CHBC Provincial Pediatric Asthma Sim – Severe

Section 1: Case Summary

Scenario Title:	Severe Pediatric Asthma
Keywords:	
Brief Description of Case:	This is a case of a 4-year-old child with a past medical history of asthma who presents to the emergency department with severe respiratory distress. The patient progresses to respiratory failure despite initial management. Once on advanced oxygenation modalities (BiPAP) the patient improves.

Goals and Objectives	
Educational Goal:	Demonstrate management of severe pediatric asthma using the Child Health BC Provincial Pediatric Asthma Guideline initial management recommendations for severe PRAM score.
Objectives: (Medical and CRM)	**Knowledge:** 1. Discuss and demonstrate recognition of pediatric asthma illness severity 2. Demonstrate understanding of engaging with specialist support and consideration of transfer to higher level of care utilizing Provincial Pediatric Virtual Support Pathways **Technical Skills:** 1. Recognition of asthma severity utilizing Pediatric Respiratory Assessment Measure (PRAM) Scoring Table 2. Demonstrate skills of basic management of asthma 3. Demonstrate use of the CHBC Provincial Pediatric Asthma Guideline 4. Demonstrate resuscitation skills **Non-technical Skills:** 1. Demonstrate use of the CHBC Provincial Pediatric Asthma Guideline 2. Demonstrate effective closed loop communication and defined role clarity 3. Demonstrate crisis resource management and critical thinking ***NOTE:*** *The BC Simulation Network's Crisis Resource Management Reference (CRM model v9) in Appendix A outlines the components of effective CRM and can also be downloaded from the BC Simulation Network Simulation Resources Page*
EPAs Assessed:	N/A

Learners, Setting and Personnel				
Target Learners:	☐ Junior Learners	☐ Senior Learners	☐ Staff	
	☒ Physicians	☒ Nurses	☒ RTs	☒ Inter-professional
	☐ Other Learners:			
Location:	☒ Sim Lab	☒ In Situ	☐ Other:	
Recommended Number of Facilitators:	Instructors: 2			
	Sim Actors: 1-2 (parents, physician)			
	Sim Techs: 1			

Scenario Development	
Date of Development:	September 2024
Scenario Developer(s):	Dr. Simi Khangura (BCCH ED), Matthew Thacker, Catherine Marshall, Trish Thomson (CHBC), Chelsea Holmes & Meghan Tome (Interior Health Simulation Program)
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Last Revision Date:	
Revised By:	
Version Number:	1

Facilitator Notes

BEFORE THE SIMULATION

1) **Pre-brief the group:**
   a. Welcome – introductions, sign-in
   b. Review overall format including approximate time for simulation and debrief. Remind that debrief often takes longer than scenario, but is the most important part
   c. Confidentiality – Review the steps taken to ensure the psychological safety of participants
   d. Engagement – Recognize this is a simulated environment but try to buy-in, the more you put into it and the more you'll get out of it
2) **Provide Orientation** (failing to give proper orientation may set participants up for failure):
   a. Manikin, monitors, code cart, meds & fluids, diagnostics, calling for help
   b. Child Health BC Provincial Documents
      1. Child Health BC Provincial Pediatric Asthma Guideline
      2. Child Health BC Pediatric Respiratory Assessment Measure (PRAM) Scoring Table
      3. Initial Management of Pediatric Asthma Exacerbations Algorithm and Medication Reference
      4. PEWS ED Vital Sign Record 4 to 6 years
   c. Equipment/Procedures in the case as needed – do a needs assessment (i.e. How to use Broselow tape and cart, IO insertion, pediatric fluid bolus etc.)
3) **Scenario briefing:**
   a. Review learning objectives with participants (knowledge/technical and non-technical skills)
   b. Roles – discuss roles, assign as needed

Section 2A: Initial Patient Information

A. Patient Chart					
Patient Name:			**Age:** 4 years	**Gender:**	**Weight:** 22 kg
Presenting complaint: Shortness of Breath (CTAS 1)					
Temp: 37.7	**HR:** 155	**BP:** 90/60	**RR:** 47	**O_2 sat:** 91%	**FiO_2:** RA
Cap glucose: 4.5 mmol			**GCS:** 15 (E: 4 V: 5 M: 6); Alert; **PAT**: Inconsolable, Tachypneic/Increased WoB, Pale		

Triage note: Started having a runny nose and cough last night, woke up this morning with faster breathing and an audible wheeze	
Allergies: Environmental	
Past Medical History: Asthma, admitted last year for 2 nights on pediatric unit for difficulties breathing and a wheeze	**Current Medications:** Salbutamol MDI and Flovent MDI

Section 2B: Extra Patient Information

A. Further History	
Include any relevant history not included in triage note above. What information will only be given to learners if they ask? Who will provide this information (mannequin's voice, sim actors, SP, etc.)? Mom stopped giving MDI medication regularly last month because their child was "doing better". Older sister sick at home with cough/cold. Goes to daycare every day.	
B. Physical Exam	
List any pertinent positive and negative findings	
Cardio: Sinus tachycardia	**Neuro**: Inconsolable
Resp: Tachypnea, audible wheezing, decreased air entry, tracheal tug/intercostal/subcostal indrawing	**Head & Neck:** Unremarkable
Abdo: Unremarkable	**MSK/skin:** No rash noted. Peripheral/central capillary refill 1 second
Other:	

Section 3: Technical Requirements/Room Vision

A. Patient
☒ Mannequin *(specify type and whether infant/child/adult) Child – 4 years approx*
☐ Standardized Patient
☐ Task Trainer
☐ Hybrid

B. Special Equipment Required

- ☐ Cardiac monitoring, SpO2, BP
- ☐ CTAS scoring aid and CEDIS coding sheet
- ☐ Age-appropriate PEWS documentation tools
- ☐ Child Health BC Pediatric Asthma Management Guideline
- ☐ Regional Pediatric Asthma Pre-Printed Orders or electronic order set if available
- ☐ Broselow tape or scale
- ☐ Personal protective equipment
- ☐ Oxygen therapy devices (BVM, oxygen mask, non-rebreather mask, nasal prongs, nebulizer mask)
- ☐ MDI spacer with mask
- ☐ BiPAP machine w/ vibrating mesh nebulizer (if available)
- ☐ IV pump, syringe pump with appropriate drug library loaded
- ☐ IV line, 3-way stop cock
- ☐ IO equipment and IO trainers
- ☐ Syringes (luer-lock tip)(5 mL, 10 mL, 20 mL, 50/60 mL)
- ☐ Medication labels
- ☐ Blunt fill needles

C. Required Medications

- ☐ Salbutamol MDI/nebules, ipratropium MDI/nebules, dexamethasone PO, methylprednisolone IV, magnesium sulfate IV
- ☐ Normal Saline 0.9% 1L bag and/or Ringer's Lactate 1L bag; D5NS 1L bag

D. Moulage

None required

E. Monitors at Case Onset

☒ Patient on monitor with vitals displayed
☐ Patient not yet on monitor

F. Patient Reactions and Exam

Include any relevant physical exam findings that require mannequin programming or cues from patient (e.g. – abnormal breath sounds, moaning when RUQ palpated, etc.) May be helpful to frame in ABCDE format.
A: alert, audible wheeze, no foreign bodies/debris, no drooling/swelling, c-spine clear
B: decreased air entry, audible wheeze, tachypnea, tracheal tug, intercostal/subcostal indrawing
C: skin pale, pulses strong, rapid, regular, capillary refill 3 seconds, cool/dry skin
D: inconsolable
E: no rash

Section 4: Sim Actor and Standardized Patients

Sim Actor and Standardized Patient Roles and Scripts	
Role	*Description of role, expected behavior, and key moments to intervene/prompt learners. Include any script required (including conveying patient information if patient is unable)*
Parent	Answers questions related to patient exam, as applicable. Cooperative with care.

Section 5: Scenario Progression

Scenario States, Modifiers and Triggers				
Patient State/Vitals	Patient Status	Learner Actions, Modifiers & Triggers to Move to Next State		Facilitator Notes
1. Baseline State **Rhythm:** Sinus tach **HR:** 155 **BP:** 90/60 **RR**: 47; audible wheeze **O_2 sat:** 91% RA **T:** 37.7 ^oC **Glucose:** 4.5 mmol **Wt**: 22 kg **PEWS**: 8 **CVS**: capillary refill 3 sec **PAT**: Pale, inconsolable, tachypneic, suprasternal indrawing, intercostal and subcostal indrawing	*The child has increased work of breathing, speaks only in partial sentences. They are inconsolable. They have suprasternal, subcostal, and intercostal indrawing. Pronounced nasal flaring*	Expected Learner Actions ☐ Calculate PRAM score = 11 *O_2 saturation (<92%) – 2* *Scalene contraction – 2* *Suprasternal indrawing - 2* *Audible wheezing – 3* *Air entry widespread decreased - 2* ☐ Continuous cardiac, resp & SpO_2 monitor ☐ Inform MRP of PRAM score ☐ Salbutamol 5 mg via nebulizer (q20min x3) ☐ Ipratropium 0.5 mg via nebulizer (q20 min x3) ☐Methylprednisolone IV 1mg/kg (max 60 mg/dose) ☐ Obtain IV access ☐ RRT consult (if available)	**Modifiers** *Changes to patient condition based on learner action* ▪ NP, mask, High flow nasal cannula (HFNC) O_2 applied > SpO_2 92% ▪ 100% 0_2 applied (BiPAP) > SpO_2 94% (and progress to Stage 3 once medications provided) ▪ Not successful with 1st IV attempt > IV successful on 2nd attempt **Triggers** *For progression to next state* • 5 mins or management incomplete/not rapid --> Phase 2 (respiratory failure) • BiPAP applied, 1st round of nebs, methylprednisolone given > Phase 3 (condition improvement)	Physicians Orders: • Salbutamol 5 mg via nebulizer (q20min x3) • Ipratropium 0.5 mg via nebulizer (q20 min x3) • IV access • D5NS @ 62 mL/hr • Methylprednisolone IV 1mg/kg (max 60 mg/dose) ***Notes:*** Facilitator can verbally progress scenario to stage 2 or 3 once methylprednisolone given) or if no salbutamol administered (deterioration of patient) *"You have given an additional 2 doses of salbutamol and ipratropium via nebulizer every 20 minutes, it is now 1 hour since you began the back-to-back nebs"*
2. Respiratory Failure **Rhythm:** Sinus tach > sinus **HR:** 155 > 92 (over 3 minutes) **BP:** 78/56	*Patient's level of consciousness decreases, only waking to painful stimuli. Marked respiratory distress at rest with added*	Expected Learner Actions ☐ Reassess PRAM score = 12 *O_2 saturation (<92%) – 2* *Scalene contraction – 2* *Suprasternal indrawing - 2* *Silent chest – 3* *Silent/minimal – 3*	**Modifiers** • BiPAP application > cyanosis goes away, work of breathing less pronounced, O_2 sats 94%, patient becomes more alert	Physicians Orders: • BiPAP @ 10/5 • Continuous nebulized salbutamol (via VMN) • Magnesium sulfate 50 mg/kg/dose (MAX 2000 mg/dose) over 20 mins

RR: 24; silent chest (no A/E or wheeze) **O_2 sat:** 78% **T**: 37.7 ^oC **PEWS**: 11 **CVS:** capillary refill 4 sec **PAT:** Pale/cyanotic, asleep, (rouses to painful stimuli only), marked resp distress (suprasternal, subcostal/intercostal indrawing, head bobbing)	*grunting upon expiration. Chest is silent upon auscultation. Cyanotic*	☐ Call Code Blue ☐ Administer O_2 via BiPAP (10/5) to support respirations ☐ Continuous nebulized salbutamol (via VMN) ☐ Magnesium sulfate 50 mg/kg/dose (MAX 2000 mg/dose) over 20 mins ☐ NS or LR bolus 20 mL/kg over 20 mins ☐ Continuous cardiac, respiratory and O_2 sats monitor; monitor BP ☐ Draw bloodwork (Na, K, Cl, blood gas, CBC & Diff) ☐ POC glucose ☐ Advocate for pediatrician consult/CHARLiE/PTN	(rousable to sound); HR increases by 10 • Continuous salbutamol administration (improves chest sounds, either from silent to audible wheeze or audible wheeze to inspiratory/expiratory on auscultation); O_2 sats increase by 2%; HR increases by 10 • Magnesium sulfate administration (improves chest sounds, either from silent to audible wheeze or audible wheeze to inspiratory/expiratory on auscultation) O_2 sats increase by 2% • 1st IV bolus > BP increases to 85/60; HR increases by 5 **<u>Triggers</u>** *For progression to next state* • 5 mins or management incomplete/not rapid --> end sim • BiPAP applied, magnesium sulfate, continuous salbutamol, methylprednisolone given > Phase 3 (condition improvement)	• NS or LR bolus 20 mL/kg over 20 mins • Draw bloodwork (Na, K, Cl, blood gas, CBC & Diff)

3. Recovery **Rhythm:** Sinus tach **HR:** 160 **BP:** 92/61 **RR:** 36; inspiratory & expiratory wheeze throughout on auscultation., decreased air entry to bases **O_2 sat:** 97% on BiPAP T: 37.6 ^oC **PEWS:** 5 **PAT:** Asleep (awake to verbal stimuli), tachypnea with suprasternal & intercostal indrawing, pink	*With adequate ventilation (BiPAP) patient displays improved respiratory effort and now wakes to verbal stimuli*	Expected Learner Actions ☐ Calculate PRAM Score = 7 *O_2 saturation -2* *Inspiratory/Expiratory wheezing – 2* *Suprasternal retractions – 2* *Decreases A/E to base - 1* ☐ Continue BiPAP ☐ Inform MRP of updated PRAM score ☐ Salbutamol q30-60 mins ☐ Verbalize plan for patient (transfer to higher level of care)	Modifiers • • Triggers • After verbalize plan of care and all actions complete > end sim •	Physician Orders: • Salbutamol 5 mg via neb (VMN) q30-60 mins

Appendix A: Laboratory Results

<u>CBC & Diff</u> RBC 4.89 x 10^{12} WBC **11.1 x 10^9/L (H)** Hgb 144 Plt 29 <u>Lytes</u> Na 140 K **3.0 (L)** Cl 100 HCO_3 24 Urea 6.1 Cr 55 Glucose **9.0 (H)** <u>Extended Lytes</u> Ca 2.32 Mg 1.00 PO_4 1.01 Albumin 46 TSH 2.22 <u>Venous Blood Gas</u> pH **7.01 (L)** pCO_2 **60 (H)** pO_2 **28 (L)** HCO_3 24 Base Excess -1	

Appendix B: ECGs, X-rays, Ultrasounds and Pictures

Paste in any auxiliary files required for running the session. Don't forget to include their source so you can find them later!

Appendix C: Facilitator Cheat Sheet & Debriefing Tips

Include key errors to watch for and common challenges with the case. List issues expected to be part of the debriefing discussion. Supplemental information regarding any relevant pathophysiology, guidelines, or management information that may be reviewed during debriefing should be provided for facilitators to have as a reference.

Facilitator Debrief Guide: *Facilitate a conversation with the group following the BC Hot Debriefing Guide (Appendix C) which can be downloaded from the BC Simulation Network Simulation Resources Page*	
S	**Summarize the Case** Example Question: *"Can someone summarize the case in one or two sentences?"*
T	**Things that went well** Example Question: *"What did you think you did well?"*
	Review: Did we accomplish the Learning Objectives? Knowledge: ☐ Discuss and demonstrate recognition of pediatric asthma and illness severity (PRAM scoring) ☐ Demonstrate understanding of when to engage specialist support, and consideration of transfer to higher level of care Technical Skills: ☐ Demonstrate management of severe asthma exacerbations ☐ Demonstrate use of PRAM Scoring Table ☐ Demonstrate use of Initial Management of Pediatric Asthma Exacerbations (Severe) and Medication Reference ☐ Demonstrate resuscitation skills Non-technical Skills: ☐ Demonstrate effective closed loop communication and defined role clarity. ☐ Demonstrate crisis resource management and critical thinking ☐ Demonstrate seeking timely support from regional and provincial resources
O	**Opportunities to Improve** Example Question: *"What would you change next time?"*
	KEY DEBRIEF POINTS: • Regardless of their PRAM score, children with decreased level of consciousness, agitation, cyanosis, decreased respiratory effort and/or confusion should be considered to have impending respiratory failure. • Early administration of steroids alternated with initial beta-agonists in the first 60 minutes shortens respiratory distress and decreases hospitalization for those with severe asthma exacerbations • In the 2nd hour of treatment, patients with severe respiratory distress improve more quickly with bronchodilators nebulized continuously versus intermittent treatment every 20 minutes • Use a VMN or large-volume nebulizer for continuous therapy of 60 minutes or more or a small volume nebulizer with repeat doses given "back to back" • BiPAP utilization is the recommended modality for respiratory support in severe asthma exacerbations when nasal prongs or facemask is not adequate • Engage local pediatrician on-call through local operator/on call system; or CHARLiE via Zoom at charlie1@rccbc.ca or phone (236)305-5352 • Early consultation to discuss patient management and transport is advised when the patient has persistent/severe respiratory distress or impending respiratory failure. Contact a higher level of care

	referral center to consult with a pediatrician/pediatric intensivist via Patient Transfer Network (PTN) (1-866-233-2337) • Nursing & Respiratory Therapist Support from Provincial Pediatric Intensive Care Units (PICU) • Further airway management resources can be found on the CHBC Pediatric Critical Care Resources In A Hurry website.
P	**Points of Action** Example Question: *"What additional support or resources do you need to be able to incorporate what you have learned today into your practice?"*

References

1) Canadian Pediatric Society (2021). *Managing an acute asthma exacerbation in children*. Canadian Pediatric Society Position Statement. Retrieved from: Managing an acute asthma exacerbation in children | Canadian Paediatric Society (cps.ca)

2) Translating Emergency Knowledge for Kids (TREKK). (2024). *Bottom line recommendations: asthma*. Retrieved from 2024_02_26_Asthma-BLR_FINAL_v2.1.pdf (trekk.ca)