

Position statement

Safe Use of Continuous Intravenous Propofol Infusions in Paediatric Critical Care

Executive Summary

- Propofol is intravenous general anaesthetic agent which has many pharmacological advantages in the Paediatric Critical Care (PCC) setting.
- Although use of propofol in UK PCC practice is not uncommon, use by infusion in intensive care patients under the age of 16 is contraindicated by the drug's manufacturers due to concerns about the potentially fatal Propofol-Related Infusion Syndrome (PRIS).
- Due to an inevitable selection bias, assessing the risk of PRIS from published case reports is challenging. Recent studies are reassuring that the incidence of PRIS in PCC is low, indicating that it can be safely used for PCC sedation provided that adequate monitoring and practitioner awareness of PRIS are maintained.
- The Paediatric Critical Care Society (PCCS), the Association of Paediatric Anaesthetists (APA) and the Neonatal and Paediatric Pharmacy Group (NPPG) make the following recommendations in relation to the use of propofol by continuous infusion for sedation in paediatric critical care:
 1. All initiation of propofol should be on documented, consultant approval only.
 2. On ward round review, both the need for continuation of propofol and an assessment of the potential for PRIS should be considered and documented.
 3. Propofol should be used at the lowest effective dose, typically no higher than 4mg/kg/hour.
 4. Propofol should be used for the shortest duration possible, typically for no more than 72 hours. Use for longer periods may increase the risk of PRIS, and closer monitoring is required.
 5. Local guidance should be in place to support the safe use of propofol, which should detail the required monitoring parameters for patients receiving the drug.
 6. PCC practitioners should be educated to recognise the clinical signs of PRIS, which primarily presents as cardiovascular collapse. If PRIS is suspected, the propofol infusion should be discontinued (switching to alternative sedatives as needed) and appropriate investigations initiated.

Introduction

Propofol is an ultra-fast-acting intravenous general anaesthetic which causes global CNS depression. The drug has many pharmacological advantages in the Paediatric Critical Care (PCC) setting, including rapid onset (1–2 minutes), a high potency that consistently produces the desired sedative effect, a short duration of action (2–8 minutes), antiemetic properties and limited respiratory depression at lower doses¹. In PCC, propofol may either be given by direct injection to facilitate short-term sedation for procedures, or by continuous infusion to maintain sedation in invasively ventilated patients.

Although use of propofol in UK PCC practice is not uncommon, drug product information states that use by continuous infusion in intensive care patients under the age of 16 is contraindicated²⁻⁷. The contraindication stems from a Committee for Safety of Medicines recommendation published in 2001, citing concerns about an increased mortality rate due to PRIS⁸. Concerns regarding PRIS have been recently raised by a UK Coroner *Prevention of Future Deaths Report* published in January 2026, describing a case of fatal PRIS associated with use of a prolonged propofol infusion in PCC⁹.

PCC practitioners must recognise the risk of PRIS, although contemporary data indicates that propofol can be safely used by continuous infusion in this setting^{10,11}. This is particularly important given the challenges associated with achieving adequate levels of sedation in PCC patients, with most patients requiring use of multiple agents^{12,13}. The development of tolerance to other sedatives including opiates and benzodiazepines is common, and the propensity of sedative agents to cause adverse drug events in PCC is high^{3,12,14}. As a result, utilising a range of sedative agents- including propofol- is a necessary facet of PCC delivery.

Introduction continued:

This position statement aims to raise awareness of the risks of propofol infusion syndrome (PRIS) within PCC and to support safe use of propofol in this setting. Decisions regarding propofol use remain the responsibility of the treating clinician, guided by appropriate local protocols. The focus is on the use of propofol by continuous intravenous infusion in PCC; use for general anaesthesia within operating theatres or the intermittent administration of bolus doses for procedural sedation within the PIC environment are outside the scope of this document. Joint [guidelines](#) from the Association of Anaesthetists and the Society of Anaesthesia are available to support the safe use of propofol as part of total intravenous anaesthesia (TIVA).

Recommendations

The Paediatric Critical Care Society (PCCS), the Association of Paediatric Anaesthetists (APA) and the Neonatal and Paediatric Pharmacy Group (NPPG) make the following recommendations in relation to the use of propofol by continuous infusion for sedation in paediatric critical care:

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4. Propofol should be used for the shortest duration possible, typically for no more than 72 hours. Use for longer periods may increase the risk of PRIS, and closer monitoring is required.
5. Local guidance should be in place to support the safe use of propofol, which should detail the required monitoring parameters for patients receiving propofol. Monitoring requirements should be determined locally, however the following parameters are considered baseline monitoring for patients receiving propofol; it is likely that these will already be in place as part of routine intensive care delivery:
 - Continuous ECG monitoring.
 - Pulse oximetry.
 - End tidal CO₂ monitoring.
 - Haemodynamic monitoring.
 - Blood gas, including lactate and electrolytes.
 - Urea, electrolytes and renal function.
6. PCC practitioners should be educated to recognise the clinical signs of PRIS, which primarily presents as cardiovascular collapse. If PRIS is suspected, the propofol infusion should be discontinued (switching to alternative sedatives as needed) and appropriate investigations initiated. These can include:
 - 12-lead ECG.
 - Creatine kinase (CK).
 - Triglyceride level.
 - Physical examination to document presence/absence of hepatomegaly.

It should be noted that whilst the above investigations may be abnormal in PRIS, this may also occur due to a range of alternative pathologies. Therefore, plans for ongoing monitoring and management should be guided by clinical decision making.

Supporting Information

Propofol-Related Infusion Syndrome (PRIS)

PRIS is a rare but life-threatening complication of propofol use, characterised by¹⁵⁻¹⁸:

- Dysrhythmia (bradycardia and tachycardia)
- Brugada-type electrocardiograph (ECG; elevated ST-segment and coved T-wave) and rapidly progressive cardiac failure
- Hyperkalaemia
- Hyperlipidaemia
- High anion gap metabolic acidosis
- Fever
- Hepatomegaly
- Rhabdomyolysis (of skeletal or cardiac muscles), myoglobinuria and subsequent renal failure.

Hyperlipidaemia, fever and hepatomegaly may be more likely to occur in children, whereas rhabdomyolysis and hyperkalaemia are thought to predominate in adults¹⁶.

Supporting Information continued

The precise pathophysiological mechanisms underlying PRIS remain to be fully elucidated, although there is likely to be disruption of the mitochondrial respiratory chain, and inadequate processing of free fatty acids^{1,17}.

PRIS was first described in children in the early 1990s, although adult cases also began to be reported later in the decade¹⁸. In subsequent years, case reports mostly described PRIS in adults; this may reflect a significant reduction in paediatric propofol use from the late 1990s/early 2000s onwards as a result of patient safety organisations such as the UK Committee on the Safety of Medicines recommending that propofol use for intensive care patients under the age of 16 be contraindicated^{8,16}.

It has been suggested that fatality due to PRIS may be higher in those under 18 years of age compared to adults¹⁷, and that children may be more prone to PRIS due to their lower glycogen storage and higher dependency on fat metabolism¹⁹.

Early case reports of PRIS in children describe use of propofol at continuous infusion rates of 7.5-10mg/kg/hour for several days. The general consensus in the literature is that that continuous infusion of propofol at doses above 4-5mg/kg/hour is associated with a significantly higher risk of PRIS¹⁶⁻¹⁹. Nonetheless, PRIS has been reported with lower doses, and it has been suggested that it may be harder to diagnose in such cases as some typical features (hypertriglyceridemia, fever, hepatomegaly, heart failure) are often missing and others (arrhythmia, ECG changes) may occur later¹⁸.

Although higher hourly propofol continuous infusion rates are associated with a higher risk of PRIS, the duration of the infusion (and thus the cumulative exposure) is likely of greater significance. Use of higher doses for shorter periods (e.g. several hours) is less likely to lead to PRIS than use of lower doses for longer periods (e.g. several days). It has been suggested that use of propofol for more than 48 hours is associated with a higher risk of PRIS¹⁶⁻¹⁸, and that arrhythmia and other ECG changes occur more frequently when propofol use exceeds 48 hours, while the incidence of rhabdomyolysis and hypertriglyceridemia rise after 96 hours of use¹⁸.

Several additional patient factors have also been suggested as increasing the risk of PRIS and/or the risk of mortality from PRIS. These include elevated catecholamine levels (either due to patient stress response, or administration of exogenous catecholamines); concomitant use of corticosteroids; a diagnosis of an inborn error of metabolism; and critical illness¹⁶⁻²⁰. However, the significance of these factors on the incidence of PRIS has not been determined.

Contemporary use of Propofol in PCC

Although contraindicated by the drug's manufacturers, propofol is frequently employed for continuous sedation in current PCC practice. Due to an inevitable selection bias, assessing the risk of PRIS in children from published case reports is challenging. Two recent retrospective studies^{10,11} of propofol use within individual PCC centres provide reassurance that the incidence of PRIS is low, and conclude that the drug can be safely used for PCC sedation provided that adequate monitoring and practitioner awareness of PRIS are maintained¹¹.

Burnhill and colleagues evaluated the usage, and complications associated with that usage, of propofol by continuous infusion at doses up to 5mg/kg/hour in almost 1600 patients aged from 1 day to 16 years within a single UK Paediatric Intensive Care Unit (PICU) between 2019 and 2022¹⁰. The median duration of propofol infusion was 17 hours (IQR 4-42 hours), and 337 (20%) patients received propofol for longer than 48 hours. Biochemical and physiological risk factors associated with PRIS were identified across the patient cohort, including prior to propofol infusion, but no documented cases of PRIS were found. When comparing patients who received propofol for more than 48 hours with those who were given the drug for a shorter duration, no statistically significant difference in the percentage of abnormal findings associated with PRIS was seen between the two groups.

Olutatomini et al evaluated the relationship between continuous propofol administration and PRIS characteristics in a single US PICU from 2000-2024. 554 patients aged 0-17 years who received propofol for more than 12 hours and/or at a dose in excess of 2.4mg/kg/hour were included in the analysis. The median propofol infusion rate was 3 (IQR 1.7-4.2) mg/kg/hour, and the median infusion duration was 22.8 (IQR 16.4-42.4) hours. Bradycardia was recorded in 146 (26.4%) patients, and 19 (3.4%) patients developed metabolic acidosis. One (0.2%) of the 554 patients whose data was analysed was thought to have developed possible non-fatal PRIS.

Off-Label Drug Use in Children

Prospective clinical trials of medication use in critically ill children, and paediatric patients more generally, raise practical and ethical difficulties. This, coupled with relatively small patient numbers relative to many adult specialities, creates a lack of financial incentive for the pharmaceutical industry to pursue paediatric licensing for many drugs. As a result, off-label prescribing is common, accounting for up to 40-80% of medication use in the neonatal and paediatric population both nationally and internationally²¹⁻²⁶.

Whilst not ideal, the informed use of unlicensed medicines, or licensed medicines outside the terms of the licence, is recognised as necessary in paediatric practice when supported by evidence, experience and appropriate professional judgement²⁷.

Research Gaps

The ongoing Paediatric Intensive Care Adaptive Platform Trial (PIVOTAL) includes a sedation domain comparing continuous intravenous dexmedetomidine, clonidine and midazolam in invasively ventilated children, and may provide important evidence to inform future sedation practice in UK PICUs. Future work to expand knowledge regarding propofol use in comparison to other agents in the PCC is warranted.

Further Information

The NPPG Information Service has prepared a detailed literature review on PRIS in children. This can be found [here](#).

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