Occupational Therapy Role in the PICU

Lisa Hoffman – OT (Canada)
Sonia Riley – OT (Australia)
SickKids, Toronto PICU/CCCU

- 42 beds (including 18 CCCU)
- OT Staffing: CCCU: 0.5FTE (0.2 Neurodev)
  PICU: 1.0 FTE

Queensland Children’s Hospital PICU

- 36 beds including (surgical, medical – incorporates cardiac surg)
- OT Staffing: approx. 1.0FTE
  (2.0FTE across PICU and Cardiac service)
Outline

• What is Occupational Therapy?
  • OT perspective/framework
  • OT in PICU?
• Impact of critical illness/PICU admission
• How does OT add value in PICU?
• Working with infants in intensive care
• Working with older children in intensive care
• Case examples
• Discussion
What is Occupational Therapy?

• Occupational Therapy (OT) is a health profession that empowers people of all ages to overcome barriers in their everyday lives so they can do more and live better.

• In the acute paediatric setting, OT aims to minimise the impact of hospitalisation, illness, or medical treatment on the child (and their family), and maximise their function and quality of life.

Focus: Person-Environment-Occupation
Occupational Therapy Framework

A.1 Referred to as the CMOP in *Enabling Occupation* (1997a, 2002) and CMOP-E as of this edition

B. Trans-sectional view

What are childhood occupations?

- "occupations" are the things that we do each day

<table>
<thead>
<tr>
<th>Eating</th>
<th>Dressing</th>
<th>Bathing</th>
<th>Toileting</th>
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<tbody>
<tr>
<td>Grooming</td>
<td>Sleeping</td>
<td>Thinking/ Learning (school)</td>
<td>Tasks at home / within family</td>
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<tr>
<td>Playing</td>
<td>Games/ sports</td>
<td>Hobbies</td>
<td>Social Activities</td>
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</tbody>
</table>

Can also include the healthcare-related tasks that children need to do
PICU Environment
Literature – Impact of critical illness

• Decline in neurofunctional status occurs in 3-20% of children following ICU stay – worse in those admitted for neurological diagnoses.  
  (Caprarola et al, 2017)

• Paediatric post-intensive care syndrome more well-recognized. Long-lasting impairments in physical, psychological, cognitive and social functioning are described. 30-50% of PICU survivors experience substantial reductions in quality of life after discharge.  
  (Hopkins et al, 2015; Watson et al, 2017)

• Functioning and QoL are emerging as key patient-centered outcomes during recovery from critical illness  
  (Fayed et al, 2020)

• An interprofessional approach including early mobilization, normalising experiences, and individualised PICU-based rehabilitation have been highlighted as important for outcomes  
  (Choong et al, 2018; Walker & Kudchadkar, 2018)
Literature – Occupational Therapy in ICU

**The role of the occupational therapist in the Intensive Care Unit: a systematic review**

Andrea Rapohtby-Beck, Jennifer Fleming, Merrill Turpin

**Occupational therapy service provision in adult intensive care units in Australia: A survey of workload practices, interventions and barriers**

**Functional Recovery in Critically Ill Children, the “WeeCover”**

**Individualized Goal Setting for Pediatric Intensive Care Unit-Based Rehabilitation Using the Canadian Occupational Performance Measure**

**Occupational Therapy in the ICU: A Scoping Review of 221 Documents**

**Caregiver dissatisfaction with their child’s participation in home activities after pediatric critical illness**

Jessica M. Jarvis, Nora Fayad, Erika L. Finch, Karen Choong, and Mary A. Khetani
Changing Needs of Medically Complex Children and Families

- Increase in the number of children in hospital and the community who are ‘medically fragile’
- Complex and/or technology dependent children with longer admissions
- Invasive medical interventions: chronically ventilated, suspended/open chest post cardiac surgery, ECMO, VADs etc.
- Sedated and/or restrained
- Lines/Technology → restricted movement
How does OT add value in PICU?

- Holistic view
- Look at strengths and abilities of the child to engage in occupations within context of the environment (including sensory, physical, social-cultural environment)
- Skills in being able to adapt task/demands and environment to enable participation
- Occupations as both the treatment modality and the outcome/goal
- Role of child within the family unit
- Thinking beyond the ICU
Risk Assessment

- Risk assessment is important before commencing with a patient in PICU (understand what is going on before walk in the door)
  - physiological factors - physical presentation, medical needs/cardiorespiratory stability, post-op precautions etc).
  - Arousal and responses (eg sedation level, delirium)
  - Medications (sedation, analgesia, paralysis, cardiovascular support etc)
  - Current interventions (eg ECMO, breathing support, renal filter)
  - What attachments/lines are present?
Co-Occupation in the PICU/CCCU

- Shared meaningful activity done by 2 or more people
- Interdependence
- Synchronicity
- “Doing Together”
- E.g. Breastfeeding, soothing, carrying, dressing, bathing, playing together...

Doidge, K. 2012
Co-Occupation in the PICU: “Doing Together”

Engagement in co-occupations is influenced by factors related to each person, their environment, and the activity. A good fit between these factors will contribute to everyone’s enjoyment and commitment.

Keshini Namalivayam & Viktoriya Dyubanova
MScOT Students at the University of Toronto

Gibbs et al, 2010
Supporting Early Neurodevelopment in ICU

- Developmentally supportive care is a philosophy and framework to optimize ND in the hospital.

- **Most at risk:** younger children who have not achieved motor, cognitive and social milestones, or those who have a prolonged and/or complicated ICU stay.

- **OT’s** are experts at analyzing & addressing the impact of both person & environment factors that influence developmental function.

**Intrinsic Individual Factors:**

- Intrinsic Individual Factors:

**Extrinsic:** Task, Experience & **Environment**
OT role with Infants in Intensive Care

• Supporting early neurodevelopment (including positioning and handling, graded sensory stimulation, positive touch, motor development)

• Supporting engagement in infant occupations (including arousal/regulation, play and early learning, interaction/engagement, feeding, sleep)

• Supporting caregiver roles in care (including carrying, feeding, ADL’s)
The Critical Care environment is stressful!

**Potential Developmental consequence**

<table>
<thead>
<tr>
<th>Poor state regulation</th>
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<tbody>
<tr>
<td>Motor delay and deconditioning</td>
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<tr>
<td>Loss of range of motion, plagiocephaly, torticollis</td>
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<tr>
<td>Delayed acquisition of social-emotional skills</td>
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<tr>
<td>Sensory processing difficulties</td>
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<tr>
<td>Delayed oral motor skills and oral defensiveness</td>
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<td>Delayed communication skills</td>
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Infant Behavioural State Regulation

Good Regulation

• Smooth movements
• Ability to calm self and/or be calmed by caregiver
• Easy transitions between sleep and alert states
• Ability to maintain calm alert state

Poor Regulation

• Frantic or jittery movements
• Unable to calm and/or be calmed by caregivers
• Sudden transitions between sleep and alert states
• Not able to achieve CALM alert state
• Autonomic changes: colour changes, HR and RR changes, hiccups
Using the Sensory System to Decrease Stress and Improve State Regulation

• Important to provide sensory stimulation that is developmentally appropriate AND situation specific

• Consider the child’s behavioural state; a child that is hyper-alert and distressed may need sensory input REDUCED

• Introduce sensory input one at a time and watch the child’s reaction as it is introduced
  • Touch
  • Sound
  • Smell
  • Interoception
  • Movement
  • Vision
  • Taste
Supportive Therapeutic Positioning

Goal to support joints, avoid muscle contracture, improve midline orientation and facilitate self-regulation.
Supported Sitting & Seating Opportunities

Upright seating benefits:

• Development of head/trunk control
• Social Engagement & Play
• Better for respiratory effort, cough strength

• Variety of options:
• In parent’s arms – important for bonding
• Infant seat
• Booster seat/High Chair
• Tumbleform
• Specialized Seating/Wheelchairs
Tummy Time:

• Important to the development of neck, chest, arm and back strength

• Be aware of sternal precautions

• Helps to prevent positional preferences and plagiocephaly

• Other benefits: respiratory, GI, self-soothing

• More challenging in ventilated patients due to tubing but can be done with alternative positioning

• Alternative positioning achieves similar goals & has other social benefits
ADL's, Caregiving & Neurodevelopment:

Lifting/Transfers

Skin-to-Skin, Holding, encircling

Oral Stim, Pre-Feeding
Promoting Individualized Infant Neurobehavioural State Regulation in ICU: Bedside Poster

OT DEVELOPMENTAL CARE RECOMMENDATIONS FOR YOUR BABY

Hospitalized and premature infants can be quite sensitive to excess stimulation in their environment. They can become easily overstimulated and stressed. This makes it hard to maintain a calm, alert state. We can help by reducing excess stimulation in the environment & by encouraging self-soothing behaviours that will help baby stay calm in order to learn new developmental skills.

These things may stress or startle Me:
- Light, “tickly” touch
- Sudden, loud noises (i.e. monitors beeping, loud talking)
- Unexpected, quick movement/handling
- Bright lights
- Being unbundled from blankets
- Painful procedures
- Diaper changes & bath time

“How You Can Help Me with Calming & Self-Soothing:
- Use firm, deep pressure touch when handling. Deep pressure touch is less irritating than light touch
- Move me very slowly when providing cares. Give me a brief break if I get too upset.
- Non-nutritive sucking on pacifier: dip it in milk for me to suck to help me soothe myself.
- 2-person caregiving: Have one person hold me (e.g. mom, co-RN) while primary RN provides cares
- Diaper Changes: roll/me move very slowly to my sides vs. lifting my legs up quickly when changing me.
- Bathing: move me very slowly: try loosely swaddling during bath, uncovering one limb at a time.
- Tummy Time position soothes me especially when I can suck on my pacifier or hand. I also like massage.
- Vertical Rocking: rock me up and down in your arms or on your chest
- Reduce noise level by moving away from crib & talking quietly

“Time Out” Stress Signals may include:
- Arching my back & neck
- Stiffening my arms & legs
- “Jittery” arm & leg movement: tremors
- Avoiding eye contact by looking away
- Changes in heart rate and breathing pattern
- Changes in skin colour
- High pitched crying, irritability
- Panicked, worried facial expression

Questions? Contact your Occupational Therapist, Lisa Hoffman
Neonatal Touch & Massage

- Infant-Parent Attachment & Bonding Opportunity
- Positive touch
- Improved state regulation
- Decreased pain
- Sleep
- Growth
- Decrease pain behaviours
OT role with older children in Intensive Care

- Facilitate participation in age-appropriate occupations (ADLs, play, productivity and leisure)
- Modify environment to enhance occupational performance (e.g. sensory environment, equipment)
- Minimise neurological or biomechanical risks and potential impact on occupational performance (e.g. splinting, positioning)
- Support occupational performance in hospital-related tasks/occupations
- Facilitate developmental progress and/or early rehabilitation
- Cognitive assessment
- Discharge planning
Children may present with a variety of functional or cognitive changes, for example:

- Significant change in occupational performance due to trauma or medical condition
  - multi-trauma
  - Acquired brain injury
  - Cardiac arrest with downtime
  - stroke/neurological event, seizures
  - Respiratory difficulties requiring breathing support
- Severe deconditioning, global weakness (e.g. following ECMO, extended period of mechanical ventilation, prolonged admission)
- Difficulties engaging in daily activities (eating, dressing, bathing, toileting, mobility) due to condition or its treatment
- Atypical behaviours, cognition changes, delirium
Facilitating participation in age-appropriate occupations

• Early engagement in ADLs, productivity and play/leisure activities

• Consider different positions that support engagement (and that are developmentally-appropriate)

• e.g. mat, chair, sitting in bed, away from bedside.

• Consider lines/attachments

• Support predictable routine
• Consider impact of motivation, mood, individual goals, and stage of recovery

• Grade participation (e.g. hand-over-hand assist with mouth cares → child does part of task only → independent brushing of teeth)

• Environmental adaption / use of equipment to enable participation

• Child & Family Empowerment
Feeding/Swallowing Function

- Oral-Motor and/or swallowing dysfunction
- Post-extubation dysphagia; VCP risk
- Decreased SSB coordination
- Decreased endurance
- GI issues: GERD, nausea, dysmotility,
- Poor State Regulation; Narcotic withdrawal
- Oral hypersensitivity/feeding aversion
- Co-morbidities: Prematurity, Genetic syndromes, Neuro

“The complications of swallowing impairment or dysphagia include aspiration, reintubation, pneumonia, and consequently prolonged duration of ICU and hospital stay”

(4,6,7) Macht et al, 2013; Macht, 2011
Feeding/Swallowing: OT Role

• Clinical Assessment
• Videofluoroscopic swallowing study (VFSS)
• Interventions:
  • Positioning
  • Texture
  • Temperature
  • Taste
  • Bolus size
  • Speed of bolus presentation
  • Timing, Volume & Duration

Early Identification improves health, LoS & QoL outcomes!
Pre-Feeding Skills & Oral Stimulation

• “Pre-Feeding” Readiness:
  • Encourage hands to mouth and bringing toys to mouth.

• Provide pleasant oral-motor and facial stimulation.

• Skin-to-Skin Holding

• OIT, pacifier

• Teething toys

• Safe Oral Feeding Experiences
Minimising neurological or biomechanical risks / Considering performance components

This may include:

• Supporting appropriate environment for early recovery (e.g. low stimulus environment post ABI, prevention/management of delirium)

• Upper limb reviews and intervention – early UL retraining, strength/ROM Ax, oedema mgt

• Splinting/positioning

• Supporting hand use for play, ADL

• Exploring sensory preferences/processing

• Early cognitive assessment
Cognitive Assessment

Who to Refer:

• Stroke, TBI, ABI
• Any change in cognitive function
• Cardiac arrest, post-ECMO
• Prolonged intubation/ICU LoS
• Significant personality/behavioural changes

Timing of Assessment:

• LoC
• Some ability to participate
• Baseline history re: function
• Informal vs Formal Ax

Cognitive Domains Evaluated:

• Orientation
• Attention
• Short, Long-term, Working memory
• Information processing
• Visual Spatial/Perception
• Executive function - inhibition, problem solving, insight, judgement, impulsivity

Always consider: how this relates to functional performance (e.g. ADL, productivity, play/leisure)
Supporting occupational performance in hospital-related tasks/occupations

• High risk for post traumatic stress disorder (PTSD) in children after a PICU admission.

• Invasive Procedures + LoS + Severity of Illness = adverse long term effects, PTSD, significant medical fears (Rennick et al, 2002)

• OT role may include:
  • Assisting with preparation for procedures for patient who is awake e.g. Age-appropriate education through play, using play to help child understand what to expect during procedure.
  • Supporting normal routine, roles, and relationships
  • Anxiety management e.g. Relaxation strategies or distraction
Discharge planning

• Consideration of usual roles and occupations, home and school environments as part of initial occupational performance assessment → discharge planning begins from the time of admission.

• At times will discharge home directly from PICU (e.g., long-term ventilation).

• Early identification of need for further inpatient rehab or community therapy services

• Assessing potential home equipment needs
Measuring Outcomes

- PICU Core data set  (Fink et al, 2020)

- Additional assessments relevant for OT:

<table>
<thead>
<tr>
<th>Occupation-based</th>
<th>Motor</th>
<th>Cognition</th>
<th>Sensory</th>
<th>Neuro-developmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIM/WeeFIM</td>
<td>MMT</td>
<td>Coma Recovery Scale (SRC)</td>
<td>Nottingham</td>
<td>Prechtl’s General Movements</td>
</tr>
<tr>
<td>COPM</td>
<td>Modified Ashworth</td>
<td>MOCA</td>
<td>Pain scales (faces, FLACC, CPOT)</td>
<td>HINE</td>
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<tr>
<td></td>
<td>ROM</td>
<td>LANCE</td>
<td>ASIA</td>
<td>AIMS</td>
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<tr>
<td></td>
<td>Dynamometer</td>
<td>PRPP</td>
<td></td>
<td>NNNS</td>
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<td></td>
<td>Cognistat, LOTCA</td>
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<td>ASQ (screen)</td>
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<td></td>
<td>PTA / COAT</td>
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<td>CAP-D / pCAM</td>
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OT role in CCCU at SickKids

- Neurodevelopment
- Feeding/Swallowing
- Cognition & Neuro-Rehab: Neurologic changes vs Delirium
- ADL’s: early mobilization, rehab & discharge planning
- Sensory processing, Self-regulation

![Figure 1. The four key domains of PICS-p model.](image)
CCCU: Case Study A.F.

- 2-mos old male
- Single ventricle physiology
- Prolonged ~1-year hospitalization due to complex course/complications:
  - Decreased cardiac function
  - Left vocal cord paralysis
  - Left diaphragm paralysis
  - Some changes on MRI brain
  - HHFNC +/- CPAP dependent
  - GERD; GJ tube; TPN
  - Osteopenia
- OT primary therapist in CCCU during ~11-mos admission.
OT Role: A.F.

• Assess & Support:
  • Tone/ROM/Movement Quality
  • GM & FM Skills
  • Adaptive Skills
  • Sensory Processing
  • Feeding/Swallowing/VFSS
  • ADL’s
  • Equipment
  • Early D/C planning
OT Role A.F.:

• Neonatal Massage for State Regulation

• ADL’s: Osteopenia Education

Acknowledgment: Poster courtesy Suzanne Breton, NICU OT, SickKids
OT Role: A.F.

• Bedside Developmental Program

• Equipment: Compression Orthoses

Oral Feeding Program:

Referrals: Music Therapy; Clown; SLP; PT
OT role in PICU at QCH

**PICUstars Liberation at QCH**

A. Assess prevent & manage pain
B. Both spontaneous awakening trials & spontaneous breathing trials
C. Choice of analgesia & sedation
D. Delirium: assess, prevent & manage
E. Early mobility & exercise
F. Family engagement & empowerment
G. Good nutrition
H. Humanism

Support early neurodevelopment
Support participation in occupations as able (early mobilization / early rehabilitation)
Assessment of cognition (e.g. neurological changes; PTA; delirium)
Support engagement in health-care occupations
Support person factors to influence above areas (e.g. sensory processing, regulation, arousal, ROM)
PICU: Case Study Abi

- 6 year old girl
- admitted via peripheral hospital (13 July)
- streptococcus pneumoniae ARDS
  - Rapid progression intubation → HFOV same day (14 July)
  - VV-ECMO (19 July – 27 August)
- Tracheostomy (24 Aug)
  - Decannulated Sept after d/c to ward
- During PICU stay – drug reaction, pneumothorax requiring ICC, feed intolerance, failed decannulation, L vocal cord palsy
PICU: Case Study Abi

More importantly from OT perspective.....

• 6 year old girl who lives with her parents and older brother
  • Loves her big brother!!!
• Started prep this year – enjoys, seems to be progressing appropriately
• Independent/age-appropriate ADL pre-admission
• Loves soccer and karate
• Loves unicorns, rainbows, and “Frozen”
• Loves arts and crafts - particularly glitter and sparkles
OT Role Abi

• Initial Ax – getting to know Abi
• Review biomechanical risks – including splinting and positioning needs
• Arousal/responses – early communication and graded cognitive engagement
• Supporting parent (family) involvement in cares
OT Role Abi

- Promoting daily routines, predictability
- Motivation/mood
- Tolerance of cares/procedures
- Play opportunities – including UL use, positioning, fun!
- Grading participation in ADL (including equipment as needed)
Discussion & Questions?
Summary:

• Set-up the environment for success
• Provide developmentally appropriate opportunities/experiences
• Position to allow movement/function
• Regulate stimulation level
• Mobilize early and often
• Identify Red Flags
• Engage parents and family in care early & often
• Utilize interprofessional expertise (OT, PT, SLP, CLS, MT, RAT)
Hot tips / Ideas for starting out

• Consider what gets "foot in the door"?

• It’s OK to start small

• Partner with other more established disciplines

• Follow patients from ward to ICU?

• "Liberation" (ABCDEF/bundled approach)
  ➢ gives wonderful opportunity for OT... other clinicians are “talking our language”

• Being present and visible: Attend IPP/Education rounds & present cases

• Education: RN, Resident orientation
Thank you for your attendance and participation!

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