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Pediatric ICU Triage, Admission, and Discharge Criteria

1. Introduction

- 1.1. **Background:** Pediatric ICU is a unit or department staffed and equipped with critical care technologies such as monitors, ventilators and life support machines to provide appropriate care to critically ill patients. Given the gap between the demand and available resources, the admission to these units should be monitored.
- 1.2. **Aim & Scope:** To optimize resource use while ensuring the safety equality and accessibility to the needed PICU health care services, we suggest pediatric Intensive Critical Care Unit (PICU) admissions and discharge guidelines based on a combination of patient needs and critical care interventions that can only be addressed in the PICU environment.
- 1.3. **Targeted population:** Pediatric patients who are in PICU or might need the PICU services soon.
- 1.4. **Targeted end-users:** PICU staff, pediatric medicine, pediatric emergency physicians and or any physician covering the PICU.
- 1.5. **Targeted setups:** Pediatric Intensive Care Units, pediatric ED, General wards.
- 1.6. **Conflict of Interest:** None
- 1.7. **Funding:** None.
- 1.8. **Methodology:** These recommendations are based on the limited quality of evidence along with expert opinions maintaining the best practices guidelines and taking into consideration the local resources, cultural variation, and the previous local practices and expertise.
- 1.9. **Updating:** This guideline is very liable to be updated several times with the emergence of higher quality evidence or in response to a need for improvement. And the next expected review shall be in one year from the date of release.
- 1.10. **DISCLAIMER:** This guideline is guidance document and shouldn't be deemed inclusive of all proper methods of care nor exclusive of other methods of care reasonably directed to obtaining the same results. The ultimate judgement regarding the propriety of any specific therapy must be made by the physician and the patient in light of all the circumstances presented by the individual patient, and the known variability and the biological behavior of the disease, and should not deny a patient the appropriate treatment or contradict the best clinical judgement. However, this guideline reflects the best available data at the time of guideline prepared. And hence the results of future studies and or evidence may require the revision of this guideline recommendations.

2. General PICU Rules:

- 2.1. Critically ill pediatric patients in the emergency department or on the general ward shall be transferred to PICU, in an expeditious manner.
- 2.2. Patient care in PICU should be led by intensivist in day-to-day management.
- 2.3. In Pandemic, we do not recommend a 24-hr, 7-day a week intensivist model.
- 2.4. We suggest optimizing PICU nursing resources with nursing patient ratios 1:1 for acute ventilated or multiple organ failure and 1:2 in severe shortage for other PICU patients.
- 2.5. Patients admitted to PICU if the prognosis for recovery and quality of life is acceptable, taken into account factors such as age, comorbidities, prognosis, underlying diagnosis, and treatment modalities that can influence survival.

3. PICU Triage Recommendations:

- 3.1. PICU triage decisions are made according to patient conditions and the need for critical care monitoring and or intervention.
- 3.2. Patients to be admitted or discharged strictly on their potential to benefit from PICU care.
- 3.3. Some over triage is more acceptable and preferable to under triage.
- 3.4. Transfer time of pediatric critically ill patients from the emergency department or ward bed to the PICU in less than or equal to 1 hour from the time of consultation if a bed is available.
- 3.5. If the PICU bed is unavailable, PICU physicians continue to deliver care for critical care patients in the emergency department or the ward with the help of the primary team.
- 3.6. The most senior PICU covering physician is responsible for making PICU triage decisions during routine or emergency conditions.
- 3.7. Scoring systems should not be used alone to determine the level of care or removal from higher levels of care.
- 3.8. Documentation and signing consent on patient behaves (parent or legal guardian) should be done before admitting to PICU whenever possible.
- 3.9. Do Not Resuscitate (DNR) status should be determined before and during PICU stay to determine the need for pediatric critical care.

4. Criteria for PICU Admission:

4.1. Respiratory System:

1. Endotracheal intubation or potential need for emergency endotracheal intubation and mechanical ventilation, regardless of etiology.
2. Rapidly progressive pulmonary, lower or upper airway, disease of high severity with risk of progression to respiratory failure and/or total obstruction.

3. High supplemental oxygen requirement ($FiO_2 > 50\%$), regardless of etiology.
4. Newly placed tracheostomy with or without the need for mechanical ventilation.
5. Acute barotrauma compromising the upper or lower airway.
6. Requirement for more frequent or continuous inhaled or nebulized medication than can be administered safely on the general pediatric patient care unit (more frequent than Q2 hours).
7. Requirement of non-invasive mechanical ventilation.
8. **Arterial blood gases:**
 - a. $PaO_2 < 60$ mmHg while on $FIO_2 > 0.5$
 - b. Acute rise of $PaCO_2$ to > 60 mmHg
 - c. $pH < 7.25$ with mental status change
 - d. $pH > 7.5$ and hemodynamic instability
9. **Respiratory rate:**
 - a. Age 0-6 months: < 15 or > 80 /min
 - b. Age 6-12 months: < 15 or > 60 /minute
 - c. Age 1 year to 5 years: < 12 or > 40 /minute
 - d. Age > 5 years: < 10 or > 30 /minute

4.2. Cardiovascular System:

1. Shock (hypotensive and compensated)
2. Hypotensive shock can be defined by blood pressure:
 - Sustained systolic BP (age ≤ 1 year) < 70
 - Sustained systolic BP (age > 1 year) $< 70 + \text{age}(\text{years}) \times 2$
3. Post-cardiopulmonary resuscitation.
4. Life-threatening dysrhythmias.
5. Unstable congestive heart failure, with or without need for mechanical ventilation
6. Need for monitoring of arterial, central venous.
7. Need for continuous IV infusion of inotrope or vasopressor.
8. Congenital cardiac disease with unstable cardio-respiratory status
9. Patient requiring temporary pacing
10. Current or impending cardiac tamponade

4.3. Neurologic:

1. Seizures, unresponsive to therapy (status epilepticus) or requiring continuous infusion of anticonvulsive agents.
2. Acutely and severely altered sensorium where neurologic deterioration or depression is likely or unpredictable, or coma with the potential for airway compromise.
3. After neurosurgical procedures requiring invasive monitoring or close observation.
4. Acute inflammation or infections of the spinal cord, meninges, or brain with neurologic depression, metabolic and hormonal abnormalities, and respiratory or hemodynamic compromise or the possibility of increased intracranial pressure;
5. Head trauma with increased intracranial pressure or with GCS ≤ 8 .
6. Preoperative neurosurgical conditions with neurologic deterioration.
7. Progressive neuromuscular dysfunction with or without altered sensorium requiring cardiovascular monitoring and/or respiratory support.
8. Spinal cord compression or impending compression.
9. Placement of external ventricular drainage device (in the acute phase).

4.4. Hematology/Oncology:

1. Exchange transfusions (apart from neonatal hyperbilirubemia that requires exchange transfusions).
2. Plasmapheresis or leukopheresis with unstable clinical condition.
3. Severe coagulopathy with high risk of bleeding.
4. Severe anemia resulting in hemodynamic and/or respiratory compromise.
5. Severe complications of sickle cell crisis, such as neurologic changes, acute chest syndrome, or anemia with hemodynamic instability.
6. Initiation of chemotherapy with anticipated tumor lysis syndrome.
7. Tumors or masses compressing or threatening to compress vital vessels, organs, or airway.

4.5. Endocrine/Metabolic:

1. Moderate and severe diabetic ketoacidosis requiring continuous insulin infusion therapy (pH < 7.2 , $\text{HCO}_3^- < 10$) or requiring monitoring exceeding patient care unit (endocrine ward) ability.
2. Other severe electrolyte abnormalities, such as:
 - a. Hyperkalemia, requiring cardiac monitoring and acute therapeutic intervention
 - b. Severe hypokalemia with ECG changes or < 2.5 and asymptomatic)

- c. Severe hypo- or hypernatremia (<120, and >160) with symptoms
 - d. Severe hypo- or hypercalcemia (symptomatic or refractory to therapy)
 - e. Hypoglycemia requiring intensive monitoring
 - f. Severe metabolic acidosis requiring bicarbonate infusion, intensive monitoring, or complex intervention
 - g. Complex intervention required to maintain fluid balance
3. Inborn errors of metabolism with acute deterioration requiring respiratory support, acute dialysis, management of intracranial hypertension, or inotropic support.
 4. Severe hyperammonemia associated with cerebral dysfunction.

4.6. Gastrointestinal:

1. Severe acute gastrointestinal bleeding leading to hemodynamic or respiratory instability.
2. After emergency endoscopy for removal of foreign bodies with risk of gut perforation
3. Acute hepatic failure leading to coma, hemodynamic, or respiratory instability.

4.7. Renal System:

1. Acute kidney injury requiring close monitoring or special intervention
2. Requirement for acute hemodialysis, or other continuous renal replacement therapies in the unstable patient
3. Acute rhabdomyolysis with renal insufficiency

4.8. Surgical:

1. Thoracic surgery
2. Neurosurgical procedures
3. Otolaryngologic surgery
4. Craniofacial surgery
5. Orthopedic and spine surgery
6. General surgery with hemodynamic or respiratory instability
7. Multiple trauma with cardiovascular instability
8. Major blood loss, either during surgery or during the postoperative period.
9. Organ transplantation.

4.9. Multi-system and Other:

1. Toxic ingestions and drug overdose with potential acute decompensation of major organ systems.
2. Multiple organ dysfunction syndrome.
3. Suspected or documented malignant hyperthermia.
4. Electrical or other household or environmental (eg, lightning) injuries.
5. 2nd or 3rd degree burns covering >10% of body surface.

5. PICU Discharge General /Recommendations:

- 5.1. Patient should be discharged from the PICU to a lower acuity area when a patient's physiologic status has stabilized, and they are no longer a need for PICU monitoring and treatment.
- 5.2. Discharge parameters are based on PICU admission criteria, the admitting criteria for the next lower level of care, institutional availability of these resources, patient prognosis, physiologic stability, and ongoing active interventions.
- 5.3. Discharge from the PICU is appropriate despite a deteriorated patient's physiological status if active interventions are no longer planned.

6. Criteria for PICU Discharge:

- 6.1. Stable hemodynamic parameters.
- 6.2. Stable respiratory status (patient extubated with stable blood gases) and airway patency.
- 6.3. No frequent suctioning requirement (less frequent than Q2 hours).
- 6.4. Minimal oxygen requirements that do not exceed patient care unit guidelines.
- 6.5. Intravenous inotropic support, vasodilators, and antiarrhythmic drugs are no longer required or, when applicable, low doses of these medications can be administered safely in otherwise stable patients in a designated patient care unit.
- 6.6. Cardiac dysrhythmias are controlled.
- 6.7. Neurologic stability with reasonable control of seizures.
- 6.8. Removal of hemodynamic monitoring catheters (except central venous catheter if deemed necessary to stay in place).
- 6.9. Chronically mechanically ventilated patients whose critical illness has been reversed or resolved and are otherwise stable may be discharged to home or other medical facilities.
- 6.10. Chronically ill patient who are supported by special device (like BiPAP) can be transferred to their designated patient care unit when the acute problem resolved and patient condition returned to the baseline.

7. Outreach PICU general recommendations:

- 7.1. Outreach PICU, Rapid response team to be utilized for early review of acutely ill non-PICU patients, this will aid in early identification of PICU eligible patients and prevent unnecessary PICU admission; also, it promotes early intervention that prevents patient health deterioration.
- 7.2. PICU consultant on-call teams facilitate transfer to PICU and reduce rates of readmission to critical care
- 7.3. No PICU Admission for a patient with signed DNR unless specified in the DNR order.
- 7.4. ICU Outreach can initiate and encourage DNR policy in the ward.
- 7.5. Follow up discharged patients from PICU for 24-48 hours to reduce the rate of readmission.

8. References

- 8.1. Pedro de la Oliva^{a,b}, Francisco José Cambra-Lasaos^{a,d}, Manuel Quintana-Díaz^{e,f}, Corsino Rey-Galáng^h, Juan Ignacio Sánchez-Díaz^{h,i}, María Cruz Martín-Delgado^{j,k}, Juan Carlos de Carlos-Vicentel, Ramón Hernández- Rastrollomⁿ, María Soledad Holanda-Peña^o, Francisco Javier Pilar-Orive^p, Esther Ocete-Hita^q, Antonio Rodríguez-Núñez^{r,s}, Ana Serrano-González^{t,b}, Luis Blanchu^{v,w}, on behalf of the Spanish Association of Paediatrics (AEP), Spanish Society of Paediatric Intensive Care (SECIP) and Spanish Society of Critical Care (SEMICYUC) Admission, discharge and triage guidelines for paediatric intensive care units in Spain *Med Intensiva*. 2018;42(4):235---246
- 8.2. Lorry R. Frankel, MD, FCCM¹; Benson S. Hsu, MD, MBA, FAAP²; Timothy S. Yeh, MD, MCCM³; Shari Simone, CRNP, DNP, FCCM, FAANP, FAAN⁴; Michael S. D. Agus, MD, FAAP, FCCM⁵; Marjorie J. Arca, MD, FACS, FAAP⁶; Jorge A. Coss-Bu, MD⁷; Mary E. Fallat, MD, FACS, FAAP⁸; Jason Foland, MD⁹; Samir Gadepalli, MD, MBA¹⁰; Michael O. Gayle, BS, MD, FCCM¹¹; Lori A. Harmon, RRT, MBA, CPHQ¹²; Vanessa Hill, MD, FAAP¹³; Christa A. Joseph, RN, MSN¹⁴; Aaron D. Kessel, BS, MD¹⁵; Niranjan Kissoon, MD, MCCM¹⁶; Michele Moss, MD, FCCM¹⁷; Mohan R. Mysore, MD, FAAP, FCCM¹⁸; Michele E. Papo, MD, MPH, FCCM¹⁹; Kari L. Rajzer-Wakeham, CCRN, MSN, PCCNP, RN²⁰; Tom B. Rice, MD²¹; David L. Rosenberg, MD, FAAP, FCCM²²; Martin K. Wakeham, MD²³; Edward E. Conway Jr, MD, FCCM, MS²⁴; on behalf of the Voting Panel: Criteria for Critical Care Infants and Children: PICU Admission, Discharge, and Triage Practice Statement and Levels of Care Guidance. *Pediatric Critical Care Medicine*. September 2019 • Volume 20 • Number 9