgement or displacement of the ETT occurs at any other time than the planned extubation.

We present the rate of unplanned extubations per 1,000 ventilated days to allow us to compare between units as the more children that are ventilated on a PICU, the more likely an unplanned extubation will occur. A small number of unplanned extubations per 1,000 ventilated days means fewer unplanned extubations have occurred.

Although unplanned extubation is rare it is associated with complications such as hypoxaemia (low blood oxygen) and/or hypercarbia (high blood carbon dioxide), and these adverse events are associated with mortality, the need for emergency reintubation, prolonged mechanical ventilation, longer length of stay and increased costs(2,3). Collection of this data allows units to review, implement and measure quality improvement initiatives to reduce their unplanned extubation rate.

#### **What is the target for the metric?**

The current target is for there to be fewer than five unplanned extubations per 1,000 ventilated days (PIC08a) (1).

#### **How is the metric calculated?**

Numerator: Number of unplanned extubation events. An unplanned extubation is defined as: a premature extubation without the intention to extubate, and without the presence of airway competent clinical staff in the bed space appropriately prepared for the procedure. This definition includes instances of self-extubation, accidental extubation due to other causes, and accidental extubation resulting in a reintubation.

Denominator: Total number of days of invasive ventilation delivered.

We multiply this ratio by 1,000 to get the rate per 1,000 ventilated days.

## **Metric 5**

### **Risk-adjusted in-PICU mortality**

#### **What does the metric measure and why is it important?**

This metric considers death of children whilst they are an inpatient on PICU.

We present mortality (death) rates using risk-adjusted standardised mortality ratios (SMRs). SMRs are calculated using a statistical approach that accounts for the child's severity of illness at the time of admission which allows us to compare the number of deaths within a PICU with how many deaths we expected to happen given how poorly children were when they were admitted to PICU.

When the number of deaths observed equals the number of deaths expected, the SMR is equal to one. When the number of deaths observed is lower than the number expected, the SMR will be less than one. When the number of deaths observed is higher than the number expected, the SMR will be more than one.

Although most children who receive care in PICU survive, it is important to assess whether more (or fewer) deaths than expected occur, as this can indicate that there is something different happening in a PICU. As we use this metric to detect potential outliers, it is important to note that this provides a statistical measure of mortality which indicates that further investigation is required, rather than as a true measure of the quality of care delivered.

#### **What is the target for the metric?**

The Specialised Services PICU Quality Dashboard 21/22 list a target of an SMR of one (i.e. the number of observed deaths should be equal to the number expected) (PIC01) (1).

However, given the uncertainty in the SMR estimate we propose using a target for the confidence interval around the SMR to include the value one or to sit entirely below the value one; this would mean that, taking into account uncertainty, we anticipate that the number of observed deaths was less than or equal to the number of expected deaths.

#### **How is the metric calculated?**

Numerator: Observed deaths in PICU.

Denominator: Number of expected deaths in PICU as predicted by the Paediatric Index of Mortality (PIM3) model (3). We use PIM3 to measure how poorly children were at the point when they were admitted to PICU. The measure takes into account many factors such as whether the child was admitted as an emergency or they needed help breathing to estimate how likely each child is of dying.

## Related documents

1. PICANet Outlier Policy
2. PICANet SAP
3. Supporting quality: PICANet's key metrics

## References

1. NHS England. *Specialised Services Quality Dashboard: Paediatric Intensive Care (PICU) Metric Definitions 2021/22*. [Online]. 2021. [Accessed 05/09/2024]. Available from: <https://www.england.nhs.uk/wp-content/uploads/2021/05/metric-definitions-level-3-paediatric-critical-care-2122.pdf>
2. Paediatric Critical Care Society (PCCS). *Quality Standard for the Care of Critically Ill or Injured Children*. [Online]. 2021. [Accessed 05/09/2024]. Available from: <https://pccsociety.uk/wp-content/uploads/2021/10/PCCS-Standards-2021.pdf>
3. Straney, L., Clements, A., Parslow, R. C., Pearson, G., Shann, F., Alexander, J., & Slater, A. *Paediatric Index of Mortality 3 An Updated Model for Predicting Mortality in Pediatric Intensive Care*. *Pediatric Critical Care Medicine*. 2013, **14**, pp.673-681