Optimus BONUS : Febrile Neutropaenia

Queensland Government

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For more information contact:

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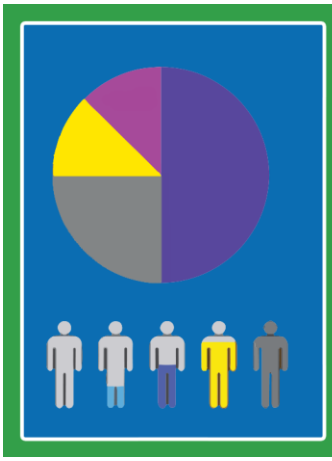
An electronic version of this document is available at :

https://www.childrens.health.qld.gov.au/research/education/queensland-paediatric-emergency-care-education/optimus-bonus/

Contents of this educational package :

Simulation

Evidence based care for children with febrile neutropaenia.
Venous port device access.



Infographic

For sharing in the weeks before or after your simulation via email or in poster format.

Further Reading

Podcasts and Blog Posts
Online Videos
Journal Articles

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Simulation Introduction by Ms Rachel Edwards
Nurse Educator for Oncology Services, Children's Health Queensland

Rachel Edwards is a registered nurse with over 25 years of experience providing care to patients with haematology and oncology conditions. Rachel currently works as a Nurse Educator for the Oncology Services Group, providing education consultancy for the tertiary Oncology Services at Queensland Children's Hospital, Children's Health Queensland, Hospital and Health Services (CHQHHS). In this role Rachel provides educational leadership, develops curriculum, and facilitates training programs for staff employed in the CHQHHS and supports education activity across the State in the Regional Paediatric Shared Care Units. Rachel is the current Chair of the Nursing Sub-Group of the Australian and New Zealand Children's Haematology and Oncology Group (ANZCHOG) and is providing nursing leadership to the group as they develop a nursing research agenda. Her research interests include symptom screening and management, vascular access, and staff wellbeing.

"Children presenting with suspected Febrile neutropenia need to be treated as an emergency.

Every year more than 400 children with cancer will present with fever and suspected neutropenia to paediatric units or paediatric and adult emergency departments across Queensland. Fever and suspected neutropenia in children with cancer is a common and serious complication that requires prompt management. Children with Cancer are at high risk of infection because of the immunosuppressive nature of the treatments they receive. Fever is often the only sign of serious underlying infection.

Universal gold standard management requires prompt assessment and timely administration of the first antibiotic within 60 minutes of hospital presentation. The use of a Clinical Pathway for Initial Management of Suspected Neutropenic Sepsis can assist clinicians to meet this target with standardised and streamlined care.

Delays in treatment have historically resulted from delayed presentation, delay in accessing the child's central venous access device (CVAD), and/or clinicians waiting for blood results prior to administering antibiotics. The delay in initiation of antibiotics has been shown to increase adverse events including progression to sepsis and intensive care admission. In addition to these adverse events, children are often left with anticipatory procedural anxiety in relation to their CVAD being accessed. It is important to remember that parents have knowledge of their child's CVAD access requirements and the need to be assessed in a timely manner when presenting with fever. They will also come equipped with the clinical pathway for use at their local healthcare facility.
Effective management is essential for long term health outcomes for these patients. We have a crucial window of opportunity from presentation to effectively manage the patient's infection risk and minimise both short and long-term psychological impacts of treatment procedures for the patient and their family.

Advice by Lyndsey, Mother of Tanner

This simulation contains links to supportive resources that were produced with the assistance of Lyndsey and Tanner, including patient and family perspectives on port access.
Tanner was kind enough to allow us to film access of his port for video demonstration.
Lyndsey also reviewed the simulation to provide advice on the parent's role description and script.
The team is very grateful for their donation of time and their starring roles in our videos, and appreciate their advocacy on behalf of children throughout Queensland.

Lyndsey's advice for healthcare professionals is :

"Please remember when you are doing a port access; these are our precious babies, if they are being difficult remember they are not doing it to make your job hard, they are doing it because they are having a rough time.. remember to always be kind, patient and try and give them a little of their power back. Chances are they have had everything they know taken away from them. Your kindness makes a huge difference".

Section I: Scenario Demographics

Scenario Title:	Febrile Neutropaenia
Date of Development:	26/11/19
Target Learning Group:	Teams that care for paediatric oncology patients.

Section II: Scenario Developers

Scenario Developers:	Dr Sonia Twigg, Dr Carolina Ardila-Sarmiento, Ms Rachel Edwards, Dr Benjamin Symon, Ms Louise Dodson
Reviewed by :	Dr Steve Foresto, , Ms Tricia Pilotto, Dr John Glasheen, Mr Stefan Pietsch, Ms Claire Marks, Ms Tinda Haffenden, Dr Jason Acworth

Section III: Curriculum

Learning Goals & Objectives

Educational Goal:	Provide safe, prompt, team-based care for children with febrile neutropaenia.
Skills Rehearsal:	Practice family centred care while accessing a venous port device in a child.
Systems Assessment:	Departmental systems for febrile oncology patients.

Case Summary: Brief Summary of Case Progression and Major Events

This case involves a 4yo boy with Acute Lymphoblastic Leukaemia who has febrile neutropaenia and has presented to your service for assessment. The simulation emphasises prompt IV access via the port or a peripheral IVC, prompt investigations and IV antibiotics in accordance with the febrile neutropaenia guideline.

The simulation can be used as an opportunity to provide training regarding central venous port devices.

Please note this simulation focuses on a stable patient. Large multidisciplinary teams may feel unfulfilled by the lack of drama or patient instability. We deliberately chose a stable patient to emphasise learning on port access and use of febrile neutropaenia pathways rather than on management of sepsis. Depending on your learning objectives and participants you may prefer to make the patient 'sicker' if you wish.

Format for the Simulation – Pause and Discuss.

This simulation can be combined with in-service training on how to provide central venous port access.
We recommend you set participants up for success by providing this training before the simulation. The simulation can then be used to reinforce the lessons learned and apply this learning in your real clinical environment.

A pause and discuss moment can be called when participants are deciding on method of IV access to discuss how IV access is most effectively and compassionately done in your hospital, as well as techniques for minimising discomfort during painful procedures for children.

There are 3 possibilities in regards to central venous port access :

1. A participating nurse with experience in port access is available and the team can practice accessing and using the port in the simulation.
2. A participating nurse who can access the port is available but needs some support to do the procedure. The clinical expert can use the pause to answer questions and coach the team through this procedure.
3. There is no nurse available who can access the port so peripheral IV access should be obtained.

Port Access Device Moulage

Port needling : Blood flash back : Fluid administration

Gather your equipment

Dismantle the Port from a Central venous access device part task trainer –a Chester Chest is used below

Port

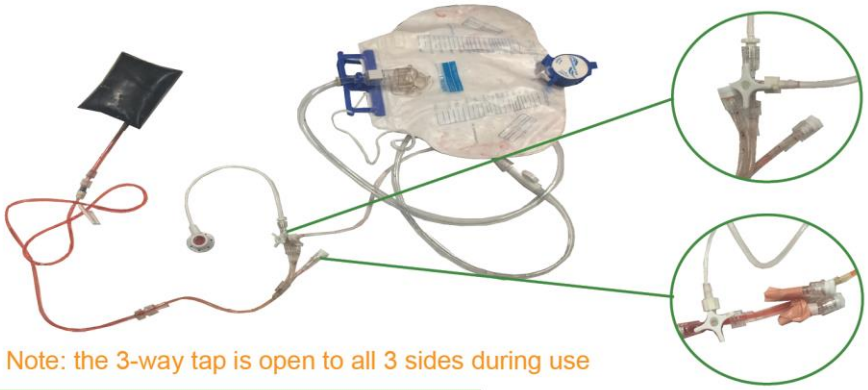
Blood Bag

Drainage system

3 way tap

Assemble blood and drainage system

Connect the blood line, port catheter and a drainage bag using a 3-way tap to one of the lumens of the triple lumen line



Make sure the connections are tight to prevent any leaks

Fold over the unused lumens and secure with tape. Needle the port test the connections for leakage by withdrawing for flash back and flushing through the port

Note: the 3-way tap is open to all 3 sides during use

Place port under the skin

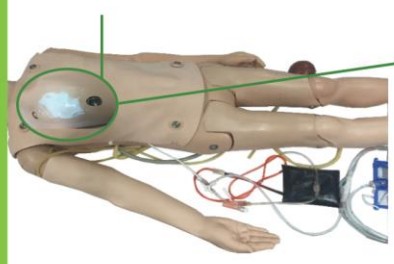
Peel back the skin from the side of the manikin you wish to place the port

Place padding to protect the mechanics of the manikin from leaks

Tape the port in place

Prepare your manikin

Secure the skin over the port



Apply topical anaesthetic over the skin

The blood bag & drain bag are placed under a sheet to the side of the manikin

Port needled

Section V: Equipment and Staffing

Scenario Cast	
Patient:	☐ Mannequin appropriate for a 4 yr old boy, moulaged with port access device.
Clinical Expert	1. Senior nurse who can teach how to access a venous port device and has a sound understanding of the febrile neutropaenia pathway. 2. Gives helpful advice so team achieves tasks. 3. If team not achieving tasks then clinical expert can call team and give advice over the phone.
Confederate 1:	Triage nurse who brings child through to resus bay and handover.
Confederate 2:	Parent of the child. Cooperative and caring.

Required Monitors	
☐ ECG leads	☐ Temperature Probe
☐ Pulse oximetry	☐ NIBP cuff

Required Equipment		
Standard Equipment :	Port access equipment :	
☐ Stethoscope	☐ Port pack provided by parent OR :	☐ Drawing up needles
☐ IV bags/ lines	☐ Sterile dressing pack	☐ 3 way tap
	☐ Alcohol 70% wipes	☐ Sterile gloves
	☐ Chlorhexidine 2% in Alcohol 70% swabsticks	☐ Sterile Normal Saline 0.9%
☐ IV cannulation equipment	☐ Sterile Gloves	Drugs :
☐10 mL syringes x 3	☐ Appropriately sized huber point needle with extension set , 3 way tap and Needless access devices	☐ Antibiotics as per your febrile neutropaenia pathway
☐ Monitoring leads	☐ Transparent dressing	☐ Paracetamol
	☐ CVAD trolley as per your service	☐ Topical anaesthetic over port site

Moulage
Moulage for a venous port device or training port device. Topical anaesthetic cream (or something visually similar) over port site.

Approximate Timing			
Set-Up: 15 mins	Prebrief : 10 mins	Scenario 20 mins	Debriefing: 20 mins

Patient Profile and History			
Patient Name: Carl		Age: 4 years	Weight: 20kg
Gender: M			
Chief Complaint: Fever			
History of Presenting Illness: Fever 38.8° noted by parent (underarm thermometer) that day.			
Past Medical History:	Acute Lymphoblastic Leukemia	Medications: Chemotherapy	Immunisations: Up to date
Allergies: NKDA			
Social History: Lives with parent and sister.			
Family History: Nil significant.			

Section VI : Scripts

Handover by Triage Nurse

Hi, this is Carl.

I have brought him through from Triage because I am worried he might have febrile neutropaenia but he doesn't appear septic at this stage.

Carl has Acute Lymphoblastic Leukemia and his last chemotherapy was 10 days ago.

His parent brought him to ED after he felt hot at home and he measured 38.8 on an underarm thermometer. He has not eaten much today and been quieter than usual but his father/mother had not noticed any other symptoms. Bloods were taken 10 days ago and his white cell count was normal.

His parents followed the advice in their "Going Home Book" given by the oncology team. EMLA local anaesthetic cream was applied to the port site one hour ago and they have brought in their port needle to access the site.

He weighs 20kg.

Parent's Information about Child

As you are representing parents of children with chronic disease in this scenario, please present as a supportive, sensible parent who knows significant detail about your child's care. You are very familiar with the healthcare system and want to give them the best information you can and advocate for your child.
Please provide this information as requested from treating team. Some of it may not be necessary.

Carl is 4 years old and was diagnosed with ALL 1 year ago.
He is currently in Maintenance phase of treatment.
His treating specialist is _____
Carl commenced his current chemotherapy cycle 10 days ago.
He has no allergies and was fully immunised.
He weighs 20kg.
He's been fine this week until becoming more quiet than usual today, and I measured a temp of 38.8 on underarm thermometer.

His last appointment for chemotherapy was 10 days ago his Neutrophils were 2 at that stage. He hasn't had any further counts done.

He has one older sister (15) who is well and she's been away on school camp.

He's had no runny nose, cough, vomiting or diarrhoea. His port site doesn't appear infected or inflamed. He weighs 20kg.

(If asked, you'd strongly prefer his port accessed rather than a drip, you've placed EMLA on there 1 hour ago. Carl gets nervous about his port being accessed but you can calm him if the team lets him have some control. He likes watching something on your phone while the needle goes in and prefers to count to 3 himself before needle insertion.).

Section VII: Scenario Progression

Scenario States			
State 1 : Assessment and differential diagnoses			
Patient State	**Patient Status**	**Learner Actions,**	**Modifiers & Triggers to Move to Next State**
Rhythm: NSR **HR:** 140 **BP:** 95/60 **Cap refill**: 2s **RR:** 40 **O_2 SAT**: 96%RA **T:** 38.8° **AVPU** = V	Child appears nervous but is talking. His parent is comforting him.	☒ Appropriate monitoring applied ☒ ABCD assessment of child ☒ Access the correct febrile neutropaenia pathway for your service ☒ Consider differential diagnosis	<u>Triggers</u> Tasks done.
State 2 : IV access			

Rhythm: NSR
HR: 140
BP: 95/60
Cap refill: 2s
RR: 40
O_2 SAT: 96%RA
T: 38.8°
AVPU = V
	Child is nervous but cooperative with port access.
	
	His parent reassures and supports him.
		☒ Consider options for venous access. If a nurse participant is able to access the port then arrange for them to proceed under sterile conditions.
		☒ Appropriate blood tests taken : Blood Cultures, FBC, ELFTs
			<u>Triggers</u>
			Tasks done.
			
			<u>Pause and Discuss Moment when IV access discussed :</u>
			• How is it best to achieve venous access for this child in your hospital?
			  ○ Do you have staff in the hospital that can access the port? Can they attend immediately?
			  ○ If not, then prompt peripheral access is indicated.
			• Remember to optimise your chance at success; optimise positioning, make it as comfortable as possible, provide the child with distractions, incorporate their preferences.
			• If participants would access the port in their normal role but are not confident then coach them through accessing the port.
			• If participants are confident to access the port then resume the sim.

State 3 : Antibiotic Administration and Disposition Planning			
Rhythm: NSR **HR:** 150 **BP:** 95/60 **Cap refill:** 3s **RR:** 40 **O_2 SAT**: 96%RA **T:** 38.8° **AVPU** = V	Child is calm and cooperative.	☒ Give antibiotics as per appropriate guideline for your service. Do not wait for the FBC. ☒ Consider fluid requirements. ☒ Talk to appropriate specialist for your service. Ie On Call Oncologist and Regional Paediatrician. ☒ Consider options for best disposition for this patient. Options include : Ward, Retrieval, PICU. ☒ Other investigations considered : CXR, Urine MCS, Respiratory PCR.	<u>Modifiers</u> Note time taken to access port and administer antibiotics _____ mins (for use in debrief if required) **End scenario when learning objectives achieved or time requirements**

Section VIII: Supporting documents, Laboratory Results, & Multimedia

Venous Gas Result

Venous blood gas	Results	Units	Normal Range
pH	7.3		**7.32 – 7.42**
pCO2	35	mmHg	**41 - 51**
pO2	60	mmHg	**25 - 40**
O2 Saturations	86	%	**40 - 70**
Bicarb	22	mmol/L	**22 - 33**
BE		mmol/L	**-3 - +3**
HCT			**0.3 - 0.42**
Hb	106	g/L	**105 - 135**
Na+	135	mmol/L	**135 - 145**
K+	3.5	mmol/L	**3.2 - 4.5**
Ca++ (ionised)	1.15	mmol/L	**1.15 – 1.35**
Glucose	3.5	mmol/L	**3.0 – 7.8**
Lactate	1.5	mmol/L	**0.7 – 2.5**

Section IX: Debriefing Guide

Objectives	
Educational Goal:	Provide safe, prompt, team-based care for children with febrile neutropaenia.
Skills Rehearsal:	Practice family centred care while accessing a venous port device in a child.
Systems Assessment:	Practice using an evidence-based pathway or procedure for management of children with cancer who have had a fever.

Sample Questions for Debriefing

This was a case of a stable, 4 yr old boy with fever and a diagnosis of acute lymphoblastic leukaemia.
He presented with fever and required venous access, appropriate investigations and administration of IV Antibiotics.

I would like to talk about port use in paediatric oncology patients :

- How did the team approach the decision to access the port or insert a peripheral line?
- How can your team most efficiently and compassionately achieve IV access in this patient?
- Does our hospital have staff members who can access a venous port device? How can they be contacted to attend?
- Are there training opportunities for other staff members to learn to access a venous port device?
- How can we improve our system to treat febrile oncology patients more effectively?

I would like to explore how we access febrile neutropaenia guidelines :

- How can our team access a guideline for febrile neutropaenia?
- Which antibiotics would your team use in this situation?

I would like to discuss disposition planning for febrile oncology patients :

- Who can we call for advice on treating children with cancer?
- What does this patient need next? More resuscitation? Ward admission? Retrieval?

I would like to explore the examples of family centered care that were demonstrated in that scenario :

- Can we talk about how you negotiated port access with this family?

Key Moments

- Recognise child may have febrile neutropaenia and is at risk of deterioration & sepsis
- Establish IV access
- Take blood cultures
- Give antibiotics
- Referral to appropriate specialist for your service

Complete our online survey and receive a training certificate!
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Children's Health Queensland Hospital and Health Service

Febrile Neutropaenia in kids

Defined as :

Fever

≥ 38.5°C once OR ≥ 38.0°C twice at least 1 hr apart

with either :

Neutropaenia

<1 x 10^9 /L

or

Recent Chemo

within last 14 days where neutropaenia expected

DO NOT wait for blood results before initiating treatment.

Secure IV access with CVAD as first preference

Scan the QR codes below to view supplementary videos

Prepare your patient

Access Port

Parent Perspectives

Give antibiotics within 60 minutes

Piperacillin/Tazobactm = 100mg/kg (of piperacillin component) IV 6H (maximum 4000mg)

If septic, critically unwell or haemodynamically unstable add Gentamicin & Vancomcyin

Pre-reading resources for participants

Management of Fever in a Paediatric Oncology Patient
Queensland Children's Hospital Guideline

Demonstration Video : Needling your patient's port
Part 1 : Preparing with your patient
Queensland Children's Hospital

Demonstration Video : Needling your patient's port
Part 2 : Demonstration Video
Queensland Children's Hospital

Demonstration Video : Needling your patient's port
Part 3 : Parent perspectives
Queensland Children's Hospital

Curriculum

This package is designed for **individuals** to refresh and retain the following skills learned in previous OPTIMUS courses as well as add new knowledge on specific conditions.

Optimus CORE	Optimus PRIME	Optimus BONUS
Intravenous access	Structured approach to sepsis	Port access
Recognition of the deteriorating paediatric patient	Prompt preparation and administration of antibiotics in children at risk of sepsis	Management of febrile neutropaenia
Clinical observation		
Local escalation pathways		

This package is designed to offer your **department** a systems level check regarding :	
Access to paediatric resources on : • Venous Port Device Access • Management of the Febrile Oncology Patient	☐ ☐
Equipment Check : • Port Access Equipment	☐
Departmental Protocols for : • Management of the Febrile Oncology Patient	☐

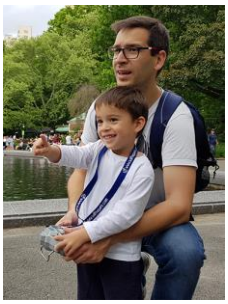
If you would like any assistance obtaining access or advice for any of the above issues, please contact stork@health.qld.gov.au

About the Creators :

Dr Sonia Twigg : Primary Author
@LankyTwig
FACEM, MBBS, BA, BSc
Fellow, STORK (Simulation Training Optimising Resuscitation for Kids)
Queensland Children's Hospital

Dr Sonia from STORK is an emergency physician doing subspecialty training in Paediatric Emergency Medicine and works at the Queensland Children's Hospital as a fellow in the emergency department and for the STORK simulation team. Sonia is interested in critical care, medical education and ultrasound. She is passionate about fun, creativity and innovation in education.

Dr Carolina Ardila : eLearning, Multimedia & consultation coordination
@caroelearning
MBBS, MPH(TH), GradDipHlthMgt
Dr Ardila is a medical doctor from Colombia with an award winning skill set in eLearning development. She has developed extensive knowledge in designing, developing and implementing engaging courses and launching award winning paediatric eLearning. She has a special interest in emergency and neonatology and in her spare time loves making videos and improving her animation and drawing skills.



Dr Ben Symon : Consultant Supervisor, Infographics and Editor
@symon_ben
RACP PEM, MBBS, BAnim
Dr Symon is a PEM Physician and Simulation enthusiast with a passion for translating clinical and educational research to front line health care workers. He is co-producer of the podcast 'Simulcast' and facilitates the Simulcast Online Journal Club, an online journal club for simulation educators throughout the world.

Tanner & Lyndsey
Patient collaborators
Tanner and his mother Lyndsey both generously contributed to the creation of our skills videos on port access and provided feedback on the parents' perspective on the simulation. The team is very grateful for their donation of time and their starring roles in our videos, and appreciate their advocacy on behalf of children throughout Queensland.

Ms Rachel Edwards RN
Resource development and specialist consultation

Rachel Edwards is a registered nurse with over 25 years of experience providing care to patients with haematology and oncology conditions. Rachel currently works as a Nurse Educator for the Oncology Services Group, providing education consultancy for the tertiary Oncology Services at Queensland Children's Hospital, Children's Health Queensland, Hospital and Health Services (CHQHHS).

Ms Anna Dean : RN VAMS Supportive video material
Anna Dean is a Registered Nurse with the Vascular Assessment and Management Service (VAMS) at Queensland Children's Hospital. After many years working at the Mater Children's Hospital in areas including general medical and babies, high risk immunisation, haematology, and clinical practice facilitation, Anna moved into the specialist area of paediatric vascular access. Anna has been an integral member of VAMS, a team dedicated to raising the awareness and profile of paediatric vascular access both in Australia and internationally. She is a member of the Alliance for Vascular Access Teaching And Research (AVATAR) and holds a strong interest in research in the area of paediatric vascular access. Anna is passionate about developing educational materials and providing educational opportunities for health care professionals and patient's families on the topic of paediatric vascular access devices.

Ms Louise Dodson : Moulage Guide
BHlthSc**,** GradCertClinSim
Louise has been a Simulation Leader since establishing the Simulation Program for the Royal Children's Hospital in Brisbane over 10 years ago. She co-created the original OPTIMUS CORE course in 2013 to improve paediatric resuscitation training throughout Queensland. The course has been delivered to more than 5000 health care professionals throughout Queensland since that time. Louise has a background in paediatric emergency nursing and tries to keep her left foot in clinically. She has also completed a grad cert in simulation and clinical education.

Ms Katrina Anderson, CN Oncology Services

Katrina is a paediatric oncology nurse with over twenty years of experience. A key part of her oncology role is the coordination of regional chemotherapy. She has been working on research initiatives to improve fever management for children with cancer in conjunction with her liaison role. She has a special interest in oncology families experience.

Ms Julia Mackay, Clinical Practice Facilitator for Oncology Day Unit
Julia Mackay is a Clinical Practice Facilitator for the Oncology Day Unit at Queensland Children's hospital. She has worked in adult and paediatric oncology for 7 years.

About the BONUS Project :

The Optimus BONUS project is a bank of useful scenarios that are open access and available for free use. It has been designed by the Simulation Training Optimising Resuscitation for Kids team for Children's Health Queensland.

We aim to use the packages to provide :

- Spaced repetition to reinforce learning objectives from CORE and PRIME
- Connections to high quality, up to date paediatric resources for health professionals
- Quality and Safety checks for local hospitals regarding paediatric clinical guidelines, resources and equipment

The scenarios have been designed in response to :

- Paediatric coronial investigations in Queensland, Australia.
- Clinical skills issues revealed through In Situ Translational simulations in hospitals throughout Queensland.
- Quality and Safety Initiatives

About STORK

In 2014, Children's Health Queensland funded the 'Simulation Training Optimising Resuscitation for Kids' service. STORK is a paediatric education team focused on improving healthcare outcomes for children throughout the state.

STORK has developed a number of courses aimed at different phases of paediatric critical care :

- CORE is a course for first responders to a paediatric emergency, and teaches recognition of the deteriorating patient, Children's Early Warning Tools, and resuscitation competencies.
- PRIME is a course for mid phase responders who look after unwell patients while awaiting for retrieval or escalation to an Intensive Care. It aims at contextualising Seizure Management, Intubation and Inotrope Administration within host hospital's real clinical environments in order for healthcare teams to generate their own practice improvement strategies as well as link peripheral hospitals with high quality resources.
- BONUS was proposed as a solution to skill and knowledge decay after these courses are run.

If you would like to know more information about STORK or acquire copies of our resources, please contact us at stork@health.qld.gov.au .

References

This educational package has been reviewed by content experts and a state-wide steering group review on behalf of Children's Health Queensland.

This Simulation Template has been adapted from the template from emsimcases.com, available at : https://emsimcases.com/template/

1. Children's Health Queensland Guideline. Management of Fever in a Paediatric Oncology Patient. 2018 Feb 2. Available from: https://www.childrens.health.qld.gov.au/wp-content/uploads/PDF/guidelines/gdl-fever-oncology.pdf