

NEPAS Consensus Guideline

Pediatric Intensive Care Unit (PICU)



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1. Background

Intensive care and high dependency units for neonates and older children are inadequate in our country. Moreover, trained manpower and essential equipments are also lacking to run such units even if units are there in the hospitals, especially in the government sector. With the emergence of COVID pandemic, children are also getting infected needing ICU care. With the view of possibility of children being more affected in the third wave of COVID, there is an imminent need of strengthening of overall pediatric critical care facilities through out the country. Nepal Pediatric Society (NEPAS) being an organization working for the welfare of children has prepared its consensus guideline for Pediatric intensive care unit and Pediatric high dependency unit set up. This guideline is aimed to improve the quality care for children and also provide guidance to the hospital management team in the process of establishment of PICU/HDU.

Generally, Paediatric HDU beds are for patients with single organ failure where a specialist can monitor and manage the cases. Paediatric ICU beds are for patients with multiple organ failure and life-threatening conditions needing immediate respiratory and cardiac support including mechanical ventilation with backup for super and multispecialty care. A hybrid critical care area (HDU +ICU) with both ventilatory and non-ventilatory beds can be established in small hospitals as well.

2. Requirements

2.1. Unit design:

PICU is dedicated to sick infants and children, separate from Neonatal and Adult ICU. Six to twelve beds are desirable. PICU with less than 4 beds risk insufficiency and PICU with greater than 16 beds are difficult to manage. A PICU of six to eight beds is ideal for the total Pediatric ward beds upto 25, (4:1). The unit should have easy access to the lift and emergency department. Walls, ceilings and the floor should be smooth, non-porous and easy to clean.

2.2. Areas of the unit: The unit should have the followings:

- **Room layout and bed area:** Patient area in open PICU should be 100 - 150 sq. feet. Ideally 1-2 isolation PICU is desirable. Wall oxygen outlets (two), air outlet (two), two suction outlets, and at least ten electrical outlets per bed are recommended for various equipments. The distance between the beds should be at least 1 metre/ 3 feet.
- **Beds:** Beds should have ability to manoeuvre head end and foot end as well as availability of two or more air/water mattresses to prevent bed sores. All beds must have a railing to prevent accidental fall of the child. Removable head board should be available in PICU beds for easy access to airway intervention.



- Nursing station (Adequate space for computers, printers, telephone and central monitor)
- Washing basin (after each 3-4 beds)
- Store (for equipment and drugs): A refrigerator is essential for some pharmaceutical products.
- Waste disposal
- Mini laboratory
- Staff area (changing room) with locker cabinets and bathroom.
- Doctor's duty room (near but outside ICU/HDU)
- Consultant Intensivist room
- Conference room
- Counselling room
- Breast feeding room
- Uninterrupted power supply
- Temperature control: Unit should preferably be centrally air conditioned and should have central heating for temperature control. Air conditioning should be designed so that air flow is always from a clean to dirty area.
- X ray viewing area
- For COVID- donning and doffing room (Preferably at entrance of the ward)
- COVID PICU should have negative pressure room.

2.3. Equipment (Table 1):

Table 1: Recommended equipments for 8 bedded level III PICU and 12 bedded level II PICU (HDU)

SN	Equipments	PICU Level III	PICU level II/ HDU
1	Beds (8+12=20)(PICU+HDU)	7 PICU beds 1 cot/warmer	10 PICU beds 2 cots with warmer
2	Monitors	8 (7 parameters)	12 (5 parameters)
3	Portable X ray	1	Same will work
4	Blood gas analyzer	1	Same will work
5	Portable USG/Echo	1	-Same will work
6	Portable ECG (12 lead)	1	1
7	ET CO2	10	-
8	Defibrillator	1	-
9	Infusion pump	16	12
10	Syringe pump	24	24



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11	Otoscope	1	-
12	Ophthalmoscope	1	-
13	Pediatric AMBU bag	8	12
14	Pediatric size masks	16	24
15	Pediatric laryngoscope	3	2
16	Emergency crash cart with content*	2	1
17	High flow nasal cannula	3	3
18	CPAP	3	3
19	Ventilators	5	-
20	Radiant Warmer	2	2
21	Portable transport ventilators	2	
22	Transport incubator	2	
23	Oxygen delivery devices -Venturi masks (different FiO2) -Non rebreathing masks -Oxygen hood -Nasal cannula		
24	Nebulizer	2	2
25	Intraosseous sets	2	1
26	Bone marrow sets	2	1
27	Glucometer with strips	5	3
28	Rectal thermometer probe	10	-
29	Noninvasive BP set (different sizes each)	5	5
30	Portable pulse oximeter	2	2
31	Portable electrical suction machine	4	4
32	Suction catheters sizes: 6,8,10,12,14,16Fr		
33	Computer	1	-



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34	Printer	1	-
35	AC	3	3
36	T piece	5	-
37	Bed side table	8	12
38	Bed trolley	8	12
39	Emergency drug trolley	1	1
40	Furniture		
41	Vein finder lights		
42	Torch		
43	Stethoscope (at least one for each bed)		
44	Electronic Weighing scales for infants and children		
45	Endotracheal tube (different Ped sizes)		
46	Nasogastric tubes (sizes 6,8,10,16 fr)		
47	Medical Waste Segregation Buckets		
48	Refrigerator	1	
49	IV infusion sets		
50	IV cannula (size 20,22 or 24,26G), three way		
51	Adhesive tape, 2 sizes		
52	Disposable needles 22,23,26 G		
53	Air/water mattress	1/bed	

*Emergency Crash cart should contain- intubation set with different sized ET tubes, laryngoscope, stylets, airways, IV start kits, defibrillator with pediatric pads



2.4. Human resources (Table 2):

Table 2: Recommended human resources

SN	Human resources	PICU level III	PICU level II (HDU)
1	PICU In charge/Intensivist	1	-Pediatrician
2	Nursing in charge	1	1
3	Medical officers	5	5
4	Nursing staffs	16	16
5	Nurse: Patient ratio	1:2/shift	1:3/shift
6	Attendant	5	5
7	Medical lab technician		
8	Security guards		

* It is desirable to have access to physiotherapists, dieticians and respiratory technicians for enhancing patient care. In addition, lab technicians, radiographers, and biomedical engineers should be available round the clock for possible emergency (e.g. power failure, equipment failure).

2.5. Preparing human resources:

- IPC training for Pediatricians, MOs, Nursing staffs and attendants
- Basic PICU training to MOs and Nursing staffs
- PICU in COVID training for Pediatricians, MOs and nursing staffs

2.6. Drugs:

- Oral Rehydration Solution
- Paracetamol (oral Syrup. And Tabs, per rectal, IV), Syrup Zinc, Nasal/ Buccal/Rectal/ IV Diazepam or Midazolam [desirable]
- Inj. Atropine
- Inj. Adrenaline
- Inj. Sodium bicarbonate
- Inj. Calcium gluconate
- Inj. Magnesium sulphate (50%)
- Inj. Phenobarbitone, Inj. Phenytoin, Inj. Valproate, Inj. Levetiracetam, Inj. Diazepam,
- Salbutamol (MDI)
- Inj. Hydrocortisone, Dexamethasone, Inj. Methylprednisolone, Tab. Prednisolone
- Inj. Furosemide
- Antibiotics: Inj. Flucloxacillin, Vancomycin, 3rd generation cephalosporin, Inj. Gentamicin/Amikacin, Piperacillin-Tazobactam, Meropenem, Colistin, Septran, Levofloxacin



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- Inj. Ketamine, Inj. Fentanyl, Inj. Morphine, Inj. Vecuronium, Inj. Succinylcholine, Inj. Propofol,
- Inj. Ranitidine/Pantoprazole
- Inj/Oral Anti-histaminics (Avil)
- Inj. Potassium chloride
- Antifungal: Inj. AMB, Fluconazole, Inj Acyclovir
- Injections Dopamine, Dobutamine, Adrenaline, Nor epinephrine, Milrinone
- Inj. Adenosine, Amiodarone, lidocaine
- Inj Naloxone
- Inj. Trenaxemic acid
- Inj. Albumin
- Inj. LMWH
- Inj IVIG
- RL/NS, 0.45% Saline with 5% Dextrose
- Dextrose 10%, 25%, 50%