

Neonatal Scenario: Necrotising Enterocolitis in SCN

Set Up:

Mannequin/ confederate	Moulage	Equipment available	Drugs available
Sim NewB	IV in situ + maintenance fluid	Bag & mask/neopuff	Volume: 0.9% Saline
Parent	NGT in situ with bile	Airway trolley incl intubation equipment	Adrenaline
NICU/SCN nurse	Phototherapy (overhead or blanket)	Circulation trolley incl iv equipment	Inotropes
NETS consultant on the phone	Cold (ice packs on periphery prior to scenario)	Neonatal stethoscope	Intubation drugs- morphine/sux/atropine
	Monitor (ECG & SpO2)		Antibiotics: flucloxacillin, gentamicin, metronidazole
	Moulage as erythematous abdomen		Adrenaline

Monitor: Basic ICU (SpO2 + ECG)

Paperwork Required:

Observation Chart	x
Drug Chart	x
Blood gas – arterial	
- venous	x (metabolic acidosis, normal gluc)
- capillary	x (metabolic acidosis, normal gluc)
Blood results: glucose (2.7mmol/L) /FBC/CRP-not back yet	x
CXR	x (pneumatosis)

Learning Objectives:

(1) Medical: Recognise cardiorespiratory compromise requiring resuscitation
Demonstrate understanding of principles of NEC management

(2) CRM

- Calling for help
- Handover (ISBAR)
- Leadership
- Delegation of workload
- Communication – parent, NETS

Synopsis of Scenario:

Level 2 SCN. 38+4 week male neonate, 72 hours of age. Known infant of diabetic mother (HbA1c 8.5%) admitted to SCN with respiratory distress, hypoglycaemia, polycythaemia. Required cot oxygen (up to 30%) for respiratory distress – ceased yesterday. Completed 48 hours of antibiotics; no evidence of sepsis. Blood sugar levels now normalised. Maintenance IV fluid + formula feeds 6mL 3 hourly. Progressive abdominal distension over course of morning. Under single light phototherapy for hyperbilirubinaemia. Haematocrit between 60 and 65%.

Develops abdominal distension, with bilious aspirate, poor perfusion & hypotension, progressing to apnoea. Team need to manage cardiorespiratory compromise, consider diagnosis of NEC (clinical assessment, x-ray) and give appropriate management.

PATIENT DEMOGRAPHICS

Patient Name:	James McGregor	DOB/Age:	72 hours of age		
Medical Record#:		Weight:	4.2kg		
Allergies:		Male	x	Female	
Relevant History	Infant of Diabetic Mother, resolved Respiratory Distress, resolved Hypoglycaemia, Jaundice, Polycythaemia				

Introductory information given to participating and observing team

- 38+4 week male infant, now 72 hours of age, infant of diabetic mother
- Admitted to SCN with respiratory distress, hypoglycaemia, polycythaemia
- Cot oxygen (up to 30%) ceased yesterday – self-ventilating in room air
- Sepsis screen and blood culture negative – antibiotics ceased yesterday
- Hyperbilirubinaemia – continues on single light phototherapy
- Haematocrit between 60 and 65%
- Blood glucose levels now normal. On maintenance iv fluids through a peripheral cannula and formula 6mL 3 hourly.
- Progressive abdominal distension over course of morning.

Mode of bringing in the participants:

- Mother is sitting next to the baby in SCN bay
- Neonatal bedside nurse (confederate) calls for a nurse and doctor from outside sim centre to come in and help, as she is concerned about the abdominal distension and gastric aspirate
- If more help called for (when infant starts having apnoeas) confederate brings rest of team from outside Sim Centre

Handover given by Confederate nurse

I James McGregor, 3 day old term neonate

S Ceased oxygen and antibiotics yesterday. Started feeds last night. Increasing abdominal distension today. AXR has been ordered but not yet reviewed. I think he has sepsis.

B Born 3 days ago at 38 weeks gestation, infant of diabetic mother, admitted with respiratory distress requiring oxygen up to 30%, hypoglycaemia requiring dextrose infusion, jaundice, and polycythaemia.

A 8mL bilious aspirate, abdominal distension, poor perfusion, temp 38.5C, BP 45/30

R I think he needs urgent review

INITIAL OBSERVATIONS:

	↑, N, ↓, absent	Description & progression
Appearance	Cool, floppy, lethargic. Cap refill 4 sec. Abdomen distended and tense.	
HR	↑ 180/min	Resting tachycardia. Falls to 160/min with fluid bolus. If ineffective/inadeq resp support for apnoea, drops to 80-100/min.

RR	N 70/min	Tachypnoeic initially. Becomes apnoeic (0/min) 1½ minutes after first responders arrive and remains so.
Temp – peripheral	38.5	No change during scenario.
Saturation	94%	In room air. Falls to 80% 20 sec after becomes apnoeic; falls further if inadeq resp support (see below)
Non-invasive BP	45/30	44/28 after 20mL/kg bolus. 60/45 after 40mL/kg given. If no volume given: 38/22.
Pupils	N 3mm	Equal & reactive

Ideal Management:	
Examination <ul style="list-style-type: none"> • DRSABCD • Notes abdominal distension and bilious aspirate 	Management <ul style="list-style-type: none"> • DRSABCD • Recognise abdominal distension and bilious aspirate – considers GI pathology including NEC in differential diagnosis • Supports airway – mask IPPV and then intubates, when apnoeic • Volume replacement for hypotension – 40mL/kg total, discusses need for inotropes, checks BP response frequently • Asks for AXR, recent blood results • Arranges blood gas: recognises metabolic acidosis • Recognises pneumatosis on AXR: NEC • Takes blood culture and starts antibiotics

First to attend: neonatal nurse and junior doctor. Onset of apnoea expected to prompt call for help and use of ISBAR to handover when help arrives.

Progression Good:	
Cues: <ul style="list-style-type: none"> • If ineffective mask IPPV: HR \uparrow to 100, SpO₂ \uparrow 70%, RR 0/min • If effective mask IPPV/intubation: HR 180/min, SpO₂ 92% • If effective volume replacement: HR to 160/min, BP 44/28 after 20mL/kg bolus; HR to 150/min, 60/45 after 40mL/kg given. 	Ideal Management: <ul style="list-style-type: none"> • IPPV for apnoea; prepares for, and intubates • Gives volume replacement: 20mL/kg and repeats; discusses need for inotropic support (either directs choice of inotrope or elects to discuss with NETS consultant depending on level of experience)

Prompts: <ul style="list-style-type: none"> • “Would you like me to do a blood gas?” • Abdominal x-ray taken this morning because of abdominal distension, not sure if it has been reviewed. • If not effective mask IPPV but not progressing to intubation: “The baby’s still apnoeic. Should we get ready to intubate?” 	<ul style="list-style-type: none"> • Orders blood gas & checks result: metabolic acidosis, normal glucose • Checks AXR: recognizes pneumatosis consistent with NEC • Takes blood culture and starts antibiotics • Discusses need to inform NETS consultant • Communicates with mother
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Progression Poor: Does not provide respiratory support for apnoea, or give fluid bolus for hypotension, or start antibiotics)	
Cues: <ul style="list-style-type: none"> • If doesn’t support airway with mask IPPV: HR to 70-80/min & SpO2 to 65% • If ineffective mask IPPV: HR 100/min, SpO2 70% • If adequate airway support but no volume replacement: HR \geq 200/min, BP 38/22 	Ideal Management: <ul style="list-style-type: none"> • Calls for help • Starts mask IPPV & prepares to intubate • Gives volume replacement: at least 20mL/kg, ideally 40mL/kg • Takes blood culture and starts antibiotics
Prompts: <ul style="list-style-type: none"> • “He’s not breathing” • “I think we should intubate” • “His perfusion is really poor” 	

Scenario finishes after 10 minutes or after intubation, fluid resuscitation, and antibiotics have been commenced, possibility of NEC considered (or other intra-abdominal pathology), there has been communication with mother, and plan to discuss with NETS.

Resources:

NETS Handbook: Necrotising Enterocolitis

NETS Handbook: Shock