CLINICAL PRACTICE GUIDE

Early mobilisation and rehabilitation of paediatric intensive care patients

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NSW GOVERNMENT

AGENCY FOR CLINICAL INNOVATION

Intensive Care NSW

The information in this document should not replace a clinician's professional judgement.

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At a glance

Early mobilisation and rehabilitation of paediatric intensive care patients can prevent complications, delays in mobility and extended hospital stays. It requires a multidisciplinary, collaborative approach.

This document uses an animal system to classify a safe level of movement for all children in the paediatric intensive care unit, with gradual increases in movement as they recover.

Lizard – Limited activity, contraindications present. Repositioning, pressure area care and splints only.

Koala – High acuity patient, low level activities. Activities within the bed only.

Wombat – Medium acuity patient, moderate level activities. Mobility within the bedspace.

Kangaroo – Low acuity patient, higher level activities. Mobility around the unit and outside the unit with medical approval.

Summary

Despite recent advances in paediatric intensive care medicine, paediatric intensive care unit (PICU) patients are vulnerable to the illness which prompted admission to intensive care and to complications associated with the care they receive.[1-4]

Significant clinical and functional deterioration and complications, such as ventilator-associated pneumonia, can occur for patients admitted to the intensive care unit (ICU).[5] This is often referred to as post-intensive care syndrome (PICS).[6] Deterioration can occur within days of hospitalisation.[7]

PICS is a well-defined phenomenon in the adult intensive care population and is now a concern in the paediatric population.[8,9] Functional and cognitive sequelae are increasingly recognised in PICU patients.[8] Immobilisation leaves PICU patients susceptible to ICU, acquired weakness (ICUAW), which is associated with worsening clinical outcomes.[10]

Early mobilisation (EM) in adults has been demonstrated to improve ICUAW.[11] Patients who mobilise early are able to get out of bed faster and have shorter hospital stays. At one year after discharge, patients who have received EM are half as likely to have died or been rehospitalised.[12]

EM can improve the long-term outcomes and functionality in children.[13-15] However, the diverse nature of the paediatric ICU population presents challenges, particularly their varied age, and cognitive and baseline functions.[4]

Special attention and care must be taken to ensure the child's safety during any mobilisation activity. The aim is to prevent accidental device disconnection or dislodgement, and limit any adverse cardiorespiratory response.[16]

According to the Society of Critical Care Medicine guidelines, an early mobility program should include:[16]

- daily screening for readiness to mobilise
- activities that target a patient's highest level of mobility, based on the child's illness
- a coordinated, collaborative team effort.

In this guide, mobility targets for paediatric patients are:[16]

- in bed
- edge of bed
- out of bed with functional mobility.

Introduction

This guide is intended for use by the NSW Ministry of Health, pillar organisations, local health districts (LHDs), and relevant NSW clinicians working in PICUs.

In NSW, PICUs are located at three facilities: The Children's Hospital at Westmead, Sydney Children's Hospital and John Hunter Children's Hospital. In 2021, the following admissions were recorded:

- 1,288 children were admitted to the PICU at The Children's Hospital at Westmead
- 894 to Sydney Children's Hospital PICU
- 327 to John Hunter Children's Hospital PICU

Patients had a median length of stay in the PICU of 33-45 hours, with a range of conditions. The most common conditions for admission to PICU from the ANZICS data were post-operative scoliosis, brain tumour, bronchiolitis, asthma, respiratory syncytial virus (RSV) and pneumonia.[17]

This guide provides a framework to support clinicians in the safe use of EM activities for PICU patients, providing clinicians with a structured approach. It uses evidence-based criteria for patient inclusion and assignment of EM categories for activities, with contraindications and precautions to ensure safe goal-oriented EM in PICUs (Appendix 1).

This document has been written for use with paediatric ICU patients only. This information is not a substitute for healthcare providers' professional judgement and clinical reasoning. Specific information about the individual patient and consultation with other medical authorities must always be considered.

Method

A working group was formed from the Paediatric Intensive Care Advisory Group (PICAG) within the Agency for Clinical Innovation (ACI). The purpose of this group was to develop a clinical practice guide on EM and rehabilitation of PICU patients.

Clinicians were recruited to develop this guide from each of the three level six paediatric units. The work was initially developed by Queensland Children's Hospital PICU, with the work based on Dr Karen Choong's EM projects in 2018-2019.[18] Dr Choong is Professor in Paediatrics and Critical Care within the Department of Health Research Methods, Evidence and Impact at McMaster University, Canada.

This clinical practice guide and related resources were developed, with permission, based on the experience and lessons learned by the Queensland Children's Hospital PICU.

This document was written using electronic databases to search current available literature including the Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medline (Ovid), Cochrane and the TRIP databases for a period spanning 2011-2021. Key search terms included "Early Mobility" OR "Early Ambulation", which produced 2,113 initial results. Keywords and the Medical subject Heading (MESH) of "PICU" were combined using 'AND' narrowing the search to 22 papers. Limitations were applied to capture literature in the last five years in full text (English only).

The remaining 22 articles were reviewed and classified to evaluate the strength of the outcomes reported.[19] Fifteen papers were selected from the 22 reviewed papers. The remaining three papers were selected by manually searching appropriate reference lists, resulting in a final 18 papers that reflected the highest level of research for this evidence review.

Criteria for early mobilisation

Inclusion criteria

Any child who is admitted into the PICU will be assessed daily by the medical team for potential inclusion. This assessment should include consideration of contraindications and precautions to EM for the child (Tables 1 and 2).

If there are no contraindications present, the medical team, in consultation with the nursing and allied health team, should assign a mobility level to the child. This should be documented in the patient's health record and communicated to the child's carer or parent. Where precautions are identified, extra resources and considerations may be required to ensure safe mobilisation for the patient.

For younger infants, specific neurodevelopmental care strategies should continue to be incorporated. Early mobility and neurodevelopmental care are not mutually exclusive, and involvement in neurodevelopmental rounds should continue as per the PICU's processes.

Contraindications criteria

Table 1: Contraindications to mobilisation in critically ill children[4] (not safe to mobilise, bed repositioning only)

Type	Contraindications
Haemodynamic instability	• Hypotension (blood pressure persistently below patient's target causing end-organ hypoperfusion) • Ongoing need for fluid resuscitation and/or escalation in vasoactive medication • Suspected or confirmed acute unstable or uncontrolled arrhythmia • Evidence of cardiac tamponade (untreated) • Acute cardiac ischemia (symptomatic and/or confirmed electrocardiography (ECG) changes) – not resolved • Acute systemic or pulmonary hypertensive crisis – not resolved and/or requiring intravenous antihypertensive therapy
Respiratory instability	• Acute, impending respiratory failure; ongoing escalation in respiratory support and/or endotracheal intubation is anticipated • Critical airway, e.g. new tracheostomy within 72 hours • Escalating intravenous bronchodilator, intravenous or inhaled pulmonary vasodilator therapy within last 4 hours Note: stable titration and/or weaning of respiratory support and FiO_2 requirements, even if high, are not absolute contraindications to mobilisation.

Type	Contraindications
Neurological instability	• Evidence or high suspicion of acute cerebral oedema, or active management of elevated intracranial pressure (ICP) with cerebral perfusion pressure (CPP) not within target range • Sudden unexplained acute deterioration in level of consciousness • Active uncontrolled seizures, or refractory status epilepticus, exacerbated by active or passive mobilisation activity (documented)
Surgical	• Uncontrolled major active bleeding • Unstable or unstabilised pelvic or spinal fracture • Acute surgical emergency

Table 2: Precautions to mobilisation in critically ill children[4] (special care, resources and attention are required during mobilisation of these patients)

Type	Contraindications
Cardiovascular	• Patients receiving vasoactive infusion(s) • Stable or weaning doses of vasoactive agents are not an absolute contraindication to mobilisation, and should be discussed on a case-by-case basis. There is no consensus agreement from clinicians regarding this • Systemic or pulmonary hypertension
Respiratory	• Patients receiving invasive ventilation via endo/nasotracheal tube or non-invasive mechanical ventilation • Patients with accessory muscle use and high oxygen requirements (i.e. FiO_2 over 0.5) • Post airway reconstructive surgery or new tracheostomy within 72 hours • Prone positioning during mechanical ventilation

Type	Contraindications
Neurological and neurosurgical	• Post craniectomy (until the patient is cleared by the lead medical team) • External ventricular drain and/or intracranial pressure monitor in situ • Acute spinal cord injury • Patients who are on neuromuscular blockers or present with acute muscle paralysis
Orthopaedic and musculoskeletal	• Strict spinal precautions in place (inline immobilisation required) • Limb fractures, osteopenia • Joint laxity; hypotonicity or spasticity; specific regional or joint considerations
Other	• Invasive lines or catheters in situ • Continuous renal replacement therapy • Specific requirements or instructions following surgery, e.g. status post skin grafts and muscle flaps, open abdomen, risk of wound dehiscence • Visceral organ injury, e.g. high-grade liver or splenic laceration • Uncontrolled agitation and/or pain, confusion or delirium • Bleeding diathesis • Risk of postural hypotension or autonomic dysreflexia Note: These patients may have the bedhead elevated and in-bed limb mobility, as long as dressing seal or wound integrity can be maintained.

Risk management

Incident monitoring and infection control

Any adverse events such as falls, near misses, dislodgement or accidental removal of lines or tubes must be reported via the Incident Management System (IMS+) or as per the local reporting process.

All staff must follow policy directives, use universal precautions and adhere to local work health and safety guidelines, such as infection prevention, hand hygiene, cleaning equipment and single-use equipment.

Adverse events and safety thresholds

The risks associated with EM are minimal, with an overall consensus that EM is a safe and feasible intervention in PICUs.[20] Barriers to EM are related to staff perceived safety concerns, e.g. mobilising patients with an endotracheal tube (ETT) out of bed.[21, 22] The rates of adverse events are low for these patients, which suggests the negative perceptions associated with EM may be more significant than the actual adverse events.[23-25]

Patient safety in the PICU should always be the priority. EM safety recommendations must be considered prior to any patient mobilisation activity.

Early mobilisation safety requirements

- Any clinical deterioration requires reassessment of the allocated patient activity level by the senior medical officer. Local escalation pathways and processes need to be followed.
- A pre-mobilisation assessment is recommended prior to undertaking any mobilisation activity (see Figure 1).
- Prior to any mobilisation, ensure the child's airway, lines and dressings are secured.
- Optimise the child's analgesia and level of comfort prior to the mobilisation activity.
- All mobilisation activities should be planned in collaboration with the child and their family.
- Each activity must be planned to include the appropriate number of staff trained in manual handling and mobilisation procedures of these children.
- Some complex activities, e.g. supine cycling, infant seating, or special supportive seating, will require a referral and coordination with either a physiotherapist and/or occupational therapist.
- The medical team must be notified if there are any associated adverse events, such as falls, near misses, dislodgement or removal of lines or tubes. Any incident needs to be submitted via IMS+.

Figure 1: Pre-mobilisation checklist

- ☑ No contraindications present and all precautions reviewed
- ☑ Mobility activity discussed with child and parent or carer
- ☑ Appropriate number of skilled clinicians prepared and available to assist. Allied health review where appropriate
- ☑ Airway, lines and dressings assessed and secured
- ☑ Child's analgesia and comfort level optimised, including assessment of delirium and agitation

Assessment tool

Children's Chelsea Critical Care Physical Assessment (cCPAx) (see Appendix 2)

To optimise functional recovery of PICU patients and promote safe mobilisation, the Children's Chelsea Critical Care Physical Assessment (cCPAx) tool should be used by physiotherapists to provide a standardised assessment.

All children over two years of age can be assessed, and the score can provide a useful measure of physical function in PICU patients.

This tool should be completed with input from the child, where appropriate, and/or their carer or parent. It is used to guide mobility goals at the bedside and provides a measure to monitor physical function during critical illness. The use of this tool is to guide standardised practice for the EM program.

Implementing an early mobility program

Assigning an activity level classification

Each child within the unit will be assessed by the senior medical officer during multidisciplinary ward rounds. They will then be categorised as one of the following animal activity levels. This categorisation is to be undertaken at a minimum of once per day, noting patient category may change throughout the day (see Appendix 3).

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Kangaroo – Low acuity patient, higher level activities. Mobility around the unit and outside the unit with medical approval.

Roles and responsibilities in the early mobility team

1. Physiotherapy and occupational therapy

Physiotherapy and occupational therapists will continue to treat a child in PICU as per the local process and will be involved with achieving EM activities. The physiotherapist within each unit will be the champion for the EM program and will provide clinical support.

The physiotherapist should complete a cCPAx assessment (see Appendix 2) for all appropriate children and ensure the score is documented in the patient's health record. It is recommended the score is reviewed 2-3 times a week and it will inform and guide the therapist on goal setting and physical progress for the patient.

2. Family engagement

The young person, their carer and/or family are an integral part of the team. It is essential that staff keep them informed about the EM program, including goals and rationale for decision making. The patient and their family should be reassured and supported with the progression of mobility.

Staff should communicate with families at the bedside, or virtually if required. Collaboration with the young person and their families is key to their involvement in the program and to maintaining safety.

3. Senior medical officer

The medical staff will establish the activity level during the morning ward round, in conjunction with the multidisciplinary team, and will adjust as needed throughout the day. The medical staff are responsible for classifying all eligible children who are considered for EM.

Nursing and allied health staff work collaboratively with the child and family to achieve the activities for the day. In some cases, the PICU multidisciplinary team, which may include a physiotherapist, social worker, dietitian, occupational therapist and pharmacist, will be required for activities.

4. Bedside registered nurse

Nursing staff will display the appropriate animal activity level at the bedside. They will engage with the family to choose activities for the day from the bedside resource pack to meet the child's goal of up to three activities per day. This is based on a unit's expectations and the child's ability.

If nursing staff are unsure of activities or require assistance, they should contact a member of the allied health or early mobility team, as per their local processes. The education team will also be available to support the bedside nurse.

Completed activities are updated daily by nursing or allied health clinicians in the patient's health record.

Mobility activities

Activities are implemented daily by nursing or allied health staff, in collaboration with the child and family. Allied health staff will continue to treat children in PICU as per the local process and may not be involved with achieving EM activities.

Lizard – Limited activities such as:

- repositioning
- splints
- passive range of motion stretches.

Koala – Activities that are bed based and may include, but are not limited to:

- active assisted and/or passive joint range of motion
- increased position changes
- bed mobility
- supported sitting up in bed with gradual increase of bedhead degree and assessment of the child's tolerance
- resting splints, if indicated
- developmentally supportive positioning
- supine cycling (only to be used in consultation with physiotherapist).

Wombat – Activities within the bedspace area that may include:

- active and/or passive joint range of motion
- increased position changes
- bed mobility
- transfer into standard chair, supportive wheelchair or stroller set up by the occupational therapist
- supported sitting in, or transfer out of, bed to chair or to be held for cuddles out of bed
- resting splints, if indicated
- developmentally supportive positioning and play in or out of bed
- pre-gait activity
- tilt table (only to be used in consultation with physiotherapist)
- cycling (only to be used in consultation with physiotherapist)
- standing
- stepping.

Kangaroo – Activities within or outside of the bedspace that may include:

- active and/or passive joint range of motion
- increased position changes
- bed mobility
- transfer into standard chair, supportive wheelchair or stroller set up by occupational therapist
- supported sitting in, or transfer out of, bed to chair or to be held for cuddles out of bed
- resting splints, if indicated
- developmentally supportive positioning and play in or out of bed
- pre-gait activity
- tilt table (only to be used in consultation with physiotherapist)
- cycling (only to be used in consultation with physiotherapist)
- standing
- stepping
- visit outside the unit – may be active or passive using mobility equipment as required
- self-care, e.g. teeth brushing, shower, bath, with supportive equipment if required (see Appendix 3).

Data collection and documentation

Data collection and documentation is important to assess the effectiveness of the activities on promoting early mobility. Information should be entered into the patient's electronic health record by the senior medical officer and nursing staff looking after the patient.

Data to be collected:

- Level of mobility for the patient
- Activity classification level and daily activities
- Patient's tolerance of activities
- Any adverse events or incidents

Education, equipment and resources

Education

Early mobility education involves the multidisciplinary team and family using various types of education.

The types of education recommended include:

- bedside teaching
- resource packages
- simulation.

All clinical PICU staff, including new staff, will receive education specific to EM techniques, activity inclusion and exclusion criteria, allocation of an activity level and staff's role in the process.

Bedside resource package

A bedside resource package has been developed to support staff, which includes:

- an early mobility classification algorithm
- activity level classification and activity ideas
- role responsibilities
- cCPAx, including radar chart and bedside signs (see Appendix 2).

A child and parent and carer information pamphlet has also been developed to support the bedside nurse with explanation of the EM process (see Appendices 1-4).

Equipment to support the mobility activities

Age-appropriate equipment may include:

- floor mat
- tilt table
- seating – baby beanbag, appropriate chair, Regency chair, high-backed chair, wheelchair, pram
- buggy
- standing frame
- supine cycle
- cycle pedals
- sports equipment – balls, quoits, velcro tennis, cricket bat
- ride-on car and cart
- ride-on trike.

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Appendix 1: Traffic light early mobility pathway

Step 1. Is my patient safe to mobilise?

No, contraindicated

Contraindications

Lizard – Not safe to mobilise, bed repositioning only

Cardiovascular

- Haemodynamic instability (stable or weaning vasoactive infusion is NOT a contraindication)
- Acute ischaemia, unstable or uncontrolled arrhythmia
- Systemic or pulmonary hypertensive crisis

Respiratory

- Impending respiratory failure
- Escalating respiratory support and intervention
- Critical or unstable airway

Neurological

- Acute cerebral oedema or intracranial hypertension
- Deterioration in consciousness
- Uncontrolled seizures
- Seizures exacerbated by mobilisation

Surgical

- Major active bleeding
- Pelvic or spinal fracture

No contraindications
Assess for precautions

Maybe, with precautions

Precautions (mobilise with care)

Cardiovascular

- Vasoactive infusion(s), hypertension

Respiratory

- Mechanical ventilation
- Increased WOB and high FiO_2 (>0.5) requirements

Neurological or neurosurgical

- Post craniectomy
- External ventricular drain (EVD) or Codman
- Spinal cord injury

Musculoskeletal

- Osteopenia, fractures, joint laxity, hypotonicity or spasticity

Other

- Endotracheal tube (ETT) or cutdown ETT
- Invasive lines or catheters, continuous renal replacement therapy (CRRT), etc.
- Post-operative specification
- Uncontrolled agitation, pain, confusion or delirium
- Risk of postural hypotension or autonomic dysreflexia

Yes, safe to mobilise

Pre-mobilisation checklist

- ☑ No contraindications present
- ☑ Precautions reviewed during rounds
- ☑ Activity order and goal(s) set
- ☑ Allied health input as indicated
- ☑ Staff required for mobilisation available – roles allocated
- ☑ Airway lines and dressings secured
- ☑ Patient's comfort and analgesia optimised

Step 2: Set activity level, complete pre-mobilisation checklist

Continuous reassessment of stability and tolerance during mobility using initial assessment parameters

▼

If stable – continue mobility

▼

If unstable – modify mobility and reassess

▼

If patient remains unstable after modification – Cease mobilise session

Step 3: Make it happen – MOBILISE PATIENT

Source: Adapted from Choong, et al. 2018[17] and provided by Queensland Children's Hospital

Appendix 1: Traffic light early mobility pathway (cont.)

Level of assistance	Definition	Activity goals
 **Koala**	Activities are bed based. High acuity patient and low level activities	• Passive range of motion • Resting splints applied, if indicated • Sit up in bed
 **Wombat**	Activities within the bedspace. Medium acuity patient and moderate level activities	• Active range of motion or active assisted range of motion • Transfers • Lying-sitting-standing • Pre-gait activities
 **Kangaroo**	Activities within and outside of the bedspace. Low acuity patient and high level activities	• Mobility in and out of the room • Developmental play

Appendix 2: Children's Chelsea Critical Care Physical Assessment Tool (cCPAx)

	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5	Key definitions
Respiratory	Complete ventilator dependence, with inconsistent or absent spontaneous effort. May be sedated or paralysed	Ventilator dependence. Consistent complete or partial spontaneous effort with continuous invasive ventilatory support	Spontaneously breathing with full dependency on continuous non-invasive ventilatory support	Spontaneously breathing with intermittent non-invasive ventilatory support **OR** on continuous high flow oxygen	Self-ventilating and receiving low flow oxygen therapy (<1L/kg/min)	Self-ventilating with no oxygen therapy	**MAXIMAL** Assistance defined by requiring ≥1 person to assist; Or ≥75% dependent **MODERATE** Assistance defined by requiring ≥1 person to assist; Or 26-74% dependent **MINIMAL** Assistance defined by requiring 1 person to assist; or ≤25% dependent **STANDBY** Assistance defined by the patient requiring the presence of another person within arm's reach to support their safety by physical intervention or cueing while the patient is performing the activity
Cough	Absent cough, may be fully sedated or paralysed	Cough stimulated on suction or tracheal stimulation only	Weak ineffective voluntary cough, unable to clear independently, e.g. suction required	Weak, partially effective voluntary cough, sometimes able to clear secretions, e.g. may require Yankauer suctioning	Effective cough clearing secretions with airway clearance techniques	Consistent effective cough, voluntary cough, clearing secretions independently	
Moving in bed	Unable, may be fully sedated or paralysed	Initiates voluntary movement. Requires **MAXIMAL** assistance	Initiates voluntary movement. Requires **MODERATE** assistance	Initiates voluntary movement. Requires **MINIMAL** assistance	Requires **STANDBY** assistance	Independent appropriate for age	
Supine to sit	Unable/unstable	Initiates voluntary movement. Requires **MAXIMAL** assistance	Initiates voluntary movement. Requires **MODERATE** assistance	Initiates voluntary movement. Requires **MINIMAL** assistance	Requires **STANDBY** assistance	Independent appropriate for age	
Dynamic sitting	Unable or unstable	Requires **MAXIMAL** assistance	Requires **MODERATE** assistance	Requires **MINIMAL** assistance	Independent with some dynamic sitting balance, i.e. able to alter trunk position within base of support; feet may need to be stabilised	Independent with full dynamic sitting balance, i.e. able to reach out of base of support	

Appendix 2: Children's Chelsea Critical Care Physical Assessment Tool (cCPAx) (cont.)

	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5	Key definitions
Standing	Unable, unstable or bedbound	Dependent on tilt table, standing frame, hoist or similar. Requires **MAXIMAL** assistance	Dependent on frame, crutches or similar, Requires **MODERATE** assistance	Uses frame, crutches or similar with supervision, or requires **MINIMAL** assistance	Independent without aides and maintains static standing balance, unable to reach outside base of support	Independent without aides and full dynamic standing balance, i.e. able to reach outside of base of support	**MAXIMAL** Assistance defined by requiring ≥ 1 person to assist; Or ≥75% dependent **MODERATE** Assistance defined by requiring ≥1 person to assist; Or 26-74% dependent **MINIMAL** Assistance defined by requiring 1 person to assist; or ≤25% dependent **STANDBY** Assistance defined by the patient requiring the presence of another person within arm's reach to support their safety by physical intervention or cueing while the patient is performing the activity
Sit to stand	Unable or unstable	Sit to stand requires **MAXIMAL** assistance (±passive equipment e.g. hoist)	Sit to stand requires **MODERATE** assistance	Sit to stand requires **MINIMAL** assistance (no equipment)	Sit to stand independently pushing through arms of the chair **OR** with **STANDBY** assistance	Sit to stand independently without upper limb support	
Transfer bed to chair	Unable or unstable	Passively lifted. Manual transfer or hoist. Requires **MAXIMAL** assistance	Transfer with mobility aid or physical assistance. Requires **MAXIMAL** assistance	Pivot transfer (no stepping) ±mobility aid or physical assistance. Requires **MODERATE** assistance	Stand and step transfer ±mobility aid or physical assistance. Requires **MINIMAL** assistance	Independent transfer without equipment	
Stepping	Unable or unstable	Using mobility aids AND assistance. Requires **MAXIMAL** assistance	Using mobility aids AND/OR assistance. Requires **MODERATE** assistance	Using mobility aids **OR** assistance. Requires **MINIMAL** assistance	Requires **STANDBY** assistance **OR** mobility aid	Independent without aid	
Grip strength	Unable	Flickers of movement but unable to grasp. 1/5 gross power	Able to grasp and exert weak squeeze of hand. 2/5 gross power	Able to grasp and exert moderate squeeze of hand. 3/5 gross power	Able to grasp and exert strong squeeze. 4/5 gross power	Able to grasp and sustain strong squeeze. 5/5 gross power	

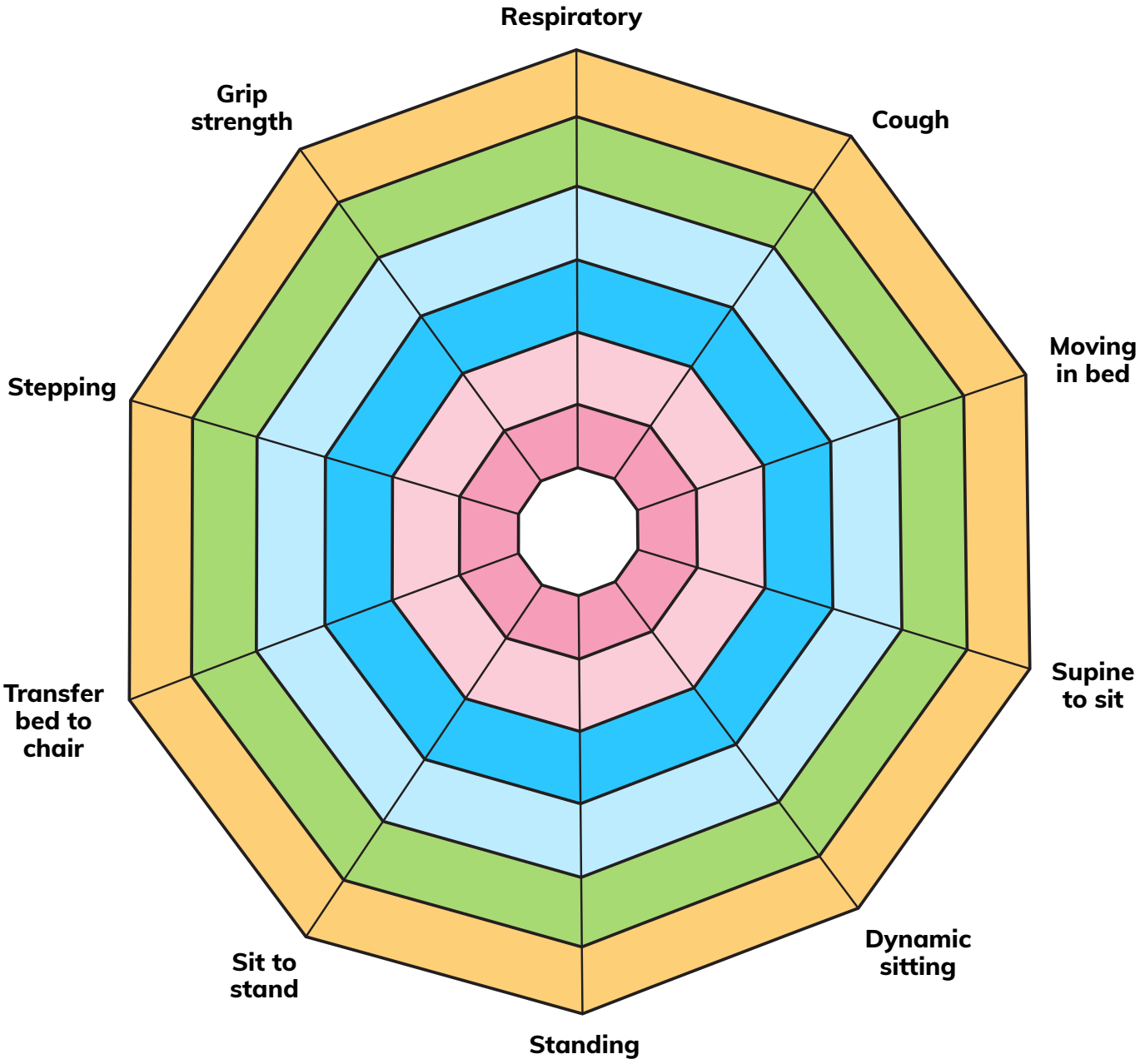
Source: Adapted from Choong, et al. 2018[17] and provided by Queensland Children's Hospital

Appendix 2: Children's Chelsea critical care physical assessment tool (cCPAx) (cont.)

Name: _____ DOB: _ _/_ _/_ _ _ _

Date: _ _/_ _/_ _ _ _

Total: _____



Source: Adapted from Choong, et al. 2018[17] and provided by Queensland Children's Hospital

Appendix 3: Activity level classification

Level of assistance	Classification	Definition	Activities
1		**ACTIVITY ON HOLD** Contraindications present	Limited activities only, such as: • pressure area care • bed repositioning • splints • passive range of motion stretches.
2		**HIGH ACUITY PATIENT AND LOW LEVEL ACTIVITIES** Patient requires assistance with the activity; and/or precautions present **cCPAx (guide only) 0-10** Examples: • Intubated or non-invasive ventilation with Fio_2 >60% or peak end expiratory pressure (PEEP) >8 • High flow nasal annual (HFNC) 3L/kg/min • Oral ETT • Difficult intubation • New tracheostomy prior to first tracheostomy change • Acute neurological event	**KOALA ACTIVITIES ARE BED BASED** • Active range of motion (AROM) or passive range of motion (PROM) • Position changes 2 hours per day or 4 hours per night • Developmentally supportive positioning • Resting splints applied if indicated • Elevate head of bed >30 degrees for 10-15 mins x3 daily • Sit up in bed
3		**MEDIUM ACUITY PATIENT AND MODERATE LEVEL OF ACTIVITIES** The patient may require assistance to participate and/or precautions present **cCPAx (guide only) 0-10** Examples: • Intubated or non-invasive ventilation with Fio_2 <60% or PEEP <8 • HFNC 2L/kg/min • Haemofiltration • Femoral access	**WOMBAT ACTIVITIES ARE WITHIN THE BEDSPACE** • AROM or active-assisted range of motion (AAROM) stretching and strengthening exercises • Bed mobility – active assisting • In-bed cycling; active-assisted • Transfers; lying-sitting-standing • Increasing sitting tolerance • Pre-gait activities
4		**LOW ACUITY PATIENT AND HIGHER LEVEL ACTIVITIES** The patient may require assistance to participate **cCPAx (guide only) >16** Examples: • Stable long-term or baseline support HFNC or ventilation • Low flow oxygen or room air • External ventricular drain (EVD) cleared by neurosurgery	**KANGAROO ACTIVITIES ARE WITHIN AND OUTSIDE OF THE BEDSPACE** • Mobility in and out of the room • Transferring out of bed • Activities of daily living • Developmental play • Visit outside the unit

Source: Adapted from Choong, et al. 2018[17] and provided by Queensland Children's Hospital

Koala

Activity is bed-based. Aim for minimum 3 activities per day.

Infant	Child	Adolescent
• PROM twice daily, upper and lower limbs, head and neck. Hold gentle stretch at the end of each movement • Position change – every 2 hours per day, every 4 hours per night • Elevate cot >30 degrees (goal 45 degrees) aim 10 mins, 3 times daily or as tolerated. Support to achieve midline head and trunk position • Developmentally supportive positioning – nesting, prone, side lying with hands and hips in midline, supine with hips, head and shoulders supported in midline where appropriate. All positions as tolerated • Resting splints applied for upper or lower limb as indicated	• PROM twice daily, upper and lower limbs, head and neck. Hold gentle stretch at end of each movement • Position change – every 2 hours per day, every 4 hours per night • Elevate head of bed above 30 degrees (goal 45 degrees) aim 10 mins, 3 times daily or as tolerated. Support to achieve midline head and trunk position • Resting splints for upper or lower limb as indicated • Physiotherapist to complete cCPAx	• PROM twice daily, upper and lower limbs, head and neck • Position change – every 2 hours per day, every 4 hours per night • Elevate head of bed above 30 degrees (goal 45 degrees) aim 10 mins, 3 times daily or as tolerated. Support to achieve midline head and trunk position • Resting splints for upper or lower limb as indicated • Physiotherapist to complete cCPAx • In-bed cycling

Source: Adapted from Choong, et al. 2018[17], provided by Queensland Children's Hospital as an example with slight adaptations as per agreement from Sydney Children's Hospitals Network and John Hunter Children's Hospital

Wombat

Activity is within the bedspace. Aim for minimum 3 activities per day.

Infant	Child	Adolescent
• PROM or AAROM upper and lower limbs, head and neck – aim twice daily • Reaching and fine motor skills • Positive touch – integrate into standard care, including bathing, changing, repositioning • Out of bed for cuddles – aim 2-3 times a day • Gentle developmental play in or out of bed – integrate into standard care, including bathing, changing, repositioning • Sit out of bed in appropriate chair or beanbag – aim for 3 times a day if not up for cuddles • Daily weight	• AROM or AAROM upper and lower limbs, head and neck – aim twice daily • Bed mobility including rolling, repositioning and bridging • Sit on the edge of the bed – aim twice daily 1-5 mins duration • Sit up in bed three times a day above 45 degrees at least 10 mins per session • Sit out of bed – may be active or assisted lift or hoist • Passive tilt table with physio • Pre-gait activity – lower limb active movement in bed, sit to stand, weight shift, stepping in place, side stepping	• AROM or AAROM upper and lower limbs, head and neck – aim twice daily • Bed mobility, including rolling, repositioning and bridging • Sit on the edge of the bed – aim twice daily 1-5 mins duration • Sit up in bed three times a day above 45 degrees at least 10 mins per session • Sit out of bed – may be active or assisted lift or hoist • Passive tilt table with physio • Pre-gait activity – lower limb active movement in bed, sit to stand, weight shift, stepping in place, side stepping • Assist with activities of daily living, e.g. oral care

Source: Adapted from Choong, et al. 2018[17], provided by Queensland Children's Hospital as an example with slight adaptations as per agreement from Sydney Children's Hospitals Network and John Hunter Children's Hospital

Kangaroo

Activity is in and out of bedspace. Aim for minimum 3 activities per day.

Infant	Child	Adolescent
• Developmental play out of bed – aim for 2+ sessions daily (5 minutes minimum) • Floor play – crawling, rolling, sitting • Supported sitting in appropriate chair or other seating – or independent sitting in or out of bed. Aim for 3 sessions daily at least 10 mins per session. May be combined with developmental play • Out of bed for cuddles – varied positions including upright • Visit outside unit in stroller or bed	• Bed mobility, including rolling repositioning and bridging; promote patient independence • In-bed cycling • Transfer to standing next to bed, and from standing back to bed • Transfer from bed to chair and then back to bed, 2+ times per day • Sit out of bed as tolerated – aim at least 30 mins 2-3 times daily • Mobilise twice daily outside of the bedspace • Activities of daily living, including walking to and using the bathroom, washing, oral hygiene, dressing • Visit outside unit – this may be in a wheelchair or with assisted device	• Bed mobility, including rolling repositioning and bridging; promote patient independence • In-bed cycling • Transfer to standing next to bed, and from standing back to bed • Transfer from bed to chair and then back to bed, 2+ times per day • Sit out of bed as tolerated – aim at least 30 mins 2-3 times daily • Mobilise twice daily outside of the bedspace • Activities of daily living, including walking to and using the bathroom, washing, oral hygiene, dressing • Visit outside unit- this may be in a wheelchair or with assisted device

Source: Adapted from Choong, et al. 2018[17], provided by Queensland Children's Hospital as an example with slight adaptations as per agreement from Sydney Children's Hospitals Network and John Hunter Children's Hospital

Appendix 4: Examples of bedside resources

Medical staff

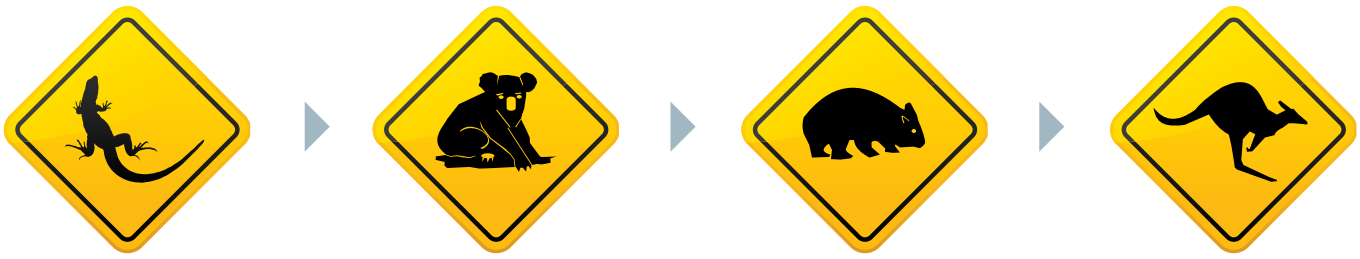
- Patients present in PICU >24hr in allocated EM or liberation bedspace will be categorised as Lizard, Koala, Wombat or Kangaroo activity level by the consultant in ward round on the daily goal sheet.
- Patients not ready to mobilise are Lizard/on hold. This is based on current medical condition and evidence-based classification system.

Nursing staff

- Put the relevant animal sign on the bedspace door.
- Choose and complete 3 activities for the day from bedside resource list.
- Record activities from the dropdown list in the clinical information system for any of the activities completed during their shift, e.g. bedhead up or down, sit out of bed, out for cuddles.

Allied health

- Allied health will assist with and advise on mobilisation where indicated, as they do now, but aim is to empower and use assistants in nursing (AIN) and allied health assistants to work with nursing staff and families.
- Physios to provide EM program support to help enable activities.
- Physio completes physical assessment score (cCPAx).



Lizard
Limited activity

Koala
Low level activity
High patient acuity

Wombat
Moderate level activity
Moderate patient acuity

Kangaroo
High level activity
Low patient acuity

Source: Adapted from Queensland Children's Hospital bedside resource package

Glossary

Term	Definitions
ACI	Agency for Clinical Innovation
AROM	Active range of motion
AAROM	Active assisted range of motion
cCPAX	Children's Chelsea Critical Care Assessment
CINAHL	Cumulative Index to Nursing and Allied Health Literature
ETT	Endotracheal tube
EM	Early mobilisation
FiO_2	Fraction of inspired oxygen
HFNC	High flow nasal cannula
IMS+	Incident Management System
ICUAW	Intensive care unit-acquired weakness
PEEP	Peak end expiratory pressure
PICU	Paediatric intensive care unit
PICS	Post-intensive care syndrome
PICAG	Paediatric intensive care advisory group
PROM	Passive range of motion

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We also work closely with the Ministry of Health and the four other pillars of NSW Health to pilot, scale and spread solutions to healthcare system-wide challenges. We seek to improve the care and outcomes for patients by re-designing and transforming the NSW public health system.

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