

Pediatric Airway Management

Module 1

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The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official CMS position, policy or decision unless so designated by other documentation.

I. Title: 3 month old bronchiolitis

II. Target Audience: Pediatric Residents, PEM fellows, EM Residents

III. Learning Objectives or Assessment Objectives

A. Primary - key learning objectives of the scenario

1. Assessing airway
2. Recognize respiratory distress
3. Manage respiratory distress
4. Manage airway for a 3 month old

B. Secondary - detailed technical goals, behavioral goals, didactic points

1. team work and communication
2. resource management

C. Critical actions checklist – a list to ensure the educational /assessment goals are met.
This *may* include: Simple checklist of critical actions, optimal sequence, time to critical action

1. A,B,C's
2. IV, oxygen, monitors
3. albuterol
4. consider RSI
5. cricoid pressure
6. intubation
7. post intubation chest xray
8. nasogastric tube

IV. ACGME Competencies Assessed

A. Patient Care

1. Interviewing
2. Informed Decision Making
3. Performance of Routine Procedures

B. Systems-Based Practice

1. Patient advocate

C. Interpersonal / Communication Skills

1. Patient reassurance
2. Information transfer to supervisor / admitting MD

V. Environment and Props

See Appendix B Scenario Setup Checklist

VI. Simulation Personnel and Assigned Roles (Faculty, Actors, etc)

Parent: You are appropriately concerned, a little stressed out. You are helpful with history when asked. Full-term, NSVD, home on day of life #2. 3 days of runny nose, today seems to be having difficulty breathing and not feeding well. No fevers noticed. She has had several wet diapers today, but less than normal. She is fed with formula. Siblings all have colds.

PMHx: none

Meds: none

Social hx: lives with mom and dad, 3 brothers

FHx: no childhood illnesses, no asthma

Nurse: Your role is to be helpful when asked to do something, but not make suggestions as to what they should do. Please go through the motions of putting on the leads, pulse oximeter, BP cuff. Attempting an IV. You will help feed cues when instructed through the ear piece. Sometimes the hardest thing is to stand and wait and watch.

Resp therapist: when called, you come in and help with bagging the child if asked. Wait to have people ask you to do things, but once they ask, you can perform the appropriate tasks, such as handing things during intubation.

“Intern”: Arrive 90 seconds into to code. You are to help out, but not have any independent thought. If you are asked to intubate, you say that you are not comfortable and would rather watch the first one. You can be helpful with other tasks.

A. Who may play them – other residents, other students, actors

VII. Case Narrative (describes what the learner will experience)

A. Paragraph narrative overview or case and how case starts (i.e. EMS, signout, etc)
“Pediatric code team to Children’s 4”. Nurse tells you this is Betty Burns, she is a 3 month old who was admitted yesterday for RSV+ bronchiolitis and overnight she has been coughing more and her work of breathing has increased. She does not seem to respond to the albuterol treatments. Her sats are 88% on 2 l via nasal cannula. I am really worried about her so I called a code on her.

B. Board format overview of patient:
Name/Age/Sex Betty Burns / 3 mo old / female
Mode of arrival admitted on floor
Accompanied by parent
Triage Note see ED documentation in Appendix C

Chief Complaint admitted with bronchiolitis

Past Medical History none

Medications and Allergies NKDA

Family and Social History cancer and heart attacks

Initial Exam

Temp 100.2

RR 79

HR 180

BP 81/53

Oxygen Sat 88% on 2L nasal cannula

General appearance irritable in severe distress

HEENT airway patent, copious secretions, anterior fontanelle open + flat, tympanic membranes normal, mucous membranes

slightly dry, neck supple

NECK, supple

RESP Tachypneic, severe retractions, diffuse wheezing and crackles.

CV tachycardia, normal S1S2 no murmur, palpable pulses, capillary refill = 3 seconds

ABD soft, non-tender, non-distended

EXT no trauma

NEURO GCS 15, moving all extremities well, normal tone

Expected Interventions I:

1. Ask for oxygen via non-rebreather, monitors.

Hospital course:

She was treated with albuterol in the ED with no improvement. An IV was placed and a chest Xray was obtained which shows hyperinflation and peribronchial cuffing. She has not been taking much orally and her IVF are at 20cc/hr.

Progression:

Continues to have moderate/severe respiratory distress. Oxygen via non-rebreather mask will bring the sats up to the mid 90's.

VS HR 190 RR 72 and shallow, BP 101/62 O2 sat 94% on 100% O2

Expected Interventions II:

1. verify access
2. normal saline 20cc/kg bolus IV / IO
3. albuterol nebulizer or racemic epinephrine

Progression:

At 4 minutes after oxygen is placed, a trend (bronchiolitis worse) will start where her sat's will begin to drop and then her respiratory rate will also begin to drop representing impending respiratory failure, if patient is not intubated in 4-5 minutes, the patient will have respiratory / cardiac arrest.

VS: P-199, BP-81/46, RR-55, Sats – 90%.

Expected intervention III:

1. BVM ventilation with 100% O2 with cricoid pressure
2. RSI
3. Intubate with Miller 1 blade and 3.5-4.0 ETT tube
nasogastric tube, end tidal CO2 detector
4. call for chest xray

Progression:

Once intubated, a trend starts (bronchiolitis_recov) the oxygen saturation comes up to high 90's, heart rate comes down, patient is stable and ready for transfer to the PICU once a chest xray confirms tube placement.

Laboratory Exam see Appendix D

C. **Flow diagram** (see SimBaby Programming Appendix E)

VIII. Instructors Notes (what the instructor must do to create the experience)

Explain roles to role players and have a facilitator available to assist with the flow of the Scenario. Computer operator will need to perform some manual adjustment of vital signs as the scenario is ongoing.

IX. Debriefing Plan

Method of debriefing – should follow learning objectives
conference room video playback

Debriefing Objectives:

1. Recognition of respiratory distress and pending respiratory failure
2. Management of bronchiolitis
3. RSI in this case
4. Airway management

A. Actual debriefing materials (articles or learning materials)

Refer to Current PALS manual airway section

X. Authors and their affiliations. Frank L. Overly (PEM)

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Appendix A Global Competency Rating Scale

	Resident name _____ Examiner _____ Case Title <u>3 mo bronchiolitis</u> Scenario Type Single Patient ☐ Multiple Patient ☐	
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Critical Actions Checklist

	Critical Action	Yes	No	Time
1	Identify self as leader and assign roles			
2	Assess A,B,C			
3	Oxygen non-rebreather mask			
4	Monitors			
5	Access (IO or IV)			
6	racemic epinephrine albuterol			
7	cricoid pressure			
8	RSI			
9	Intubation (Benzodiazepines, Narcotics)			
10	ETCO2			
11	nasogastric tube			
12	chest xray			
13	I-stat			
14	PICU			

RIHMSC Global Competency Scale

Immediate critical EM actions	1	2	3	4	5	6	7
Appropriately targeted H&P	1	2	3	4	5	6	7
Recognizes & manages disease process	1	2	3	4	5	6	7
Considers differential diagnosis	1	2	3	4	5	6	7
Communication skills	1	2	3	4	5	6	7
Case synthesis (PICU)	1	2	3	4	5	6	7
Degree of expertise & leadership	1	2	3	4	5	6	7
BARS see attached							

Notes:

Rating Scale						
Very poor	Poor	Marginal	Acceptable	Good	Very good	Superior
1	2	3	4	5	6	7

Harmful action

Yes

No

Comment:

Description of Elements in RIH MSC Global Rating Scale

No	Competency	Descriptor
1	Immediate emergency medicine actions	● IV, O2, Monitor ● Immediate stabilization dependent on case
2	Appropriately targeted history/physical exam	● History and physical based on case
2	Recognizes & manages disease process	● Completes all critical actions based on checklist in appropriate sequence and timeframe
3	Considers differential dx	● Avoids premature diagnostic closure
4	Presentation skills/interpersonal relations	● Quality of verbal presentation (assessment-oriented)¹ = data content, expression, organization of medical decision making, overall presentation – (AO format = patient ID, assessment & mgmt/therapeutic plan, limited justification based on H&P) ● Respectful interaction with patient ● Works effectively with ED staff
5	Case synthesis/Cognition	● Recognizes diagnosis ● Appropriately dispositions patient ● Obtains all appropriate consults/follow-ups ● Recognizes unresolved issues ● Avoids common cognitive errors²
6	Degree of Expertise/Leadership ³	● fluency: does the activity run together in an integrated and uninterrupted sequence with a minimum of pauses/hesitations. ● automaticity: can practitioner deal appropriately with a situation even when not concentrating on it or expecting it ● simultaneity: ability to complete several tasks at one time ● rapidity: the ability to make an appropriate response quickly ● knowledge base
7	Crisis Management Behaviors/Teamwork ⁴	● Anticipation and planning ● Awareness and utilization of all available resources ● Distribution of workload and mobilization of help ● Routine reevaluation of the situation ● Awareness and utilization of all available information ● Triage and prioritization ● Efficient management of multiple patients ● Effective coping with disruptions/distractions ● Can add BARS assessment/Medteams⁵
8	Safety Behaviors	● Safe medication ordering (asks about allergies, Knows indications/contraindications for therapy, communicates dose, route and timing, knows pt weight) ● Any potentially harmful behaviors should be noted

¹ Maddow CL, et. al. Efficient Communication: Assessment-Oriented Oral Case Presentation. Academic Emergency Medicine 2003; 10: 842-847.

² Pat **Croskerry** Achieving Quality in Clinical Decision Making: Cognitive Strategies and Detection of Bias Acad Emerg Med 2002 9: 1184-1204.

³ Gellatly Angus, editor. The Skillful Mind: An Introduction to Cognitive Psychology. Open University Press, Milton Keynes England. 1986

⁴ Martin Reznick, Rebecca Smith-Coggins, Steven Howard, Kanthi Kiran, Phillip Harter, Yasser Sowb, David Gaba, and Thomas Krummel
Emergency Medicine Crisis Resource Management (EMCRM): Pilot Study of a Simulation-based Crisis Management Course for Emergency Medicine
Acad Emerg Med 2003 10: 386-389.

⁵ Gregory D. Jay, Scott D. Berns, John C. Morey, Dan T. Risser, Shawna J. Perry, and Robert Simon Formal Teamwork Training Improves Teamwork and Reduces Emergency Department Errors: Results from the MedTeams Project Acad Emerg Med 1999 6: 408-a

Appendix B Scenario Setup Checklist

key: solid text - minimum requirements

light text - optional

A. Environment Children's Hospital Inpatient Ward

- ☐ bed: hospital
 - ☐ actor roles: Pediatric nurse
Parent
Respiratory technician
Radiology technician
Senior physician (expert)
 - ☐ personnel: Manikin operator / Audiovisual technician
Facilitator x 1-2
Actor x 1-2
 - ☐ patient medical forms (included in package)
-

B. Advanced medical simulation manikin

- ☐ gender: female
 - ☐ clothing: hospital patient garb
 - ☐ moulage / props: 24g IV right arm; in bed
 - ☐ programming: Laerdal Simbaby scenario (included in package)
-

C. Medical equipment

-patient assessment equipment

- ☐ blood pressure cuff
- ☐ cardiac monitor / defibrillator
- ☐ EKG machine
- ☐ pulse oximeter
- ☐ stethoscope
- ☐ ventilator

-standard resuscitation equipment ("pediatric code cart" / "crash cart")

- ☐ protective equipment (gloves, goggles, gowns)
- ☐ basic airway management devices
 - ☐ oropharyngeal airway (OPA; assorted)
 - ☐ nasopharyngeal airway (NPA; assorted)
 - ☐ bag-valve mask (pediatric)

**DE-IDENTIFY IMAGES AND PROPS TO
COMPLY WITH HIPAA REGULATIONS!!!**

- ☐ intubation equipment
 - ☐ laryngoscope handles / blades / batteries (assorted)
 - ☐ water-based lubricant
 - ☐ endotracheal tubes (assorted)
- ☐ intravenous access equipment
 - ☐ tourniquets
 - ☐ gauze pads
 - ☐ intravenous catheters (assorted)
 - ☐ intravenous fluid tubing drip sets (micro + macro)
 - ☐ intravenous fluid bags (normal saline)
 - ☐ phlebotomy supplies
 - ☐ sterile saline for flushes
 - ☐ stopcocks and connectors
- ☐ dressings (assorted)
- ☐ naso-/oro-gastric tubes (assorted)
- ☐ nebulizer
- ☐ oxygen source
- ☐ oxygen delivery devices (face masks, nasal cannulas)
- ☐ syringes (catheter tip; assorted)
- ☐ syringes (lavage tip)
- ☐ tape
- ☐ urinary catheters (assorted)
- ☐ wall suction and suction tubing (Yankower and tracheal suction)

-difficult airway management equipment

- ☐ endotracheal tubes (assorted, including size 3.5)
- ☐ surgical tracheostomy kit

-medications

- ☐ general medications
 - ☐ adenosine
 - ☐ amiodarone
 - ☐ atropine
 - ☐ dextrose (D50)
 - ☐ dopamine infusion
 - ☐ epinephrine
 - ☐ vasopressin
- ☐ asthma medications
 - ☐ anti-cholinergic (inhalational + nebulization; e.g. ipratropium)
 - ☐ beta-agonist (inhalational + nebulization; e.g. albuterol)
 - ☐ Racemic Epinephrine
 - ☐ magnesium (parenteral)
 - ☐ methylxanthine (parenteral; e.g. aminophylline)
 - ☐ steroid (parenteral; e.g. prednisolone)
- ☐ rapid sequence induction / intubation medications (institution-specific)
 - ☐ e.g. etomidate / midazolam / ketamine
 - ☐ e.g. succinylcholine / vecuronium/ rocuronium

D. Radiographs, electrocardiograms, and other patient data
(included in package)

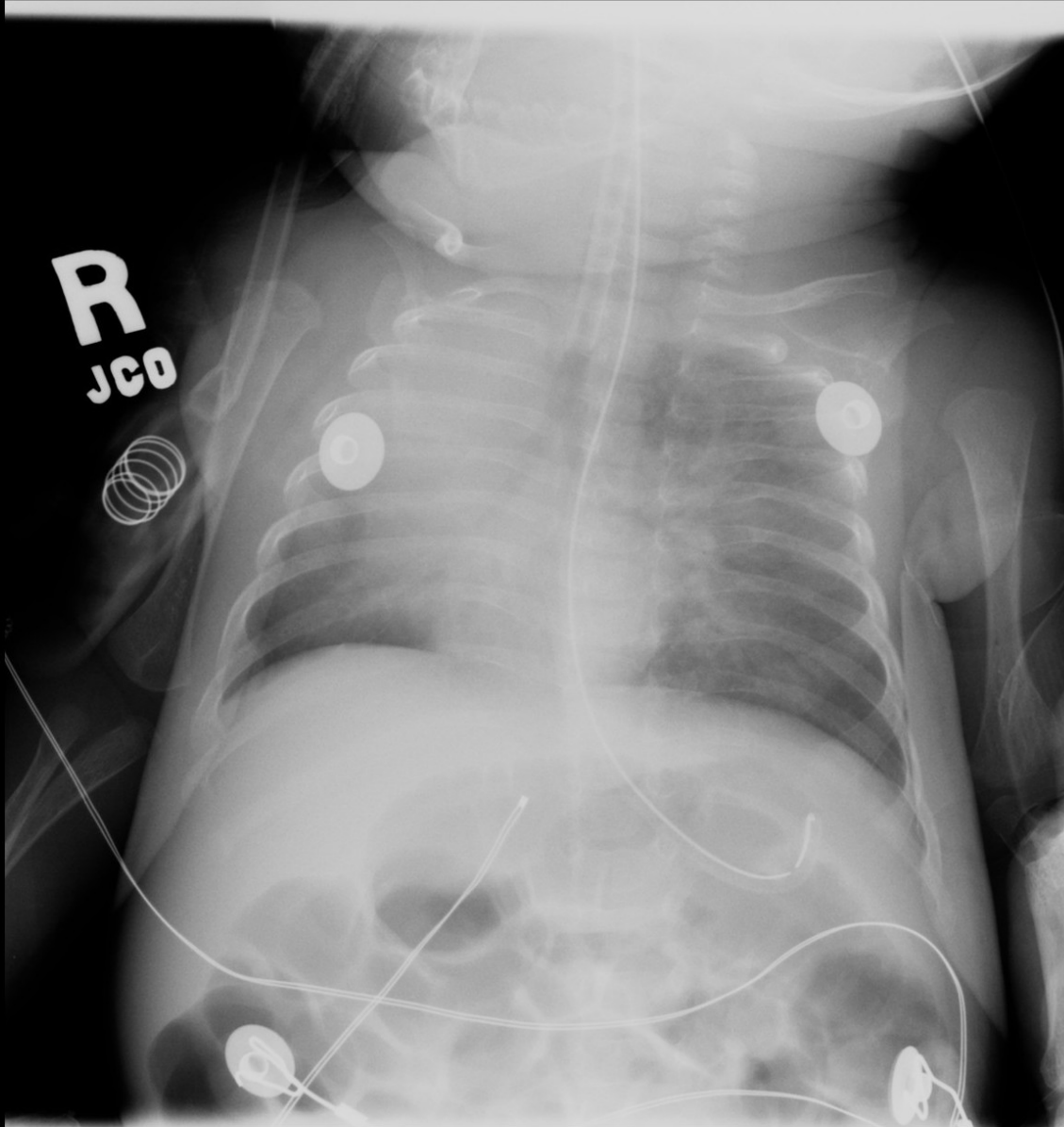
☐ chest radiograph (hyperinflated lungs)



**DE-IDENTIFY IMAGES AND PROPS TO
COMPLY WITH HIPAA REGULATIONS!!!**

☐ chest radiograph (intubated 3 month old)

Portable SUPINE



**DE-IDENTIFY IMAGES AND PROPS TO
COMPLY WITH HIPAA REGULATIONS!!!**

Appendix C Pediatric Module 1 Patient Chartwork



Community Hospital
A Standard Medical Corporation Partner

EMERGENCY DEPARTMENT PHYSICIAN DOCUMENTATION

CENSUS NO.

PATIENT NAME: **BURNS, Elizabeth**
(*"Betty"*)
DATE OF BIRTH:

Chief complaint *difficulty breathing*

History of Present Illness *(Historian: parent). 3 month old female child, full-term baby without complications during pregnancy or delivery. developed 2 days of upper respiratory infection signs and symptoms, runny nose, nasal congestion, cough, with difficulty breathing. Saw pediatrician yesterday, but worsening over course of day today. Fever to 101F. Sick siblings w/ similar illness. Patient being bottle-fed currently, immunizations up-to-date.*

ROS	Constitutional: <i>crying more</i>	Eyes: <i>normal</i>	PMHx:	<i>asthma</i>
	Ear / Nose / Throat: <i>congested</i>	Neurologic: <i>irritable?</i>		
	Respiratory: <i>cough, dyspnea</i>	Genitourinary: <i>wet diapers</i>		
	Cardiovascular: <i>normal</i>	Skin: <i>no rash</i>		
	Gastrointestinal: <i>drinking less</i>	Lymphatics:	Social History	<i>non-contributory</i>
	Hematologic:	Musculoskeletal: <i>normal</i>	Family History	<i>non-contributory</i>

none

no known drug allergies

Vital signs: *see front sheet* *cries on exam, not lethargic.*

Head / Neck: *normal suck, rhinorrhea, conjunctivae + pharynx + ears normal, reactive pupils*

Chest: *mild respiratory distress, some retractions, + wheezing and scattered rhonchi*

Heart: *regular rate, rhythm, cap refill < 2 seconds*

Abdomen: *soft, non-distended*

Genitourinary:

Extremities: *no edema*

Neurologic:

Skin: *warm, dry, no rash*

X-rays:

Lab values: *pending*

received albuterol, not improved. presentation and exam consistent with bronchiolitis.

will admit for observation due to oxygenation issues. RSV assay pending

Diagnosis *bronchiolitis*

DISPOSITION: **Admit**

C. Jones-Bence, PGY-2 PHYSICIAN 1

PHYSICIAN 2

Appendix D Pediatric Module 1 Patient Laboratory Values

Pediatric Module 1 Complete Blood Count

White Blood Cell (3.5-11.0) K/uL:	8.5
Hemoglobin (11.0-15.0) G/DL:	13.1
Hematocrit (32.0-45.0) %:	40.7
Platelet (150-400) K/uL:	345
Differential:	
Neutrophils:	45%
Lymphocytes:	50%
Monocytes:	5%

Pediatric Module 1 Chemistry Panel

Na⁺ (135-145) MEQ/L: 142

K⁺ (3.6-5.1) MEQ/L: 4.3

Cl⁻ (98-110) MEQ/L: 100

CO₂ (20-30) MEQ/L: 21

BUN (6-24) MG/DL: 20

Creat (0.4-1.3) MG/DL: 1.0

Glu (67-109) MG/DL: 95

Pediatric Module 1 Arterial blood gas (iStat)

pH (7.35-7.45): 7.2 L

PCO₂ (35-45) MMHG: 70 H

PO₂ (78-82) MMHG: 45 L

O₂ Sat (93-98) %: 90 L

Na⁺ (135-145) MEQ/L: 140

K⁺ (3.6-5.1) MEQ/L: 4.0

Cl⁻ (98-110) MEQ/L: 98

CO₂ (20-30) MEQ/L: 23

Glu (67-109) MG/DL: 88

Hematocrit (32-45)%: 39

Appendix E SimBaby Scenario Programming

Laerdal Scenario Builder for SimBaby

File Edit View Settings Help

3_mo_bronchiolitis.scb

SimBaby

Actions

BP, SpO2, CO2, Temp, etc.

Events

?, x < a, ABC, Misc, !

Patient: Betty Burns
Monitor: Big Numeric Layout

Initial State

Sinus Rhythm: 181bpm
Auscultation Sounds
Left Lung: Wheezes
Right Lung: Wheezes
Monitor Controls
SpO2 = 88
CO2 = 33.8 mmHg
Trend Max/Min
SpO2 : 96.0/65.0
BPSys : 130/40
BPDia : 70/25
HR : 200/40
RR : 80/0
Respiration Rate: 70
Breathing pattern: Retraction
Chest Rise: Deep
Blood Pressure: 94/66 Volume = 5 No gap
Vocal Sound: 'Babycry' Loop Interval: 15 s

Oxygen

Frame2

Monitor Controls
SpO2 = 90
Vocal Sound: 'Babycry' Loop Interval: 20 s

FT=4:00

Frame3

Start Trend: bronchiolitis_worse (Start: 0 min)
Stop Vocal Sound
Comment:
Intubation or BVM will stop the worsening trend and start a recovery trend.

Intubation Two person mask

Frame4

Start Trend (stop others): bronchiolitis_recovery (Start:)
Comment:
computer operator may need to adjust vital signs to reflect appropriate values for the situation.

Frame1

Comment:
Expected Interventions I:
1. Ask for oxygen via non-rebreather, monitors.

Hospital course:
She was treated with albuterol in the ED with no improvement. An IV was placed and a chest Xray was obtained which shows hyperinflation and peribronchial cuffing. She has not been taking much orally and her IVF are at 20cc/hr.

Progression:
Continues to have moderate/severe respiratory distress. Oxygen via NRB will bring the sats up to the mid 90's.

VS HR 190 RR 70 and shallow, BP 100/60 O2 sat 94% on 100% O2

Expected Interventions II:

1. verify access
2. Normal saline 20cc/kg bolus IV/IO
3. Albuterol neb or Racemic Epinephrine

Progression:
At 4 minutes after oxygen is placed, a trend (3 mo bronchiolitis) will start where her sat's will begin to drop and then her respiratory rate will also begin to drop representing impending respiratory failure, if patient is not intubated in 4-5 minutes, the patient will have resp/cardiac arrest.

VS: P-200, BP-80/40, RR-55, Sats - 90%.

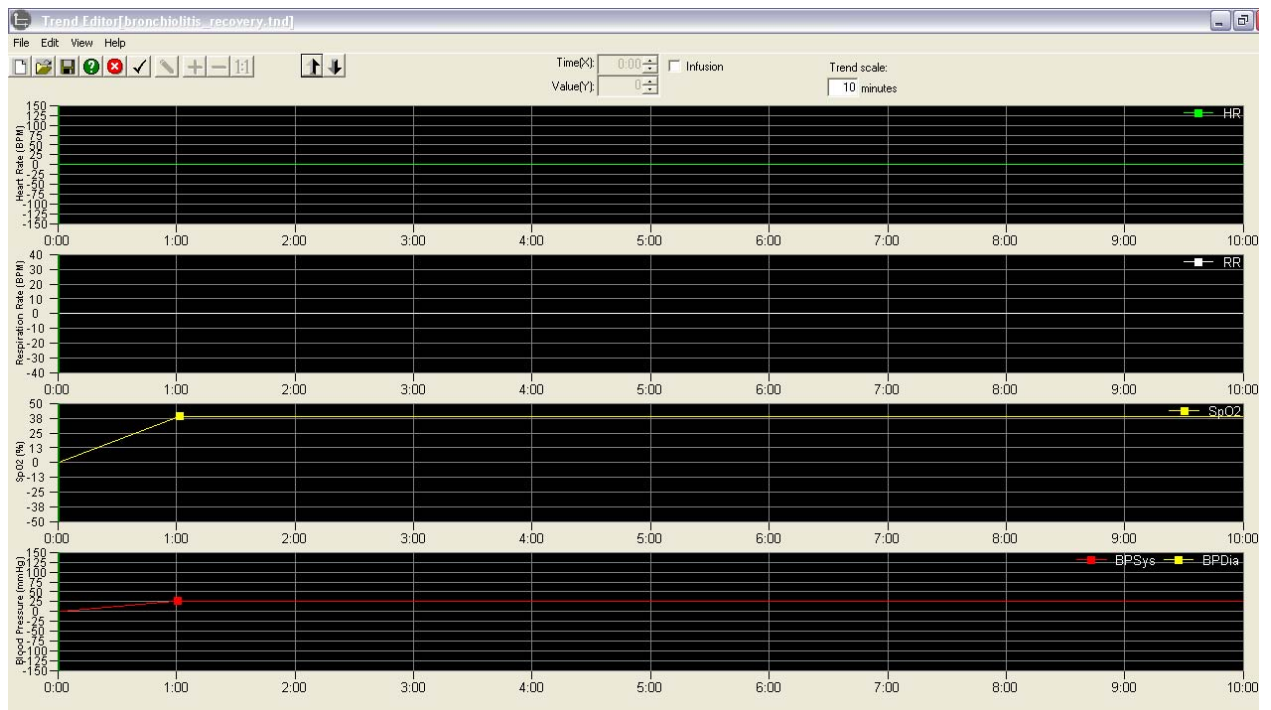
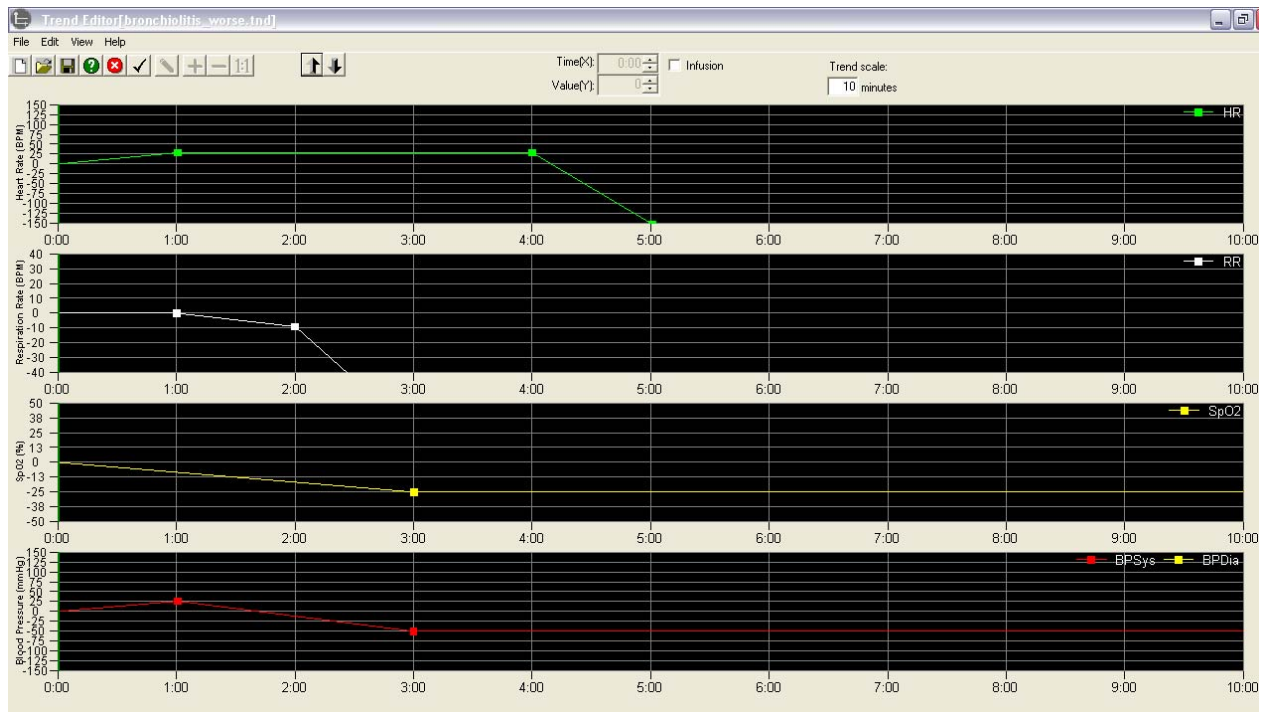
Expected intervention III:

1. BVM ventilation with 100% O2 with cricoid pressure
2. RSI
2. Intubate with Miller 1 blade and 3.5-4.0 ETT tube
- NG, end tidal CO2 detector
3. Call for Cxray

Progression:
Once intubated, a trend starts (3 mo bronchiolitisrecov) the oxygen saturation comes up to high 90's, heart rate comes down, patient is stable and ready for transfer to the PICU once a CXray confirms tube placement.

Screenshot images used with permission from Laerdal Medical Corp.

SimBaby Scenario Trends



Screenshot images used with permission from Laerdal Medical Corp.