

Physician/Provider Guidelines for Admission/Transfer to and Discharge/Transfer from PICU and PICU Stepdown

PICU:

In general, PICU care is appropriate for patients either with or who are at high risk for deterioration of one or more organ system. This includes patients aged 0 through 17 years with:

1. Hemodynamic instability refractory to simple volume administration.
2. Acute airway or respiratory compromise not responsive to modalities/management available on peds floor.
3. Need for invasive monitoring (e.g., ICP monitoring, arterial catheters).
4. Need for procedures/treatments that can only be managed in the PICU setting.
5. Severity of illness or clinical needs beyond what can safely be managed on a general pediatric ward.
6. Candidacy for organ procurement.
7. Altered mental state with Glasgow Coma Score < 13 or extreme agitation/combativeness requiring closer observation or pharmacologic therapy.
8. Moderate to severe trauma.
9. Acute intracranial hemorrhage.
10. Overdose with significant potential for deterioration.

Patients admitted to the PICU with a non-intensivist attending will receive an automatic Intensivist consult within 12 hours of admission, or sooner if clinically indicated.

PICU Stepdown:

In general, PICU stepdown care is appropriate for patients who do not meet PICU admission criteria, but require more intensive monitoring or a higher level of patient care than can be safely achieved on the pediatric floor. Patients admitted to the PICU stepdown with a non-intensivist attending will receive an automatic Intensivist consult within 24 hours of admission, or sooner if clinically indicated.

The following detailed recommendations for clinical placement in PICU or PICU stepdown are by necessity arbitrary and should be used in conjunction with clinical judgement. Once admitted to PICU or PICU stepdown, the intensivist may adjust status (PICU v. Stepdown) according to clinical course. The intensivist may choose to take over care for patients initially admitted with a non-intensivist attending. If this is the case, it will be communicated directly with that attending.

- A. Respiratory System:** Patients with severe or potentially life-threatening pulmonary or airway disease or who are at risk for deterioration. Conditions include, but are not limited to:
1. Endotracheal intubation or high risk of need for endotracheal intubation and mechanical ventilation, regardless of etiology.
 2. Pulmonary disease, lower or upper airway, with high risk of progression to respiratory failure and/or total obstruction.
 3. High supplemental oxygen requirement regardless of etiology (Product of LPM x FiO₂)
 - a. Age 0-6 months: > 6 LPM HFNC with FiO₂ > 0.6 (3.6)
 - b. Age > 6 months to ≤ 12 months and HFNC ≥ 8 LPM with FiO₂ > 0.6 (4.8)
 - c. Age 1 year – 5 years and HFNC ≥ 10 LPM with FiO₂ > 0.6 (6)
 - d. Age ≥ 6 years and HFNC ≥ 15 LPM with FiO₂ > 0.8 (12)
 4. Newly placed tracheostomy with or without the need for mechanical ventilation. Established tracheostomy (>6 month) with home mechanical ventilation. Established tracheostomy admitted

- with respiratory illness. Established tracheostomy admitted for non-respiratory reasons should be housed in PICU for nursing care, but does not require PICU or PICU stepdown admission.
5. Need for new BIPAP therapy. Patient on home BiPAP admitted with respiratory illness or with support requirements beyond normal home BIPAP. Patient on home BiPAP admitted for non-respiratory reasons can be admitted to the pediatric floor.
 6. Ongoing requirement for continuous or frequent bronchodilator treatments Patients may receive back-to-back nebs x 3 (if not yet done in the emergency setting) and q2h nebs on the peds floor for a short period of time. Patients may also receive up to 1hr continuous on the floor in certain circumstances. Patients requiring more than 1hr continuous or 6-8hrs of q2 nebs should be transferred to PICU/Stepdown.
 7. Apnea observed by any trained medical personnel
 8. Significant hypoxia, hypercapnia, respiratory acidosis or respiratory distress
 - Arterial blood gases:
 - PaO₂ <60 mmHg while on FIO₂ > 0.5
 - PaCO₂ > 60 mmHg
 - pH < 7.25 with mental status change
 - pH > 7.5 and hemodynamic instability
 - Sustained SpO₂ < 86% (cyanotic heart disease patients excluded) on oxygen support
 - Respiratory rate
 - Age 0-6 months: < 15 or > 80/min
 - Age 6-12 months: < 15 or > 60/minute
 - Age 1 year to 5 years: < 12 or >40/minute
 - Age > 5 years: <10 or >30/minute

B. Cardiovascular System:

Patients with severe, life-threatening, or unstable cardiovascular disease or who are at risk for deterioration. Conditions include, but are not limited to:

1. Shock not responsive to volume resuscitation with two boluses.
2. Post-cardiopulmonary resuscitation.
3. Acute arrhythmia as cause of admission or chronic arrhythmia with hemodynamic instability or need for invasive therapy.
4. Moderate or severe congestive heart failure.
5. Cyanotic congenital heart disease prior to repair (TOF, Truncus arteriosus, DORV, HLHS, and Glenn) or any heart disease with unstable hemodynamics.
6. Myocarditis
7. Need for invasive monitoring of arterial, central venous, or pulmonary artery pressures.
8. Hypertension requiring intravenous therapy.

C. Neurologic:

Patients with life-threatening or unstable neurologic disease or who are at risk for deterioration. Conditions include, but are not limited to:

1. Seizures unresponsive to therapy or requiring continuous infusion of anticonvulsive agents, including status epilepticus.
2. Acute stroke, overdose, infection, head injury or other process with risk for deterioration of neurologic, respiratory or cardiac systems requiring vital sign and neuro assessment more frequently than every 4 hours.
3. Glasgow Coma Scale < 13 for any reason.
4. Post-operative neurosurgical patients requiring invasive monitoring or close observation.

5. Acute inflammation or infection of the CNS with increased intracranial pressure, new onset seizures or severe agitation requiring pharmacologic intervention.
6. Moderate to severe head trauma.
7. Pre-operative neurosurgical conditions with acute neurologic deterioration.
8. Progressive neuromuscular dysfunction with or without altered sensorium requiring cardiovascular monitoring and/or respiratory support.
9. Spinal cord compression or impending compression.
10. Increased ICP or placement of external ventricular drain or ICP monitor.
11. Any acute intracranial hemorrhage or cerebral edema on imaging
12. New onset change of pupils, level of consciousness, mental status or deteriorating Glasgow Coma Score.

D. Hematology/Oncology:

Patients with life-threatening or unstable hematologic or oncologic disease or who are at risk for deterioration. Conditions include, but are not limited to:

1. Exchange transfusions.
2. Plasmapheresis or leukopheresis with unstable clinical condition.
3. Severe coagulopathy.
4. Chemotherapeutics requiring frequent monitoring and/or nursing intervention or that places the patient at higher risk of potentially dangerous side effects
5. Severe anemia with hemoglobin <4 gm/L. Hgb <6 with ssx of hemodynamic or respiratory compromise or CHF or whose treatment places them at high risk for CHF
6. Severe complications of sickle cell crisis, such as neurologic changes, acute chest syndrome, or aplastic anemia with hemodynamic instability.
7. Initiation of chemotherapy/biotherapy with anticipated tumor lysis syndrome and/or need for close monitoring of VS, labs and patient clinical condition.
8. Tumors or masses compressing or threatening to compress vital vessels, organs, or airway.

Endocrine/Metabolic

Patients with life-threatening or unstable endocrine or metabolic disease or who are at risk for deterioration. Conditions include, but are not limited to:

1. Severe diabetic ketoacidosis requiring therapy with $\text{HCO}_3 \leq 15$. (If hemodynamic or neurologic compromise, see specific section).
2. Other severe electrolyte abnormalities, such as:
 - a. Hypokalemia ($\text{K}^+ < 2.5$ mEq/L)
 - b. Hyperkalemia ($\text{K}^+ > 6$ mEq/L on venipuncture)
 - c. Severe hyponatremia ($\text{Na}^+ \leq 125$ mEq/L) or hypernatremia ($\text{Na}^+ > 160$ mEq/L).
 - d. Severe hypocalcemia ($\text{Ca}^{++} < 6$ mEq/L or hypocalcemia with associated tetany/seizures) or hypercalcemia
 - e. Hypoglycemia (glucose < 60 mg/dL or < 40 in newborns) requiring a continuous infusion of greater than 10% dextrose to treat
 - f. Hyperglycemia requiring intensive monitoring (serum glucose > 800 mg/dL)
 - g. Severe metabolic acidosis (bicarb <12) requiring bicarbonate infusion, intensive monitoring, or complex intervention.
 - h. Complex intervention to maintain fluid balance.
 - i. Inborn errors of metabolism with acute deterioration requiring respiratory support, acute dialysis, hemoperfusion, management of intracranial hypertension, or inotropic support.

E. Gastrointestinal:

Patients with life threatening or unstable gastrointestinal disease or who are at risk for deterioration. Conditions include, but are not limited to:

1. Severe acute gastrointestinal bleeding leading to hemodynamic or respiratory instability.
2. After emergency endoscopy for removal of foreign bodies with associated severe acute GI bleed or airway obstruction.

F. Surgical:

Postoperative patients requiring frequent monitoring and potentially requiring intensive intervention. Conditions include, but are not limited to:

1. Cardiovascular surgery.
2. Thoracic surgery at risk for hemodynamic or respiratory compromise.
3. Neurosurgical procedures at risk for CNS deterioration.
4. Otolaryngology surgery at risk for airway or respiratory compromise.
5. Craniofacial surgery at risk for airway or respiratory compromise.
6. Orthopedic and spine surgery at risk for neurologic or hemodynamic compromise.
7. General surgery with hemodynamic or respiratory instability.
8. Multiple trauma with or without cardiovascular instability.
9. Major blood loss, either during surgery or during the post-operative period.

G. Renal System:

Patients with life-threatening or unstable renal disease or who are at risk for deterioration. Conditions include, but are not limited to:

1. Renal failure:

<u>Age</u>	<u>Normal Cr</u>	<u>Creatinine consistent with renal injury</u>	<u>Normal eCCL (ml/min/1.73 M²)</u>
0-12 months	0.2 - 0.4	0.4-0.8	90
1-5 years	0.3 - 0.7	0.6 - 1.4	80
6-18 years	0.5 - 1	1 - 2	80

pRIFLE category can be estimated by calculating estimated creatinine clearance in ml/min/1.73 M²

<u>pRIFLE category</u>	<u>eCCL (ml/min/1.73 M²)</u>
Risk	decreased 25% from normal
Injury	decreased 50% from normal
Failure	decreased 75% from normal
Loss of function	
End stage	

Website to calculate eCCL in children: <http://www.globalrph.com/specialpop.cgi>

2. Acute rhabdomyolysis, with acute kidney injury

H. Multi-System and Other:

Patients with life-threatening or unstable multi-system disease. Conditions include, but are not limited to:

1. Toxic ingestions and drug overdose with potential for acute decompensation of major organ systems.
2. Multiple organ dysfunction syndrome.
3. Suspected or documented malignant hyperthermia.
4. Electrical or other household or environmental (e.g., lightning) injuries with unstable life

- threatening disease.
5. Burns not requiring transfer per Trauma Services policy # 2.02).
 6. Venomous or insect bites that lead to DIC, shock, compartment syndrome or other clinical instability.

PICU Transfer/Discharge Guidelines:

1. Typically, patients who are not candidates for resuscitation are transferred to a lower acuity area; exceptions will be made as care management dictates.
2. Patients may be transferred from PICU when they no longer require the intensive care unit scope of service and whose care needs can be managed by the general pediatric ward.
3. Patients may be discharged to home or other facilities from PICU.
4. Patients transported while still on PICU status must be on a cardiac monitor and accompanied by personnel competent in emergency management unless otherwise authorized by the attending PICU physician

PICU Discharge/Transfer Criteria:

Patients in the PICU will be evaluated and considered for discharge/transfer based on the reversal of the disease process or resolution of the unstable physiologic condition that prompted admission to the unit, and it is determined that the need for complex intervention exceeding general pediatric ward capabilities is no longer needed. Transfer/Discharge will be based on the following criteria:

1. Stable hemodynamic parameters.
2. Stable respiratory status (patient extubated with stable arterial blood gases) and airway patency.
3. Minimal oxygen requirements that do not exceed general pediatric ward guidelines.
4. Intravenous inotropic support, vasodilators, and antiarrhythmic drugs are no longer required
5. Cardiac dysrhythmias are controlled.
6. Intracranial pressure monitoring equipment has been removed.
7. Neurologic stability with control of seizures.
8. Removal of all hemodynamic monitoring catheters excluding central venous lines.
9. Chronically mechanically ventilated patients whose critical illness has been reversed or resolved will remain in the PICU until they are discharged to home.
10. Patients with mature artificial airways (e.g., tracheostomies) will remain housed in the PICU until they are ready for discharge to home.
11. The health care team and the patient's family, after careful assessment, determine that there is no benefit in keeping the child in the PICU or that the course of treatment is medically futile.

Sources:

Guidelines for Developing Admission and Discharge Policies for the Pediatric Intensive Care Unit (America College of Critical Care Medicine of the Society of Critical Care Medicine and American Academy of Pediatrics); reaffirmed February 2008 (Ref: www.pediatrics.org/cgi/doi/10.1542/peds.2008-1427).