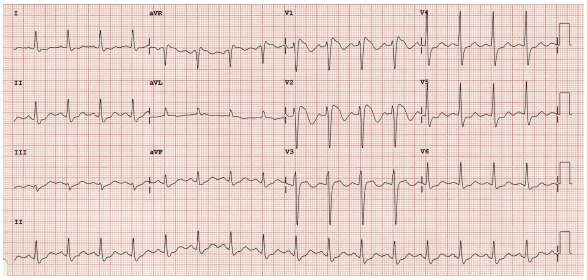
"List" = 1-3 words
"State"= short statement/ phrase/ clause

UNIVERSITY HOSPITAL, GEELONG
FELLOWSHIP WRITTEN EXAMINATION
WEEK 14– TRIAL SHORT ANSWER QUESTIONS Suggested answers

PLEASE LET TOM KNOW OF ANY ERRORS/ OTHER OPTIONS FOR ANSWERS
Please do not simply change this document - it is not the master copy !

Question 1 (18 marks)

A 45 year man presents following a collapse. His observations are: BP 130/70mmHg Temp 36° O2 saturation 98% on room air



a. State four (4) abnormal findings shown in this ECG.(4 marks)
- **Sinus tachycardia 100 bpm**
- **STE:**
  - **4mm in V1-2, "Downsloping" or "Coved"**
  - **Brugada sign (as this is followed by inverted Twave)**
- **STD 2mm V4-V6, II, III, aVF**
- **TW V1-2, aVL, biphasic in V3**

b. What is the significance of this ECG for this patient? List two (2) points of significance. (2 marks)
- **In association with syncope is diagnostic of Brugada syndrome**
- **Needs admission to monitored bed to monitor for malignant arrhythmia**
- **High untreated mortality from VF** *(~ 10% / year)*

Type 1 (Coved ST segment elevation >2mm in>1 of V1-V3 followed by a negative T wave) is the only ECG abnormality that is potentially diagnostic.
The other two types of Brugada are non-diagnostic but possibly warrant further investigation.
Type 2 has >2mm of saddleback shaped ST elevation.
Brugada type 3 can be the morphology of either type 1 or type 2, but with <2mm of ST segment elevation.

c. What is the pathophysiological basis for this problem? (3 marks)
- **Mutation in a sodium channel gene (sodium channelopathy)**
- **Either spontaneous or familial clustering (autosomal dominant)**
- **Subendocardial fibrosis or replacement of myocardium with adipose**

d. List four (4) likely precipitating causes for this presentation. (4 marks)

NB: ECG changes of Brugada syndrome can be transient and can be augmented or unmasked by multiple factors
- **Drugs:**
  - **Na Channel blockers/ CCB/ BBlockers**
  - **Nitrates**
  - **Cholinergic stimulation**
  - **Alcohol**
  - **Cocaine**
- **Fever**
- **Myocardial ischaemia**
- **↓K^+**
- **Post DCR**
- **Alcohol**
- **Hypothermia**

e. List four (4) other clinical features ***(Clinical features = Hx & Ex)*** that may also be associated with this problem. (4 marks)

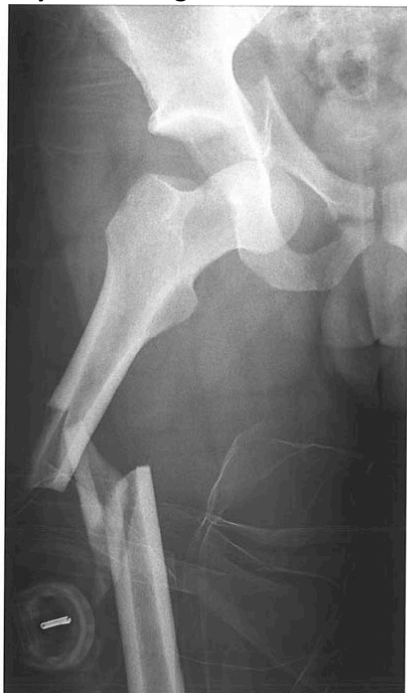
NB: To be Dx as "Brugada Syndrome": 1) Brugada sign on ECG (Coved ST > 2mm in > 1 of V1-V3 followed by TWI) <u>&</u>
2) One of the following clinical criteria (or syncope as here)
- **VF**
- **Polymorphic VT**
- **FHx sudden cardiac death < 25 years old**
- **Coved-type ECGS in family members**
- **Inducible VT with flecainide or electrical stimulation**
- **Nocturnal agonal respiration**

f. What is the specific treatment of choice for this problem?
- **AICD (or Quinidine if AICD CI eg neonate)**

Question 2 (12 marks)

A 45 year old man is brought into your emergency department, by ambulance, with isolated severe pain in his right hip after a fall from his motorbike one hour earlier. He has a past history of IVDU.
The ambulance officers were unable to obtain IV access and have provided penthrane for analgesia alone.
His ambulance handover observations are: BP 95/50mmHg HR 130 bpm RR 24 bpm Oxygen saturations 98% RA GCS15
His primary survey, including a FAST scan, is negative. You arrange a trauma series plain xray.

a. State five (5) steps in your initial approach to provision of analgesia. Include any drug doses and routes. (5 marks)
   NB: Hx IVDU
   - **Continue penthrane/ redose penthrane if only single dose given**
   - **Inhalational: Nitrous oxide 50/50**
   - **IN fentanyl- anticipate > usual doses needed (usual 1.5 mcg/kg accept to 2mcg/kg repeat same dose in 10/60 if inadequate)**
   - **IM ketamine after Hx taken: 2-3 mg/kg, followed by Ketamine 10-20 mg IV when IV access obtained**
   - **IV narcotic- morphine when IV access obtained- anticipate high levels needed - 15-20mg total+. May aggravate hypotension. Fentanyl 25-50 mcg titrated a better option.**



b. State five (5) abnormal findings shown in this xray. (5 marks)
   - **Comminuted # of R femur at junction of prox and mid 1/3 with 100% off ending and angulation.**
   - **Dislocated R hip, likely anterior with infero-medial displacement**
   - **Transverse # R pubic bone, symphysis not widened**
   - **# R superior pubic ramus/acetabular floor with medial displacement**
   - **metal and material artifact R thigh**

His injuries are confirmed to be isolated to those shown in the hip xray only.
Despite your initial provision of analgesia, he continues to complain of severe pain.

c. State two (2) points in your on-going approach to his analgesia. Include any drug doses and routes. (2 marks)
   - **Reduced # femur and longitudinal traction**
   - **Further IV ketamine- 10 mg bolus/ background infusion**
   - **Femoral nerve block under US guidance (0.5% 2-3 mg/kg)**

   NB: given Hx IVDU- PCA is relatively CI

Question 3 (12 marks)

a. Complete the table to distinguish between the investigative features of diabetic ketoacidosis and hyperosmolar non ketotic state. (4 marks)

Investigation	Diabetic ketoacidosis	Hyperosmolar non ketotic state
BSL	**>11 (rarely > 30)**	**BSL very high (> 33)**
Osmo	**N**	**Hyperosmo > 350 mosm/L**
Acidosis	**pH < 7.3** **HCO3 < 15**	**Mild or absent (may have mild Lactic acidosis**
Se ketones	**≥ 0.6 mmol/L (usually > 10 mmol/L)**	**≤ 0.6**
Ur:Cr		**increased**

b. Complete the table to distinguish between the management of diabetic ketoacidosis and hyperosmolar non ketotic state. (8 marks)

Key Management step	Diabetic ketoacidosis	Hyperosmolar non ketotic state
Fluid requirements	**~ 5L deficit replaced over 24-48/24**	**Greater volumes needed- 8-20 L, slow IV replacement over 48-72/24**
Insulin rate	**Required at 0.1 IU/kg/hr if BGL > 15**	**May not be required.** **If required, lower dose 0.05 IU/kg/hr**
K^+ replacement	**Initial rate 10-20 mmol/hr** **Often large deficit**	**Deficits variable**
VTE prophylaxis	**Not usu. clinically relevant**	**VTE major cause of morbidity/mortality**
Rx underlying cause		

Question 4 (12 marks)

A 65 year old woman presents with a severe headache. She is otherwise asymptomatic and takes no regular medications. Her observations are:

BP	245/130 mmHg	
HR	80	bpm
Respiratory rate	18	bpm
Temperature	36	°C
Oxygen saturation	100%	room air
GCS	15	

a. List four (4) key examination findings to seek on your examination. List why each sign is important. (4 marks)

Examination finding	Why is this sign important?
Papilloedema	**↑ ICP**
Meningism- neck stiffness	**↑ ICP- SAH**
CN III	**Suggests aneurysm**
Renal a bruit	**RAS**
Renal mass	**RCC**
Adrenal mass	
Cushing syndrome features	**Leads to possible underlying Dx**
Hypertensive retinopathy	**End organ effect of longstanding HT**
LVF, 4th heart sound	**CCF**

b. List four (4) drug options for the management of her blood pressure. For each state your initial dose and route. (8 marks)

Drug option	Dose/ route
Labetolol *(stroke, preeclampsia +with GTN in dissection)*	**10-20mg IV bolus repeated every 10 min until target BP obtained then 1-2mg/min infusion**
Hydralazine	**5-10 mg bolus repeated 10 minutely**
GTN *(ischaemia, LVF)*	**300-600 mcg S/L** **Followed by infusion 5mcg/kg/hr titrated to response**
Phentolamine *(Phaeo)*	**1-5mg boluses to maximum 15 mg**
Nifedipine	**60 mg QID PO**
Morphine	**2.5 mg boluses 5/60**

Question 5 (12 marks)

A 6 week old female infant presents with vomiting.

a. List six (6) likely causes of vomiting in this patient. State the clinical features that would allow you to differentiate each cause. (12 marks)

Cause of vomiting	Distinguishing clinical feature/s
Overfeeding	**Hx of overfeeding + absence of features of other serious cause**
Reflux	**small milk possets post feeds in well infant**
Sepsis	**Temperature,**
Pyloric stenosis	**projectile non bilious vomiting post feeds, then hungry, olive shaped mass, visible peristalsis R-L**
Intussusception	**Intermittent episodes crying and pallor, well in between**
Malrotation	**Distended abdo, distressed with pain, bilious vomiting, feeding issues since birth**
NEC	**Prematurity**
Metabolic disorder	**FHx same, FFT, ↓BSL** *(98% have ≥1 episode of hypo)* **Dysmorphic** **Seizures**
Infective gastro	**rapid onset diarrhoea +/- vomiting, fever, abdominal pain, often history contact with another person with similar Sx**

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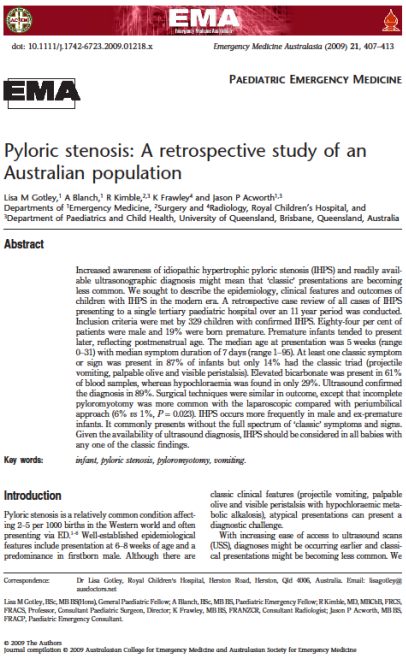

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EMA

PAEDIATRIC EMERGENCY MEDICINE

Pyloric stenosis: A retrospective study of an Australian population

Lisa M Gotley,[1] A Blanch,[1] R Kimble,[2,3] K Frawley[4] and Jason P Acworth[1,3]
Departments of [1]Emergency Medicine, [2]Surgery and [4]Radiology, Royal Children's Hospital, and [3]Department of Paediatrics and Child Health, University of Queensland, Brisbane, Queensland, Australia

Abstract

Increased awareness of idiopathic hypertrophic pyloric stenosis (IHPS) and readily available ultrasonographic diagnosis might mean that 'classic' presentations are becoming less common. We sought to describe the epidemiology, clinical features and outcomes of children with IHPS in the modern era. A retrospective case review of all cases of IHPS presenting to a single tertiary paediatric hospital over an 11 year period was conducted. Inclusion criteria were met by 329 children with confirmed IHPS. Eighty-four per cent of patients were male and 19% were born premature. Premature infants tended to present later, reflecting postmenstrual age. The median age at presentation was 5 weeks (range 0–31) with median symptom duration of 7 days (range 1–95). At least one classic symptom or sign was present in 87% of infants but only 14% had the classic triad (projectile vomiting, palpable olive and visible peristalsis). Elevated bicarbonate was present in 61% of blood samples, whereas hypochloraemia was found in only 29%. Ultrasound confirmed the diagnosis in 89%. Surgical techniques were similar in outcome, except that incomplete pyloromyotomy was more common with the laparoscopic compared with periumbilical approach (6% vs 1%, $P = 0.023$). IHPS occurs more frequently in male and ex-premature infants. It commonly presents without the full spectrum of 'classic' symptoms and signs. Given the availability of ultrasound diagnosis, IHPS should be considered in all babies with any one of the classic findings.

Key words: *infant, pyloric stenosis, pyloromyotomy, vomiting.*

Introduction

Pyloric stenosis is a relatively common condition affecting 2–5 per 1000 births in the Western world and often presenting via ED.[1–6] Well-established epidemiological features include presentation at 6–8 weeks of age and a predominance in firstborn male. Although there are classic clinical features (projectile vomiting, palpable olive and visible peristalsis with hypochloraemic metabolic alkalosis), atypical presentations can present a diagnostic challenge.

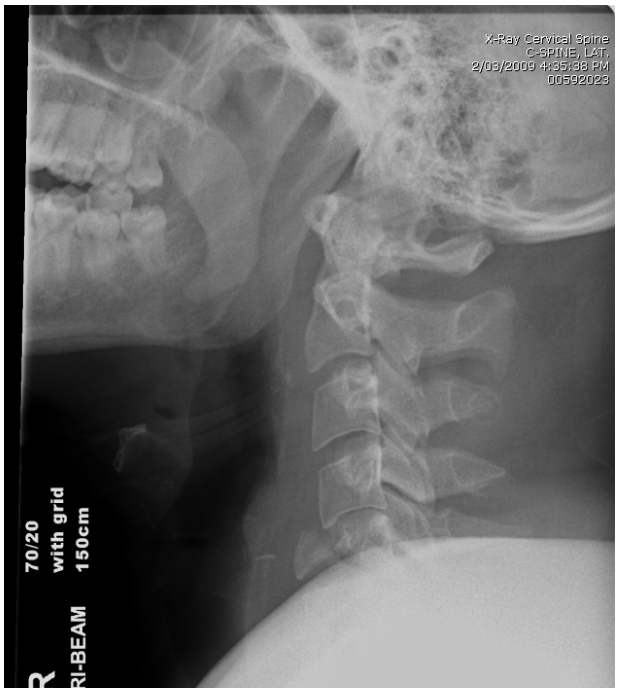
With increasing ease of access to ultrasound scans (USS), diagnoses might be occurring earlier and classical presentations might be becoming less common. We

Correspondence: Dr Lisa Gotley, Royal Children's Hospital, Herston Road, Herston, Qld 4006, Australia. Email: lisagotley@ausdoctors.net

Lisa M Gotley, BSc, MB BS(Hons), General Paediatric Fellow; A Blanch, BSc, MB BS, Paediatric Emergency Fellow; R Kimble, MD, MBChB, FRCS, FRACS, Professor, Consultant Paediatric Surgeon, Director; K Frawley, MB BS, FRANZCR, Consultant Radiologist; Jason P Acworth, MB BS, FRACP, Paediatric Emergency Consultant.

Question 6 (12 marks)

A 23 year old man presented with a painful neck after diving into a pool.



a. State three (3) abnormal findings shown in his x-ray. (3 marks)
   - **# ant C5- flexion teardrop**
   - **Anterior displacement of fracture fragment**
   - **Disruption middle column**
   - **ST swelling anteriorly**

b. Is this injury likely to be stable or unstable and why? (2 marks)

Stable or unstable	Why?
Unstable	• **Ligamentous disruption highly likely- anterior longitudinal** • **2 columns involved- anterior & middle**

c. List four (4) physical methods that you could utilise to immobilise this patient. (4 marks)
   - **Rigid Cx spine collar**
   - **Sandbags and tape**
   - **Foam hard block and spinal board**
   - **Strapping head, thorax, abdo, pelvis**
   - **Vacuum mattress**

d. If the patient is to remain <u>not</u> intubated, list three (3) other non-physical measures could you employ t ensure spinal immobility
   - **Explain to pt and ensure he is aware to lie still**
   - **Analgesia**
   - **Antiemetic**
   - **Sedation**

Question 7 (10 marks)

An 87 year old man from a nursing home presents following a generalised seizure.

His observations are: BP 120/70mmHg HR 100bpm Temperature 36.8°C Oxygen saturation 97%room air GCS 12 E4, V3, M5

			Reference Range
Na^+	183	mmol/L	(135-145)
K^+	4.9	mmol/L	(3.2-4.3)
Cl^-	137	mmol/L	(99-109)
HCO_3^-	25	mmol/L	(21-28)
Urea	23.5	mmol/L	(2.7-8.0)
Creat	105	micromol/L	(50-100)
Glu	6.9	mmol/L	(3.0-6.0)
PO_4^-	2.41	mmol/L	(0.65-1.45)
Ca^{2+}	2.39	mmol/L	(2.0-2.55)
Mg^{2+}	1.12	mmol/L	(0.70-0.95)

a. Provide two (2) calculations to help you to interpret these results. (2 marks)
   - **Derived value 1: Serum osmo 2 x Na + Ur + glucose = 396**
   - **Derived value 2: Anion gap = 185- 25- 137 = 21**
   - **Ur:Cr ratio > 100**

b. What is the likely cause for this clinical picture? (2 marks)
   - **Dehydration secondary to swallowing disability/ institutionalisation/ infection/illness/ drugs**

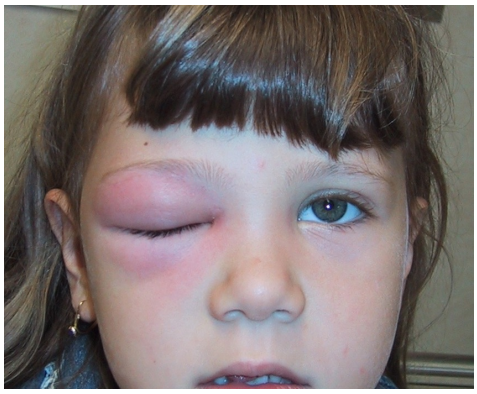
c. Complete the following table demonstrating three (3) key specific treatment tasks and state how you would achieve each of these. (6 marks)

Key treatment task	How will you achieve the task?
Replace fluid/ reduce Na	**Water deficit = 0.6 x premorbid weight x (serum Na-140)/ (140)** **Replace water deficit with 5% dextrose over 24-48hrs aiming for fall in Na conc 0.5mmol/hr 0r < 10-15mmol/24hrs, check Na regularly to monitor progress and adjust Rx** **+ will need maintenance and ongoing losses**
Treat underlying cause infection etc	**As guided by hx and ex +/- more Ix** **Eg. If central diabetes insipidis, ADH supplementation, desmopressin 1-2mcg IV/day once euvoaelmic**
Discussion with family re goals Rx and ceilings of treatment	**high morbidity and mortality expected** **Pre existing advance care directions, premorbid QOL**

Dr Tom Reade (Staff Specialist, University Hospital, Geelong Emergency Department)
Email: tomre@barwonhealth.org.au

Question 8 (12 marks)

A 4 year old girl presents with a painful right eye for the last 1 day.



a. Using the table provided, list six (6) clinical features that would differentiate between insect bite, preseptal and orbital cellulitis. (6 marks)

Clinical feature	Insect bite	Preseptal cellulitis	Orbital cellulitis
Source	**Bite witnessed, visible**	**N**	**N**
Systemic features (unwell, febrile, nauseated)	**N**	**Possible**	**Very likely**
Opthalmoplegia/ ↓ eye movements	**-**	**-**	**Present**
Proptosis	**-**	**-**	**Possible (late sign)**
Presence of anterior changes- chemosis	**-**	**-**	**Possible**
↓VA	**N**	**N**	**Possible**
RPAD	**-**	**-**	**Possible**

b. Assuming the diagnosis is orbital cellulitis, list three (3) key management points for this patient. Provide one justification for each choice. (6 marks)

Key management point	Justification
IV antibiotics- IV fluclox + ceftriaxone	**Infection with serious complications necessitating parenteral Abs** **Cover Staph, Strep, H Inf**
Analgesia	**Very painful condition**
Admit/disposition	**Urgent Opthalmology consult as may require orbital decompression if CT proven abscess**

Question 9 (18 marks)

a. Complete the table, listing six (6) causes of neonatal jaundice. List each cause in the characteristic timeframe for appearance of jaundice. (4 marks)

Time to onset of jaundice	Cause of neonatal jaundice
< 2 days	• **ABO incompatibility** • **Rh incompatibility** • **Bacterial sepsis** • **TORCH infections** • **Haemolysis eg G6PD deficiency**
2-3 days	• **Physiological**
3-7 days	• **Bacterial sepsis** • **Toxoplasmosis** • **CMV**
> 1 week	• **Bacterial sepsis** • **Hepatitis** • **Congenital bile duct atresia** • **Congenital haemolytic anaemia** • **Drug induced Haemolytic anaemia** • **Rubella** • **Herpes** • **Hypothyroidism** • **Breast milk jaundice**

b. List two (2) biochemical features seen with pathological jaundice. (2 marks)
- **Conjugated bilirubin**
- **Se Bili > 13**

c. List three (3) options for the management of pathological jaundice. (3 marks)
- **Observe**
- **Phototherapy**
- **Exchange transfusion**

d. Define "Apparent Life Threatening Event". (1 mark)
- **An episode that is frightening to the observer, characterised by some combination of:**
  - **Apnoea**
  - **Colour change**
  - **Change in muscle tone**
  - **Chocking or gagging**

e. List three (3) features of a benign "Apparent Life Threatening Event". (3 marks)
- **Term child**
- **Previously well**
- **Symptoms temporally related to feeding**

f. List five (5) investigations that are indicated in a patient who shows features of a serious "Apparent Life Threatening Event".
- **FBE & diff**
- **U+E**
- **RBG**
- **NPA for viruses/ pertussis**
- **ECG (esp for QT)**

Considered in selected cases: lactate, ammonia, acycamitine profile, EEG, CTB, Holter, tox screen, metabolic screen

From RCH:

ALTE Definition

An episode that is frightening to the observer and is characterized by some combination of:

- **Apnoea** (central or obstructive)
- **colour change** (cyanotic, pallid, or plethoric)
- **change in muscle tone** (usually diminished but may be stiffening)
- **choking or gagging**

In some cases, the observer fears that the infant will die or has died.

Notes

"Apparent Life Threatening Event (ALTE)" is not a diagnosis but rather a description which encompasses a broad range of presentations described in the definition above. While a useful term for clinicians to collectively describe these presentations, it is a term which can provoke unnecessary anxiety and alarm in parents. In well over 95% of patients with these presentations the cause is physiological or a relatively benign pathological condition (see below).

The terminology should not be used in front of parents or on written materials they might see without careful thought and explanation.

ALTE is a presentation of infancy, with highest frequency in the first 3 months of life. Approximately 0.1% of otherwise-healthy term babies will present to an emergency department with an ALTE.

There is no proven association between infants with ALTE presentations and Sudden Infant Death Syndrome. The epidemiology is different, and there is no documented increased risk of subsequent SIDS in otherwise well term infants who present with an ALTE. The term 'near-miss SIDS' should not be used.

While there is a long list of potential causes of such presentations, extensive investigation has a very low yield and is unwarranted in most cases. Targeted testing is more appropriate.

History

History should be taken, ideally first-hand, from persons who observed the infant during or immediately after the event.

1. Description of event:
    - What alerted the caregiver to a problem?
    - Behavioural state: awake or asleep
    - Colour and colour distribution (cyanosis, pallor, plethora)
    - Tone - stiff, floppy or normal
    - Seizure-like activity or abnormal movements, including abnormal eye movements
2. Circumstances and environment prior to event:
    - Relationship of the event to feeding and history of vomiting
    - Sleep position- prone / supine / side
    - Environment: nature and type of sleeping arrangement, chair, lounge, crib, car seat, bed as well type of bedding and clothing
3. Recent Illness and Family History:
    - History of coryza or other upper or lower respiratory tract symptoms in infant and family members
    - Relevant past medical history (especially prematurity), immunisation
    - Social factors including drugs and medication taken by caregiver or given to infant
4. Interventions used by caregivers
    - Degree of resuscitation required: gentle/vigorous stimulation, mouth-to -mouth/CPR

Examination

A detailed general physical examination is required, bearing in mind the possible causes.

Pay particular attention to:

- Neurological state and fontanelle
- Cardio respiratory examination
- Examine entire skin of baby for evidence of injury
- Consider fundoscopic examination if NAI suspected and consult senior medical staff (possible ophthalmology review)
- Abdomen for mass, and inguinoscrotal abnormalities

Risk-assessment

The following criteria suggest a higher risk of an underlying cause or more problematic course:

- Age less than 28 days
- Significant prematurity
- Significant prior medical illness
- Clinically unwell looking.
- Recurrent events before presentation
- More severe/prolonged ALTE symptoms

Possible Causes

It is common for no specific diagnosis to be made after evaluation and a period of observation.
Exaggerated physiological airway protection reflexes is the most common explanation (**read more**)
Occasionally the ALTE is the first sign of a developing viral respiratory infection, with more typical coryzal illness or bronchiolitis appearing in subsequent days.
Much less common, but potentially more serious causes include:

- Child abuse (shaken baby, drug overdose, Munchausen by proxy syndrome or intentional suffocation)
- Infection : Pertussis, pneumonia, meningitis, septicaemia
- Airway obstruction: congenital abnormalities, infection, hypotonia
- Abdominal: intussusception, strangulated hernia, testicular torsion
- Metabolic problems: hypoglycaemia, hypocalcaemia, hypokalaemia, other inborn errors of metabolism
- Cardiac disease: congenital heart disease, arrhythmias, vascular ring, prolonged QT
- Toxin / Drugs: accidental or non-accidental
- Neurological causes: head injury, seizures, infections, cerebral malformations etc.

Investigations

In a previously-well term infant with a clear history of ALTE symptoms temporally related to feeding, the diagnostic yield of investigations is very low. Investigations for this group are often not necessary.
For patients with more severe episodes, or those without the benign clinical picture outlined above the following investigations are reasonable:

- Full blood count and differential
- Urea & electrolytes, blood glucose,
- Nasopharyngeal aspirate for viruses & pertussis.
- ECG (measure QT interval)

If febrile - also follow the usual approach to the febrile infant

Other investigations which may be considered in selected cases:

- Investigations for occult features of non-accidental injury see
- Metabolic: lactate, ammonia, acylcarnitine profile
- EEG
- CT head
- Holter monitoring
- Urine toxicology / Metabolic screen

Investigations for Gastro-oesophageal reflux are often unhelpful see

Management

This may include initial resuscitation, and/or management of any identified underlying aetiology for the presentation (eg bacterial infection, NAI)

Need for admission:

Term-babies with more minor presentations (especially feed-related), who are well on examination, and whose parents can be appropriately reassured and educated to return if they have further concerns, may be discharged with recommendation for early follow-up with their GP or a paediatrician. In practice most babies with this presentation are admitted for observation.

Follow-up

Close follow-up post-discharge is recommended, again largely for helping with parental anxiety.