Thames Valley & Wessex Operational Delivery Networks
(Hosted by University Hospital Southampton NHS Foundation Trust)

THAMES VALLEY & WESSEX
NEONATAL NETWORK

PRETERM STABILISATION

MODULE:

Preterm Stabilisation Scenario number 4
Author- Kate Graham-Evans

TARGET:

Doctors (level 1-3 trainees)
Neonatal nurses
Any level Neonatal Unit

BACKGROUND:

Preterm babies can be born at any level unit with minimal warning. Senior support may not be available immediately. Junior medical staff should have the knowledge and confidence to manage preterm babies at birth until senior help arrives. This includes prioritisation of thermal care, assessment of condition and airway management (but not necessarily intubation).

RELEVANT AREAS OF THE CURRICULUM

Besides human factors and communication this scenario addresses

WORKPLACE-BASED ASSESSMENTS

Mini CeX: Recognition of deterioration / communication and escalation
CBD: MRSA and preventing cross-infection
DOPs: Needle Thoracocentesis

INFORMATION FOR FACULTY

LEARNING OBJECTIVES

Behavioral:

- Importance of having a structured team approach to assessment of a deteriorating baby on respiratory support
- Calling for help
- Identifying competencies of team members and allotting tasks appropriately.

Scenario-based Clinical:

- Recognition of pneumothorax and need for needle thoracocentesis
- Identification of widespread contamination risk after emergency procedures on a MRSA colonised patient
- Reinforcement of need for isolation precautions to be followed (as much as possible) during an emergency situation.

SCENE SETTING

Estimated scenario time: 20 minutes

Estimated debriefing time: 20 minutes

SCENARIO SUMMARY:

It is a Sunday evening just after nursing handover. A 3 week old, (24+2 gestation at birth) is now 27 weeks corrected and was re-ventilated yesterday for apnea. He was identified as MRSA positive on skin swabs last week. A PDA murmur was noted today. He will have an acute deterioration with a tension pneumothorax on the ventilator which must be recognized and decompressed via needle thoracocentesis. However in addition to this and unknown to the candidates, the mannequin will be covered in “invisible” UV powder to simulate MRSA. After the scenario, UV light can be used to look for spread of the powder to the immediate environment and on the participants hands/gloves - and to reinforce visually, the need for infection control precautions in MRSA colonized patients.

PREPARATION

MANNEQUIN ENVIRONMENT

“Premmie” mannequin, in incubator. Dressed, nappy and monitoring in situ. UV powder spread on clothes/ mannequin/blankets. Mannequin is intubated and ventilated – ideally connected to a working ventilator. If mannequin has interchangeable lungs, use pneumothorax/single lung model.

EQUIPMENT AND CONSUMABLES

Incubator, blankets and nest
Ventilator
Gloves and aprons
Stethoscope
Bag-valve-mask (500 ml) or T-piece circuit
Suction tubing and catheters (6F/8F/10F/12F)
End tidal CO2 detector/capnograph
UV infection prevention powder
UV torch/ "black-light"
Needle thoracocentesis set

PERSONNEL-IN-SCENARIO

INITIALLY

Neonatal Nurse
Neonatal SHO

ON REQUEST

Neonatal SpR

APPENDICES

- CXR
- Respiratory acidosis blood gas
- Participant reflection and feedback

BACKGROUND INFORMATION

MATERNAL/NEONATAL HISTORY:

The mother was 24+2 weeks gestation with spontaneous preterm labour and this pregnancy was without any significant problems. Steroids and magnesium sulphate were given.

CANDIDATE BRIEFING:

It is a Sunday evening at 8pm. A 24+2 week (now 27 weeks, 3 weeks old) baby has been stable on the ventilator in 30% oxygen. He was reintubated yesterday for concerns about apnoeas, he had a normal CXR and CRP<1, and is awaiting blood culture results (skin swabs were positive for MRSA so he is in isolation). He is otherwise stable and building up on enteral feeds, has a long line in situ and is still on some TPN for growth. He had a murmur noted earlier in the day so you have asked for an echo which has not yet been done. There is concern he has gone into more oxygen so you are called urgently to review. The consultant is on the unit but is talking to parents about redirection of care in another nursery and must not be disturbed.

NURSING STAFF BRIEFING

You are looking after a 3 week old, born at 24+2 weeks who is now 27 weeks corrected. It is the start of your shift and you have done all your checks already. Everything is functioning properly. He has been treated for presumed sepsis in the first 48hours, but did well and has had an uneventful initial neonatal course. He was re-intubated yesterday for apneas and has been started on antibiotics, his CRP so far is <1. He was identified as MRSA positive on skin swabs but blood cultures are negative so far. A new murmur was noted earlier today and an echo has been requested. He has been stable on the ventilator with pressures of SIMV 25/5, rate 50, Ti 0.4 and has been in 30% oxygen since intubation with occasional self limiting desaturations. He is on 2 hourly NG feeds and TPN, and IV antibiotics are due in 2 hours time. In the past 10 minutes, his saturations are 78-82% despite an increase to 90-95% Oxygen.

INFORMATION FOR DOCTORS:

It is a Sunday evening at 8pm. A 24+2 week (now 27 weeks, 3 weeks old) baby has been stable on the ventilator in 30% oxygen. He was reintubated yesterday for concerns about apnoeas, he had a normal CXR and CRP<1, and is awaiting blood culture results (skin swabs were positive for MRSA so he is in isolation). He is otherwise stable and building up on enteral feeds, has a long line in situ and is still on some TPN for growth. He had a murmur noted earlier in the day so you have asked for an echo which has not yet been done. There is concern he has gone into more oxygen so you are called urgently to review. The consultant is on the unit but is talking to parents about redirection of care in another nursery and must not be disturbed.

INFORMATION FOR NURSE:

You are looking after a 3 week old, born at 24+2 weeks who is now 27 weeks corrected. It is the start of your shift and you have done all your checks already. Everything is functioning properly. He has been treated for presumed sepsis in the first 48hours, but did well and has had an uneventful initial neonatal course. He was re-intubated yesterday for apneas and has been started on antibiotics, his CRP so far is <1. He was identified as MRSA positive on skin swabs but blood cultures are negative so far. A new murmur was noted earlier today and an echo has been requested. He has been stable on the ventilator with pressures of SIMV 25/5, rate 50, Ti 0.4 and has been in 30% oxygen since intubation with occasional self limiting desaturations. He is on 2 hourly NG feeds and TPN, and IV antibiotics are due in 2 hours time. In the past 10 minutes, his saturations are 78-82% despite an increase to 90-95% Oxygen.

Scenario commences

↓

Baby in incubator on ventilator:
SIMV 25/5, Rate 40, 90% 02.

A: ETT in situ, not displaced.

B: sats 75% and falling slowly. **Chest wall movement good, normal flow loops, asymmetrical breath sounds.**

C: HR 120

Expected Actions:

- Put on gloves/apron
- Assess and examine baby: ABC approach
- Look at ventilator settings (no flow loops, alarming)

May consider suction via ETT

consider using CO2 detector (Pedicap): (positive)

May Disconnect from ventilator and use Neopuff/ bagMay

May use cold light to assess for pneumothorax
(Positive on left)

Set up butterfly /3 way tap / syringe for needle thoracocentesis. Identify landmarks (2nd intercostal space, mid-clavicular line) and aspirate air.

Reassess clinical parameters afterwards: immediate improvement in saturation and HR.

Request CXR and chest drain equipment

End Scenario

Extension for senior trainees: pneumothorax after IPPV due to higher PIPs on neopuff – secondary desaturation after intubation.

Prompt: comment on the falling saturations despite good chest wall movement on the left side.

Prompt: comment on how the chest is looking asymmetrical now.

Prompt: Baby is looking much better. Saturations are now climbing.

After needle decompression
Saturations increase to 96%
HR increases to 140
Baby more active

Extension to debrief: use UV light to see how far the UV powder has spread from the cot to emergency trolley / participants gloves/ clothes etc.

FURTHER RESOURCES

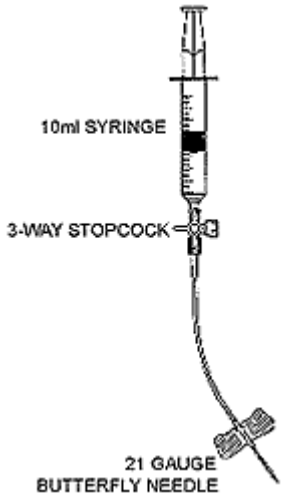
INFORMATION FOR PARTICIPANTS

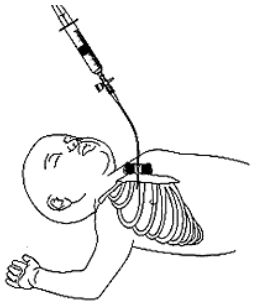
DOPE: Displacement, Obstruction, Pneumothorax and Equipment failure

- If you are unsure after auscultation about ET tube being in-situ consider using a Pedicap (Co2 detector). Remember if the baby is bradycardic, this may take a while to change colour.
- Ventilator graphics will also give you some information – closed loops and expiratory flow detected?
- Consider changing from ventilator to neopuff or bag – removes element of equipment failure, and can increase PIP manually.
- Consider suctioning to check for ETT obstruction.
- Asymmetry in chest signs or sudden deterioration – consider pneumothorax. "Cold light" transillumination works well in smaller babies but may be difficult in larger term babies. You may also need to cover the incubator fully or turn out all the lights completely for it to work.

PROCEDURE: NEEDLE THORACOCENTESIS

- Position infant supine, prepare area with alcohol wipe
- Insert needle into the pleural space (directly over the top of the rib in the second or third intercostal space in the midclavicular line) until air is aspirated into the syringe. Note volume.
- Rotate stopcock and expel air from syringe via an open port.
- Rotate stopcock and aspirate air from chest into syringe again.
- Repeat as required.
- Minimise movement in the needle to avoid lacerating the lung or puncturing blood vessels.
- Remove needle once no further air aspirated. If required, repeat with new needle. Do not leave needle in-situ as this will damage the lung.

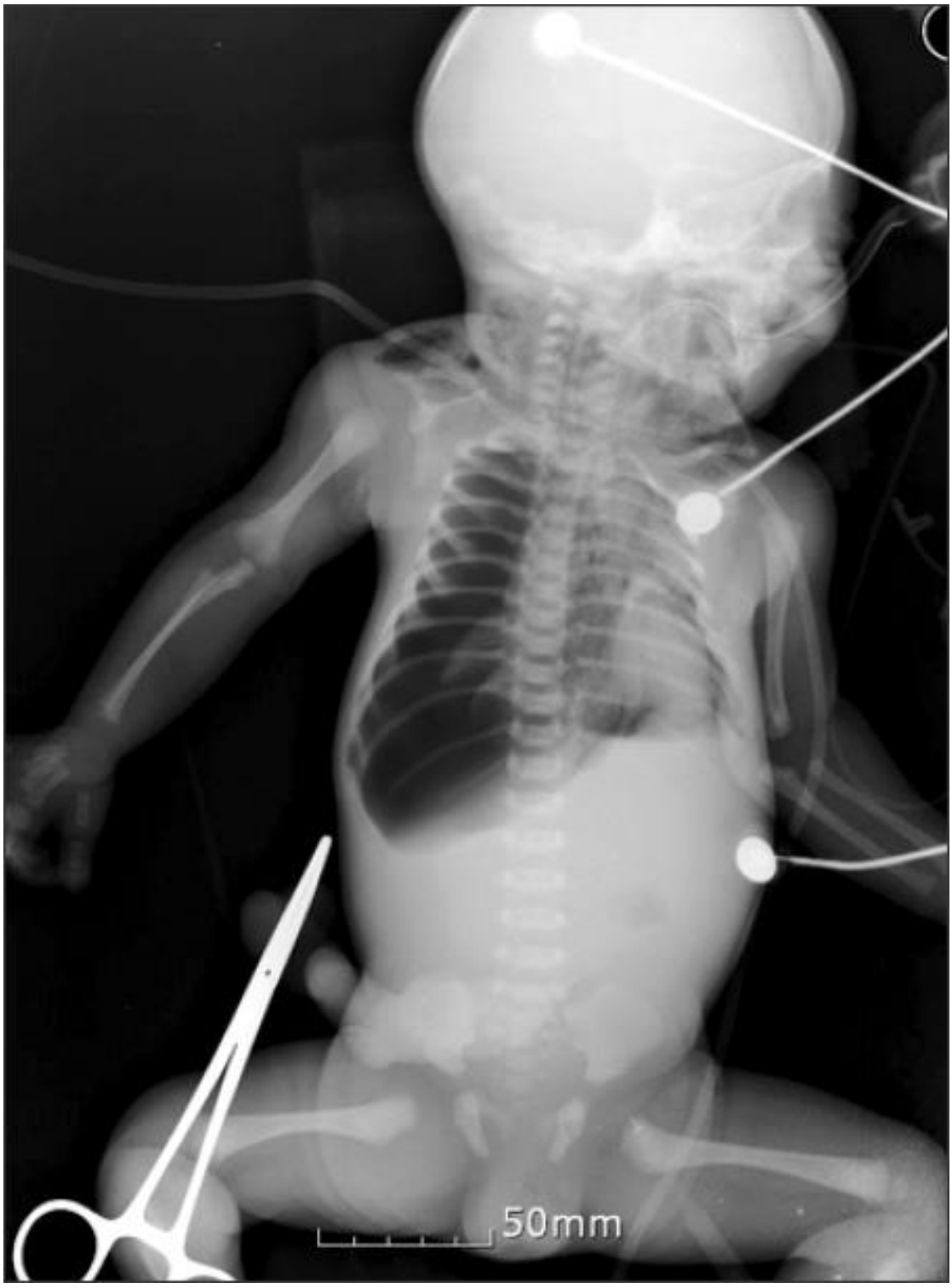




An alternative technique is to place the end of the butterfly tubing underwater e.g. in a gallipot or sterile water bottle and air from the chest should bubble through the water seal. However this does not allow you to measure air volume aspirated and care must be taken to ensure the tubing remains underwater at all times.

APPENDICES

X RAY



APPENDICES

BLOOD GAS

RADIOMETER ABL800 FLEX

ABL835 Neonatal Unit 2 13.07 09/05/2017
PATIENT REPORT Capillary (No bilirubin) Sample# 147138
FLEXMODE

Identifications

Patient ID	2016000
Patient Last Name	Simulation
Patient First Name	Baby
Date of Birth	011/01/2016
Sample type	Capillary
FO_2(I)	21.0%
T	37.0°C

Blood Gas Values

pH	7.01		[-]
pCO_2	12.8	kPa	[-]
pO_2	4.23	kPa	[-]

Acid Base Status

$cHO_3^-(p)^c$	16.0	mmol/l
ABE_c	-2.5	mmol/l

Oximetry Values

*ct*Hb	165	g/l	[-]
Hct_c	50.1	%	
So_2	52.8	%	[-]
$F0_2Hb$	21.2	%	
*F*COHb	1.3	%	[-]
*F*MetHb	1.8	%	[-]

Electrolyte Values

cNa^+	139	mmol/l	[-]
cK^+	5.3	mmol/l	[-]
cCa^{2+}	1.45	mmol/l	[-]
cCl^-	1.9	mmol/l	[-]
AnionGap,K^+c	9.7	mmol/l	[-]

Metabolite Values

*c*Glu	5.5	mmol/l	
*c*Lac	5.9	mmol/l	[-]

Temperature Corrected Values

pH(*T*)	7.01		[-]
pCO_2(*T*)	12.8	kPa	[-]
pO_2(*T*)	4.23	kPa	[-]

Notes
↓ Value(s) below reference range
C Calculated value(s)
0879:Adaptive measuring mode applied

Printed 13:07:00 09-05-17

APPENDICES

PARTICIPANT REFLECTION AND FEEDBACK

What have you learned from this experience? (Please try and list 3 things)

How will your practice now change?

What other actions will you now take to meet any identified learning needs?

How could the scenario be improved for future participants?