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TAME

Training against Medical Error

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D1.4, Documented Assessment Strategy

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1. INTRODUCTION

The aim of this study is to evaluate the effectiveness of the Error VPs (eVPs) as an educational intervention for undergraduate medical students designed to develop their awareness of medical error, its causes, and the factors that increase the likelihood of errors taking place. The principal elements of this study is to measure the impact of eVPs on learner performance in answering questions relating to error.

Two types of cases are being used:

1. One set of cases are the 6 branching eVP cases, designed to cover a range of different errors and causes. These Error VPs include branching logic at key trigger points, giving learners the possibility of making errors and exploring the narrative that results.
2. A second set of linear VP cases, i.e. standard VPs, which cover the same material and topics as those in the intervention group. These cases are derived from the error cases above, but the key difference is that these VPs will not include branched decision-making elements, and will not give the opportunity for learners to make decisions and subsequently errors. However, they will have addressed the same learning objectives, because in each case the route will have taken students through the sub-optimal route allowing them to explore implications of error.

The interactive eVPS include branching logic at key trigger points, giving learners the possibility to make errors and exploring the narrative that results. Students will have be divided into 2 cohorts. The first cohort of the students (Cohort A: the intervention group) is going to receive the eVPS; the second cohort (Cohort B) will receive linear VPs which cover the same cases and topics as those in the intervention group, but students are not involved in the direction or clinical management of the patient in VP case. In order that all students can cover the same learning objectives, the direction of the case is sub-optimal i.e. to an extent the scenario contains an element of error, but not serious error; clinical management is sub optimal, i.e. the best management option was not taken.

The eVP cases have been adapted to the language and the cultures (social, healthcare, religious) of the countries concerned (Del. 2.1). Each of the countries concerned, the 2 universities have agreed to construct common cases, so i.e. students of both universities in each country will using identical cases.

The main assessment tool is a group of 54 Single Best Answer questions (SBAs) as described, Section 3.1.

2. STUDY POPULATION

2.1. Study Population and Participants

The study participants will be drawn from undergraduate medical students at six medical schools from within the partnership of the TAME project; Karaganda State Medical University (Kazakhstan), Astana Medical University (Kazakhstan), Bukovinian State Medical University (Ukraine), Zaporozhe State Medical

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University (Ukraine), Hanoi Medical University (Vietnam) and Hue University of Medicine and Pharmacy (Vietnam).

Our inclusion criteria are that learners must be current undergraduate medical students at the participating institutions and are enrolled in the Paediatric block of teaching as part of their studies during the period October 2016 to January 2017.

2.2. Student Cohorts

There are 3 student cohorts being tested:

1. Cohort A comprises students receiving branched VP cases. Students in Group A will have participated in 6 branching eVP cases, designed to cover a range of different errors and causes. These Error VPs include branching logic at key trigger points, giving learners the possibility of making errors and exploring the narrative that results.

2. Cohort B comprises students who receive a linear VP case, i.e. standard VPs, which cover the same material and topics as those in the intervention group. The key difference is that these VPs will not include branched decision-making elements, and will not give the opportunity for learners to make decisions and subsequently errors. However, they will have addressed the same learning objectives, because in each case the route will have taken students through the sub-optimal route allowing them to explore implications of error.

3. Cohort C comprise students have received no intervention at all, they receive conventional teaching on medical error using traditional didactic methods.

Students in both cohort A and B will have conducted the VPs in a Problem-Based Learning style setting, as small groups of 6-8 students facilitated by a tutor, with room layouts including a computer workstation, a rounded table and a projector/smartboard (R. H. Ellaway, Poulton, & Jivram, 2014). Each session is designed to last up to 3 hours. After each session learners will be asked to complete a survey instrument evaluating the case and their perceptions.

The number of students in this study was originally proposed as 32 from each institution in each group, which is more than adequate. In certain case this may be less than 32, and the final figure for the number of students involved in the assessment strategy will depend solely on the number of participants in Cohorts A and B who have received the cases. That plan is outlined in Deliverables 2.2, and the power and effect calculations in Deliverable 4.2.

Power and effect calculations will be repeated when the number of students receiving paediatric cases has been confirmed.

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3. ASSESSMENT TOOL

3.1. Creation of Single Best Answer Examination

The student assessment tool consists of a group of 54 Single Best Answer tests (SBAs), which will be given to the students towards the end of the academic year 2017, and at least 8 weeks after the students have completed the six paediatric cases. The 54 SBA questions fall into three groups:

1. The first 18 SBAs (Group 1) are written to be as close to the options from the relevant VP cases as possible (i.e. the assessment cases may have a slightly different wording and structure present the identical scenario), within the constraints of the SBA format, with 3 SBAs for each case, representing the 3 option points in the case. (The large volume of text in the cases precludes the automatic direct use of the text and options as SBAs). Typically, there are either 3 or 4 options at each decision point in the cases, these have been used as the stems (individual possible answers) in the SBAs, and either one or two stems have been added to produce 5 - stems for each SBA.

   A short scenario had been written as lead in to each SBA, based on the VP cases, but again conforming to the SBA format, and this situates the student taking the SBA in a similar position to the 'players' in the TAME cases.

2. The next set of 18 SBAs (Group 2) are constructed to match the same area of medicine as the six eVPs (e.g. Neonatology (subject)/patent ductus (diagnosis)/management (skill)).

   So, each SBA from Group 2 is paired with one of the original 18 SBAs from Group 1, i.e. similar subject, diagnosis, management. However, unlike Group 1 SBAs, they are NOT written with the TAME options as a central query of the SBA, and also use a different scenario to present the questions.

   The purpose of this group of 18 SBAs is to determine to what extent TAME learning is transferable beyond the original TAME case option into a similar clinical setting.

3. The final set of 18 SBAs (Group 3) are in the same broad areas of medicine as the six TAME cases, with 3 questions for each area of medicine corresponding to similar setting of the TAME cases.

   The purpose of this group of 18 SBAs is to determine to what extent TAME learning is transferable beyond the original TAME case option into a different clinical setting.

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4. STUDY DESIGN

4.1. How the tool will be used.

The learners in all cohorts (A, B and C) will be required to take this standardised assessment consisting of single-best answer (SBA) questions at a controlled interval after the conclusion of the EVP sessions.

This assessment will be translated into the native language of each participating country as described.

How will the students be assessed?

All the SBA question stems will be allocated a score based upon the responses provided. Differential marking will be applied, allowing serious errors to contribute a lower mark (or a greater reduction) to the total score than mildly poor choices. For each MCQ, stems are graded as either correct (excellent); incorrect (but not entirely unsatisfactory, recoverable; sub-optimal): very poor, (completely incorrect/possibly dangerous/ unacceptable at this level of training).

4.2. Learner testing

The learners will be assessed post-test, through a controlled trial. The single independent variable is the design of the educational intervention; an Error Virtual Patient, a Virtual Patient without branched decision-making elements, and no specific error training.

The trial is to be conducted at multiple centres as described in section 2.1. It is anticipated that cultural differences, and language differences, in the different countries will introduce factors that will prohibit merging the datasets and analysing the results as a multi-centre randomised trial. Instead each participating country will be treated as a single trial taking place at two universities in each country, and in each country both universities have agreed to create as near as possible identical testing conditions for this study, in particular using identically modified cases. Subsequently an attempt to review and compare the findings of each trial using a meta-analytical approach.

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5. APPENDIX- 54 SINGLE BEST ANSWER QUESTIONS

Q1

A male infant is born at 34 weeks gestation following premature labour. After 45 minutes, he is grunting and tachypneoic, then becomes desaturated in air. Oxygen is given and he is taken to the neonatal unit. He is afebrile.

He deteriorates and is intubated, ventilated, sedated and started on intravenous fluids.

Blood tests are sent and a chest radiograph obtained, which shows a ground glass appearance.

What is the most appropriate next action?

A ***Give intravenous Benzylpenicillin and Gentamicin**
B Give Surfactant via the endotracheal tube
C Give intravenous Dexamethasone
D Give furosemide
E Give prostaglandin

Q2

A female infant, born at 28 weeks is now 6 weeks old but is becoming increasingly tachcardic and tacypnoeic. Her oxygen requirements have increased steadily over the last three days.

On examination, she has fine crackles over the lung fields and a murmur loudest in systole at the left clavicle.

A chest radiograph is obtained and this shows an enlarged heart and hazy lung fields.

What would you like to do at this stage?

A Request Echocardiogram
B Start Benzylpenicillin and Gentamicin
C* **Start Frusemide**
D Prepare for cardiac catheterisation
E Start prostacyclin

Q3

A seven week old girl is referred to the paediatrician with jaundice that seems to be deepening. She is breastfed and growing well. There are no respiratory or cardiovascular signs and her stools are pale.

What is the most appropriate action at this stage?

A check bilirubin and if not requiring phototherapy, see in clinic next week.
B ***check bilirubin (split into conjugated and unconjugated), liver function tests, direct combes test,**

thyroid function test and urine culture
C Check bilirubin, then transfer to liver specialist centre
D Obtain a liver ultrasound
E Start Benzylpenicillin and gentamicin

Q4

A nine month old boy is taken by his parents to the emergency department with a loud barking cough, temperature to a maximum of 38.1 C, and a loss of appetite. These symptoms have worsened over the last 2 days.

On examination he is not distressed at rest, with no increased work of breathing at rest and a respiratory rate of 30/min, heart rate 115/min, SaO2 97% in air. When he becomes upset he develops a moderate inspiratory stridor with tracheal tug and subcostal recession.

A cannula has been sited.

What would you like to do next?

A ***Intravenous Dexamethasone**
B Nebulised Salbutamol
C Nebulised Adrenaline
D Intravenous Salbutamol
E Intravenous Co-Amoxiclav

Q5

A 12 month old female has been assessed in the emergency department. The diagnosis of viral croup has been made and she has been given a budesonide nebuliser.

The doctor reviews her after 60 minutes as her parents feel that she is no better than when she was admitted.

Currently she has minimal stridor at rest, but this is more obvious when she begins to cry. Her HR is 105 /min and respiratory rate 26/min, and her saturations are 98% in air.

What is the most appropriate course of action at this stage?

A Repeat the budesonide nebuliser
B ***observe him for a few hours**
C nebulized adrenaline
D nebulized salbutamol
E chest radiograph

Q6

A 20 month old is seen in the rapid access clinic because of a sudden onset, persistent cough lasting for 36

hours. His mother tells you that it began while he was playing with his older brother.

On examination he is not distressed, but has a dry, unproductive sounding cough. He has quiet breath sounds and a wheeze on the right side of the chest, but auscultation on the left is normal. A chest radiograph is normal apart from hyper expansion on the right side.

What is the next most appropriate action?

A prescribe oral antibiotics
B CT scan of the chest
C site a cannula and give intravenous dexamethasone
D prescribe a salbutamol nebulizer
E *arrange bronchoscopy

Q7

A three month old boy is seen by his family doctor in the local surgery. He has been well until the last 3 days when he has developed increasing vomiting, which has now turned greenish in colour. He was seen 2 days ago and the diagnosis of viral gastroenteritis was made, and his parents advised to give oral paracetamol.

Since then has not opened his bowels and has developed abdominal distension.

Observations are taken: HR 125/min, RR 28/min, SaO2 98% in air, capillary refill 2 sec.

What would you like to do now?

A send home, advise to use oral rehydration solution
B * referral to paediatric surgery
C prescribe anti-emetic
D prescribe oral trimethoprim
E referral to paediatricians at local trust

Q8

The surgical team is seeing a 4 year old on the children's ward. She has been admitted the previous day with poor feeding, a fever and vomiting. Since admission, she has continued to vomit and now has developed abdominal distension.

On examination, she has mild abdominal distension, is tender throughout the abdomen and no masses are felt. Heart rate is 125/min, respiratory rate 35/min.

How should she be best investigated?

A oesophago-gastro-duodenoscopy

B CT scan of the abdomen
C *ultrasound abdomen
D exploratory laparotomy
E contrast swallow and follow-through

Q9

A 4 month old boy has been admitted following a breath holding episode. He was investigated for a possible infection with blood tests which are normal, and a chest radiograph, which has revealed 3 posterior rib fractures with callus formation, but there are no acute changes suggestive of infection.

The infant has been well overnight and no further episodes have been noted.

What is best approach at this stage?

A refer to paediatrician for follow up in outpatients
B ask GP to follow up in the community
C *refer to social services, keep as an inpatient.
D investigate cause first as inpatient before referral
E call police services to arrest parents

Q10

A two week old infant is seen in the community by the family doctor. She was born at term without complications and discharged home on the second day. Birth weight was 3.1 Kg. After one week breastfeeding was established, but the weight was only 2.8Kg. Now the weight is 2.8 Kg still. The infant looks thin and but does not have a sunken fontanelle and is otherwise healthy.

The doctor asks more about the feeding and finds that the baby sucks for about one hour on each nipple and then sleeps for around an hour before waking, apparently hungry.

What is the best course of action at this stage?

A site a cannula and start a dextrose infusion
B commence formula feeding
C request a sweat test
D check bloods and hormone profile
E *refer to breastfeeding counsellor

Q11

A ten month old boy is seen in the paediatric clinic with poor weight gain. His growth was normal until 6 months of age, since when his height and head circumference have followed the 75th centile, but his weight has fallen from the 50th to the 0.4th centile.

His parents report that his appetite was good until the last few weeks, and apart from his rather loose stools, he is well.

Some baseline blood test are taken.

What else would be most important to do at this stage?

A Also request a dietician review
B Also request a chest radiograph
C ***Also request coeliac antibodies, and thyroid profile**
D Also request a blood ESR
E Also request a sweat test

Q12

A three year old girl is being investigated for poor weight gain, although his height is normal for his age. Blood tests include show an anaemia, a raised CRP and ESR as well as positive coeliac antibodies.

What is the next most appropriate action?

A referral to a dietician to start a gluten-free diet
B stool fat measurement
C blood free iron and ferritin, B12 and folate measurements
D ***** endoscopy and small bowel mucosal biopsy**
E detailed nutritional assessment including skinfold fat measurement

Q13

A 2 year old boy is seen with a fever at his family doctor's surgery. His mother is reluctant to allow the doctor to undress the child, and asks the doctor to just look into his ears and mouth to identify the cause of the infection. However, the doctor finds this mark on the child's abdomen. His mother tells you when you ask that he scraped himself on a table two days ago and wonders if this were the cause of the mark.

What is the most appropriate plan at this stage?

A Prescribe oral antibiotics and review in the morning
B Swab for Herpes simplex virus
C Book rapid access paediatric clinic in the morning at the hospital
D ***Refer to the paediatricians immediately**
E Prescribe steroid cream

Q14

A 6 month old boy has been brought by ambulance to the emergency department following a 17 minute seizure, terminated by rectal diazepam.
Prior to this he had become increasingly drowsy over the last day and had vomited twice.

He has a temperature of 38.1 C, has no rash. Apart from being very drowsy, there are no other specific signs.

What would you like to do now?

A Start anticonvulsants and arrange an MRI brain scan
B Prescribe regular diazepam and arrange for detailed fundoscopy.
C Do a lumbar puncture and an Electro-encephalogram
D * Start broad spectrum antibiotics and arrange a CT brain scan
E Give paracetamol, observe for 6 hours then review

Q15

In the emergency department a child has been seen and a provisional diagnosis of non-accidental injury has been made. The parents are told this and it is explained that they must be seen by the social worker before they can go home. Soon after they parents and the child have left the department before being seen by the social worker. They told one of the nurses that they had to feed their other children as a reason for their leaving.

What is the most appropriate action in this situation?

A Allow the mother to bring Rory back when convenient
B Ask the GP to see Rory at home
C *Alert the police and ask them to find Rory and return to the hospital
D Inform the social work department of what has happened
E Attempt to contact the family at home by telephone

Q16

At handover, the paediatrician is given a number of patients to review. The new symptoms are indicated in italics:

Cubicle 2	3 years, male	Diarrhoea and vomiting, *poor urine output*	HR 100, RR 25, CRT <2
Cubicle 3	3 weeks, female	Poor feeding, *lethargy*	HR 155, RR45, CRT <2
Bed 7	4 years, female	Asthma, *tachycardia*	HR 165, RR25, CRT <2, SaO_2 98%
Emergency Dept #1	3 days, female	*Jaundice*	HR 145, RR 25, CRT <2
Emergency Dept #2	18 months, male	Fever, runny nose, *blanching rash*	HR 120, RR20, CRT <2

Which is the most appropriate place to go first?

A) cubicle 2
B) * cubicle 3
C) bed 7
D) ED #1
E) ED #2

Q17

A four day old infant is seen in the Emergency Department, sent in by the community midwife who has noticed that his lips, tongue and nail beds are blue.

He is assessed and looks well. His respiratory rate is 25/min, heart rate 135/min, he has minimal chest recession and a grade 3/6 systolic murmur. His oxygen saturations are 82% in air, and increase to 83% with a trial of face mask oxygen.

What treatment option should be considered next?

A) surfactant
B) ibuprofen
C) *prostaglandin
D) intubation and ventilation
E) hyperbaric oxygen

Q18

A decision is made to start an 3.1 kg infant with a duct-dependent cardiac defect on a prostaglandin infusion at a rate of 5 ng/kg/minute. The prescription is charted, and made up by the nurses (see below). After 30 minutes, the infant has deteriorated. The syringe is running at 1 ml/hr.

Name: *James Moffat*		Weight (Kg) *3.1*		Age: *4*		Days ~~Weeks~~ ~~Months~~ ~~Years~~
Volume	Fluid	Drug	Dose	Dose range	Rate range	Notes
50 ml	*0.9% NaCl*	*Prostacyclin*	*46.5 mg*	*5-20 ng/kg/min*	*1-4 ml/hr*	*Monitor for apnoeas*

What is the most appropriate response in this situation?

A) call the consultant to review the patient
B) *stop the infusion and change prescription
C) double the rate of the infusion.
D) increase the rate by a factor of 3.1
E) reduce the rate by a factor of 3.1

Q19

A male infant is born in good condition at 26 weeks corrected gestational age. However within a few minutes he develops respiratory distress and becomes cyanosed.
He is intubated and surfactant is administered. After transfer to the neonatal unit he is started on antibiotics.
His chest radiograph is typical of respiratory distress syndrome (RDS). The parents ask why he was started on the antibiotics.

What is the most accurate answer that could be given?

a) His immune system is immature, so prophylactic antibiotics are appropriate
b) Intubation allows colonisation of the respiratory tract with bacteria, which can be prevented with antibiotics
c) Preterm delivery is almost always caused by placento-fetal infection
d) RDS is caused by infections such as group B streptococcus
e) *The presentation of pneumonia can be identical to RDS

Q20

A 4 week old child has been admitted with RSV positive bronchiolitis.

The following morning a low pitched murmur is heard, loudest in the upper right sternal area, louder during inspiration and quieter when lying supine.

His heart rate is 155/min, pulse and oxygen saturations are normal.

What is the most likely diagnosis

A *patent ductus arteriosus
B Fallot's tetralogy
C Mitral regurgitation
D Aortic stenosis
E Transposition of the great arteries

Q21

An 18 day old baby boy is referred to the paediatrician by the health visitor as he is jaundiced and has been from the third day of life.
He was born normally at term after an uneventful pregnancy with no identifiable perinatal risk factors for sepsis. He is breast feeding well, his urine is dark yellow in colour and his stools are pale.
No abnormality is found on examination apart from the jaundice.
What is the most likely cause for his jaundice?
A Prolonged physiologic jaundice
B Breast feeding jaundice

C Hypothyroidism
D *Biliary atresia
E Urinary tract infection

Q22

A 2 year old boy has been unwell for the last 3 days with coryzal symptoms and fever. He has developed a severe cough with intermittent stridor. He is sat playing and starts crying on examination increasing the stridor.

He has a low grade fever (37.9oC), S98% on air. He is well perfused with moist oral mucosa and has mild subcostal recession.
What is the most likely diagnosis?
a) Epiglottitis
b) Laryngeal foreign body
c) Angioedema
d) *Viral laryngotracheitis (croup)
e) Tonsillitis

Q23

A 2-year-old boy presents to the Emergency Department with a worsening cough and noisy breathing. His respiratory rate is 40 and oxygen saturations are 98% in room air. On examination he has a barking cough and an inspiratory stridor that increases when he cries. He has some tracheal tug and intercostal recession. His chest is clear on auscultation.

What would be the most appropriate first medication to administer?

a) *Dexamethasone orally
b) Hydrocortisone intravenously
c) Ipratropium nebuliser
d) Salbutamol inhaler
e) Salbutamol nebuliser

Q24

An 18 month old boy is brought urgently to the emergency department. He was apparently well, but then began to cough forcefully and now seems to be unable to settle again as he is still coughing. Over the past few days he has had a runny nose, but this has not affected his play or his appetite.
On examination he is slightly cyanosed, with marked biphasic stridor and recession. His respiratory rate is 45/min and heart rate 165/min.
What is the most appropriate course of action to resolve his problem?
A *urgent bronchoscopy
B intubation and ventilation
C nebulised beclomethasone
D nebulised adrenaline

E intravenous dexamethasone

Q25

A five year old boy has intermittent severe pain in the right upper quadrant for 12 hours. He has had an unproductive cough for three days, but no vomiting. He looks flushed and has a temperature of 400C. His respiratory rate is 50/min. His abdomen is soft with minimal tenderness on the right side and normal bowel sounds.

What is the single most likely diagnosis?

A. Acute Appendicitis
B. Acute Pancreatitis
C. Enteric fever
D. Mesenteric adenitis
E. *Pneumonia

Q26

A 6 week baby boy presented to A&E with history of vomiting after feeds, vomiting is projectile but non bilious. The baby is bottle fed 4-5 ounces on demand and has lost weight in the last 2 weeks. Blood gas showed hypocholeremic, hypokalemic metabolic alkalosis.

What is the most likely diagnosis?
a) Gastroeosophageal reflux
b) *Pyloric stenosis
c) Duodenal atresia
d) Intussception
e) Urea cycle defect

Q27

An 18-month-old girl is brought into the Accident and Emergency Department having being referred by the Health visitor due to several bruises. The history given by the parents is very vague and on examination she is noted to have several bruises.

Non-accidental injury would be more likely if bruising is on which of the following?

a) *Abdomen
b) Chin
c) Elbows
d) Forehead
e) Shins

Q28

1. A 2 month old baby girl seen by the GP as she is failing to put on weight. She was born at term after an uneventful pregnancy. She passed urine first after 4 hours and meconium at 48 hours. Now she is bottle fed and takes 60-90 ml every 3-4 hours. She has dropped two centiles on her growth chart and appears slightly jaundiced.

Which is the MOST likely diagnosis:

a) Coeliac disease
b) *Cystic Fibrosis
c) Tuberculosis
d) Hirschprung's disease
e) Lactose intolerance

Q29

A 14-year-old boy is worried that he is the shortest in his class. He is otherwise healthy and does well at school but is starting to get upset that he looks younger than his friends.

His height is 149 cm (2nd centile) and his weight is 42 kg (9th centile). His father has brought a previous height and he has grown 4 cm in the last year.
His mid parental height is 173 cm (25th centile). His father went into puberty at about 14 years of age. His testicular volume is 4 mls. A bone age x-ray is 12 years at a chronological age of 14.5 years.

What is the most likely diagnosis?

a) Coeliac disease
b) *Constitutional delay of growth and puberty
c) Growth hormone deficiency
d) Hypothyroidism
e) Kallman's syndrome

Q30

A 12-month-old Asian girl is noted to be pale by her GP. She appears otherwise well, and her height and weight are between the 10th and 25th 'centiles. She is developing well and has no specific health concerns, although her mother reports that she is a fussy eater whose diet is mostly (full fat) cow's milk. A full blood count is requested and it demonstrates an Hb of 8.5 g/dL.

What is the most likely explanation for her anaemia?

a) *Cow's milk has a low bio-available iron content
b) Her mother's iron stores were low, so little was transferred across the placenta
c) She has been weaned onto cow's milk too early
d) She has thalassaemia trait
e) There is an underlying ileal disorder

Q31

A seven year old girl is brought to the GP with a three day history of increasing fever and a developing itchy rash (image of rash on back). The child also is complaining of lethargy and a headache. She has been previously well.

On examination the rash is primarily on the back, chest, abdomen and head and similar in all areas with some excoriation. Both tympanic membranes are mildly injected but no other abnormalities are found.

The temperature is 39.2 C, heart rate 128/min, respiratory rate 25/min and capillary refill time 2-3 seconds.

What is the most appropriate course of action?

A ***discharge with advice to drink plenty and take paracetamol**
B admit for IV ceftriaxone
C discharge with paracetamol and flucloxacillin
D admit for biopsy and IV steroids
E discharge with topical steroid cream

Q32

A 5 year old boy is brought to the emergency department after a 10 minute seizure, terminated by intravenous midazolam. The seizure was predominantly on the right side of the body, and following the episode the child remains drowsy but responsive to voice.
Observations show a fever of 38.5C, heart rate of 132/min and respiratory rate of 28/min with saturations 95% in air.
Examination does not identify a focus for the infection, and there is no rash.

Blood tests and blood cultures are taken, an IV cannula sited and antibiotics given.

What is the most important next step?

A ***CT brain scan**
B lumbar puncture for CSF culture
C IV phenytoin
D Intubation for airway protection
E Electro-encephalogram (EEG)

Q33

A child is brought by the mother to the Emergency department as the child is not using its right leg. There is swelling to the thigh and moving the leg causes pain. A radiograph shows a fracture to the femur.

Which of the following features are most suggestive of non-accidental injury as the cause of the fracture?

A ***the child is 11 months old**
B the child is a girl
C the fracture is a transverse mid-shaft fracture
D the child was born at 25 weeks gestation
E the child is being treated for congenital hypothyroidism

Q34

A four week old infant presents to the Emergency Department with a one week history of increasing tachypnoea, poor feeding and lethargy. He was born at term by spontaneous vaginal delivery. Antenatal scans were unremarkable.
On examination he is tachypnoeic, and has absent femoral pulses, with normal heart sounds and no murmurs.
Coarctation of the aorta is suspected.

What should the team request to make an immediate diagnosis?

A ***4 limb blood pressure**
B chest radiograph
C nitrogen washout test
D electrocardiogram
E CT chest

Q35

The parents of a 5 day old baby boy have been told to come to the emergency department as their midwife has noticed he has blue lips. The parents tell you that the baby was found to have some dysmorphic features, but the diagnosis has not yet been confirmed.
On examination the baby has an ejection systolic murmur at the left sternal edge with a loud second heart sound. The baby is cyanosed with pre-ductal oxygen saturations of 78% in air but is not in respiratory distress and has a clear chest on auscultation.
You request a chest x-ray, an ECG and an Echocardiogram.
What initial management would you instigate next?

A inhaled nitrous oxide (NO)
B *IV prostaglandin infusion
C IV frusemide
D IV sildenafil
E IV ceftriaxone and amoxicillin

Q36

A 4-week-old girl is seen in the paediatric emergency department. Her parents are concerned that she has been progressively been feeding less and seems to be struggling to breathe. 1 week earlier she was seen with similar symptoms and thought to have a blocked nose, treated with saline nasal drops.

She has a temperature of 36.7 C, oxygen saturation of 94% in air, a respiratory rate of 49/min, and a heart rate of 171/min. She has a moderate degree of recession and inspiratory crackles. Her liver is palpable 4 cm below the costal margin.

A chest radiograph is taken.

What is the most likely diagnosis to account for these findings?

a) Aspiration pneumonia
b) Bronchiolitis
c) Bronchopneumonia
d) Tetralogy of Fallot
e) *Ventricular septal defect

Q37

A 6-hour-old boy is noted to be lethargic with tachypnea and poor feeding in the postnatal ward, barely rousable next to his sleepy mother.
He was born at 36 weeks gestation to a pre-eclamptic mother by vaginal delivery after induction of labor for growth restriction. His birth weight was 1.9 kg and there were no risk factors for perinatal infection.

As the mother plans to breast-feed her baby, she declined any formula feeding.and fed the baby shortly after delivery, after which she herself became tired and fell asleep.

Which of the following is the most appropriate immediate investigation?

a) Arterial blood gas
b) *Capilliary blood sugar
c) C-reactive protein
d) Full blood count
e) Spinal fluid microscopy and culture

Q38

A 12-year-old girl is reviewed in Paediatric Out Patients Clinic with a history of constipation and lethargy. Her growth chart shows that her weight has increased from the 75th to the 98th centile while her height increased very little over the last year. Some blood tests have been performed:

TSH 12.2 mU/L (0.4-5.0 mU/L)
Free T4 5.3 pmol/L (10.0-23.0 pmol/L)

What would be the most appropriate treatment?

a) Carbimazole
b) *Levothyroxine
c) Propranolol
d) Radioactive Iodine
e) Somatotropin

Q39

A newborn baby girl is being reviewed by the paediatrician prior to discharge home. The father has read that infants can have a condition called congenital dislocation of the hip, and is concerned that his daughter might have this.

Asking more about the baby, the doctor finds that the baby's aunt was treated for congenital dislocation of the hip on one side and that the baby was born by caesarian for maternal reasons.

What is the most appropriate way to exclude the possibility of congenital dislocation of the hip?

A *arrange outpatient hip ultrasound
B MRI pelvis
C plain radiograph of pelvis
D Ortolani-Barlow test

E compare true and apparent leg length

Q40

A 9-week-old infant is brought to A&E by his parents. He has been feeding poorly for the last 24 hours and his parents have noted a cough.

On examination he is afebrile, has a respiratory rate of 42 /min, heart rate of 145 bpm, moderate subcostal recession and expiratory crackles and wheeze. He has an oxygen saturation of 97% in air.

What is the most likely diagnosis?

a. Asthma
b. *Bronchiolitis
c. Croup
d. Pertussis (whooping cough)
e. Pneumonia

Q41

A 4 year old girl is seen in the emergency department. Over the last month she has been using her Salbutamol inhaler almost daily and has been coughing most nights. She has been diagnosed with asthma and normally takes beclomethasone via inhaler twice a day and salbutamol inhaler as required.
On examination she has marked respiratory distress, a respiratory rate of 35/min and good air entry bilaterally with expiratory wheeze.

What else does the doctor need to know at this stage?

A *capillary oxygen saturation
B chest radiograph findings
C peak expiratory flow rate
D expired nitric oxide levels
E Forced expiratory volume in one second (FEV1)

Q42

A 4 year old girl has been at a birthday party where she suddenly developed difficulty breathing. She is brought by ambulance to A&E. She has a temperature of 37OC, a respiratory rate of 30 /min, a heart rate of 150 /min and a blood pressure of 85/55 mmHg. She is pale and has loud stridor and audible wheeze. She has a blotchy red rash on her face, trunk and arms. She is placed on high flow oxygen by face mask. Which is the single most important drug to give next?

A. *IM adrenaline
B. IV ceftriaxone
C. IV hydrocortisone

D. Nebulised salbutamol
E. Oral chlorphenamine

Q43

A nine month old girl is brought to the Emergency Department with a 2 day history of vomiting and diarrhoea. She has not taken any solids in the last two days and has been taking less than half of her normal fluid intake. Her mother has changed at least 10 'dirty' nappies in the last 8 hours, but is not sure if any contained urine.

The infant appears thirsty, but has vomited all oral fluids since arrival in the department 2hours ago. Her tongue looks dry, her hands and feet are cool and she has a capillary refill time of 2 seconds centrally.

Which would be the most appropriate route to administer fluids in the first instance?

A. Intraosseous (IO)
B. Intravenous (IV)
C. *Nasogastric (NG)
D. Oral (PO)
E. Subcutaneous (SC)

Q44

A 6-year-old girl presents to the Emergency Department with a 24 hour history of abdominal pain. The pain has increased over the last 4 hours and she has vomited three times. On arrival her temperature is 38.2OC, heart rate is 120 bpm, respiratory rate is 27 and oxygen saturations are 98% in room air. On examination she has a diffusely tender abdomen with rebound tenderness in the lower abdomen. Blood tests reveal a white blood cell count of 18 x 109/L with a neutrophil count of 11 x 109/L and her CRP is 50 mg/L.

What is the most likely diagnosis?

a) *Appendicitis
b) Cholecystitis
c) Mesenteric adenitis
d) UTI
e) Viral gastroenteritis

Q45

A 2 day old baby boy is reviewed on the Post Natal Ward with a history of vomiting. The Midwife is concerned that he hasn't passed any meconium yet.
On examination his abdomen appears distended and the vomit is a yellow/ green colour. Immediately after rectal examination there is an explosive passage of stool.

Which investigation will confirm the diagnosis?

a) Abdominal ultrasound scan
b) pH Study
c) Plain abdominal x ray
d) Stool for microscopy and culture
e) *Suction rectal biopsy

Q46

A 14 year old boy presents to the emergency department with a three week history of polyuria, polydipsia, lethargy and weight loss. He has no previous medical history of note.

His temperature is 37.3 C, heart rate is 125/min and respiratory rate 35/min. His pulse is normal and there are no chest signs.

An arterial blood gas is taken:-
pH 7.15
pCO2 3.5 kPa
pO2 11 kPa
HCO3 14 mmol/L
BE – 8 mmol/L

Which is the most most useful diagnostic test?

A *blood glucose
B chest radiograph
C blood culture
D urine culture
E urine electrolytes

Q47

A 7-year-old girl presents with breast enlargement and rapid growth over the past 6 months.
Examination reveals a healthy looking girl with Tanner 3 breast development with café au lait spots with irregular margins and no pubic hair.
Some investigations are obtained:
Estradiol 1423 pmol/L (NR <130 pmol/L in children)
FSH <0.2 IU/L
LH <0.2 IU/L
Ultrasound of ovaries shows the presence of a 2cm ovarian cyst.

What is the most likely diagnosis?

A Pituitary-driven precocious puberty
B *GnRH independent precocious puberty

C Congenital Adrenal Hyperplasia
D Premature Adrenarche
E Premature Thelarche

Q48
A 21 day old male infant brought is brought to the Emergency Department as the parents are worried that he has cried excessively in the last 24 hours. In the department he has a bottle feed and then falls asleep. His parents look stressed and argue with each other during the consultation.

On examination is normal apart from a 3x4 cm flat, blue discolouration is noted over the left buttock area. Examination is otherwise normal.

What is the most likely diagnosis?

A. Idiopathic thrombocytopaenic purpura
B. *Mongolian blue spot

C. Blue naevus
D. Non accidental injury
E. Vitamin K deficiency

Q49

An 18-month-old girl is seen in the clinic. Her mother has noticed an abnormality of her eyes. She is otherwise well and developmental progressing well.

What is the most likely explanation for the mother's concern?

a. Amblyopia
b. Epicanthic folds
c. *Hypermetropia
d. Left lateral rectus palsy
e. Right lateral rectus palsy

Q50

A mother takes her 14-month-old daughter to a walk-in clinic at the local hospital. She has a 2-day history of fever and coryzal symptoms and a 4-hour history of vomiting and lethargy.

She is examined and found to be drowsy and pale, has a temperature of 38.7°C, Pulse of 186/min, BP 120/50 mmHg. capillary refill time of 4 secs. Her respiratory rate is 32/min and her breathing laboured. She is peripherally cyanosed.
Her GCS is 9 and she has no neck stiffness. She has a fine blanching rash on her trunk and a petechial spot on her abdomen.
A cannula is inserted, blood cultures and tests taken.

She is given an appropriate fluid bolus. What would be the immediate next course of action?

A Blood, urine and spinal fluid microscopy and culture, await results
B Urgent CT brain and act on results
C *IV antibiotics
D Urgent echocardiogram and act on results
E Transfer to PICU, electively intubate and ventilate

Q51

The health visitor has referred a 14-month-old girl for an assessment, concerned about her development. She is the fourth child in a crowded flat, whose father is an alcoholic. The child was born at 36 weeks and is currently well, although she has been admitted twice with 'wheezy chest'. The doctor finds that she is able to say 5-10 single words and can pick up raisins and point with her forefinger. She feeds herself crackers and eats the raisins. She is able to sit unsupported and pulls herself to stand, but cannot walk. She is initially wary of the doctor, but soon starts to interact normally.

Which of the following best describes her development?

a. Delayed gross motor milestones
b. Delayed speech and language milestones
c. Delayed vision/fine motor milestones
d. Global developmental delay
e. *Normal development

Q52

A 4-month-old boy is brought in by ambulance to the Emergency Department. His parents report that over about a 30 minute period he became pale, short of breath and drowsy. He had been unwell over the previous day with reduced feeding, occasional vomiting and a runny nose.

He is examined and found to have a heart rate of 250/min, respiratory rate of 45/min, oxygen saturations of 95% in air, and a blood pressure of 65/20 mmHg. His liver edge is palpable at 4 cm below the costal margin and inspiratory crackles.

Blood tests are sent off and an ECG is requested.

What is the most likely diagnosis?

a) Sinus tachycardia secondary to dehydration
b) Sinus tachycardia secondary to sepsis
c) *Supraventricular tachycardia
d) Ventricular septal defect
e) Ventricular tachycardia

Q53

A 3 week old baby is reviewed with poor feeding.
On examination the baby is noted to be hypotonic with epicanthic folds and bilateral single palmar creases. A loud pansystolic heart murmur is heard, loudest at the lower left sternal edge and radiating to the epigastium.

Which heart lesion is most likely?

a) Patent ductus arteriosus
b) Ventricular septal defect
c) *Atrio ventricular septal defect
d) Coarctation of the aorta
e) Pulmonary atresia

Q54

A two year old boy is seen in the Emergency Department with a three day history of cough, pyrexia and lethargy. His HR is 150bpm, RR 35/min and temperature 38.6 degrees. On examination he has a mild respiratory distress, right sided crepitations and a cardiac murmur.

Which feature would suggest that the murmur is not an innocent murmur?

a) Change on positioning
b) Grade 2/6
c) Present at upper left sternal edge
d) *Presence of a thrill
e) Systolic murmur