STATISTICAL ANALYSIS PLAN

LEVEL 3: INTENSIVE CARE

2023

V1.1

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Table of contents

1 Amendments

This is the first version of the Level 3 Intensive Care Statistical Analysis Plan (SAP) for the 2023 State of the Nation Report analysis and as such there are no amendments to record.

2 Introduction

The Paediatric and Intensive Care Audit Network (PICANet) was established in 2002 to record details of the treatment of all critically ill children admitted for care in a designated Level 3 paediatric intensive care unit (PICU) and currently consists of three main datasets: admissions, transports and referrals. Additionally, information on data quality is also recorded. These datasets would be analysed; the results of which would be presented in an annual report. In 2022, PICANet expanded to collected data on Level 2 high dependency care. This analysis plan relates to data collected from designated Level 3 PICUs only.

The State of the Nation report will present data collected in the previous full three calendar years; the 2023 State of the Nation report will therefore analyse and present data from 2020, 2021 and 2022. Data for a three year period is presented to make sure data is complete, results are comparable and admission numbers are robust, as focusing on one year only doesn't easily allow examination of time trends and changes in practice.

3 Data

3.1 Datasets

Data manuals for Level 3 PICANet data can be found online at https://www.picanet.org.uk/data-collection/data-manuals-and-guidance/. Information on dataset changes over time can be found at https://www.picanet.org.uk/wp-content/uploads/sites/25/2022/05/PICANet_Dataset_Changes_v2.0.pdf.

3.1.1 Admission data

The admissions dataset includes information on all admissions in designated Level 3 PICUs across the United Kingdom and the Republic of Ireland (ROI). Data are collected from admission to discharge with additional data items collected 30 days following discharge such as mortality. Treatment received on the PICU is recorded in terms of daily activities received through the stay in the PICU and CT3 clinical coding (READ codes). Daily activities are defined from the *Paediatric Critical Care Minimum Data Set* (PCCMDS) (1). An admission event should be completed by the admitting unit within two months of the discharge (PCCS L3-702 (2)); prior to the 1st January 2022 the standard was within three months.

Although there is an ongoing process to replace READ codes with SNOMED, READ codes will remain the system for recording diagnoses in the 2023 State of the Nation report until the transition to the SNOMED coding scheme is complete.

3.1.2 Transport data

The transport dataset includes information on all children requiring paediatric intensive care transport by centralised transport services (CTS) or PICU providing the transport for a retrieval / transfer.   A transport event is completed by the team providing the transport. The transport could be from: the original admitting hospital to a PICU; between PICUs; or a child requiring paediatric intensive care being moved to a district general hospital, home or a hospice. An event is completed following agreement that PIC transport is required, irrespective of whether the child is transported to another care provider. A record should be submitted to PICANet as soon as possible and no later than two months after a transfer (PCCS Standard T-701 (2)).

Data collection began on 01/01/2012 and was first presented in the annual report in 2014. Prior to 2018 transport events were completed for all children transferred from the original admitting hospital to PICU.

Transport data items include patient demographic information, basic details about the transport team and collection unit, critical incidents during transit, transport times, interventions received by the patient both prior to the arrival of the transport team and while the transport team is in attendance (including PIM variables), and the outcome of the transport event.

3.1.3 Referral data

The referral dataset includes information on all children referred for Level 3 paediatric intensive care transport and admission. The referrals dataset data collection began on 01/01/2012 and was first presented in the annual report in 2014. A referral event is reported to PICANet for all requests for paediatric intensive care transport and all requests for PIC admission where the clinicians agree that the child requires PIC transport and/or a PICU bed. A child may have multiple referral events for the same episode of care, e.g. if it took several attempts to locate them a PICU bed after agreeing they required transport.

3.1.4 Additional external datasets

Paediatric admissions to adult intensive care units

The PICANet State of the Nation report presents information collected directly through PICANet Web. Additionally, admissions of children to Adult Intensive Care Units (AICUs) are presented. This information is obtained from the Intensive Care National Audit & Research Centre (ICNARC) dataset via data request for information on children admitted to AICUs in England, Wales and Northern Ireland. Data are usually requested from ICNARC by the team at Leeds at the end of March in the report year. For the 2023 report, the variables requested include:

- Unit and country of admission
- Month and year of admission
- Length of ICU stay (days)
- Discharge destination
- Age of patient
- Sex of patient
- ICU discharge status
- Primary reason for admission to ICU

For the 2023 report, PICANet will explore requesting data relating to children in AICUs in the Republic of Ireland from Irish National Intensive Care Unit Audit (INICUA) and include these data if possible.

Geography data

England

42 Integrated Care Boards (ICBs) replaced clinical commissioning groups (CCGs) in the NHS in England from 1 July 2022. The 2023 State of the Nation report will reflect this in its prevalence calculations for all three years of the reporting period henceforth. The spatial data used in the calculations will be obtained from the Office for National Statistics (ONS)[1].

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[1]https://geoportal.statistics.gov.uk/documents/ons::integrated-care-boards-july-2022-map-in-england/about

Wales

In Wales, spatial coverage of the seven health boards are the sub-national unit of geography used where applicable. These same spatial areas have been obtained from the ONS[2] and used in PICANet's 2021 and 2022 annual reports, and remain in use in 2023.

Scotland

Delivery of frontline healthcare services in Scotland are the responsibility of 14 regional National Health Service (NHS) Boards. The spatial coverage for each board is available from the Scottish government[3] and will be used in the 2023 report.

Northern Ireland

Data on location of patients is not collected in Northern Ireland. Therefore sub-geography of NI is used by PICANet.

Republic of Ireland

PICANet use 26 counties within the Republic of Ireland as units of spatial analysis. These are obtained from the Government of Ireland Open Data Portal[4].

Mid-year population estimates

Mid-year population estimates are used to calculate prevalence of PICU admission as detailed in Section 5.2.6; these estimates will be obtained from the following sources:

1. For England from ONS website (https://www.ons.gov.uk/)
2. For Wales from StatsWales website (https://statswales.gov.wales/Catalogue)
3. For Scotland from NRS website (https://www.nrscotland.gov.uk/)
4. For Northern Ireland from NISRA website (https://www.nisra.gov.uk/)
5. For Republic of Ireland from CSO website (https://www.cso.ie/en/index.html)

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[2] https://geoportal.statistics.gov.uk/documents/f442005ac5ff4a5885493296cd3a81f4/about
[3] https://spatialdata.gov.scot/geonetwork/srv/api/records/f12c3826-4b4b-40e6-bf4f-77b9ed01dc14
[4] https://data-osi.opendata.arcgis.com/

National child mortality statistics

National child mortality statistics are used to calculate the percentage of child deaths which occur in PICU as detailed in Sections 5.1 and 5.2.5. Data on deaths for 0-15 year olds will be obtained from the following sources:

1. For England and Wales from the Office for National Statistics (ONS)
   Data for 2020 and 2021 extracted from: DR2021 Deaths registered in England and Wales[5]
   Data for 2022 need to be requested from health.data@ons.gov.uk

2. For Scotland from the National Records of Scotland (NRS)
   Data for 2020 and 2021 extracted from: Table DT.03 Deaths, by sex and single year of age, Scotland 1974 to 2021[6] [REF]
   Data for 2022 need to be requested from statisticscustomerservices@nrscotland.gov.uk

3. For Northern Ireland from the Northern Ireland Statistics and Research Agency (NISRA)
   Data for 2020 and 2021 extracted from: Deaths by Age 1955-2021 Dataset[7]
   Data for 2022 need to be requested from demography@nisra.gov.uk

4. For Republic of Ireland from the Central Statistics Office (CSO)
   Data for 2020, 2021 and 2022 need to be requested from via email vitalstats@cso.ie

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[5]https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/datasets/deathsregisteredinenglandandwalesseriesdrreferencetables
[6]https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/vital-events/deaths/deaths-time-series-data
[7]https://www.nisra.gov.uk/publications/death-statistics

3.2 Key metrics and key data

The NCAPOP Provider Methodology Manual[8] sets out three types of metrics (four if case ascertainment is included); Outcomes, Process and Structure. PICANet has the following Level 3 key metrics (details of which can be found on PICANet Web at https://www.picanet.org.uk/about/policies/):

- Mortality in PICU (outcome)
- Emergency readmission to PICU within 48 hours of discharge (outcome)
- Retrieval mobilisation times (process)
- Unplanned extubations (process)
- Case ascertainment

Numbers of nurses providing care per clinical care bed (a structure measure) was previously a key metric, but discontinued in 2022 as the data are no longer collected by the audit as requested by NHS England.

Other key data are:

- Palliative care discharge status
- Data items feeding into PIM calculations (required for case-mix adjustment):
  - Elective admission
  - Pupil reaction
  - Mechanical ventilation
  - Absolute values of base excess
  - SBP (systolic blood pressure) at admission
  - $SBP^2/1000$
  - PaO2/FiO2 ratio: $100x\ FIO_2/PaO_2$ (mmHg)[9]
  - Recovery from a bypass cardiac procedure
  - Recovery from a non-bypass cardiac procedure
  - Recovery from a non-cardiac procedure
  - Very high risk diagnosis
  - High risk diagnosis
  - Low risk diagnosis

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[8] HQIP Provider Methodology Manual available from https://www.hqip.org.uk/about-us/provider-methodology-manual/

[9] FIO_2 is the fraction of inspired oxygen at the time of PaO_2, and PaO_2 is the partial pressure of oxygen in the arterial blood

3.3 Data processing and quality improvement

3.3.1 Database validations

Data is entered onto the PICANet Web via manual data entry or via data import. The 'live' web based data entry system has automatic validations. All validations run: (i) for data import, at time of upload; (ii) for manual data entry: every time a new field is selected and when the event entry is saved.

There are four categories of validation: missing value, warning, error and reject. Further information on validation categories can be found in Appendix A. Some validations allow for manual override by the person entering/checking the data.

3.3.2 Validation visits

PICANet has now replaced in-person validation visits with virtual validation visits; in-person validation visits ceased in March 2019 and as such this is the first report where all validation visits for the reporting period will have been virtual. The aim is for each participating organisation to receive a virtual validation visit every 12 – 18 months with members of the PICANet team. The timeliness and completion of data is reviewed and the visit allows the PCC team to compare patient notes and observations with those entered onto PICANet Web, review case ascertainment, and raise any outstanding issues. This ongoing process ensures that any systematic errors with data recording or inputting can be identified and resolved in advance of reporting.

3.4 Management of datasets

Each dataset is analysed separately. Data management is undertaken at the University of Leeds. The Universities of Leeds and Leicester both assess data quality. Analysis of the admissions data is conducted at the University of Leeds, and transport and referral data analysed at the University of Leicester.

3.4.1 Data freeze (soft lock)

A data freeze (soft lock) occurs on the 31st March of each year; sites are required to enter information on an event within 2 months of discharge and therefore all events occurring to 31st December of the previous year should be entered by this point. Previously data were expected

to be submitted within 3 months of discharge. For the 2023 State of the Nation Report, the soft lock date was maintained at 3 months to allow for a transition period to the shorter time scales; in future years the data freeze will occur on the 1st March.

3.4.2 Data cleaning

The main data cleaning process is undertaken annually after data freeze (soft lock) mainly in SQL and Stata by the data manager(s) and statistician(s) analysing the data. See Section 3.5 for details of data cleaning undertaken.

3.4.3 Final data download (data hard lock)

Final data download (data hard lock) will take place following data cleaning and querying (usually in Q2 of the Annual Report year). The date of hard lock is agreed within the PICANet team and is dependent on the quality and cleanliness of the data to be included in the report. This means the date of hard lock may change each year due to number of working days, Easter etc. The final dataset will contain events beginning on or before 31st December of the final reporting year which were entered onto the database on or prior to the soft lock of the data.

3.5 Data cleaning and stats checks

3.5.1 Postcode validation

Address details are collected in order to validate postcode. Units in England, Scotland and Wales provide address including postcode; those in the Republic of Ireland provide county and country of residence only and Northern Ireland provide country of residence alone. PICANet will conduct manual checks on postcodes where there is error or ambiguity due experiencing a technical issue relating to the use of the software afd Postcode Plus (https://www.afd.co.uk/products/postcode-plus/). The intention is to re-instate use of this software as soon as possible. PICUs in the Republic of Ireland and Northern Ireland are asked to manually validate country/county of residence.

3.5.2 Patient ID matching review

PICANet employ a probabilistic approach to assigning patient IDs to records. The IDs are assigned automatically and an associated confidence score (between 1=low confidence and 3=high confidence) in the matching is provided. Any patient IDs with a confidence score of 1 will be manually reviewed looking at key demographics such as NHS number, date of birth and sex. Following this review, manual adjustment of patient ID or confidence score is undertaken.

Following this process, instances where a Patient ID has multiple NHS numbers assigned are manually checked and corrected.

De-identified records (such as those for admissions in Northern Ireland or the Republic of Ireland) are given IDs based on perfect matches of case note number, date of birth and sex.

3.5.3 Admissions dataset checks

Overlapping or duplicate admissions

This check can only be conducted once address validation and patient ID matching review has been undertaken. Overlapping admissions <u>within</u> the same unit are identified and manually reviewed. If these appear to be separate patients given same patient ID in error (for example twins) then the patient ID will be amended accordingly referring the multiplicity field as required. Any discrepancies that cannot be resolved by the PICANet team will be sent to site. If these appear to be duplicate admissions or overlapping admissions for the same patient then these will be queried with the unit. Units are asked to resolve issue on PICANet Web where possible and inform the PICANet team of any alterations.

Events readmitted from theatre as planned admissions within 12 hours

This check can only be conducted once address validation and patient ID matching review has been undertaken. Cases are identified within hospitals and are merged centrally by the PICANet team using the first event for patient demographics and PIM data and the last event for discharge and follow-up data; daily activity data is appended as appropriate. This process was undertaken for the 2018 Annual Report to improve consistency in submissions since we became aware that one PICU (Royal Brompton) submitted data differently to all other PICUs. This work was done in SQL and will be repeated for the 2023 State of the Nation report.

Clinical coding

Unknown READ codes and READ codes falling into the PICANet 'unknown' primary diagnostic category are identified and queried with the unit.

Additional checks

It is known that sometimes a default time (12:00 or 14:00 or similar) is entered for admission, discharge etc. Where deemed relevant, times will be explored on a unit basis to identify any trends and to allow for appropriate assumptions to be made.

The following checks will be performed on the data for the 2023 State of the Nation report. As a minimum, the following will be examined and queried with units where appropriate:

- NHS number (*nhsno*)– where 9s have been provided

- Type of admission (*adtype*) – where unknown

- Source of admission (*sourcead*) – where unknown

- Care area admitted from (*careareaad*) – where unknown and admitted from same or other hospital (as recorded in *sourcead)*

- Retrieval/Transfer (*retrieval*) – where unknown

- Type of transport team (*atransportorgtype*) – where unknown

- Collection unit (*acollectionorg*) – where unknown

- Main reason for PICU admission (*primreason*) – where unknown

- Surgical procedure (*surgicalprocedure*) – where unknown

- Evidence available to assess past medical history (*medhistevid*) – where unknown

- Blood gas measured (*bgfirsthr*) – where unknown

- Mechanical ventilation (*mechvent*) – where unknown and patient has been discharged

- Tracheostomy performed during this admission (*tracheostomy*) – where unknown; and where *tracheostomy* is recorded as performed during the admission ("Yes") but tracheostomy cared for by nursing staff is not recorded in daily activities

- Primary diagnosis (*primarydiagnosis*) – where unknown (unless the accepted code for unknown diagnosis has been used) and child has been discharged prior to data freeze

- Discharged for palliative care (*dispalcare*) – where unknown

- Unplanned extubations – confirmation of events meeting definition and completeness

Country of residence assigned for analysis for each event ID should be checked manually for those admitted to Northern Ireland and the Republic of Ireland via a list sent to units.

3.5.4 Transport data cleaning

As a general rule for the cleaning of transport data, we only identify issues of data quality where the owner of the event is a Centralised Transport Service (CTS) or a PICU although in recent years following centralisation of the transport service nearly all events are owned by a CTS. All data cleaning should only be undertaken for the most recent year of data.

Duplicate events

Potential duplicates in the transport dataset are identified in the following ways:

1. Two events (or more) with the same patient ID and the transport was accepted at the same date and time.
2. Same patient ID with two or more transports on the same day from the same collection area (investigated to see if they are potentially transfers for short periods of treatments).
3. Two (or more) events where the transport request was received at the same date and time, by the same transport organisation, for two (or more) differing patient IDs that lived within the same IMD score area (note: these could be twins and so manual review is undertaken).

Where possible potential duplicates are investigated further before feedback, e.g. by checking to see if the (local) transport numbers are identical although this hasn't always been possible.

Potential duplicates should be fed back to data owners, with a request for review and probable deletion of one or more events for each suspected duplicate. We encourage data owners to tell us how they have amended the data or why the data is correct if it is not amended. We can, if desired, check that all requests have been dealt with at a later stage.

Transport times and dates

If an event breaches any of the following rules they are identified and the owner of the event will be encouraged to check <u>all</u> dates and times on the transport record to identify the point of the potential error.

Where possible the comments field should be investigated, and any other useful variables, to allow acceptance of any instances when the entry is actually correct, e.g. a long mobilisation time due to adverse weather conditions, or a long patient journey time due to a vehicle breakdown or simply a long distance travelled. It should also be investigated if there is an acknowledged delay by the transport team. It is possible to be identified by more than one of these rules at the same time.

- A mobilisation time (difference between time the child was accepted for transport and time when team departed base) which was more than 2 hours <u>and</u> the transport was non-elective <u>and</u> the event is owned by a CTS
- A time to bedside (difference between acceptance for transport and the time of arrival at the collection unit) which was more than 6 hours <u>and</u> the transport was non-elective <u>and</u> the event is owned by a CTS

- A patient journey time which lasted more than 3 hours and the event was owned by a CTS (can be checked for both elective and non-elective events). These are inspected before feedback as there are many journey times that can legitimately last >3 hours.

Events identified for breaching one of these rules, with no clear reason, are reported back to data owners. They are encouraged to check dates and time and if these are correct, to identify if there should be a reason documented for the delay.

Missing dates and times are not investigated further as this is raised as validation query. However, this should be considered for checking in future years.

3.5.5 Referrals data cleaning

As a general rule for the referral data, we only identify issues of data quality where the owner of the event is a Centralised Transport Service (CTS). The exception to this is if a duplicate entry belongs to a PICU, in which case we will feed back to the PICU which events to remove. All data cleaning should only be undertaken for the most recent year of data. All data cleaning requests are fed back to the owners of the data and we encourage them to tell us how they amend their data.

Duplicate events

Duplicates in this dataset are much harder to identify as times and dates are often reported poorly, particularly by non-PIC transport teams, (validation visits have confirmed this issue). Therefore this approach will overlook some, but the ones that are identified are more likely to be true duplicates. Duplicates in the referral data are identified in the following ways:

- Two (or more) events both with the same patient ID where the referral date and time is identical <u>and</u> the transport was accepted <u>and</u> the admission was accepted <u>and</u> the destination unit was the same.

Duplicates are generally one of the following:

- What appears to be the same event, entered by a CTS and by a PICU – we recommend deletion of the PICU owned event (event given to the PICU for deletion)
- The same event entered twice by a CTS and this is 'confirmed' by an apparently identical referral number – one event should be deleted (CTS to decide which to keep)
- The same event entered twice by a CTS but this is not confirmed by the use of the same referral number – investigation needed to identify if truly a duplicate (CTS to investigate)

All potential duplicates are fed back to data owners and we encourage them to tell us how they have amended their data. If desired we can check, at a later stage, that these issues have been dealt with.

Additional checks

The following should also be investigated each year:

- Events where there is an unknown intended destination unit (some of these have been identified as advice only calls and these should be deleted by the event owners as currently PICANet does not collect information about advice calls although this may change)
- Neonatal teams should not be able to accept referrals for paediatric intensive care transport and these should be investigated to see if they are "outside of scope of care" or "transport not requested" or should be removed
- Where the medical history is unknown
- Where there is disagreement as to whether a record is non-elective (or elective) and unplanned (or planned)

Unknown transport organisation in referral dataset

The following rules are used if the transport team name is missing:

- If the event is owned by a CTS, assume it was the CTS who did the transport
- If the event owner is allowed to do referrals, then allow them to be the transport organisation.

3.5.6 AICU data

Range and sense checks are undertaken before analysis as appropriate however queries are not raised with ICNARC and the cleaning process is purely to allow assumptions to be made where necessary. Any assumptions applied will be documented.

3.6 Derivations

3.6.1 Admissions data

Age

Age is calculated as the difference between the date of admission to PICU and the date of birth using the DATEDIFF function in SQL. When date of birth is not provided age is classed as '*unknown'*.

Age in months and age in years are complete months and years respectively, so for example if a child is 14 ½ months old this will be classed as age 14 months or age 1 year. Age in days is similarly complete days.

Bed activity

Bed activity looks at occupancy levels on the unit by day. A bed is counted as occupied if a child was present on a unit for any part of a day. This inevitably results in higher figures than the bed census data as a bed may have more than one child occupying it in any one day.

Bed census

Calculated as the number of children present in a PICU bed at 10 minutes past midnight.

Bed days (total number)

Bed days looks at how many days children are on a unit for (truncated at the start and end of the reporting period). The total number of *bed days* delivered is calculated as the sum of children in a PICU each day.

Clinical Commissioning Groups

CCGs are the predecessor to ICBs. Data on the Clinical Commissioning Group (CCG) are obtained by linking the validated home address of children admitted to PICU, to CCG/NHSCR via the National Statistics Postcode Lookup (NSPL) for the UK (https://geoportal.statistics.gov.uk/datasets/aef0a4ef0dfb49749fe4f80724477687/about). Children in the Republic of Ireland are identified by a text search of address fields. For the Republic of Ireland the only available geographical breakdown is by county region. All data processing is done in SQL and Excel.

Deprivation

Deprivation score is based on the home postcode of the patient of each admission, matched to a Lower Super Output Area (LSOA) and its rating based on Children in low-income families

local measure (HMRC, 2014)[10]. Admissions are split into five deprivation categories based on the score of the patient LSOA. There will be an equal number (or as close as possible) of child population in each group, however the number of admissions in each of these categories will vary.

Emergency readmissions within 48hrs of PICU discharge

Calculated for patients readmitted to the same unit as unplanned admissions (admission type 'Unplanned- following surgery' or 'Unplanned- other') within 48 hours of discharge.

Expected probability of mortality

Expected probability of mortality is estimated using the Paediatric Index of Mortality 3 (PIM3) (3), further details on PIM3 variables can be found in Appendix B. Recalibration on PIM3 data will be required as detailed in Section 3.7.

In previous reports a recalibrated version of the Paediatric Index of Mortality 2 (PIM2) (4) was used (recalibration performed using data to be published in the report). In many tables the expected probability of mortality is presented in groups: <1%, 1-<5%, 5%- <15%, 15-<30% and 30+% to reflect those used by the Australian and New Zealand Intensive Care Society (ANZPICS) (5) for comparability.

Integrated Care Boards

Patient residential locations in England will be spatially matched to Integrated Care Board (ICB) boundaries via a lookup between 2011 LSOAs and ICBs provided by the Office for national statistics[11]. This will be used to calculate a prevalence of admission for each English ICB.

Invasive ventilation

A child is said to have received invasive ventilation on any given day if they received either: invasive ventilation via endotracheal tube, invasive ventilation via tracheostomy tube, advanced ventilatory support (jet ventilation) or advanced ventilatory support (oscillatory ventilation) as recorded on the daily interventions (PCCMDS) data.

Length of stay in days

Length of stay is calculated as date of discharge minus date of admission for admissions occurring in the reporting period. Length of stay is not calculated for individuals still on PICU at the time of final data freeze.

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[10] https://www.gov.uk/government/collections/children-in-low-income-families-local-area-statistics
[11] https://geoportal.statistics.gov.uk/datasets/ons::sub-icb-locations-to-integrated-care-boards-to-nhs-england-region-april-2023-lookup-in-england/

Length of stay in hours

Length of stay in hours is calculated as the difference between time of discharge and time of admission for admissions occurring in the reporting period. Where no time of admission and/or discharge is available, midnight is imputed as the missing time Length of stay is not calculated for individuals still on PICU at the time of final data freeze.

Level of activity in PICU

Calculated from the daily activities dataset (PCCMDS) which is a section of the admissions dataset but stored in a different table in the database (the activity dataset). The purpose of the PCCMDS is to provide the basis for payment by results (PbR) through the establishment of healthcare resource groups (HRGs). They were specified to take into account differing levels of activity in PICU, the 2021/22 HRG grouper will be applied to the 2023 State of the Nation Report:

- XB09Z - Enhanced Care
- XB07Z - High Dependency
- XB06Z - High Dependency Advanced
- XB05Z - Intensive Care Basic
- XB04Z - Intensive Care Basic Enhanced
- XB03Z - Intensive Care Advanced
- XB02Z - Intensive Care Advanced Enhanced
- XB01Z - Intensive Care - ECMO / ECLS
- UZ01Z – Unable to group

'Unable to Group' mostly comprises combinations of activities no longer regarded as high dependency, as well as some where problems arise in aspects of the grouper other than activity e.g. Diagnosis.

LSOA

A patient's residential address is collected on the admissions form. The postcode of this address is validated using specialist software (afd[12]) and a final round of manual checks. These validated postcodes are each matched to three LSOAs (one for each of the 2001, 2011 and 2021 census geographies) using the National Statistics Postcode Lookup (NSPL[13]).

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[12] https://www.afd.co.uk/
[13] https://geoportal.statistics.gov.uk/documents/a-guide-to-ons-geography-postcode-products-1/

Non-invasive ventilation

A child is said to have received non-invasive ventilation on any given day if they received non-invasive ventilation as recorded on the daily interventions (PCCMDS) data.

Primary diagnosis

The primary diagnosis for the whole admission is categorised into 13 diagnostic groups to enable a simple comparison between organisations. Diagnostic group is assigned using a lookup table developed by Roger Parslow (University of Leeds).

Relative rate of emergency readmission within 48 hours of PICU discharge

The average emergency readmission rate over all units combined calculated. Each PICU's individual emergency readmission rate is then divided by overall rate to give that PICU's relative rate of emergency readmission within 48 hours of PICU discharge.

Renal support

A child is said to have received renal support on any given day if they received either: peritoneal dialysis, haemofiltration, haemodialysis, plasma filtration or plasma exchange as recorded on the daily interventions (PCCMDS) data

Ventilator free days

The number of days free of invasive ventilation in the first four weeks of the admission if the child survives and zero days if they die within that period, representing a combination of ventilation and mortality. No account is taken of re-admission during that period, or of non-invasive ventilation.

3.6.2 Transport data

New CTS teams

As of 01.01.2018 CTS Heartlink Paediatric ECMO transport service are recording transport events (as CTS028). As of 07.04.2021 the Paediatric and Neonatal Decision Support and Retrieval Service (PaNDR) are providing PIC transport in the East of England and submit data to PICANet (as CTS032).

Categorisation of the smaller transport services:

Since 2019 we only report data related to CTS teams and therefore these categorisation will only be found in older reports.

Smaller transport services are categorised as follows in transport data reporting:

PICU Transport team: We no longer receive information about PICU transports (as CTS teams are the majority of transports) and therefore this is no longer applied.

Neonatal team: A specialist neonatal team (e.g. CENTRE) transported the child.

Non-specialist team: A non-specialist team transported the child (e.g. a team from a District General Hospital)

Other specialist team: Another specialist team transported the child. We define another specialist team (not a centralised transport service (PIC) or neonatal transport team), transported the child. This could be a trauma transport team transferring the child or a private specialist transfer service

3.6.3 Referrals data

Categorisation of the smaller transport services

- *PICU transport team*: transports attributed to PICUs where an individual PICU only has one event in a calendar year.

3.7 PIM recalibration

Recalibration of PIM3 will be performed using the data to be published in the report (i.e. for the 2023 report, this would be admission years: 2020, 2021, and 2022). Recalibrated PIM3 co-efficient for each factor as obtained through a logistic regression model; exclusions apply for patients aged 18 years and over.

Recalibration is undertaken annually in Stata and the resulting coefficients saved in SQL for future reference.

Assessments of the recalibrated model will include examining the area under the Receiver Operating Characteristic (ROC) curve and goodness-of-fit assessments for discrimination ability and calibration. Both values will be reported alongside co-efficient as per the Health Quality Improvement Partnership (HQIP) outlier guidance [REF].

3.8 Assumptions

Standard assumptions made in analysis are listed below. Additional specific assumptions based on stats checks will be documented.

Postcodes

Following the postcode validation processes, including manual review, if the postcode still cannot be validated by the address then the postcode will be treated as unknown for analysis purposes in the State of the Nation report as the data are deemed to not be of sufficient quality for inclusion.

Date and time of death

If date of death is missing and time of death is recorded as 00:00:00, then it will be assumed that time of death is an import error and that the patient survived. The validity of this assumption will be checked using the discharge status field (*unitdisstatus*). Following this confirmation, time of death will be replaced with a missing value for those without a death date.

High flow nasal cannula therapy

Where maximum daily flow for high flow nasal cannula was recorded as 0 l/min or unknown, it was assumed that no high flow nasal cannula therapy was given.

4 Analysis methods

4.1 Software

Analysis will be performed in SQL or Stata v17 (or later) (6) unless otherwise stated. Maps are created in ArcMap unless otherwise stated.

4.2 Statistical program validation

A header should be included in all statistics syntax files; as a minimum the header should include the program name and purpose, the author and date created. Additionally, a list of amendments made post review, last amended date, date of review and reviewers name should ideally be included. Programs can be validated by the author and do not need third party review, unless otherwise stated.

4.3 General analysis methods

Descriptive analysis comprises the largest part of the report. In the admissions dataset, most of the tables and figures are usually broken down by admitting PICU and year. The majority of tables and figures report data on admissions between 0-15 years of age, where all admissions are included in an analysis this will be clearly identified.

Unless stated otherwise, the proportions in tables throughout the report are row percentages, except in the total column where they are column percentages.

The report mainly focuses on year of admission. There are only a few sections of the report that focus on activity in the year rather than year of admission. These are:

- Bed days
- Bed census
- Bed activity
- PCCMDS data

Geography

All the Maps are drawn based on the country of residence and not country of admission, unless otherwise stated. Units in England, Scotland and Wales provide address including postcode; those in the Republic of Ireland provide county and country of residence only and Northern Ireland provide country of residence alone.

Standardised mortality ratios

Unadjusted Standardised Mortality Ratios (SMRs) are calculated by dividing the observed number of deaths in each organisation by the expected number of deaths, based on the national data for the same admission period.

Risk-adjusted SMRs are calculated by dividing the observed number of deaths in each organisation by the expected number of deaths predicted using the recalibrated version of PIM3 (see Section 3.7). This provides case-mix adjustment based on PIM3.

The benchmark for SMR is 1 (i.e. the number of expected deaths equals the number of observed deaths).

4.4 General inclusion/exclusion criteria

This section broadly summarises the inclusion and exclusions criteria for different sections of the State of the Nation Report Tables and Figures. Where a unit has not been open for the whole three-year reporting period, inclusion in tables which present data over the whole period must be considered on a case by case basis.

Clinical and patient characteristics tables

In general, the following inclusion/exclusion criteria apply to tables and figures relating to PICU admissions (Section 5.2.1), outcomes (Section 5.2.5) and prevalence (Section 5.2.6), however, specific criteria for each individual analysis are detailed in Section 5.2 below.

- Based on admissions occurring between 1st January of the first year of the reporting period and the 31st December of the last year of the reporting period, inclusive;
- Exclude patients of ambiguous or unknown sex;
- Exclude patients aged 16 years of over;
- Include patients who were not discharged from PICU at the time of final data lock.

PICU workload and activity

In general, the following inclusion/exclusion criteria apply to tables and figures relating to interventions (Section 5.2.3), bed activity (Section 5.2.4) and activity data (Section 5.2.7), however, specific criteria for each individual analysis are detailed in Section 5.2 below.

- Based on activity occurring between 1st January of the first year of the reporting period and the 31st December of the last year of the reporting period, inclusive, regardless of admission date;
- Include patients of ambiguous or unknown sex;
- Include patients aged 16 years of over;
- Include patients who were not discharged from PICU at the time of final data lock.

Length of stay

In general, the following inclusion/exclusion criteria apply to tables and figures relating to length of stay (Section 5.2.4), however, specific criteria for each individual analysis are detailed in Section 5.2 below.

- Based on activity occurring between 1st January of the first year of the reporting period and the 31st December of the last year of the reporting period, inclusive, regardless of admission date;
- Include patients of ambiguous or unknown sex;
- Include patients aged 16 years of over;
- Exclude patients who were not discharged from PICU at the time of final data lock.

Standardised mortality ratios

In general, the following inclusion/exclusion criteria apply to tables and figures relating to standardised mortality ratios (Section 5.2.5), however, specific criteria for each individual analysis are detailed in Section 5.2 below.

- Based on admissions occurring between 1st January of the first year of the reporting period and the 31st December of the last year of the reporting period, inclusive;
- Exclude patients of ambiguous or unknown sex;
- Exclude patients aged 16 years of over;
- Exclude patients who were not discharged from PICU at the time of final data lock.

4.5 Potential sources of measurement error and bias

4.5.1 Bias

Sampling bias

This national audit collects information from all PICUs in NHS England, NHS Wales, Scotland, Northern Ireland and ROI PICUs as well as private PICUs in England (Portland; Harley Street until 2020). Additionally, data are collected from all centralised UK and ROI PIC transport teams. As such, there is no sampling bias introduced as the entire population is collected.

Selection bias

PICANet has a Section 251 exemption which allows collection of data without individual patient/parental consent. PICANet is exempt from the national data opt-out (for the purposes

of audit). As such we collect data on all patients treated within participating PICUs with no selection bias introduced.

Bias introduced through missing data

Data being missing not at random can introduce bias into results. For example, data that are difficult to obtain and are not clearly accessible in patient records may be less likely to be reported. It is not believed that this is likely to apply in many cases and PICANet Web validation, validation visits, data cleaning and emails all focus on data completeness as well as quality. Levels and patterns of missing data will be reported as appropriate for transparency.

Bias may also be introduced via assumptions used to exclude any individuals from analysis, assumptions made will be recorded and reported as appropriate alongside analyses to allow the audience to assess the impact of such assumptions for themselves.

4.5.2 Measurement error

Transposition error

During the data entry process, data may be entered incorrectly into PICANet Web e.g. due to misreading clinical notes, handwriting legibility or human error. Virtual validation visits are conducted to check the accuracy and completeness of data in order to detect such errors, data cleaning may also identify issues and the database validations also apply a modulus 11 check on NHS number (where applicable). It is, however, likely that there will be a low underlying level of transposition error that will go undetected.

Interpretation error

Misinterpretation of PICANet definitions may also lead to inaccurate data. Training materials are publically available including data definitions and examples of how to complete PICANet forms. Validation visits are also used to pick up such systematic errors and improve data quality.

4.6 Missing data methods

Database validations flag missing data and validation visits are used to ensure data completeness as well as quality. Patterns of missing data will be explored as appropriate for key data and variables. Missing data will be queried with units where appropriate.

There are no plans to use formal methods for missing data such as multiple imputation due to the descriptive nature of the State of the Nation Report. Numbers of missing data items will be presented alongside results as appropriate to aid interpretation.

4.7 Outlier detection

Detection of outliers is undertaken using funnel plots for the key metric of (risk-adjusted) mortality. The process for selecting the Mortality in PICU key metric and responding to outliers can be found in the 2023 update to PICANet's Level 3 Intensive Care Outlier Policy: https://www.picanet.org.uk/about/policies/.

4.8 Reporting conventions

Percentages will be reported to 1 decimal place (dp) unless otherwise stated. Totals are presented as whole numbers or to 1dp if required.

Any exclusions applied in analysis (e.g. exclusion of unknown age, ambiguous gender or neonatal teams) will be specified in the footnote of the associated table. Additionally, tables will clearly indicate whether analysis has been performed on based on country of residence or country of treatment (i.e. location of PICU where admissions occurred).

4.8.1 PICANet standard categorisations

The following categorisations will be used in analysis unless otherwise stated.

Admission type: planned following surgery; unplanned following surgery; planned other; unplanned other; unknown.

Age: <1 year; 1-4 years; 5-10 years; 11-15 years; 16+ years.

Age (16+ only): 16-17 years; 18+ years.

Age in months (<1 year only): <1 month; 1-2 months; 3-5 months; 6-11 months.

Care area admitted from: accident and emergency; HDU (step-up/step-down); ICU/PICU/NICU; other intermediate care area (not ICU/PICU/NICU); recovery only; theatre and recovery; ward; x-ray, endoscopy, CT scanner or similar; unknown.

Country of admission: England (NHS); England (non-NHS); Wales; Scotland; Northern Ireland; Republic of Ireland

Deprivation: Deprivation quintile of patient's home address, defined by the Children in Low Income Metric[14]. Quintile boundaries are set so that they contain an equal number of children (aged 0-15), as opposed to an equal number of patients in the cohort. Currently calculated for patients resident in England and Wales admitted to PICU in these nations only. The ability to expand deprivation analyses to Scotland will be explored.

Discharge destination: normal residence; hospice; same hospital; other hospital; unknown.

Ethnicity: white British; white Irish; white other; mixed white and black Caribbean; mixed white and black African; mixed white and Asian; mixed other; Asian Indian; Asian Pakistani; Asian Bangladeshi; Asian other; black Caribbean; black African; black other; Chinese; other; Arab; not stated; unknown.

> Categories defined by the UK census and used by the NHS as a national mandatory standard. 'Other' text box available for further detail if required e.g. for the category 'Mixed other'.

Length of stay: <1h; 1h-<4h; 4h-<12h; 12h-<24h; 1d-<3d; 3d-<7d; 7d+.,

PIM group: <1%; 1%-<5%; 5%-<15%; 15%-<30%; 30%+.

Primary diagnostic group: cardiovascular; endocrine/metabolic; gastrointestinal; infection; musculo-skeletal; neurological; oncology; respiratory; other; unknown.

> Whenever used, a footnote should be added explaining that 'Other' includes a mixture of diagnoses but also some coding where a non-diagnostic READ code was given e.g. 'Post-surgical wound care' and that this practice varies by organisation. Additionally, where 'Other' includes less common diagnostic groups this should also be transparent.

Sex: male; female; ambiguous; unknown.

Source of admission: same hospital; other hospital; clinic; home; unknown.

Ventilation status: invasive ventilation only; non-invasive ventilation only; both invasive and non-invasive ventilation; neither; unknown.

5 State of the Nation report content

5.1 Key metrics

Key findings are agreed upon by: the co-PIs, statistician(s) and relevant clinicians.

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[14] https://assets.publishing.service.gov.uk/media/5a7c31a940f0b67d0b11f7b2/measure_2_.pdf

The first table in the report will focus on the admissions tables outlined below. It will include a count of admissions by year, broken down by sex, age group ethnicity, deprivation and nation.

The State of the Nation report will also present the key metrics, introduced in Section 3.2 and outlined in further detail in Appendix A. The report will make recommendations based on the key metrics, in combination supporting tables and figures in Section **Error! Reference source not found.**.

5.2 Tables and Figures

5.2.1 PICU Admissions

All tables and figures in this section **exclude** patients aged 16 years and over, those of unknown, and patients of ambiguous or unknown sex, unless otherwise stated.

TABLE 1.1 AND FIGURE 1.1 ADMISSIONS BY AGE AND SEX (ALL ADMISSIONS) - Produced in SQL

Breakdown variables & categorisation:

- Age in years (and additionally months if under 1 year old) - follows standard PICANet categorisation (Section 4.7)
- Sex - follows standard PICANet categorisation (Section 4.8)

Presentation:

- Three-year reporting period combined

Notes:

- This table includes all admissions including those for patients aged 16+ and those of unknown age.
- A footnote needs to be added for the number of ambiguous or unknown sex admissions

Exclusions:

- Patients of ambiguous or unknown sex

TABLE 1.2 ADMISSIONS BY AGE AND HEALTH ORGANISATION (ALL ADMISSIONS) - Produced in SQL

Breakdown variables & categorisation:

- Age in years (and additionally months if under 1 year old) - follows standard PICANet categorisation for those aged 0-15 years (Section 4.7). Data those aged over 16 are combined in order to maintain statistical disclosure control due to small numbers in each unit.
- Health organisation

Presentation:

- Individual years

Exclusions:

- Patients of unknown age
- Patients of ambiguous or unknown sex

TABLE 1.3 ADMISSIONS BY MONTH AND HEALTH ORGANISATION - Produced in SQL

Breakdown variables & categorisation:

- Month of admission
- Health organisation

Presentation:

- Individual years

Exclusions:

- Patients aged 16 years or older
- Patients of unknown age
- Patients of ambiguous or unknown sex

TABLE 1.4 AND FIGURE 1.4 ADMISSIONS BY MONTH AND AGE - Produced in SQL

Breakdown variables & categorisation:

- Month of admission
- Age in years - follows standard PICANet categorisation (Section 4.7)

Presentation:

- Individual years

Exclusions:

- Patients aged 16 years or older
- Patients of unknown age
- Patients of ambiguous or unknown sex

TABLE 1.5 AND FIGURE 1.5 ADMISSIONS BY MONTH AND PRIMARY DIAGNOSTIC GROUP - Produced in SQL

Breakdown variables & categorisation:

- Month of admission
- Diagnostic group - follows standard PICANet categorisation (Section 4.7) with the top eight most commonly occurring groups being presented and all other diagnostic groups being combined into the 'Other' category alongside unknown diagnostic groups for statistical disclosure control.

Presentation:

- Individual years

Exclusions:

- Patients aged 16 years or older
- Patients of unknown age
- Patients of ambiguous or unknown sex

TABLE 1.6 RESPIRATORY ADMISSIONS BY MONTH AND AGE - Produced in SQL

Breakdown variables & categorisation:

- Month of admission
- Age in years - follows standard PICANet categorisation (Section 4.7)

Presentation:

- Individual years

Exclusions:

- Patients aged 16 years or older
- Patients of unknown age
- Patients of ambiguous or unknown sex

TABLE 1.7 ADMISSIONS BY YEAR, ETHNICITY AND AGE - Produced in SQL

Breakdown variables & categorisation:

- Age in years - follows standard PICANet categorisation (Section 4.7)
- Ethnicity - follows standard PICANet categorisation (Section 4.7)

Presentation:

- Individual years

Exclusions:

- Patients aged 16 years or older
- Patients of unknown age
- Patients of ambiguous or unknown sex

TABLE 1.8 ADMISSIONS BY ETHNICITY AND AGE - Produced in SQL

Breakdown variables & categorisation:

- Age in years - follows standard PICANet categorisation (Section 4.7)
- Ethnicity - follows standard PICANet categorisation (Section 4.7)

Presentation:

- Three-year reporting period combined

Exclusions:

- Patients aged 16 years or older
- Patients of unknown age
- Patients of ambiguous or unknown sex

TABLE 1.9 ADMISSIONS BY COUNTRY OF RESIDENCE AND YEAR - Produced in SQL

Breakdown variables & categorisation:

- Country of residence - Country of residence is categorised as: England; Wales; Scotland; Northern Ireland; Republic of Ireland; Other UK; Out of Area; Missing. "Other UK" includes patients resident in the Isle of Man and the Channel Islands; areas are combined for statistical disclosure control.
- Country of admission – England (NHS); Wales, Scotland; Norther Ireland; Republic of Ireland; England (non-NHS); unknown.

Presentation:

- Three-year reporting period combined

Exclusions:

- Patients aged 16 years or older
- Patients of unknown age
- Patients of ambiguous or unknown sex

TABLE 1.10 ADMISSIONS BY PREDICTED MORTALITY RISK GROUP AND HEALTH ORGANISATION - Produced in SQL

Breakdown variables & categorisation:

- Recalibrated PIM score - follows standard PICANet categorisation (Section 4.7)
- Health organisation

Presentation:

- Individual years

Exclusions:

- Patients aged 16 years or older
- Patients of unknown age
- Patients of ambiguous or unknown sex

TABLE 1.11 AND FIGURE 1.11 ADMISSIONS BY ADMISSION TYPE AND AGE - Produced in SQL

Breakdown variables & categorisation:

- Age in years - follows standard PICANet categorisation (Section 4.7)
- Admission type - follows standard PICANet categorisation (Section 4.7)

Presentation:

- Three-year reporting period combined

Exclusions:

- Patients aged 16 years or older
- Patients of unknown age
- Patients of ambiguous or unknown sex

TABLE 1.12 AND FIGURE 1.12 ADMISSIONS BY ADMISSION TYPE AND HEALTH ORGANISATION - Produced in SQL

Breakdown variables & categorisation:

- Admission type - follows standard PICANet categorisation (Section 4.7)
- Health organisation (grouping variable)

Presentation:

- Individual years

Exclusions:

- Patients aged 16 years or older
- Patients of unknown age
- Patients of ambiguous or unknown sex

TABLE 1.13 AND FIGURE 1.13 ADMISSIONS BY SOURCE OF ADMISSION AND HEALTH ORGANISATION (ADMISSION TYPE UNPLANNED - OTHER) - Produced in SQL

Breakdown variables & categorisation:

- Source of admission – same hospital; other hospital; unknown (i.e. clinic and home sources of admission are not included)
- Health organisation (grouping variable)

Presentation:

- Individual years

Exclusions:

- Patients aged 16 years or older
- Patients of unknown age
- Patients of ambiguous or unknown sex

TABLE 1.14 AND FIGURE 1.14 ADMISSIONS BY CARE AREA ADMITTED FROM AND HEALTH ORGANISATION, (ADMISSION TYPE UNPLANNED - OTHER; ADMITTED FROM HOSPITAL) - Produced in SQL

Breakdown variables & categorisation:

- Care area admitted from - follows standard PICANet categorisation (Section 4.7) with recovery only; x-ray, endoscopy, CT scanner or similar; and, unknown admission source combined into the 'Other' admission source category for statistical disclosure control
- Health organisation (grouping variable)

Presentation:

- Individual years

Exclusions:

- Patients aged 16 years or older
- Patients of unknown age
- Patients of ambiguous or unknown sex

TABLE 1.15 AND FIGURE 1.15 ADMISSIONS BY PRIMARY DIAGNOSTIC GROUP AND AGE - Produced in SQL

Breakdown variables & categorisation:

- Age in years - follows standard PICANet categorisation for those aged 0-15 years (Section 4.7).
- Diagnostic group - follows standard PICANet categorisation (Section 4.7) with the top eight most commonly occurring groups being presented and all other diagnostic groups being combined into the 'Other' category alongside unknown diagnostic groups for statistical disclosure control.

Presentation:

- Three-year reporting period combined

Exclusions:

- Patients aged 16 years or older
- Patients of unknown age
- Patients of ambiguous or unknown sex

TABLE 1.16 ADMISSIONS BY PRIMARY DIAGNOSTIC GROUP AND HEALTH ORGANISATION - Produced in SQL

Breakdown variables & categorisation:

- Health organisation
- Diagnostic group - follows standard PICANet categorisation (Section 4.7) with the top eight most commonly occurring groups being presented with all other diagnostic groups and any unknown being combined into the 'Other' category for statistical disclosure control.

Presentation:

- Individual years

Exclusions:

- Patients aged 16 years or older
- Patients of unknown age
- Patients of ambiguous or unknown sex

TABLE 1.17 ADMISSIONS BY PRIMARY DIAGNOSTIC GROUP AND HEALTH ORGANISATION, (PLANNED - FOLLOWING SURGERY) - Produced in SQL

Breakdown variables & categorisation:

- Health organisation
- Diagnostic group - follows standard PICANet categorisation (Section 4.7) with the top eight most commonly occurring groups being presented and all other diagnostic groups being combined into the 'Other' category alongside unknown diagnostic groups for statistical disclosure control.

Presentation:

- Three-year reporting period combined

Exclusions:

- Patients aged 16 years or older
- Patients of unknown age
- Patients of ambiguous or unknown sex

TABLE 1.18 ADMISSIONS BY PRIMARY DIAGNOSTIC GROUP AND HEALTH ORGANISATION, (PLANNED - OTHER) - Produced in SQL

Breakdown variables & categorisation:

- Health organisation
- Diagnostic group - follows standard PICANet categorisation (Section 4.7) with the top eight most commonly occurring groups being presented with all other diagnostic groups and any unknown being combined into the 'Other' category for statistical disclosure control.

Presentation:

- Three-year reporting period combined

Exclusions:

- Patients aged 16 years or older
- Patients of unknown age
- Patients of ambiguous or unknown sex

TABLE 1.19 ADMISSIONS BY PRIMARY DIAGNOSTIC GROUP AND HEALTH ORGANISATION, (UNPLANNED - OTHER) - Produced in SQL

Breakdown variables & categorisation:

- Health organisation
- Diagnostic group - follows standard PICANet categorisation (Section 4.7) with the top eight most commonly occurring groups being presented with all other diagnostic groups and any unknown being combined into the 'Other' category for statistical disclosure control.

Presentation:

- Three-year reporting period combined

Exclusions:

- Patients aged 16 years or older
- Patients of unknown age
- Patients of ambiguous or unknown sex

TABLE 1.20 ADMISSIONS BY PRIMARY DIAGNOSTIC GROUP AND HEALTH ORGANISATION, (UNPLANNED - FOLLOWING SURGERY) - Produced in SQL

Breakdown variables & categorisation:

- Health organisation
- Diagnostic group - follows standard PICANet categorisation (Section 4.7) with the top eight most commonly occurring groups being presented with all other diagnostic groups and any unknown being combined into the 'Other' category for statistical disclosure control.

Presentation:

- Three-year reporting period combined

Exclusions:

- Patients aged 16 years or older
- Patients of unknown age
- Patients of ambiguous or unknown sex

TABLE 1.21 ADMISSIONS BY DEPRIVATION GROUP (ENGLAND, WALES AND SCOTLAND) - Produced in Stata

At present this table covers residents and admissions within England, Wales and Scotland (with the intention to expand to the British Isles in future reports)

Breakdown variables & categorisation:

- Age in years - follows standard PICANet categorisation (Section 4.7)
- Ethnicity - follows standard PICANet categorisation (Section 4.7)

Presentation:

- Individual years
- Three-year reporting period combined

Exclusions:

- Patients aged 16 years or older
- Patients of unknown age
- Patients of ambiguous or unknown sex
- Patients with unknown postcode
- Patients not resident in England, Wales or Scotland
- Patients not admitted in England, Wales or Scotland

5.2.2 Retrievals and Transfers

No tables are presented based on retrievals and transfers (information in the PICANet Admissions dataset).

5.2.3 Interventions

All tables and figures in this section **include** patients aged 16 years and over, those of unknown, and patients of ambiguous or unknown sex, unless otherwise stated.

TABLE 2.1 INTERVENTIONS RECEIVED BY HEALTH ORGANISATION AND YEAR - Produced in SQL

Previously named Table 2.5

Breakdown variables & categorisation:

- Interventions - invasive ventilation (as defined in Section 3.6); non-invasive ventilation (as defined in Section 3.6); tracheostomy; ECMO; IV vasoactive drugs; LVAD; ICP device; renal support; high flow nasal cannula therapy. Interventions are not mutually exclusive.
- Health organisation
- Based on date of admission

Presentation:

- Individual years

Exclusions:

- None

TABLE 2.2 ADMISSIONS BY VENTILATION STATUS AND AGE – Produced in SQL

Previously named Table 2.6

Breakdown variables & categorisation:

- Ventilation status - follows standard PICANet categorisation (Section 4.8)
- Age in years - follows standard PICANet categorisation (Section 4.8)

Presentation:

- Individual years

Exclusions:

- None

Important: A footnote should state the number of children still on PICU at the time of final data lock as their status may change before final discharge from PICU.

TABLE 2.3 ADMISSIONS BY VENTILATION STATUS AND HEALTH ORGANISATION – Produced in SQL

Previously named Table 2.7

Breakdown variables & categorisation:

- Ventilation status - follows standard PICANet categorisation (Section 4.8)
- Health organisation

Presentation:

- Individual years

Exclusions:

- None

Important: A footnote should state that children still on PICU at the time of final data lock are included in this table and the number of admissions this relates to should be presented.

TABLE 2.4 ADMISSIONS BY HIGH FLOW NASAL CANNULA THERAPY AND HEALTH ORGANISATION – Produced in Stata

Previously named Table 2.8

Breakdown variables & categorisation:

- High flow nasal cannula therapy (HFNCT) – summary statistics presented
- Health organisation
- Based on date of activity

Presentation:

- Individual years

Exclusions:

- None

Important: A footnote should state the number of children still on PICU at the time of final data lock as their status may change before final discharge from PICU.

5.2.4 Bed activity and length of stay

All tables and figures in this section **include** patients aged 16 years and over, those of unknown, and patients of ambiguous or unknown sex, unless otherwise stated.

Bed activity

TABLE 3.1 AND FIGURE 3.1 BED DAYS BY AGE AND SEX – Produced in SQL

Breakdown variables & categorisation:

- Sex - follows standard PICANet categorisation (Section 4.7)
- Age in years – single year of age presented

Presentation:

- Three-year reporting period combined

Exclusions:

- None

Note:

- Despite there being no exclusions to this analysis, data are presented by sex. In order to provide statistical disclosure control, the number of bed days for children of ambiguous or unknown sex will be footnoted subject to consideration of the number of children this relates to.

TABLE 3.2 BED DAYS BY AGE, BY HEALTH ORGANISATION AND COUNTRY OF ADMISSION – Produced in SQL

Breakdown variables & categorisation:

- Age in years – follows standard PICANet categorisation (Section 4.7)
- Health organisation – including a breakdown by nation (England NHS; England non-NHS; Northern Ireland; Republic of Ireland; Scotland; Wales)

Presentation:

- Individual years

Exclusions:

- None

TABLE 3.3 AND FIGURE 3.3 BED CENSUS BY MONTH, ALL ADMISSIONS – Produced in Stata

Breakdown variables & categorisation:

- Month of admission – summary statistics presented
- Year of admission

Presentation:

- Individual years

Exclusions:

- None

TABLE 3.4 AND FIGURES 3.4a-c BED CENSUS BY HEALTH ORGANISATION, ALL ADMISSIONS – Produced in Stata

Breakdown variables & categorisation:

- Health organisation – summary statistics presented
- Year of admission

Presentation:

- Individual years

Exclusions:

- None

TABLE 3.5 AND FIGURE 3.5 BED ACTIVITY BY MONTH, ALL ADMISSIONS – Produced in Stata

Breakdown variables & categorisation:

- Month of admission – summary statistics presented
- Year of admission

Presentation:

- Individual years

Exclusions:

- None

Note: Bed activity differs from the census insofar as a bed is counted as occupied if a child was present on a unit for any part of a day. This results in higher figures than the bed census as a bed may have had more than one child occupying it in any one day.

TABLE 3.6 AND FIGURES 3.6a-c BED ACTIVITY BY HEALTH ORGANISATION, ALL ADMISSIONS – Produced in Stata

Breakdown variables & categorisation:

- Health organisation – summary statistics presented
- Year of admission

Presentation:

- Individual years

Exclusions:

- None

Length of stay

For analyses in this section, length of stay in days and length of stays in hours are defined as in Section 3.6.

TABLE 3.7 LENGTH OF STAY BY AGE AND HEALTH ORGANISATION – Produced in Stata

Breakdown variables & categorisation:

- Length of stay – summary statistics presented
- Age of years – follows standard PICANet categorisation (Section 4.7)
- Health organisation

Presentation:

- Individual years

Exclusions:

- Patients not discharged from PICU at the time of final data lock

TABLE 3.8 LENGTH OF STAY BY PRIMARY DIAGNOSTIC GROUP AND HEALTH ORGANISATION – Produced in Stata

Breakdown variables & categorisation:

- Length of stay – summary statistics presented
- Diagnostic group - follows standard PICANet categorisation (Section 4.7) with the top six most commonly occurring groups being presented only
- Health organisation

Presentation:

- Three-year reporting period combined

Exclusions:

- Patients not discharged from PICU at the time of final data lock

TABLE 3.9 ADMISSIONS BY LENGTH OF STAY AND HEALTH ORGANISATION – Produced in SQL

Breakdown variables & categorisation:

- Length of stay in hours - follows standard PICANet categorisation (Section 4.7)
- Health organisation

Presentation:

- Individual years

Exclusions:

- Patients not discharged from PICU at the time of final data lock

5.2.5 Outcomes, SMR and individuals

All tables and figures in this section **exclude** patients aged 16 years and over, those of unknown, and patients of ambiguous or unknown sex, unless otherwise stated.

Outcomes

TABLE 4.1 ADMISSIONS BY UNIT DISCHARGE STATUS, AGE AND SEX – Produced in SQL

Breakdown variables & categorisation:

- Age in years (and additionally months if under 1 year old) - follows standard PICANet categorisation (Section 4.7), admissions for those over 16 years of age are combined to maintain statistical disclosure control
- Sex - follows standard PICANet categorisation (Section 4.8)

Presentation:

- Individual years

Exclusions:

- Patients aged over 16 years
- Patients of unknown age
- Patients of ambiguous or unknown sex
- Patients not discharged from PICU at the time of final data lock

TABLE 4.2 ADMISSIONS BY UNIT DISCHARGE STATUS, HEALTH ORGANISATION AND COUNTRY OF ADMISSION – Produced in SQL

Breakdown variables & categorisation:

- Discharge status – alive / dead
- Health organisation – summary statistics presented

Presentation:

- Individual years

Exclusions:

- Patients aged over 16 years
- Patients of unknown age
- Patients of ambiguous or unknown sex
- Patients not discharged from PICU at the time of final data lock

TABLE 4.3 DEATH IN PICU, AS A PROPORTION OF ALL CHILD DEATHS, BY COUNTRY OF ADMISSION – Produced in Stata

Breakdown variables & categorisation:

- Deaths in PICU
- National child mortality statistics – as described in Section 3.1.4
- Country of admission – UK or Republic of Ireland

Presentation:

- Individual years

Exclusions:

- Patients aged over 16 years
- Patients of unknown age
- Patients of ambiguous or unknown sex
- Patients not discharged from PICU at the time of final data lock
- Patients discharged from PICU alive

TABLE 4.4 ADMISSIONS BY UNIT DISCHARGE DESTINATION AND AGE – Produced in SQL

Breakdown variables & categorisation:

- Age in years - follows standard PICANet categorisation (Section 4.7)
- Discharge destination - follows standard PICANet categorisation (Section 4.7)

Presentation:

- Three-year period combined

Exclusions:

- Patients aged over 16 years
- Patients of unknown age
- Patients of ambiguous or unknown sex
- Patients not discharged from PICU at the time of final data lock
- Patients with unknown discharge destination

TABLE 4.5 VENTILATOR FREE DAYS, BY PIM3 GROUP AND HEALTH ORGANISATION – Produced in Stata

Breakdown variables & categorisation:

- Recalibrated PIM score - follows standard PICANet categorisation (Section 4.7)
- Health organisation

Presentation:

- Individual years

Exclusions:

- Patients aged over 16 years
- Patients of unknown age
- Patients of ambiguous or unknown sex

TABLE 4.6 EMERGENCY READMISSIONS WITHIN 48 HOURS OF DISCHARGE BY ADMISSION TYPE AND HEALTH ORGANISATION – Produced in Stata

Breakdown variables & categorisation:

- Admission type of index admission - planned / unplanned
- Health organisation

Presentation:

- Three-year reporting period combined

Exclusions:

- Patients aged over 16 years
- Patients of unknown age
- Patients of ambiguous or unknown sex

Note:

- Only readmissions within 48h to the discharging PICU included

TABLE 4.7 RELATIVE RATE OF EMERGENCY READMISSIONS WITHIN 48 HOURS OF DISCHARGE, BY HEALTH ORGANISATION – Produced in Excel

Breakdown variables & categorisation:

- Relative rate of emergency readmission within 48h of PICU discharge - calculated as detailed in Section 3.6.1.

Presentation:

- Three-year reporting period combined

Exclusions:

- Patients aged over 16 years
- Patients of unknown age
- Patients of ambiguous or unknown sex

Note:

- Only readmissions within 48h to the discharging PICU included

TABLE 4.8 EMERGENCY READMISSIONS WITHIN 48 HOURS OF DISCHARGE, BY COUNTRY OF ADMISSION – Produced in Stata

Breakdown variables & categorisation:

- Number of admissions and readmissions
- Country of admission - follows standard PICANet categorisation (Section 4.7) with NHS and non-NHS combined for England

Presentation:

- Individual years
- Three-year reporting period combined

Exclusions:

- Patients aged over 16 years
- Patients of unknown age
- Patients of ambiguous or unknown sex

Note:

- Only readmissions within 48h to the discharging PICU included

TABLE 4.9 AND FIGURE 4.9a UNPLANNED EXTUBATION RATES BY HEALTH ORGANISATION (ALL ADMISSIONS) – Produced in Stata

Breakdown variables & categorisation:

- Number of days of activity, number of unplanned extubations, number of intubated days, rate of unplanned extubations per 1,000 intubated days
- Health organisation

Presentation:

- Individual years
- Based on activity occurring within the reporting period regardless of admission date

Exclusions:

- Patients of ambiguous or unknown sex

FIGURE 4.9b UNPLANNED EXTUBATION RATES BY HEALTH ORGANISATION (0-15 YEARS) – Produced in Stata

Breakdown variables & categorisation:

- Number of days of activity, number of unplanned extubations, number of intubated days, rate of unplanned extubations per 1,000 intubated days
- Health organisation

Presentation:

- Individual years
- Based on activity occurring within the reporting period regardless of admission date

Exclusions:

- Patients aged over 16 years
- Patients of unknown age
- Patients of ambiguous or unknown sex

TABLE 4.10 UNPLANNED EXTUBATION RATES COUNTRY OF ADMISSION – Produced in Stata

Breakdown variables & categorisation:

- Number unplanned extubations, number of intubated days, rate of unplanned extubations per 1,000 intubated days
- Country of admission - follows standard PICANet categorisation (Section 4.7) with NHS and non-NHS combined for England

Presentation:

- Individual years
- Three-year reporting period combined
- Based on activity occurring within the reporting period regardless of admission date

Exclusions:

- Patients aged over 16 years
- Patients of unknown age
- Patients of ambiguous or unknown sex

Standardised mortality ratios

TABLE 4.11 SINGLE YEAR STANDARDISED MORTALITY RATIOS BY HEALTH ORGANISATION (ALL ADMISSIONS), 2022 – Produced in Stata

FIGURE 4.11a UNADJUSTED SINGLE YEAR STANDARDISED MORTALITY RATIOS (ALL ADMISSIONS), 2022 – Produced in Stata

FIGURE 4.11b RISK-ADJUSTED SINGLE YEAR STANDARDISED MORTALITY RATIOS (ALL ADMISSIONS), 2022 – Produced in Stata

Breakdown variables & categorisation:

- Adjusted and unadjusted standardised mortality ratio with 95% confidence interval
- Health organisation

Presentation:

- Most recent year of the reporting period

Exclusions:

- Patients not discharged from PICU at the time of data lock

Notes:

- PIM3 recalibrated is used for risk adjustment

TABLE 4.12 THREE-YEAR STANDARDISED MORTALITY RATIOS BY HEALTH ORGANISATION (ALL ADMISSIONS) – Produced in Stata

FIGURE 4.12a UNADJUSTED THREE-YEAR STANDARDISED MORTALITY RATIOS (ALL ADMISSIONS) – Produced in Stata

FIGURE 4.12b RISK-ADJUSTED THREE-YEAR STANDARDISED MORTALITY RATIOS (ALL ADMISSIONS) – Produced in Stata

Breakdown variables & categorisation:

- Adjusted and unadjusted standardised mortality ratio with 95% confidence interval
- Health organisation

Presentation:

- Three-year reporting period combined

Exclusions:

- Patients not discharged from PICU at the time of data lock

Notes:

- PIM3 recalibrated is used for risk adjustment

TABLE 4.13 & FIGURE 4.13a-b SINGLE YEAR STANDARDISED MORTALITY RATIOS BY HEALTH ORGANISATION (0-15 years) – Produced in Stata

> ***New in 2023 report***

Breakdown variables & categorisation:

- Adjusted and unadjusted standardised mortality ratio with 95% confidence interval
- Health organisation

Presentation:

- Most recent year of the reporting period

Exclusions:

- Patients aged over 16 years
- Patients of unknown age
- Patients of ambiguous or unknown sex
- Patients not discharged from PICU at the time of data lock

Notes:

- PIM3 recalibrated is used for risk adjustment

TABLE 4.14 & FIGURE 4.14a-b THREE-YEAR STANDARDISED MORTALITY RATIOS BY HEALTH ORGANISATION (0-15 YEARS) – Produced in Stata

Previously named Table 4.13 & Figure 4.13a-b

Breakdown variables & categorisation:

- Adjusted and unadjusted standardised mortality ratio with 95% confidence interval
- Health organisation

Presentation:

- Three-year reporting period combined

Exclusions:

- Patients aged over 16 years
- Patients of unknown age
- Patients of ambiguous or unknown sex
- Patients not discharged from PICU at the time of data lock

Notes:

- PIM3 recalibrated is used for risk adjustment

Sensitivity analyses for 0-15 year olds – all reporting years combined

TABLE 4.15 & FIGURE 4.15a-b ALL YEARS STANDARDISED MORTALITY RATIOS BY HEALTH ORGANISATION (0-15 years, intensive care only) – Produced in Stata

> ***New in 2023 report***

Breakdown variables & categorisation:

- Adjusted and unadjusted standardised mortality ratio with 95% confidence interval
- Health organisation

Presentation:

- Three-year reporting period combined

Exclusions:

- Patients aged over 16 years
- Patients of unknown age
- Patients of ambiguous or unknown sex
- Patients not discharged from PICU at the time of data lock
- Patients not receiving intensive care during their admission (intensive care defined by HRG grouping as: XB05Z; XB04Z; XB03Z; XB02Z; XB01Z)

Notes:

- PIM3 recalibrated is used for risk adjustment

TABLE 4.16 & FIGURE 4.16a-b ALL YEARS STANDARDISED MORTALITY RATIOS BY HEALTH ORGANISATION (0-15 years, excluding discharge for palliative care) – Produced in Stata

New in 2023 report

Breakdown variables & categorisation:

- Adjusted and unadjusted standardised mortality ratio with 95% confidence interval
- Health organisation

Presentation:

- Three-year reporting period combined

Exclusions:

- Patients aged over 16 years
- Patients of unknown age
- Patients of ambiguous or unknown sex
- Patients not discharged from PICU at the time of data lock
- Patients discharged for palliative care

Notes:

- PIM3 recalibrated is used for risk adjustment
- Footnote needs adding regarding completeness of discharged for palliative care

TABLE 4.17 & FIGURE 4.17a-b ALL YEARS STANDARDISED MORTALITY RATIOS BY HEALTH ORGANISATION (0-15 years, invasively ventilated only) – Produced in Stata

> ***New in 2023 report***

Breakdown variables & categorisation:

- Adjusted and unadjusted standardised mortality ratio with 95% confidence interval
- Health organisation

Presentation:

- Three-year reporting period combined

Exclusions:

- Patients aged over 16 years
- Patients of unknown age
- Patients of ambiguous or unknown sex
- Patients not discharged from PICU at the time of data lock
- Patients who did not receive invasive ventilation during their admission

Notes:

- PIM3 recalibrated is used for risk adjustment

Footnote needs adding regarding completeness of discharged for palliative care

TABLE 4.18 ORIGNIAL AND RECALIBRATED COEFFICIENTS (LOG-ODDS RATIOS) FOR PIM3

> ***Previously named Table 14a and Table 14b***

Breakdown variables & categorisation:

- Co-efficients for component variables of PIM3 as published [REF]
- Recalibrated co-efficients for component variables of PIM3

Presentation:

- Four decimal places

Exclusions:

- Patients aged over 18 years (*please note this is 18+ rather than 16+)*

Individuals

No tables based on individuals are planned for inclusion in the 2023 Report. This section will be redeveloped and expanded for the 2024 Report and may include: (i) the number of admissions to PIC for each child; (ii) length of time to readmission; (iii) characteristics of children with long PICU stays; amongst other tables.

5.2.6 Prevalence and children in adult ICUs

Prevalence

TABLE 5.1 AGE-SEX SPECIFIC PREVALENCE (PER 100,000 PER YEAR) FOR ADMISSIONS TO PAEDIATRIC INTENSIVE CARE IN THE UK AND THE REPUBLIC OF IRELAND – Produced in Stata

Breakdown variables & categorisation:

- Age-sex specific prevalence for admissions (rate per 100,000 children) with a 95% CI
- Age group in years - follow standard PICANet categorisation (Section 4.8)
- Sex - follow standard PICANet categorisation (Section 4.8).

Presentation:

- Individual years
- Three-year reporting period combined
- Based on country of residence

Exclusions:

- Patients aged over 16 years
- Patients of unknown age
- Patients of ambiguous or unknown sex
- Patients with unknown country of residence

TABLE 5.2 AND FIGURE 5.2 AGE-SEX ADJUSTED PREVALENCE (PER 100,000 PER YEAR) FOR ADMISSIONS TO PAEDIATRIC INTENSIVE CARE BY COUNTRY – Table produced in Stata; Figure numbers produced in Stata and map in QGIS

Breakdown variables & categorisation:

- Age-sex adjusted prevalence for admissions (rate per 100,000 children) with a 95% CI
- Country of residence - England; Wales; Scotland; Northern Ireland; Republic of Ireland.

Presentation:

- Individual years
- Three year reporting period combined
- Based on country of residence

Exclusions:

- Patients aged over 16 years
- Patients of unknown age
- Patients of ambiguous or unknown sex
- Patients with unknown country of residence

Note:

A footnote is required stating that this figure contains National Statistics data with the associated Crown copyright statement. An additional footnote should be included in the Figure stating that it contains Ordnance Survey data with the associated Crown copyright statement.

TABLE 5.3 AGE-SEX ADJUSTED PREVALENCE (PER 100,000 PER YEAR) FOR ADMISSIONS TO PAEDIATRIC INTENSIVE CARE IN ENGLAND BY INTEGRATED CARE BOARD – Table produced in Stata

Note: this table was previously presented by CCGs but has been updated to ICBs this year

Breakdown variables & categorisation:

- Age-sex adjusted prevalence (rate per 100,000 children) with a 95% CI
- Health care area of residence - ICBs

Presentation:

- Three year reporting period combined
- Based on country of residence

Exclusions:

- Patients not resident in England
- Patients aged over 16 years
- Patients of unknown age
- Patients of ambiguous or unknown sex
- Patients with unknown health care area of residence

TABLE 5.4 AGE-SEX ADJUSTED PREVALENCE (PER 100,000 PER YEAR) FOR ADMISSIONS TO PAEDIATRIC INTENSIVE CARE IN WALES BY HEALTH BOARD – Table produced in Stata

Breakdown variables & categorisation:

- Age-sex adjusted prevalence (rate per 100,000 children) with a 95% CI
- Health care area of residence – health boards

Presentation:

- Three year reporting period combined
- Based on country of residence

Exclusions:

- Patients not resident in Wales
- Patients aged over 16 years
- Patients of unknown age
- Patients of ambiguous or unknown sex
- Patients with unknown health care area of residence

TABLE 5.5 AGE-SEX ADJUSTED PREVALENCE (PER 100,000 PER YEAR) FOR ADMISSIONS TO PAEDIATRIC INTENSIVE CARE IN SCOTLAND BY HEALTH BOARD – Table produced in Stata

Breakdown variables & categorisation:

- Age-sex adjusted prevalence (rate per 100,000 children) with a 95% CI
- Health care area of residence – health boards

Presentation:

- Three year reporting period combined
- Based on country of residence

Exclusions:

- Patients not resident in Scotland
- Patients aged over 16 years
- Patients of unknown age
- Patients of ambiguous or unknown sex
- Patients with unknown health care area of residence

TABLE 5.6 AGE-SEX ADJUSTED PREVALENCE (PER 100,000 PER YEAR) FOR ADMISSIONS TO PAEDIATRIC INTENSIVE CARE IN REPUBLIC OF IRELAND BY COUNTY – Table produced in Stata

Breakdown variables & categorisation:

- Age-sex adjusted prevalence (rate per 100,000 children) with a 95% CI
- County of residence

Presentation:

- Three year reporting period combined
- Based on country of residence

Exclusions:

- Patients not resident in Scotland
- Patients aged over 16 years
- Patients of unknown age
- Patients of ambiguous or unknown sex
- Patients with unknown health care area of residence

Children treated in adult intensive care units

Tables and Figures in this section are based on a dataset provided by the Intensive Care National Audit Research Centre (ICNARC). This analysis includes children aged less than 16 years of age treated in hospitals in England, Northern Ireland and Wales. Permission to use these data is covered by a data sharing agreement between PICANet and ICNARC which forms part of the data request process PICANet undertake to obtain these data.

TABLE 5.7 ADMISSION OF CHILDREN TO AICUs BY AGE AND SEX – Produced in Stata

Breakdown variables & categorisation:

- Age in years - follows standard PICANet categorisation (Section 4.7)
- Sex - follows standard PICANet categorisation (Section 4.8)

Presentation:

- Individual years

Exclusions:

- Patients of unknown age
- Patients of ambiguous or unknown sex

TABLE 5.8 ADMISSION OF CHILDREN TO AICUs BY AGE AND MONTH OF ADMISSION– Produced in Stata

Breakdown variables & categorisation:

- Age in years - follows standard PICANet categorisation (Section 4.7)
- Month of admission

Presentation:

- Individual years

Exclusions:

- Patients of unknown age
- Patients of ambiguous or unknown sex

TABLE 5.9 ADMISSION OF CHILDREN TO AICUs BY AGE AND DIAGNOSTIC GROUP – Produced in Stata

Breakdown variables & categorisation:

- Age in years - follows standard PICANet categorisation (Section 4.7)
- Diagnostic group - follows standard PICANet categorisation (Section 4.7) with the top four most commonly occurring groups being presented and all other diagnostic groups being combined into the 'Other' category alongside unknown diagnostic groups for statistical disclosure control.

Presentation:

- Individual years

Exclusions:

- Patients of unknown age
- Patients of ambiguous or unknown sex

TABLE 5.10 DISCHARGE DESTINATION FOR CHILDREN ADMITTED TO AICUs – Produced in Stata

Breakdown variables & categorisation:

- Age in years - follows standard PICANet categorisation (Section 4.7)
- Discharge destination - discharged to PICU; discharged elsewhere; died.

Presentation:

- Three year reporting period combined

Exclusions:

- Patients of unknown age
- Patients of ambiguous or unknown sex

**TABLE 5.11 LENGTH OF STAY FOR SURVIVING CHILDREN ADMITTED TO AICUs –
Produced in Stata**

Breakdown variables & categorisation:

- Length of stay – summary statistics presented
- Age in years - follows standard PICANet categorisation (Section 4.7)

Presentation:

- Individual years

Exclusions:

- Patients of unknown age
- Patients of ambiguous or unknown sex
- Patients who died on AICU

Note:

Length of stay is calculated in days as the difference between the date of admission to AICU
and the date of discharge from AICU plus one (therefore is inclusive of the day of admission
and the day of discharge).

5.2.7 Activity data

All tables and figures in this section **include** patients aged 16 years and over, those of unknown, and patients of ambiguous or unknown sex, unless otherwise stated.

Level of activity is derived as in Section 3.6 as above and is categorised as: XB09Z - Enhanced Care; XB07Z - High Dependency; XB06Z - High Dependency Advanced; XB05Z - Intensive Care Basic; XB04Z - Intensive Care Basic Enhanced; XB03Z - Intensive Care Advanced; XB02Z - Intensive Care Advanced Enhanced; XB01Z - Intensive Care - ECMO / ECLS; and, UZ01Z – Unable to group.

TABLE 6.1 & FIGURE 6.1 ACTIVITY BY HEALTH ORGANISATION – Produced in Stata

Previously named Figure PCCMDS 1 and Table PCCMDS 2

Breakdown variables & categorisation:

- HRG group – proportion of days of care at each level
- Health organisation

Presentation:

- Three-year period combined
- Based on activity occurring within the reporting period regardless of admission date

Exclusions:

- UZ01Z is excluded from the figure but included in the Table

TABLE 6.2 NUMBER OF ACTIVITIES PER DAY – Produced in Stata

Previously named Table PCCMDS 3

Breakdown variables & categorisation:

- Number of activities per day
- Number of days where a given number of activities occurred

Presentation:

- Three-year period combined
- Based on activity occurring within the reporting period regardless of admission date

Exclusions:

- None

FIGURE 6.3 PREDICTED AND OBSERVED DEATH RATES BY INITIAL HRG – Numbers produced in Stata and graph in Excel

Previously named Figure PCCMDS 4

Breakdown variables & categorisation:

- Predicted and observed deaths
- Confidence intervals

Presentation:

- Three-year period combined
- Based on activity occurring within the reporting period regardless of admission date

Exclusions:

- None

TABLE 6.4 HIGHEST LEVEL OF CARE DURING ADMISSION BY HEALTH ORGANISATION – Produced in Stata

New in 2023 report

Breakdown variables & categorisation:

- HRG group – highest level per admission
- Health organisation

Presentation:

- Three-year period combined
- Based on activity occurring within the reporting period regardless of admission date

Exclusions:

- Patients not discharged from PICU at the time of final data lock

5.2.8 Data quality reporting

TABLE DQ1, DATA COMPLETENESS BY DATA ITEM – REFERRAL – Produced in SQL

This table presents completeness by data item for referral events, for each of the three years in the reporting period separately . The number of expected data items is presented alongside the number of these records that were complete and valid at the point of final data lock. The number of data items with unresolved database validation queries are also presented with the proportion of all expected items this represents. The final two columns relate to missing data items: one shows the number of records which have been left blank without explanation, the other shows the number of data items which have been left blank but it has been confirmed that these data are not available or another explanation has been given. Percentages in both of these final columns show the proportion of expected data items these represent.

TABLE DQ2, DATA COMPLETENESS BY DATA ITEM - TRANSPORT – Produced in SQL

This table shows completeness by data item for transport events, for each of the three years in the reporting period separately. It reports the expected number of data items, and breaks these down by the categories used in table DQ1 (Complete and valid; Unresolved validation, Blank field; Missing value).

TABLE DQ3, DATA COMPLETENESS BY DATA ITEM – ADMISSION – Produced in SQL

This table shows completeness by data item for admission events, for each of the three years in the reporting period separately. The table headings are identical to those in DQ2.

TABLE DQ4, COMPLETENESS FOR NHS/CHI NUMBER BY ORGANISATION – REFERRAL – Produced in SQL

This table shows completeness of NHS/CHI number for referral events, by organisation, for the three year reporting period combined. The table headings are identical to those in DQ2.

TABLE DQ5, COMPLETENESS FOR NHS/CHI NUMBER BY ORGANISATION – TRANSPORT – Produced in SQL

This table shows completeness of NHS/CHI number for transport events, by organisation, for the three year reporting period combined. The table headings are identical to those in DQ2.

TABLE DQ6, COMPLETENESS FOR NHS/CHI NUMBER BY ORGANISATION – ADMISSION – Produced in SQL

This table shows completeness of NHS/CHI number for transport events, by organisation, for the three year reporting period combined. The table headings are identical to those in DQ2.

TABLE DQ7, COMPLETENESS FOR 30 DAY FOLLOW-UP BY ORGANISATION – Produced in SQL

Table DQ7 shows completeness of 30 day follow-up (which is recorded for admission events), by organisation, for the three year reporting period combined. It uses the standard DQ table headings.

TABLE DQ8 EVENT DATA SUBMISSION STATUS WITHIN 3 MONTHS OF DISCHARGE BY HEALTH ORGANISATION – REFERRALS – Produced in SQL

Number of complete records submitted to PICANet within 3 months of patient discharge by year of discharge. This is split by Country and Organisation. The headings on the table show the total discharged, whether the record is complete, and then whether the record was completed within 3 months. Percentages are also presented.

TABLE DQ8.2 EVENT DATA SUBMISSION STATUS WITHIN 2 MONTHS OF DISCHARGE BY HEALTH ORGANISATION – REFERRALS – Produced in SQL

Number of complete records submitted to PICANet within 2 months of patient discharge by year of discharge. This is split by Country and Organisation. The headings on the table show the total discharged, whether the record is complete, and then whether the record was completed within 2 months. Percentages are also presented.

TABLE DQ9 EVENT DATA SUBMISSION STATUS WITHIN 3 MONTHS OF DISCHARGE BY HEALTH ORGANISATION – TRANSPORT – Produced in SQL

Number of complete records submitted to PICANet within 3 months of patient discharge by year of discharge. This is split by Country and Organisation. The headings on the table show the total discharged, whether the record is complete, and then whether the record was completed within 3 months. Percentages are also presented.

TABLE DQ9.2 EVENT DATA SUBMISSION STATUS WITHIN 2 MONTHS OF DISCHARGE BY HEALTH ORGANISATION – TRANSPORTS – Produced in SQL

Number of complete records submitted to PICANet within 2 months of patient discharge by year of discharge. This is split by Country and Organisation. The headings on the table show the total discharged, whether the record is complete, and then whether the record was completed within 2 months. Percentages are also presented.

TABLE DQ10 EVENT DATA SUBMISSION STATUS WITHIN 3 MONTHS OF DISCHARGE BY HEALTH ORGANISATION – ADMISSIONS– Produced in SQL

Number of complete records submitted to PICANet within 3 months of patient discharge by year of discharge. This is split by Country and Organisation. The headings on the table show the total discharged, whether the record is complete, and then whether the record was completed within 3 months. Percentages are also presented.

TABLE DQ9.2 EVENT DATA SUBMISSION STATUS WITHIN 2 MONTHS OF DISCHARGE BY HEALTH ORGANISATION – ADMISSIONS – Produced in SQL

Number of complete records submitted to PICANet within 2 months of patient discharge by year of discharge. This is split by Country and Organisation. The headings on the table show the total discharged, whether the record is complete, and then whether the record was completed within 2 months. Percentages are also presented.

TABLE DQ11 PIM VARIABLE AVAILABILITY BY YEAR – ADMISSIONS – Produced in SQL

This table presents each PIM variable by year. It includes the number of expected data items (defined by the number of admissions for that year) and a count and percentage of whether a PIM item was available for PIM calculations, or not available. This is for admissions under 16 years old.

5.2.9 Referral and transport

Referrals data

No tables based on referrals are planned for inclusion in the 2023 Report. This section will be redeveloped and expanded following a review of data items collected.

Transport data

For the 2023 State of the Nation report, these tables will be sent by Sarah Seaton (University of Leicester) via Biscom to the PICANet team at the University of Leeds.

TABLE T1 NUMBER OF TRANSPORTS BY YEAR, TRANSPORT ORGANISATION & OUTCOME– Produced in Stata

Reports the total number of transports and outcome by the organisation who undertook the transport. No exclusions are made.

TABLE T1A NUMBER OF TRANSPORTS, NONELECTIVE AND ELECTIVE, BY DESTINATION & ORGANISATION - Produced in Stata

The table reports a breakdown of the number of elective vs non-elective transports to different locations. The column indicating the number of non-elective transports to the PICU provides the denominator for many of the remaining transport tables throughout the report. Unless indicated otherwise, tables report for non-elective transports to PICU only.

TABLE T2 AND FIGURE T2 NONELECTIVE TRANSPORTS TO PICU BY YEAR, TRANSPORT ORGANISATION & MOBILISATION TIMES (MINUTES) – Produced in Stata

Table T2 reports the mobilisation times (difference between the time the transport was accepted and the time the team departed base) in bandings of: 0-30 minutes; 31-60 minutes; 61-180 minutes; 181+ minutes and missing/not recorded.

Figure T2 is a box plot (corresponding to Table T2) of minutes to mobilisation (x-axis) by transport organisation (y-axis) for non-elective transports with recommend time shown. Exclusions apply if missing/not recorded for all 3-years of the reporting period combined.

TABLE T3 AND FIGURE T3 NONELECTIVE TRANSPORTS TO PICU BY YEAR, TRANSPORT ORGANISATION & TIME TO BEDSIDE (MINUTES) – Produced in Stata

This table reports the time to bedside (difference between the time the transport was accepted and the team arriving at the collection site) in bandings of: 0-60 minutes; 61-120 minutes; 121-240 minutes; 241+ minutes and missing/not recorded.

Figure T3 is a box plot (corresponding to Table T3) of time to bedside in minutes (x-axis) by transport organisation (y-axis) for non-elective transports with recommend time shown. Exclusions apply if missing/not recorded for all 3-years of the reporting period combined.

TABLE T4A AND FIGURE T4A NONELECTIVE TRANSPORTS TO PICU BY YEAR, TRANSPORT ORGANISATION & PATIENT JOURNEY DURATION (MINUTES) – Produced in Stata

Table T4a reports the journey time of the non-elective transports to PICU. A journey is measured from when the team leave the collection unit with the child until they arrive at the destination unit. It is reported in bandings of: 0-30 minutes; 31-60 minutes; 61-180 minutes; 181+ minutes and missing/not recorded.

Figure T4a is a box plot (corresponding to Table T4a) of time to the destination unit in minutes (x-axis) by transport organisation (y-axis) for non-elective transports with recommend time shown. Exclusions apply if missing/not recorded for all 3-years of the reporting period combined.

TABLE T4B ELECTIVE TRANSPORTS BY YEAR, TRANSPORT ORGANISATION AND PATIENT JOURNEY DURATION (MINUTES) – Produced in Stata

This table presents the journey time of the elective transports to any location. Journey is measured from when the team leave the collection unit with the child until they arrive at the destination unit. It is reported in bandings of: 0-30 minutes; 31-60 minutes; 61-180 minutes; 181+ minutes and missing/not recorded.

TABLE T5A NONELECTIVE TRANSPORTS TO PICU BY TRANSPORT ORGANISATION AND INTERVENTIONS PRIOR TO THE ARRIVAL OF THE TRANSPORT TEAM – Produced in Stata

Table T5a reports the number of interventions provided prior to the arrival of the transport team. Some groupings are amalgamations of details collected via the transport forms (e.g. 'airway related' refers to primary intubation and also need for re-intubation). Neonatal; other specialist and non-specialist teams are excluded from this table as they are not required to record information about interventions.

TABLE T5B NONELECTIVE TRANSPORTS TO PICU BY TRANSPORT ORGANISATIONS & INTERVENTIONS WHILST TRANSPORT TEAM PRESENT – Produced in Stata

This table reports the number of interventions provided whilst the transport team was in attendance. Some groupings are amalgamations of details collected via the transport forms (e.g. 'airway related' refers to primary intubation and also need for re-intubation). Neonatal; other specialist and non-specialist teams are excluded from this table as they are not required to record information about interventions.

TABLE T6 NON ELECTIVE TRANSPORTS TO PICU BY PIM3 GROUP - Produced in Stata

This table presents the PIM3 scores as calculated after the first contact with the transport team. PIM provides an indication of the probability of mortality for a child, calculated from information about their physiological condition (3). Neonatal; other specialist and non-specialist teams are excluded from this table as they are not required to record information about the variables which contribute towards the calculation of PIM3.

TABLE T7a NONELECTIVE TRANSPORTS TO PICU BY TRANSPORT ORGANISATION & GRADE OF CLINICAL TEAM LEADER OF TRANSPORT TEAM– Produced in Stata

This table provides information about the grade or role of the team leader for the transport.

TABLE T7b NONELECTIVE TRANSPORTS TO PICU BY TRANSPORT ORGANISATION & GRADE OF MOST SENIOR NURSE ON TRANSPORT TEAM– Produced in Stata

This table provides information about the grade or role of the most senior nurse for the transport.

TABLE T8 NONELECTIVE TRANSPORTS TO PICU BY TRANSPORT ORGANISATION & COLLECTION AREA – Produced in Stata

Reports the collection area from which the transport team retrieved the child.

TABLE T9 NONELECTIVE TRANSPORTS TO PICU BY TRANSPORT ORGANISATION & PARENT PRESENT DURING TRANSPORT – Produced in Stata

Reports whether the parent accompanied the child on the transport.

TABLE T10 NONELECTIVE TRANSPORTS TO PICU BY TRANSPORT ORGANISATION & CRITICAL INCIDENTS – Produced in Stata

Reports the critical incidents, both to the child or to the vehicle, which occur during the transport. Neonatal; other specialist and non-specialist teams are excluded from this table as they are not required to record information about critical incidents.

TABLE T11 ALL TRANSPORTS BY TRANSPORT ORGANISATION & JOURNEY BY AIR – Produced in Stata

Reports the number of transports by air for each section of the journey.

6 Signatures of approval

Name	Role	Signature	Date
Elizabeth Draper	Co-Principal Investigator		31 Oct 2023
Richard Feltbower	Co-Principal Investigator		31 Oct 2023
Sarah Seaton	Incoming Co-Principal Investigator (Jan 24)		31 Oct 2023

7 References

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Appendix A – Database validation categories

Code	Validation type	Fires when	Example	Impact on manual data entry	Impact on data import	Manual override possible
4	Reject	Data type error	Text character in a numerical only field or incorrect length	Cannot save entry & flagged to user	Whole data import will be rejected & flagged to user	No
3	Error	Logical impossibility – data entered does not make logical sense	User tries to enter a date in the future	Can save the entry but error flagged to user	Import successful but user must amend erroneous data to clear the validation error	No
2	Warning	Unlikely value	Value outside expected range	Warning flagged to user	Warning flagged to user	Where specified; have to amend or confirm data are correct
1	Missing value*	Data is not completed	No value entered	Can save the entry but must amend data to fix the validation error	Can save but must amend data to fix the validation error	Where specified; state data unobtainable

* N.B. 9s are the given way of recording 'not available'. If 9s are entered then the missing value validation query will not fire as the field is completed with a defined acceptable value. There may be cases where a warning validation query fires where 9s are entered.

Appendix B – PIM3 variables

PIM3 comprises of the following variables:

Elective admission	
Pupil reaction	
Mechanical ventilation	
Absolute values of base excess	
SBP (systolic blood pressure) at admission	
SBP^2/1000	
$100x\ FIO_2/PaO_2$ (mmHg)	
Recovery from a bypass cardiac procedure	
Recovery from a non-bypass cardiac procedure	
Recovery from a non-cardiac procedure	
Very high risk diagnosis	Includes: Cardiac arrest preceding ICU admission Severe combined immune deficiency Leukaemia or lymphoma after first induction Bone marrow transplant recipient Liver failure is the main reason for ICU admission
High risk diagnosis	Includes: Spontaneous cerebral haemorrhage Cardiomyopathy or myocarditis Hypoplastic left hear syndrome Neurodegenerative disorder

	Necrotizing enterocolitis is the main reason for ICU admission
Low risk diagnosis	If any of the below is the main reason for ICU admission Asthma Bronchiolitis Croup Obstructive sleep apnoea Diabetic ketoacidosis Seizure disorder