Health Education Thames Valley

PROLONGED SEIZURE

MODULE: NEUROLOGY

TARGET: ALL PAEDIATRIC TRAINEES; NURSING STAFF

BACKGROUND:

Prolonged seizure is the most common neurological medical emergency in children. It continues to be associated with significant morbidity and mortality.

The Royal College of Paediatrics and Child Health (RCPCH) has set standards for training; by the completion of level one training, all trainees are expected to be able to initiate therapy in a child presenting with prolonged seizure.

Editor: Dr Andrew Darby Smith
Original Author: Dr R Furr (adapted from Bristol Key Competencies)

INFORMATION FOR FACULTY

LEARNING OBJECTIVES

At the end of the session, participants should:

1. Recognise role of intraosseus access when IV access unsuccessful
2. Be able to initiate and continue anticonvulsant treatment for acute status epilepticus
3. Understand principles of anticonvulsant treatment
4. Have knowledge of common causes of seizures in babies and children
5. Form differential diagnosis for status epilepticus
6. Refer to intensive care team whilst maintaining patient safety until they take over.
7. Engage in multidisciplinary team management

SCENE SETTING

Location: Emergency Department
Expected duration of scenario: 15 mins Expected duration of debriefing: 30 mins

EQUIPMENT AND CONSUMABLES

Mannequin (baby)
Monitoring
O_2 facemask
Bag valve mask
Laryngoscope
Size 3.5, 4.0 ETT
IV cannula plus fixation stickers
EZ-IO device
0.9% saline
10 % dextrose
Simulated Drugs:
- IV Lorazepam
- Buccal Midazolam/PR Diazepam
- PR Paraldehyde
- IV Phenytoin
- IV Phenobarbitone

Syringes (enteral, 5ml, 10ml, 50ml)
Drug chart
Obs chart
Blood gas results
SORT Emergency drug chart (if requested – see appendix)

PERSONNEL-IN-SCENARIO

ST1-3 trainee *and/or*
ST4-6 trainee
ED or paediatric nurse
Mollie's mother

ADDITIONAL INFORMATION

Differential diagnosis for floppy/seizing neonate:
- Hypoglycaemia
- Sepsis
- Non-accidental injury
- Electrolyte disturbance
- Metabolic syndrome

(NB In this scenario, unable to get initial IV access so intraosseus route should be used).

PARTICIPANT BRIEFING

2-month-old Mollie has been brought to the Emergency Department by her mum who is worried because Mollie has been difficulty to settle and not feeding properly.

The triage nurse has asked you to review Mollie urgently.

FACULTY BRIEFING

'VOICE OF THE MANIKIN' BRIEFING

2-month old baby; very quiet and drowsy.

IN-SCENARIO PERSONNEL BRIEFING (MUM)

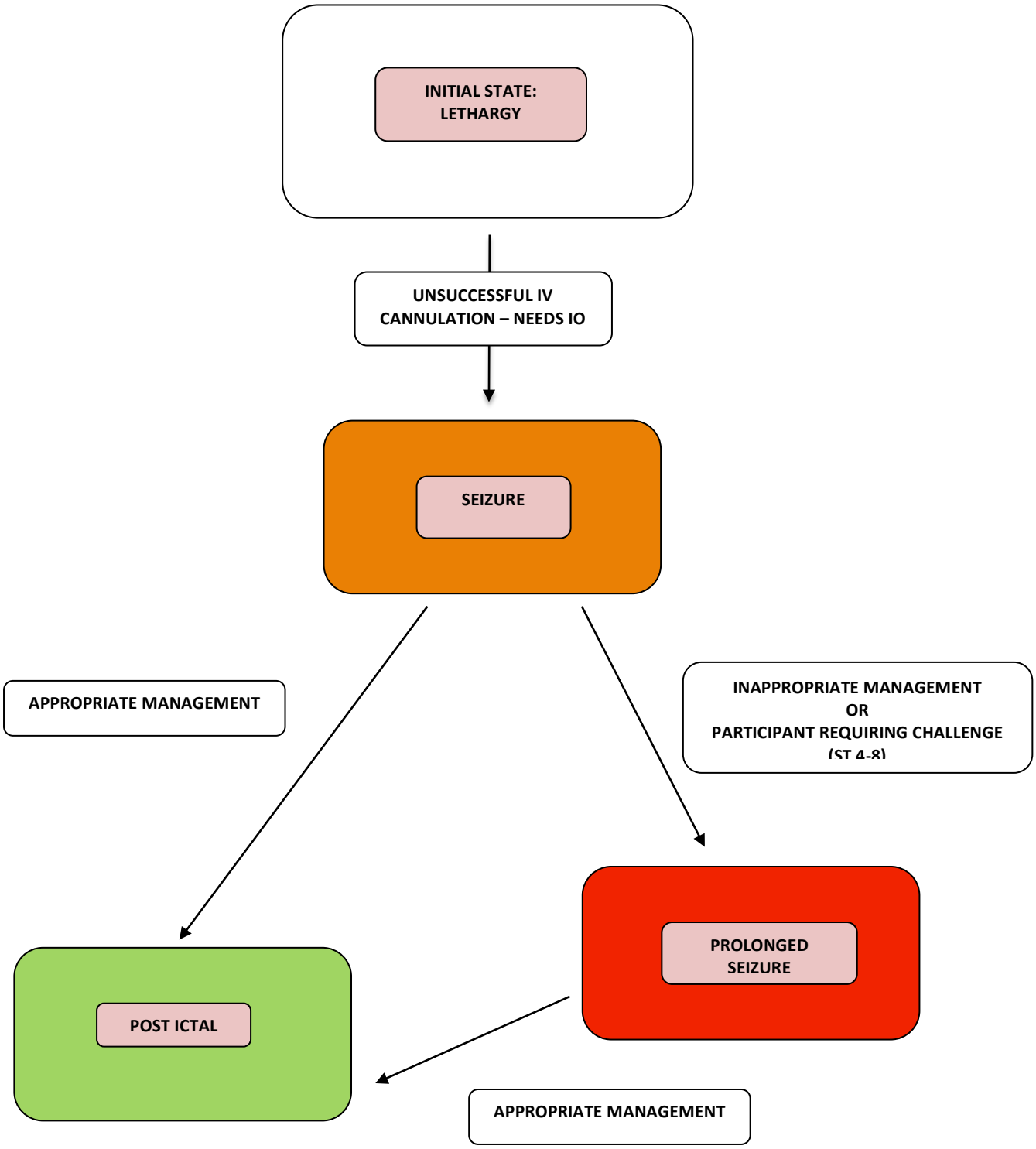
Mollie is your two-month old baby and you brought her to ED because you are worried she is getting floppier. She has been unsettled for the past day and has not been feeding well from her bottle.

If asked: Mollie was born at term by normal vaginal delivery and did not require special care after birth. Mollie has been well so far, with no medical concerns and no regular medications. She is due her first set of immunisations next week. You live with Mollie's father (your boyfriend) and Mollie. You have no other children.

IN-SCENARIO PERSONNEL BRIEFING (NURSE)

You have just triaged Mollie who was brought into ED via taxi with her mum. You are very concerned about her because she is very quiet and floppy with a bulging soft spot.

CONDUCT OF SCENARIO



INITIAL STATE: LETHARGY

VITAL SIGNS					
Rhythm	SR	**HR**	130	**BP**	68/34
Resp rate	30	**SaO_2**	95%	**$ETCO_2$**	
Temp	35.7	**AVPU**	V	**Pupils**	3 ERL
Other	Wt = 5kg	Mannequin dressed in vest and babygro			
ASSESSMENT					
Pulses	Normal	**Cap refill**	2-3 sec	**Skin**	No rashes
Airway	Maintained	**Breathing**	Normal	**Breath sounds**	Normal
Work of breathing	Normal	**Recession**	None	**Neuro**	Bulging fontanelle
Other	Baby quiet; hypotonic				

EXPECTED OUTCOMES	
Participants should:	Obtain brief history. Key features: • poor feeding • difficult to settle Full examination, exposing skin. Key features: • Very quiet • Bulging fontanelle • Hypotonic Apply monitoring • Note capillary refill 2-3 seconds but HR not tachycardic for baby of this age Attempt IV access • Unsuccessful – should move to IO access. Consider fluid bolus once IO/IV access obtained • Note floppy child with prolonged capillary refill
Facilitators should:	After five minutes move to state **'Seizure'**

STATE: SEIZURE / PROLONGED SEIZURE

VITAL SIGNS					
Rhythm	SR	**HR**	170	**BP**	Unable to pick up (seizing)
Resp rate	30	**SaO_2**	Poor signal	**$ETCO_2$**	
Temp	35.7	**AVPU**	U	**Pupils**	3 ERL
Other	Mannequin in 'seizure' state				
ASSESSMENT					
Pulses	Normal	**Cap refill**	2-3 sec	**Skin**	No rashes
Airway	Maintained	**Breathing**	Erratic pattern	**Breath sounds**	Reduced
Work of breathing	Normal	**Recession**	None	**Neuro**	Unresponsive
Other	Seizure is generalised; not focal. Still has bulging fontanelle.				

EXPECTED OUTCOMES	
Participants should:	• Gain IO access if not done already • Once blood gas results available, give bolus 10% dextrose • Give rectal diazepam 2.5mg or buccal midazolam if no IV/IO access • Give intravenous/IO lorazepam 0.1mg/kg • Give PR paraldehyde whilst IV phenytoin being prepared • Could also give 0.9% saline bolus via IO and reattempt IV access
Facilitators should:	- If suboptimal management (e.g. hypoglycaemia not addressed), or if senior trainee requiring challenge, baby continues to have seizure. - If no progression after 10 minutes, use 'pause and perfect' principle to help participant understand current state and treatment options, before restarting scenario and allowing them to instigate appropriate management. - If appropriate management, seizure stops before phenytoin given. Progress to state **'Post-Ictal'**.

STATE: POST-ICTAL

VITAL SIGNS					
Rhythm	SR	**HR**	130	**BP**	74/38
Resp rate	30	**SaO_2**	95%	**$ETCO_2$**	
Temp	36	**AVPU**	P	**Pupils**	3 ERL
Other	Seizure terminated – no abnormal movements				
ASSESSMENT					
Pulses	Normal	**Cap refill**	2-3 sec	**Skin**	No rashes
Airway	Maintained	**Breathing**	Normal	**Breath sounds**	Normal
Work of breathing	Normal	**Recession**	None	**Neuro**	Responsive to pain
Other	Seizure terminated. Baby now floppy. Cries in response to pain.				

EXPECTED OUTCOMES	
Participants should:	1. Recognise post-ictal state 2. Suggest bloods: - Ongoing BM/blood gas monitoring - U+E, FBC, Coagulation screen, - Serum amino acids, ammonia - Blood cultures 3. Suggest urine tests: - MC+S - Ketones - Amino and organic acids 4. Suggest radiology: - Cranial USS - CT head - ?Chest X-ray - ?Skeletal survey 5. Arrange transfer to ward/HDU
	- If suboptimal management (e.g. hypoglycaemia not addressed), or if senior trainee requiring challenge, baby continues to have seizure. - If no progression after 10 minutes, use 'pause and perfect' principle to help participant understand current state and treatment options, before restarting scenario and allowing them to instigate appropriate management. - If appropriate management, seizure stops. Progress to state **'Post-Ictal'**.

APPENDIX 1 – BLOOD GAS – SEIZURE

RADIOMETER ABL SIMULATION SERIES

ABL725 ICU 09:14 C0 09-01-2013
PATIENT REPORT Syringe - S 195uL Sample# 90396

Identifications

Patient ID	10183365
Patient First Name	Mollie
Patient Last Name	McGivern
Date of Birth	11/11/2012
Sample type	Venous
Operator	Emergency Department

Blood Gas Values

pH	7.19		[7.340 - 7.450]
*p*CO²	8.10	kPa	[4.70 - 6.00]
*p*O²	5.8	kPa	[10.0 - 13.3]
*p*O²(A-a)e		kPa	

Oximetry Values

*c*tHb	12.4	g/dL	[12.0 - 16.0]
sO²		%	[95.0 - 98.0]
*F*O²Hb		%	[94.0 - 99.0]
FC OHb		%	[-]
*F*HHb		%	[-]
*F*metHb		%	[0.2 - 0.6]
Hct*c*		*%*	

Electrolyte Values

cK+	4.4	mmo1/L	[3.0 - 5.0]
cNa+	137	mmo1/L	[136 - 146]
*c*Ca²+	1.10	mmoq/L	[1.15 - 1.29]
*c*C1-	97	mmo1/L	[98 - 106]

Metabolite Values

*c*Glu	1.6	mmo1/L	[3.5 - 10.0]
*c*Lac	6.7	mmo1/L	[0.5 - 1.6]

Oxygen Status

*c*tO²c		vol%
*p*50c		kPa

Acid Base Status

*c*Base(Ecf)c	-5.9	mmo1/L
*c*HCO³-(P,st)c	21.2	mmo1/L

APPENDIX 2 – BLOOD GAS – POST-ICTAL

RADIOMETER ABL SIMULATION SERIES

ABL725 ICU 09:23 C0 09-01-2013
PATIENT REPORT Syringe - S 195uL Sample# 90396

Identifications

Patient ID	10183365
Patient First Name	Mollie
Patient Last Name	McGivern
Date of Birth	11/11/2012
Sample type	Venous
Operator	Emergency Department

Blood Gas Values

pH	7.29		[7.340 - 7.450]
*p*CO²	5.3	kPa	[4.70 - 6.00]
*p*O²	5.8	kPa	[10.0 - 13.3]
*p*O²(A-a)e		kPa	

Oximetry Values

*c*tHb	12.4	g/dL	[12.0 - 16.0]
sO²		%	[95.0 - 98.0]
*F*O²Hb		%	[94.0 - 99.0]
FC OHb		%	[-]
*F*HHb		%	[-]
*F*metHb		%	[0.2 - 0.6]
Hct*c*		%	

Electrolyte Values

cK+	4.4	mmo1/L	[3.0 - 5.0]
cNa+	137	mmo1/L	[136 - 146]
*c*Ca²+	1.10	mmoq/L	[1.15 - 1.29]
*c*C1-	97	mmo1/L	[98 - 106]

Metabolite Values

*c*Glu	6.6	mmo1/L	[3.5 - 10.0]
*c*Lac	4.2	mmo1/L	[0.5 - 1.6]

Oxygen Status

*c*tO²c		vol%
*p*50c		kPa

Acid Base Status

*c*Base(Ecf)c	-4.9	mmo1/L
*c*HCO³-(P,st)c	22.7	mmo1/L

APPENDIX 3 – EMERGENCY DRUG CALCULATOR

Date Dec 20, 2012

Southampton Oxford Retrieval Team

DRUG CALCULATOR

WEIGHT 5 Kg

Enter weight and click calculate

Calculate Print

Emergency

Adrenaline 1:10,000	0.5 ml	(0.1 ml/kg)
Atropine 600mcg/ml	0.17 ml	(20mcg/kg, min 100mcg)
Atropine 100mcg/ml	1 ml	(20mcg/kg min 100mcg)
Sodium Bicarbonate 8.4%	5 ml	(1 ml/kg)
Calcium Gluconate 10%	2.5 ml	(0.5 ml/kg)

Cardiac

Cardioversion (sync)	5 Joules	(1J/kg) (use 2J/kg if fails)
Shockable rhythm (async)	20 Joules	(4J/kg)
Adenosine	500 mcg	(100 mcg/kg)
Amiodarone Load	25 mg	(5 mg/kg over 30 minutes to 4hrs)

Neuro

Lorazepam	0.5 mg	(0.1 mg/kg)
Midazolam Buccal	0.5 mg	(0.1 mg/kg)
Phenytoin	100 mg	(20 mg/kg over 20 minutes)
Phenobarbitone	100 mg	(20 mg/kg)
Paraldehyde PR	2 ml	(0.4 ml/kg, mix 1:1 with oil)
3% Saline	15 ml	(3ml/kg)
Mannitol 10%	25 ml	(5ml/kg, eqivalent to 0.5g/kg)

Respiratory

Magnesium Sulphate	200 mg	(40 mg/kg over 20 minutes)
Salbutamol load	75 mcg	(15 mcg/kg over 10 minutes)
Hydrocortisone	20 mg	(4 mg/kg , max 100mg)
Aminophylline load	25 mg	(5 mg/kg over 20 minutes)
Adrenaline 1:1000 Nebulised	2.5 ml	(0.5 ml/kg, max 5 mls) Make up to 5 ml with saline

Anaesthesia

Ketamine			10 mg	(2mg/kg)
Thiopentone	5	to	25 mg	(1-5mg/kg)
Fentanyl	10	to	25 mcg	(2-5mcg/kg)
Morphine			0.5 mg	(0.1 mg/kg)
Rocuronium			5 mg	(1mg/kg)
Atracurium			2.5 mg	(0.5mg/kg)
Vecuronium			0.5 mg	(0.1mg/kg)
Suxamethonium			7.5 mg	(1.5mg/kg)

Anaphylaxis

Adrenaline IM	0.15 ml of 1:1000

Infusions

Calculations based on Southampton PICU infusions guidelines (2011)

Dopamine (central)	75 mg in 50ml of 0.9% Saline or 5% Glucose	1 ml / hr =	5 mcg/kg/min
Dopamine (peripheral)	7.5 mg in 50ml of 0.9% Saline or 5% Glucose	1 ml / hr =	0.5 mcg/kg/min
Adrenaline	1.5 mg in 50ml of 0.9% Saline or 5% Glucose	1 ml / hr =	0.1 mcg/kg/min
Noradrenaline	1.5 mg in 50ml of 0.9% Saline or 5% Glucose	1 ml / hr =	0.1 mcg/kg/min
Milrinone	10 mg in 50ml of 0.9% Saline or 5% Glucose	0.75 ml / hr =	0.5 mcg/kg/min
Dinoprostone (Prostin E2)	50 mcg in 50ml of 0.9% Saline or 5% Glucose	1.5 ml / hr =	5 ng/kg/min
Morphine	5 mg in 50ml of 0.9% Saline or 5% Glucose	1 ml / hr =	20 mcg/kg/hr
Midazolam	5 mg in 50ml of 0.9% Saline or 5% Glucose	1 ml / hr =	20 mcg/kg/hr
Salbutamol	10 mg in 50ml of 0.9% Saline or 5% Glucose	1.5 ml / hr =	1 mcg/kg/min
Aminophylline	250 mg in 250ml of 0.9% Saline or 5% Glucose	5 ml / hr =	1 mg/kg/hr

It is the prescribers responsibility to ensure the correct dose is prescribed Compiled by Tom Bennett - May 2012

APPENDIX 4 – SORT GUIDELINE – PROLONGED SEIZURE

Treatment of prolonged seizures

Definition of prolonged seizures
Generalised seizure for ≥ 5 mins
Definition of status epilepticus
Generalised seizure lasting for ≥ 30 mins
Two or more seizures over a 30min period without full recovery between them

Causes
- Cerebro-vascular event (infarct or bleed),
- Space occupying lesion,
- Blocked VP shunt,
- Overdose (accidental or self harm),
- Hypoxia,
- Metabolic problem
- Fever
- Known epilepsy
- CNS infection,
- Hyponatraemia, hypoglycaemia,
- Head injury (acute or previous),

Issues
- **Hypoventilation post benzodiazepines**
- Failure to recognise on-going seizures
- Failure to identify and treat cause
- Refractory status epilepticus

Management principles
- Maintain ABCD
- Administer high flow oxygen
- Stop seizures as soon as possible
- Find and treat cause

0 – 10 Min

Intravenous access: *YES*
Lorazepam IV **0.1mg/kg**

Intravenous access: *NO*
Diazepam PR **0.5mg/kg OR** Midazolam buccal **0.2mg/kg**

10 – 20 Min

Lorazepam IV **0.1mg/kg**

Paraldehyde PR **0.4ml/kg**

IO if still no IVI access

20 – 40 Min

Is the child normally on phenytoin?

NO

Phenytoin IV 20mg/kg
- Give over 20 mins
- Extravasation risk
- PR Paraldehyde if not already given

YES

Phenobarbitone IV 20mg/kg
- Give over 20 mins
- Watch for hypotension
- PR Paraldehyde if not already given

40 – 60 Min

ANAESTHETISE TO TERMINATE SEIZURE: INTUBATE/VENTILATE
Thiopentone **3 – 5 mg/kg** and short acting muscle relaxant

60 Min

REASSESSMENT
- If seizures persist see management of refractory seizures
- Remember if muscle relaxed will need to assess HR, BP and pupillary reactions to determine if seizures controlled
- **If seizures controlled, wake up and consider extubation**

Urgent interventions
- **Glucose** aim for 4-6 mmols/L
- **Hyponatraemia**
  If Na < 125 mmols/L
  Give bolus 3 mls/kg 3% NaCL
- **Keep temp** <37°C
- **Bacterial Meningitis**
  Cefotaxime 80 mg/kg IV
- **Encephalitis** add Acyclovir
- **Check ammonia** in neonate

Indications for CT scan
- **Refractory seizures**
- **Focal signs**
- **New focal seizure**
- **Trauma / NAI**
- **Suspect space occupying lesion**
- **VP shunt in-situ**
- **Suspected raised ICP**

Remember to request a contrast enhanced scan if suspicion of venous sinus thrombosis

Management of refractory seizures: Discuss urgently with SORT

- Commence Midazolam infusion
- 100 mcg/kg bolus and start at 100 mcg/kg/hr
- Repeat 100 mcg/kg bolus every 5 minutes **and** increase infusion rate by 100 mcg/kg/hr until seizures controlled
- Consider further half load of phenytoin or loading with phenobarbitone
- Consider Thiopentone infusion
- Obtain central access as hypotension **will** develop and vasopressors may be required
- Find and treat cause

SORT May 2012 Review 2014
www.sort.nhs.uk

APPENDIX 5 – INTRAOSSEUS NEEDLE GUIDANCE (SORT)

Intraosseous needle (IO) observation chart and guidance

Patient Label

Time/Date			
Sites inserted		**Sites attempted**	
R Tibial		R Tibial	
L Tibial		L Tibial	
Other		Other	

Guidance

There should only be one attempt at insertion in each bone
The IO needle should be secured without bandaging the limb so that the limb can be seen and monitored
One nurse must be solely responsible for monitoring the IO needle at all times

Observation Chart – to be completed every 15 minutes

Time							
Capillary refill time in distal limb (secs)							
Colour of limb *							
Visible swelling of limb Y/N **							
Limb feels firm Y/N **							

*
Colour of limb
Pink = 1
Pale = 2
Blue/White = 3

**
Always compare with other limb

Suspect extravasation if
CRT > 4secs / colour is 2 or 3 / limb swelling / limb firmness

Actions if suspected inflitration

Stop infusion (s) immediately
Remove IO needle
Call senior orthopaedic doctor to consider immediate fasciotomy
Orthopaedic registrar at Southampton or Oxford available for advice if none available locally

SORT May 2012 Review 2014
www.sort.nhs.uk

DEBRIEFING

POINTS FOR FURTHER DISCUSSION

- Hypoglycaemia and another underlying cause for seizures may co-exist (e.g. NAI, meningitis) so treatment of hypoglycaemia may not be enough to stop seizure.
- Important to recognise Human Factors in high-stress, high-noise environment when a child beings to have seizure.
- Is everyone on team comfortable with giving PR diazepam, buccal midazolam, PR paraldehyde? Often the team member nearest the child (e.g doctor) will be handed the syringe – important to know how to give it to prevent under-dosing.
- Important to remember benzodiazepines may have been given by parents or ambulance staff. If so, **do** count this dose in algorithm and progress onto paraldehyde/phenytoin after 2nd benzodiazepine (including pre-hospital dose(s)). Risk of significant respiratory depression if you do not take these pre-hospital doses into account.
- In baby having seizure with hypoglycaemia and difficult IV access, the priority should be to correct hypoglycaemia. Investigation of hypoglycaemia is less crucial at that stage, especially if obtaining blood samples is difficult.

DEBRIEFING RESOURCES

SORT (Southampton Oxford Retrieval Service) Emergency Drug Calculator
http://www.sort.nhs.uk/Media/Guidelines/Drugcalculator.pdf

SORT guideline and obs chart for IO needles
http://www.sort.nhs.uk/Media/Guidelines/Intraosseousneedle(IO)observationchartandguidance.pdf

PROLONGED SEIZURE - HANDOUT

INFORMATION FOR PARTICIPANTS

KEY POINTS

- Hypoglycaemia and another underlying cause for seizures may co-exist (e.g. NAI, meningitis) so treatment of hypoglycaemia may not be enough to stop seizure.
- Important to remember benzodiazepines may have been given by parents or ambulance staff. If so, **do** count this dose in algorithm and progress onto paraldehyde/phenytoin after 2nd benzodiazepine (including pre-hospital dose(s)). Risk of significant respiratory depression if you do not take these pre-hospital doses into account.
- Unlike with IV infusions, PR or buccal medications are often administered by the person closest to the patient – which may be you! Make sure you are happy with how to give buccal and PR medications safely and effectively.

FURTHER RESOURCES

SORT (Southampton Oxford Retrieval Service) Emergency Drug Calculator
http://www.sort.nhs.uk/Media/Guidelines/Drugcalculator.pdf

SORT guideline and obs chart for IO needles
http://www.sort.nhs.uk/Media/Guidelines/Intraosseousneedle(IO)observationchartandguidance.pdf

RELEVANT AREAS OF THE CURRICULUM

Level One

L1_GEN_STA_02	Effective responses to challenge, complexity and stress in paediatrics
L1_GEN_STA_03	Advanced neonatal and paediatric life support skills
L1_GEN_STA_05	Effective skills in paediatric assessment
L1_GEN_STA_06	Skills in formulating an appropriate differential diagnosis in paediatrics
L1_GEN_STA_07	Effective initial management of ill-health and clinical conditions in paediatrics seeking additional advice and opinion as appropriate
L1_GEN_STA_09	Safe practical skills in paediatrics
L1_GEN_STA_15	Knowledge of common and serious paediatric conditions and their management
L1_GEN_STA_29	Effective communication and interpersonal skills with colleagues
L1_GEN_STA_30	Professional respect for the contribution of colleagues in a range of roles in paediatric practice
L1_GEN_STA_32	Effective handover, referral and discharge procedures in paediatrics
L1_GEN_STA_34	Ethical personal and professional practice in providing safe clinical care
L1_GEN_STA_35	Reliability and responsibility in ensuring their accessibility to colleagues and patients and their families
PAED_L1_ENDO_ACU_HYPO_01	Know the causes, complications and treatment of hypoglycaemia in the neonatal period and beyond
PAED_L1_ENDO_ACU_HYPO_02	Know that blood glucose is an urgent investigation in patients with impaired conscious level
PAED_L1_NEURO_GEN_10	Understand the life-threatening nature of acute neurological deterioration and when to call for help
PAED_L1_NEURO_GEN_11	Be able to recognise, initiate diagnostic tests and outline the management of common (neuro) disorders
PAED_L1_NEURO_SEIZ_01	Know the common causes of seizures in newborn babies and children
PAED_L1_NEURO_SEIZ_07	Be able to initiate treatment for acute continuing seizures
PAED_L1_NEURO_SEIZ_08	Be able to form a differential diagnosis in continuing seizures
PAED_L1_NEURO_SEIZ_09	Work effectively with the multidisciplinary team (in continuing seizures)

Level Two (as above plus):

L2_GEN_STA_02	Increasing credibility and independence in response to challenge and stress in paediatrics
L2_GEN_STA_03	Leadership skills in advanced neonatal and paediatric life support
L2_GEN_STA_04	Responsibility for conducting effective paediatric assessments and interpreting findings appropriately

L2_GEN_STA_06	Improving skills in formulating an appropriate differential diagnosis in paediatrics
L2_GEN_STA_09	Effective skills in performing and supervising practical procedures in paediatrics ensuring patient safety
L2_GEN_STA_15	Extended knowledge of common and serious paediatric conditions and their management
L2_GEN_STA_29	Skill in ensuring effective relationships between colleagues
L2_GEN_STA_32	Effective skills in ensuring handover, referral and discharge procedures in paediatrics
L2_GEN_STA_34	Sound ethical, personal and professional practice in providing safe clinical care
L2_GEN_STA_35	Continued responsibility and accessibility to colleagues, patients and their families
PAED_L2_ENDO_ACU_HYPO_01	Know when to consider rare causes of hypoglycaemia and what investigations to perform during the hypoglycaemic episode
PAED_L2_ENDO_ACU_HYPO_02	Be able to treat hypoglycaemia safely and effectively with intravenous glucose or glucagon where appropriate
PAED_L2_NEURO_SEIZ_04	Be able to refer to intensive care teams appropriately and maintain patient safety until that team takes over (acute continuing seizures)
PAED_L2_NEURO_SEIZ_05	Be able to decide initial and continuing anticonvulsant therapy in babies and children

Level Three (as above plus):

L3_GEN_STA_02	Responsibility for an effective response to complex challenges and stress in paediatrics
L2_GEN_STA_03	Leadership skills in advanced neonatal and paediatric life support
L3_GEN_STA_06	Effective skills in making safe decisions about the most likely diagnoses in paediatrics
L3_GEN_STA_07	Leadership skills in the management of common and complex conditions in general paediatrics and paediatric subspecialties seeking additional advice and opinion as appropriate
L3_GEN_STA_09	Expertise in a range of practical procedures in paediatrics specific to general and sub-specialist training
L3_GEN_STA_15	Detailed knowledge of common and serious paediatric conditions and their management in General Paediatrics or in a paediatric sub-specialty
L3_GEN_STA_29	Positive and constructive relationships form a wide range of professional contexts
L3_GEN_STA_32	Effective leadership skills in the organisation of paediatric team-working and effective handover
L3_GEN_STA_34	Exemplary professional conduct so as to act as a role model to others in providing safe clinical care
L3_GEN_STA_35	Responsibility for ensuring their own reliability and accessibility and that of others in their team
PAED_L3_NEURO_SEIZ_01	Work effectively with the multidisciplinary team and lead the care maintaining patient safety until that team takes over (acute continuing seizures)

Treatment of prolonged seizures

Definition of prolonged seizures
Generalised seizure for ≥ 5 mins
Definition of status epilepticus
Generalised seizure lasting for ≥ 30 mins
Two or more seizures over a 30min period without full recovery between them

Causes
- Cerebro-vascular event (infarct or bleed),
- Space occupying lesion,
- Blocked VP shunt,
- Overdose (accidental or self harm),
- Hypoxia,
- Metabolic problem
- Fever
- Known epilepsy
- CNS infection,
- Hyponatraemia, hypoglycaemia,
- Head injury (acute or previous),

Issues
- **Hypoventilation post benzodiazepines**
- Failure to recognise on-going seizures
- Failure to identify and treat cause
- Refractory status epilepticus

Management principles
- Maintain ABCD
- Administer high flow oxygen
- Stop seizures as soon as possible
- Find and treat cause

0 – 10 Min

Intravenous access: *YES*
Lorazepam IV **0.1mg/kg**

Intravenous access: *NO*
Diazepam PR **0.5mg/kg OR** Midazolam buccal **0.2mg/kg**

10 – 20 Min

Lorazepam IV **0.1mg/kg**

Paraldehyde PR **0.4ml/kg**

IO if still no IVI access

20 – 40 Min

Is the child normally on phenytoin?

NO

Phenytoin IV 20mg/kg
- Give over 20 mins
- Extravasation risk
- PR Paraldehyde if not already given

YES

Phenobarbitone IV 20mg/kg
- Give over 20 mins
- Watch for hypotension
- PR Paraldehyde if not already given

40 – 60 Min

ANAESTHETISE TO TERMINATE SEIZURE: INTUBATE/VENTILATE
Thiopentone **3 – 5 mg/kg** and short acting muscle relaxant

60 Min

REASSESSMENT
- If seizures persist see management of refractory seizures
- Remember if muscle relaxed will need to assess HR, BP and pupillary reactions to determine if seizures controlled
- **If seizures controlled, wake up and consider extubation**

Urgent interventions
- **Glucose** aim for 4-6 mmols/L
- **Hyponatraemia**
  If Na < 125 mmols/L
  Give bolus 3 mls/kg 3% NaCL
- **Keep temp** <37°C
- **Bacterial Meningitis**
  Cefotaxime 80 mg/kg IV
- **Encephalitis** add Acyclovir
- **Check ammonia** in neonate

Indications for CT scan
- **Refractory seizures**
- **Focal signs**
- **New focal seizure**
- **Trauma / NAI**
- **Suspect space occupying lesion**
- **VP shunt in-situ**
- **Suspected raised ICP**

Remember to request a contrast enhanced scan if suspicion of venous sinus thrombosis

Management of refractory seizures: Discuss urgently with SORT

- Commence Midazolam infusion
- 100 mcg/kg bolus and start at 100 mcg/kg/hr
- Repeat 100 mcg/kg bolus every 5 minutes **and** increase infusion rate by 100 mcg/kg/hr until seizures controlled
- Consider further half load of phenytoin or loading with phenobarbitone
- Consider Thiopentone infusion
- Obtain central access as hypotension **will** develop and vasopressors may be required
- Find and treat cause

SORT May 2012 Review 2014
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PARTICIPANT REFLECTION

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?

PARTICIPANT FEEDBACK

Date of training session:.....

Profession and grade:.....

What role(s) did you play in the scenario? (Please tick)

Primary/Initial Participant	
Secondary Participant (e.g. 'Call for Help' responder)	
Other health care professional (e.g. nurse/ODP)	
Other role (please specify):	
Observer	

	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
I found this scenario useful					
I understand more about the scenario subject					
I have more confidence to deal with this scenario					
The material covered was relevant to me					

Please write down one thing you have learned today, and that you will use in your clinical practice.

How could this scenario be improved for future participants? This is especially important if you have ticked anything in the disagree/strongly disagree box.

FACULTY DEBRIEF – TO BE COMPLETED BY FACULTY TEAM

What went particularly well during this scenario?

What did not go well, or as well as planned?

Why didn't it go well?

How could the scenario be improved for future participants?