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

UNIVERSITY HOSPITAL, GEELONG
FELLOWSHIP WRITTEN EXAMINATION
WEEK 11– TRIAL SHORT ANSWER QUESTIONS Suggested answers

PLEASE LET TOM KNOW OF ANY ERRORS/ OTHER OPTIONS FOR ANSWERS

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Question 1 (18 marks)

A 65 year old male presents with symptoms suggestive of right renal colic for this patient.

a. State six (6) aims in the use of radiological investigation for this patient. (6 marks)

- **Confirm diagnosis** *(high sensitivity 97% and specificity 96% for ureterolithiasis as >90% stones opaque)*
- **Detect calculi site**
- **Detect number calculi**
- **Detect calculi site**
- **Detect calculi size** *(indicate likelihood spontaneous passage or need for urological intervention)*
- **Detect high grade obstruction** *(CTKUB/ US <48/24- hydronephrosis, hydroureter, perinephric stranding, low density kidney suggestive oedema)*
- **Determine visibility on KUB (to allow less radiation for follow up, use of Ural if unseen)**
- **Rule out other significant causes (eg AAA rupture, diverticulitis, pyelonephritis)**

~10% of CTKUBs show an alternative Dx

b. List three (3) types of ureteric calculi that have different chemical composition. Provide two (2) clinical or epidemiological features for each type of calculi. (9 marks)

Calculi type	Feature
Calcium compound **Oxalate predominantly** **(less commonly PO_4)**	• **Majority (70-80%)** • **Usually radioopaque on plain KUB** • **Usually idiopathic or idiopathic hypercalcuria in 10%** • **Prevention: ↑ U/O > 2-3 L/day** • **Thiazides ↓ urinary concentration**
Infection/ Triple phosphate/ **Struvite** **(Ca, Mg, NH_4)**	• **Female predominance** • **High urinary pH from urea splitting organisms that create ammonium** • **Can grow rapidly (esp pregnancy) - Staghorn calculi** • **Rx lithotripsy (renacidin infusion)**
Uric acid/ Urate	• **10% all stones** • **Radiolucent on plain KUB** • **Urine pH < 6** • **"passage of gravel" described by patient** • **Prevention: allopurinol** • **Prevention: ↑ U/O > 2-3 L/day**
Cysteine	• **~ 1% of all stones** • **Most likely calculi to cause ESRF** • **Associated with Cystinuria (autosomal recessive inheritance)** • **Especially consider in young with stones**

The patient is confirmed to have a single renal calculi on CTKUB. This is his first episode of renal calculi.

c. What is the role of medical expulsive therapy in his management? State three (3) points in your answer. (3 marks)

- **Antispasmotic agents:**
  - **α blocker therapy (Tamsulosin) → α receptors are more common in the distal ureter**
    - **some support but conflicting data on 5-10 mm calculi**
  - **CaCB → nifedipine**
  - **phosphodiesterase type 5 inhibitor (Tadalafil)**
  - **may reduce symptoms & time to stone passage (existing data conflicting)**
- **Alkalinization therapy**
  - **Ural may assist in Uric acid stone dissolution**

Additional Q:

Q: Complete the table below that relates calculi size and spontaneous passage rate.(4 marks)

Diameter (mm)	Passage rate (%)
4	**90**
5	**80**
5-8	**15**
> 8	**5**

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GENERAL MEDICINE/ORIGINAL RESEARCH

Distal Ureteric Stones and Tamsulosin: A Double-Blind, Placebo-Controlled, Randomized, Multicenter Trial

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Study objective: We assess the efficacy and safety of tamsulosin compared with placebo as medical expulsive therapy in patients with distal ureteric stones less than or equal to 10 mm in diameter.

Methods: This was a randomized, double-blind, placebo-controlled, multicenter trial of adult participants with calculus on computed tomography (CT). Patients were allocated to 0.4 mg of tamsulosin or placebo daily for 28 days. The primary outcomes were stone expulsion on CT at 28 days and time to stone expulsion.

Results: There were 403 patients randomized, 81.4% were men, and the median age was 46 years. The median stone size was 4.0 mm in the tamsulosin group and 3.7 mm in the placebo group. Of 316 patients who received CT at 28 days, stone passage occurred in 140 of 161 (87.0%) in the tamsulosin group and 127 of 155 (81.9%) with placebo, a difference of 5.0% (95% confidence interval −3.0% to 13.0%). In a prespecified subgroup analysis of large stones (5 to 10 mm), 30 of 36 (83.3%) tamsulosin participants had stone passage compared with 25 of 41 (61.0%) with placebo, a difference of 22.4% (95% confidence interval 3.1% to 41.6%) and number needed to treat of 4.5. There was no difference in urologic interventions, time to self-reported stone passage, pain, or analgesia requirements. Adverse events were generally mild and did not differ between groups.

Conclusion: We found no benefit overall of 0.4 mg of tamsulosin daily for patients with distal ureteric calculi less than or equal to 10 mm in terms of spontaneous passage, time to stone passage, pain, or analgesia requirements. In the subgroup with large stones (5 to 10 mm), tamsulosin did increase passage and should be considered. [Ann Emerg Med. 2016;67:86-95.]

Please see page 87 for the Editor's Capsule Summary of this article.

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0196-0644/$-see front matter

http://dx.doi.org/10.1016/j.annemergmed.2015.06.001

INTRODUCTION

Background

Ureteric calculi are a common reason for presenting to the emergency department (ED), with more than a million ED visits per year in the United States.[1] Ureteric calculi are estimated to affect up to 12% of men and 6% of women in their lifetime[2] and typically affect young and healthy adults. There are limited data on spontaneous passage rates of ureteric calculi, but factors such as stone size, location, smooth muscle spasm, edema, and anatomy are known to affect passage.[3,4] Calculi greater than 5 mm in diameter frequently require intervention.[5] A number of pharmacologic agents have been used to facilitate stone passage, so-called medical expulsive therapy. The most frequently recommended agents are α-blockers, specifically tamsulosin. Commonly used for benign prostatichypertrophy, tamsulosin acts at the α-1D adrenergic receptors present in the distal ureter. Guidelines suggest it may be appropriate to offer medical therapy as part of a strategy of observation and periodic evaluation for newly diagnosed stones less than 10 mm in diameter; however, these recommendations are based on limited and poor-quality data and come with the caveat that they be administered "off label."[5]

Importance

Numerous published clinical trials of tamsulosin have been limited by small size and serious methodological issues such as lack of blinding, no placebo, use of adjunctive medications, and poorly defined primary outcomes of stone passage, all of which call into question the validity of the results.[6–23] A recent systematic review of α-blockers[24] demonstrated a high risk of bias overall in the studies

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ORIGINAL RESEARCH

Predictors for urologic intervention and alternate diagnoses in people having computed tomography urography for suspected renal colic

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Abstract

Objective: The majority of ureteric calculi pass spontaneously and are uncomplicated, yet use of computed tomography urography (CTU) has increased in recent years. This study describes a cohort of ED patients undergoing CTU for renal colic and assesses the predictors of urologic intervention.

Methods: A retrospective cohort study enrolled patients who underwent CTU at three Melbourne EDs. Demographic data, clinical assessments, laboratory and radiological findings and interventions were abstracted. Univariate analysis was performed and significant predictors were entered into a multivariate logistic regression model to calculate adjusted odds ratios for associations with urologic intervention.

Results: Six hundred and seventeen patients underwent 626 CTUs; mean age was 48 and 67.7% were male. 58.2% of scans found calculi, of which median size was 4 mm. 9.2% of scans revealed an alternate diagnosis, of which 2.7% were acutely important. 14.6% of patients with calculi received an intervention. Multivariate analysis found the factors associated with intervention were female sex (OR 3.9, 95% CI 1.8–8.7), proximal calculus site (OR 4.1, 95% CI 1.5–11.7), single kidney (OR 9.0, 95% CI 1.7–49.0) and calculus size >5 mm (OR 7.0, 95% CI 3.3–14.7).

Conclusion: Factors associated with urologic intervention included female sex, single kidney, calculus size >5 mm and proximal calculus. Information on acute alternate diagnoses was uncommon. A prospective study is needed to further clarify clinical parameters that could predict intervention to allow targeting of CTU to those most likely to benefit.

Key words: *renal colic, retrospective studies, ureteral calculi, X-ray computed tomography.*

Key findings

- Many ED patients undergo CT urography for suspected renal colic, the majority of which do not undergo intervention.
- Factors associated with intervention are female sex, single kidney, calculus size >5 mm and proximal calculus.
- Very few CT scans discovered an acutely important alternate diagnosis thus there may be an opportunity to rationalise use of CT for renal colic.

Introduction

Renal colic is a condition commonly managed in the ED. Although the clinical presentation is often dramatic, most patients are managed conservatively, with 80% of ureteric calculi passing spontaneously.[1] Over the past decade, computed tomography urography (CTU) has become the first line imaging for suspected renal colic,[2,3] due to its diagnostic accuracy and ability to document calculus site and size, which are the two strongest predictors of spontaneous calculus passage.[1]

In recent years, a 10-fold increase in CTU usage has been reported.[4] The reason for this is likely multifactorial, including increased availability of CT, a desire for calculus characterisation, and the belief that information might be gained on alternate diagnoses if a calculus is not present. Despite greater CTU utilisation, the proportion of patients diagnosed with urolithiasis or rates of urological intervention have not changed,[4] and a recent study reported that detection of an acutely important alternate diagnosis was uncommon.[2]

Since this increased CTU usage has not led to any demonstrable change in acute management, the issues of unnecessary radiation exposure and overdiagnosis have been raised.[5–8] There is a dose-response relationship between absorbed radiation dose and

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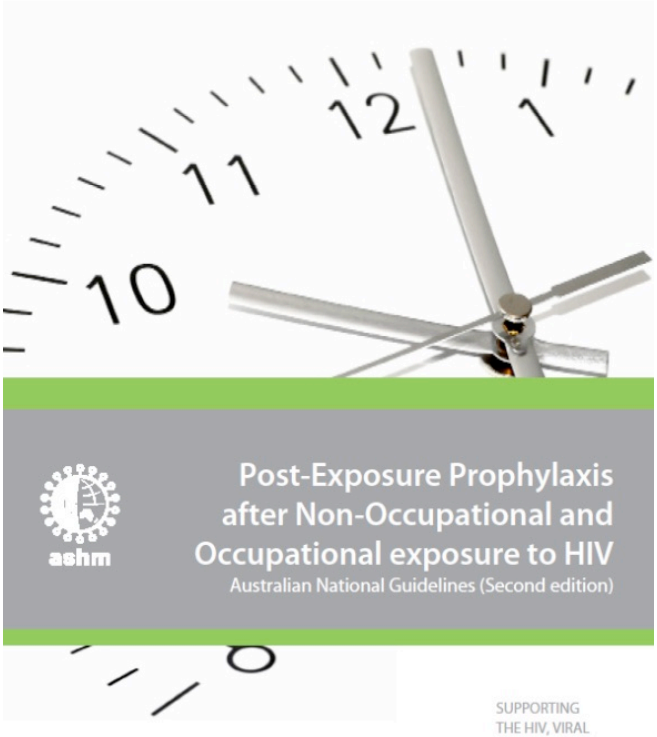
Victorian guidelines for post-exposure prophylaxis following non-occupational exposure to HIV

Victorian NPEP Guidelines 2013

With Addendum (April 2014)

Victorian NPEP Service
Alfred Hospital

Written by Dr Anna Pierce
Endorsed by the Victorian NPEP Service Steering Committee



Question 2 (12 marks)

A 25 year old Emergency Department nurse sustains a needle stick from a known patient in the Emergency Department.
The details of the exposure are obtained and documented.

a. Other than details of the exposure, list six (6) key features in history that you would seek from this nurse. (6 marks)
   - **Has first aid been performed?**
   - **Hep B vaccination status- immunisation date and post immunisation titre**
   - **Prior PEP / Hx of treatment**
   - **Pregnancy risk/ contraception/ lactation**
   - **Medical History**
   - **Medication use**
   - **Allergies**
   - **Psychiatric Hx**
   - **Drug / alcohol Hx**
   - **Recent HIV/Hep B/ Hep C testing**

The source is identified as having Hepatitis B, Hepatitis C and HIV.

b. List the approximate risk of transmission of each virus for this patient. (3 marks)

Virus	Risk of transmission (%)
Hepatitis B	**3**
Hepatitis C	**30**
HIV	**0.3**

c. Complete the table below, listing the time course of required serological testing for this patient. (3 marks)

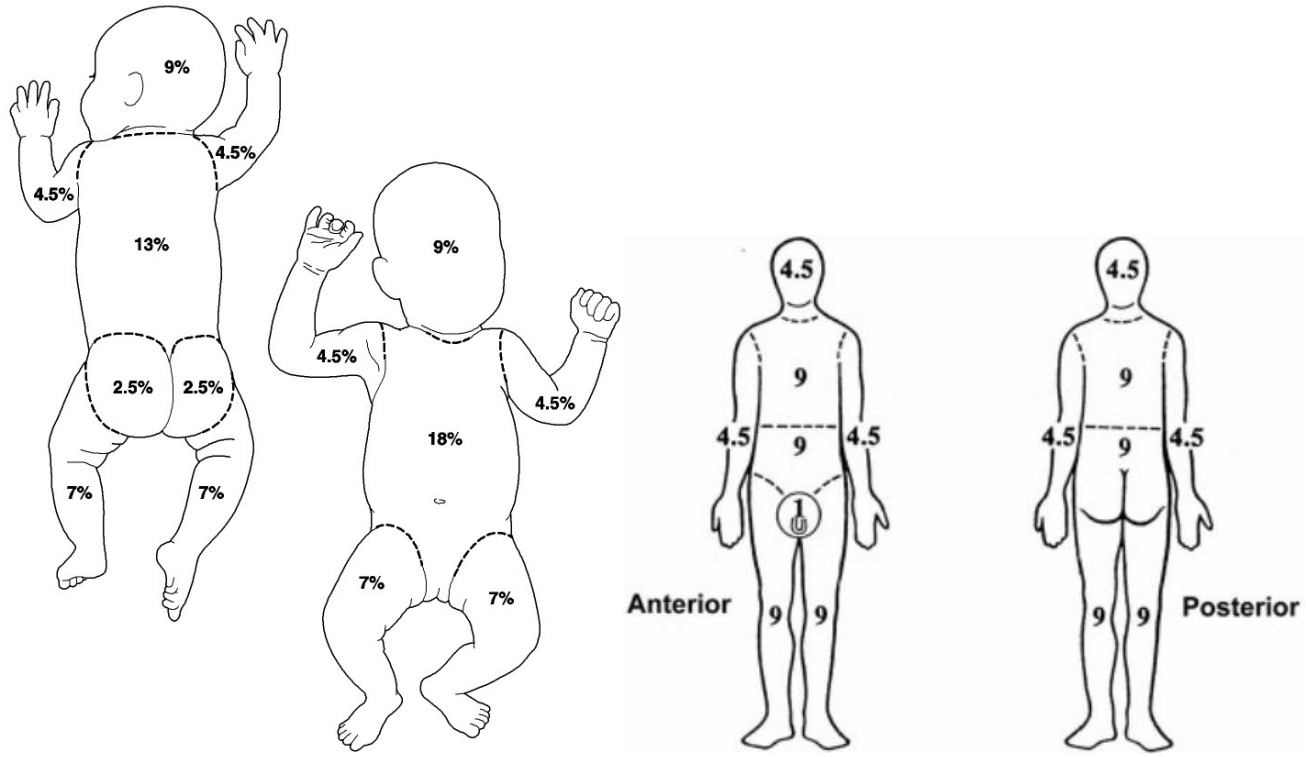
Test	Timeframe of test/s
Hepatitis B	**Baseline**
Hepatitis C	**Baseline** **3 months**
HIV	**Baseline** **4-6 weeks** **3 months**

Possible alternative Q: (discuss as a group). List five (5) key steps in the management of this patient.

- **First aid**
  - skin: wash exposed area with soap and water
  - eye: remove contact lenses, irrigation with copious water or saline
    - oral mucous/membrane: spit out contaminating material, rinse mouth with water several times
- **Counselling**
  - risk ass with specific exposure
  - efficacy and SEs of PEP (vomiting)
  - risk reduction strategies (safe sex, don't donate, no pregnancy)
  - follow up
  - stress leave
- **Refer for follow up**
  - testing 4-6 weeks and 3 mths, psychological support, stress leave
- **Hep B immunisation/ Ig**
- **PEP**
  - truvada (combo drug) and raltegravir for 28days (2 vs 3 drugs controversial, 2 drugs better tolerated with no evidence of less efficacy)
  - preferably within 2hrs but up to 72
  - consult ID
  - indicated: HIV +ve person not on Rx, HIV +ve on Rx but with measurable viral load, no other info available but are known to be HIV +ve

Question 3 (12 marks)

a. Complete the chart below demonstrating the percentage of burn estimation in an infant for the areas indicated with a box. (7 marks)



A 35 year old man is brought into your emergency department with extensive burns to his upper body following a house fire.

b. State three (3) indications for emergency escharotomy. (3 marks)
   - **Circumferential limb injuries with evidence of distal neurovascular compromise**
   - **Chest wall injuries with impaired ventilation**
   - **Circumferential neck injuries**

c. Assuming adequate analgesia and sedation, consent and explanation, list two (2) steps in the procedure of limb escharotomy. (2 marks)
   - **Linear incision Volar aspect- often only one side required, cut down to subcutaneous fat**
   - **Upper limb extending to dorsum of hand/ lateral aspect of digits or 1cm above and 1 cm below area burn**

Additional Q:

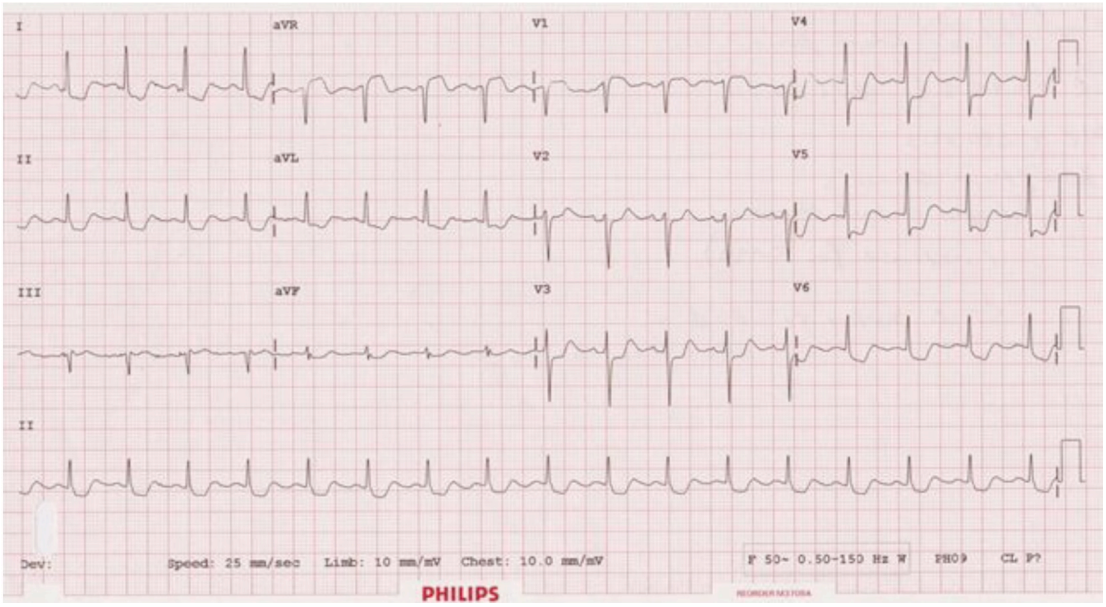
Q: Assuming adequate analgesia and sedation, consent and explanation, list four (4) steps in the procedure of chest escharotomy. (4 marks)

- **Lateral incision on either side**
  - **Anterior axillary line**
  - **From level 2nd rib to lower margin rib cage**
- **Join lateral incisions with 2 transverse incisions**
  - **Superior at level of the manubriosternal joint**
  - **Inferior incision at the lower border of the rib cage**
- **Floating square results**

Question 4 (12 marks)

A 76 year old woman presents to your emergency department with one hour of severe chest pain.

An ECG is taken- refer to the props booklet- page 1.



a. State four (4) abnormal findings in this ECG. (4 marks)
   - **STE aVR 3mm, V1 1mm (ie aVR > V1)**
   - **STD I, II 2mm aVL, aVF 1 mm, V3-6- 3/5/5/3 mm**
   - **Rate 102-110- sinus Tach**
   - **QT > 600 msec**

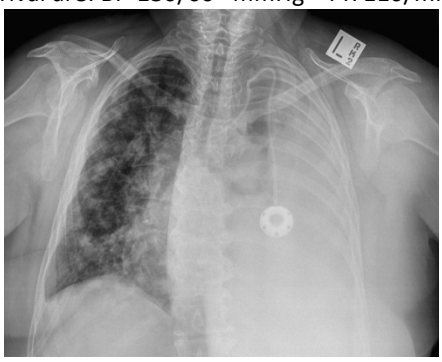
b. What is the significance of these ECG changes for this patient? Sate four (4) points in your answer. (4 marks)
   - **L Main / Triple vessel disease**
   - **High likelihood cardiovascular compromise**
   - **High morbidity/ mortality** (up to 70%)
   - **Requires urgent early PCI**
   - **Responds poorly to non-invasive Rx**

The cardiology registrar does not agree with your assessment of this ECG and its' significance.

c. State four (4) pieces of information from a bedside ECHO that would support your case. (4 marks)
   - **Global wall motion abnormalities**
   - **Papillary mm rupture/ valve incompetence**
   - **Absence of pericardial fluid**
   - **Absence of LV aneurysm**
   - **Absence of features to support PE**

Question 5 (12 marks)

A 52 year old Italian woman presents to your emergency department with gradually increasing breathlessness over the last 3 days. It is 1 week since her last chemotherapy treatment for cancer. She has a portocath in situ.
Her observations on arrival are: BP 130/60 mmHg PR 110/min RR 28/min Temp 37.8°C Oxygen saturation 90% Room air



Refer to the props booklet for larger image

a. Other than the portocath, list (4) abnormalities shown in this X-ray. (4 marks)
- **Opacification L lung field**
- **R neck surgical clips**
- **R axilla surgical clips**
- **Asymmetric breast shadow**
- **Mediastinal shift to R**
- **Patchy changes R lung**

Her FBE shows normal Hb and platelet counts. Her WCC is 1.5 (ref 4-11) and her neutrophil count is 0.4 (ref 2.0- 7.5).

b. State your antibiotic choice/s. (2 mark) *NB: Doses and route not requested*
Antibiotic choice:
1. **piperacillin-tazobactam 4.5g IV Q8h (Q6h if septic shock/ critically ill)**
   OR cefepime 2 g (child: 50 mg/kg up to 2 g) IV q8h
   OR ceftazidime 2 g (child: 50 mg/kg up to 2 g) IV q8h)
2. **vancomycin 15mg/kg max 500mg IV q6h**

c. State two (2) points to justify your choice/s. (2 marks)
Justification:
1. **Febrile neutropenia necessitating board spectrum antibiotic covering Pseudomonas** (Bacteraemia due to *Pseudomonas aeruginosa* occurs relatively infrequently but, because morbidity and mortality are high, empirical regimens cover this microorganism)
2. **Add Vancomycin if vascular device possible source of sepsis**
   - add Vancomycin for suspected MRSA if
     - patient has severe sepsis / septic shock
     - known to be colonised with methicillin-resistant *Staphylococcus aureus* (MRSA)
     - clinical evidence of a catheter-related infection in a unit with a high incidence of MRSA infection
     - fever persists at 48 hours

   Consider the following:
   - changing to Meropenem for suspected ESBL
   - add antifungal (e.g. voriconazole) if:
     - suspected fungal infection (e.g. candida, aspergillus, mucormycosis)
     - fevers persist in high-risk patients beyond 96 hours of antibacterial therapy (seek expert advice)
   - add Co-trimoxazole for suspected PCP
   - add acyclovir/ganciclovir for suspected HSV or CMV infections

d. **Other than U+E and LFT,** list six (4) **key** investigations that you would order for this patient **in the emergency department**. (4 marks)
- **blood cultures peripheral**: identify organism with sensitivities guiding ongoing antibiotic regiment
- **blood cultures CVC**: identify organism with sensitivities guiding ongoing antibiotic regiment
- **Sputum MCS**: identify organism with sensitivities guiding ongoing antibiotic regiment
- **Ca**
- **Bedside transthoracic ECHO:** exclude valvular vegetations
- **ECG**
- **Swab any skin lesion:** identify organism with sensitivities guiding ongoing antibiotic regiment

Question 6 (12 marks)

A 65 year old man presents with abdominal distension and pain. The patient is noted to have free fluid on an Emergency Department screening ultrasound.

An aspirate of peritoneal fluid is performed.

Appearance	dark brown	
White blood cell count	1500	
Polymorph count	1000	
Glucose	0.1	mg/Dl
LDH	450	
Albumin	36	g/dL
Serum Albumin	34	g/dL

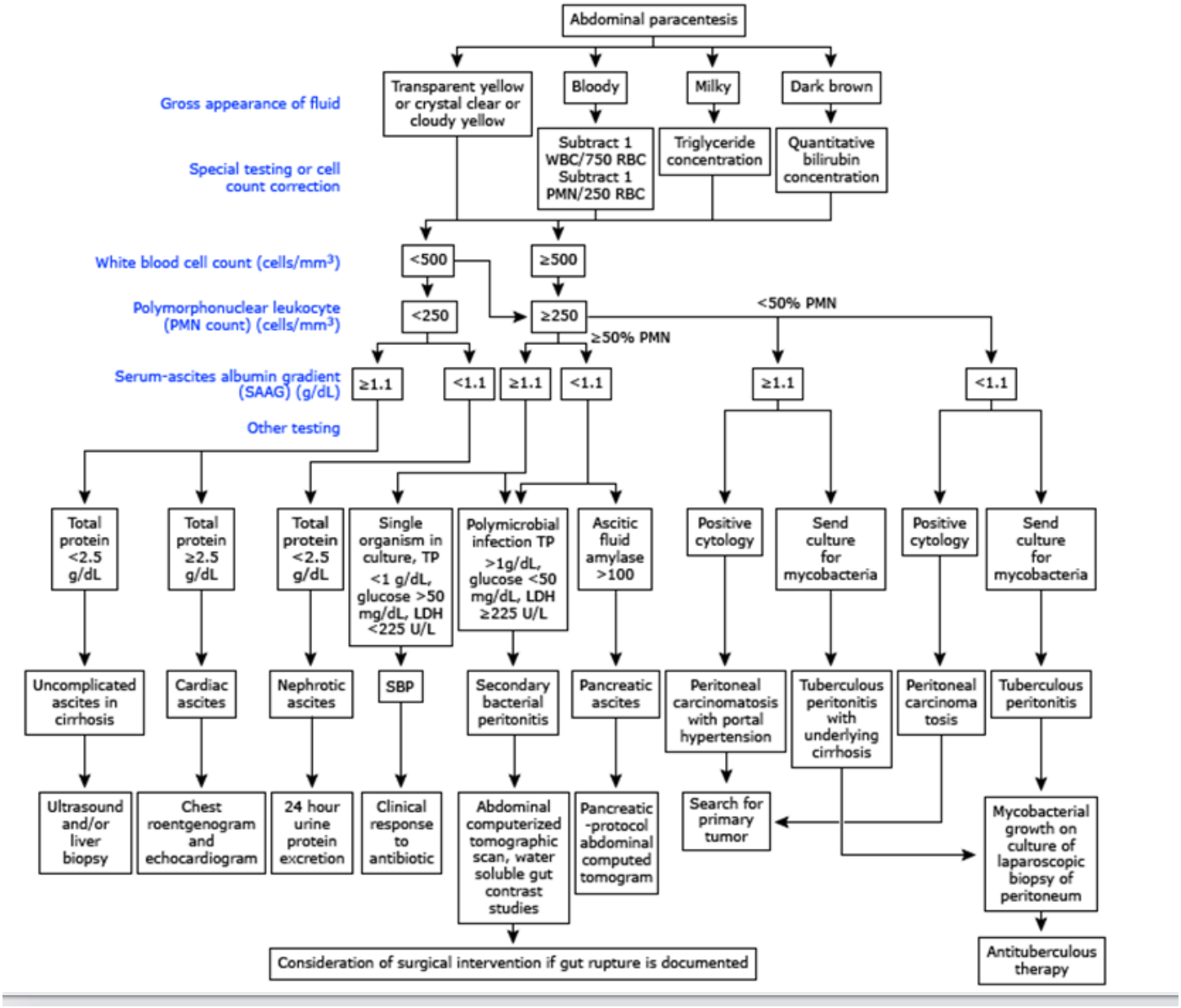
a. State the most likely diagnosis. (1 mark)
   - **Bacterial peritonitis (either spontaneous or secondary)**

b. List five (5) likely causes for this condition. (5 marks)
   - **Spontaneous bacterial peritonitis**
     - **CLD with ascites**
     - **Nephrotic syndrome**
     - **Peritoneal dialysis**
   - **Secondary bacterial peritonitis**
     - **Ascites + appx**
     - **Ascites + pancreatitis**
     - **Ascites + perf viscus**
     - **Ascites + diverticulitis**

c. List three (3) key pathological investigations that you would perform in the emergency department. State one (1) justification for your choice. (6 marks)

Investigation (3 marks)	Justification (3 marks)
Blood cultures	**+ve in 50%** **Guide antibiotic use**
LFT	**↓ Albumin as a cause of low ascites** **Evidence of synthetic impairment suggests chronic liver disease**
Clotting	**Prior to ascitic tap**
FBE	**WCC > 15 and > 75% neutrophils +/-or L shift supports the likelihood SBP**
Lipase	**>3 normal suggests pancreatitis as a cause of ascites**

Differential diagnosis of ascites



Initial ascitic fluid tests — The routine tests ordered on ascitic fluid samples include an analysis of the appearance, serum-to-ascites albumin gradient, cell count and differential, culture, and total protein.

Appearance — The gross appearance of the ascitic fluid can be helpful in the differential diagnosis. Clear fluid is typically seen in the setting of cirrhosis, turbid or cloudy fluid in the setting of infection, milky fluid in the setting of chylous ascites, and bloody fluid in the setting of malignancy or a traumatic paracentesis.

●**Clear** – Uncomplicated ascites in the setting of cirrhosis is usually translucent yellow; it can be completely clear if the bilirubin is normal and the protein concentration is very low.

●**Turbid or cloudy** – Spontaneously infected fluid is frequently turbid or cloudy. A study of 916 samples demonstrated that an "abnormal ascitic fluid appearance" as defined as hazy, cloudy, or bloody was 98 percent sensitive, but only 23 percent specific in detecting spontaneous bacterial peritonitis.

●**Opalescent** – Infrequently, ascitic fluid in the setting of cirrhosis is "opalescent" and has a slightly elevated triglyceride concentration. This peculiarity does not seem to have clinical significance except to explain the opalescence, which can be misinterpreted as "pus."

●**Milky** – Milky fluid usually has a triglyceride concentration that exceeds the serum concentration, is greater than 200 mg/dL (2.26 mmol/L), and is often greater than 1000 mg/dL (11.3 mmol/L); such specimens are referred to as "chylous ascites" [41]. A study performed in a tertiary referral center reported that malignancy was the most common cause of chylous ascites; however, this probably represented selection bias [41]. By contrast, a prospective study performed in large general hospitals documented that cirrhosis caused 10 times as many cases of chylous ascites as malignancy [40]. Approximately 1 out of 200 patients (0.5 percent) with cirrhosis has chylous ascites in the absence of cancer.

●**Pink or bloody (and corrected neutrophil count)** – Pink fluid usually has a red cell concentration of >10,000 per mm^3. Frankly bloody fluid has a red cell count of tens of thousands per mm^3. Most bloody samples are due to a "traumatic tap" with trivial leakage of subcutaneous blood during the tap. In this setting, the fluid is heterogeneously bloody with clearance of the red color during the tap and clotting of the specimen if the sample is not promptly placed into the anticoagulant tube. If the fluid appears to be homogeneously bloody, the bleeding probably occurred long before the current tap with subsequent clot lysis and distribution of the red cells throughout the abdominal cavity. A rapid repeat paracentesis entering the other side of the abdomen can confirm that the fluid is homogeneously bloody.

The differential diagnosis in this setting is bloody ascites due to cirrhosis, leakage of blood from a punctured collateral (eg, from a previous tap), or malignancy [56,57]. Of samples obtained from patients with cirrhosis, approximately 5 percent were bloody in one study [56]. Of the bloody samples, 41 percent were "spontaneous" and probably related to bloody lymph, 34 percent were due to bleeding hepatocellular carcinoma, 22 percent due to traumatic tap, and 3 percent due to tuberculous peritonitis [56]. Careful paracentesis technique minimizes the risk of puncturing a collateral vein or artery. (See "Diagnostic and therapeutic abdominal paracentesis".)

Ascites is bloody in approximately 50 percent of patients with hepatocellular carcinoma [56-58] and in 22 percent of malignancy-related ascites overall [58]. Patients with hepatocellular carcinoma can develop massive intra-abdominal bleeding with hemodynamic instability and rapid death; embolization of the bleeding vessel by an interventional radiologist can be effective in stopping the bleeding [57,59]. Such patients rarely qualify for liver transplantation due to advanced tumor stage and intraperitoneal spread. (See "Malignancy-related ascites".)

Contrary to popular belief, tuberculous peritonitis is rarely bloody [56]. (See "Tuberculous peritonitis".)

●**Brown** – Deeply jaundiced patients have brown ascitic fluid with a bilirubin concentration approximately 40 percent of the serum value [60]. If the ascitic fluid is as brown as molasses and the bilirubin concentration is greater than the serum value, the patient likely has a ruptured gallbladder or perforated duodenal ulcer [60].

Serum-to-ascites albumin gradient — The serum-to-ascites albumin gradient (SAAG) accurately identifies the presence of portal hypertension and is more useful than the protein-based exudate/transudate concept (table 3 and table 6 and algorithm 1) [40,61]. The SAAG is easily calculated by subtracting the ascitic fluid albumin value from the serum albumin value, which should be obtained the same day. The SAAG generally does not need to be repeated after the initial measurement.

●The presence of a gradient ≥1.1 g/dL (≥11 g/L) predicts that the patient has portal hypertension with 97 percent accuracy [40].

●A gradient <1.1 g/dL (<11 g/L) indicates that the patient does not have portal hypertension [40].

The SAAG will be elevated with any disorder leading to portal hypertension and is not specific to ascites due to cirrhosis (table 6). Other testing may be needed to differentiate cirrhotic from noncirrhotic portal hypertension. Additional testing will depend upon the clinical setting and may include an evaluation for heart failure, hepatic metastases, or Budd-Chiari syndrome.

Patients with ascites due to heart failure can narrow their gradient during diuresis, whereas the SAAG in the setting of cirrhosis remains stable unless blood pressure or portal pressure decreases significantly.

Cell count and differential — The cell count with differential is the single most useful test performed on ascitic fluid to evaluate for infection and should be ordered on every specimen, including therapeutic paracentesis specimens (ie, a paracentesis being performed as part of the treatment of ascites). Ascitic fluid infection is a reversible cause of deterioration and a preventable cause of death in patients with cirrhosis and ascites. The key to survival is early detection and treatment [52,62]. The cell count should be available within one hour, while the culture takes several hours to days [63,64]. Antibiotic treatment should be considered in any patient with a corrected neutrophil count ≥250/mm^3 [52,62,64].

The fluid should be submitted to the lab in a tube containing an anticoagulant to avoid clotting (usually EDTA—"purple top" tube). Rapid turn-around may require a "stat" order. Some laboratories prioritize routine peripheral blood tests over the processing of ascitic fluid cell counts, and a call should be placed to the laboratory if the result is not rapidly available. If the results are delayed or if the clinician fails to follow-up on the cell count in a timely manner, infection may not be diagnosed until is at an advanced, and possibly fatal, stage.

The white blood cell and neutrophil counts need to be corrected in patients with bloody samples. One white blood cell should be subtracted from the white blood cell count for every 750 red blood cells to yield the "corrected white blood cell count," and one neutrophil should be subtracted from the absolute neutrophil count for every 250 red blood cells to yield the "corrected neutrophil count" [65]. In bloody ascites, the corrected neutrophil count is frequently <0 due to remote hemorrhage with lysis of neutrophils. (See 'Appearance' above and "Spontaneous bacterial peritonitis in adults: Diagnosis".)

Total protein concentration — Ascitic fluid can be classified as an exudate if the total protein concentration is ≥2.5 or 3 g/dL and a transudate if it is below this cutoff. However, the exudate/transudate system of ascitic fluid classification has been replaced by the SAAG, which is a more useful measure for determining whether portal hypertension is present [40]. (See 'Serum-to-ascites albumin gradient' above.)

Despite its problems, the ascitic fluid total protein concentration remains of some value. This parameter does not change with development of spontaneous bacterial peritonitis (SBP), and patients with a value less than 1 g/dL have a high risk of SBP [66,67]. Selective intestinal decontamination may help prevent SBP in patients with low protein ascites [68]. (See "Spontaneous bacterial peritonitis in adults: Treatment and prophylaxis", section on 'Prophylaxis'.)

Measurement of total protein, glucose, and lactate dehydrogenase (LDH) in ascites may also be of value in distinguishing SBP from bowel perforation into ascites [69,70]. Patients with ascitic fluid that has a corrected neutrophil count ≥250 cells/mm^3 and meets two out of the following three criteria are unlikely to have SBP and warrant immediate evaluation to determine if bowel perforation into ascites has occurred [69,70]:

- Total protein >1 g/dL
- Glucose <50 mg/dL (2.8 mmol/L)
- LDH greater than the upper limit of normal for serum

The total protein concentration may also help differentiate uncomplicated ascites from cirrhosis from cardiac ascites, both of which have a SAAG ≥1.1 g/dL (≥11 g/L). In the case of ascites from cirrhosis, the total protein is <2.5 g/dL (<25 g/L), whereas in cardiac ascites it is ≥2.5 g/dL (≥25 g/L).

In patients with nephrotic ascites, the SAAG is <1.1 g/dL (<11 g/L), and the total protein in the ascites of <2.5 g/dL (<25 g/L).

Other ascitic fluid tests — Other tests should be ordered in appropriate settings (table 3 and algorithm 1) [52]. These additional tests may be performed with the initial paracentesis if there is clinical suspicion for a particular disorder, or they may be performed on a subsequent paracentesis based on the results of initial testing. As a general rule, these tests are most useful when there is suspicion of something other than sterile ascites due to cirrhosis.

- **Culture** — Cultures of ascitic fluid should be obtained on specimens from patients who are being admitted to the hospital with ascites and those who deteriorate with fever, abdominal pain, azotemia, acidosis, or confusion [52]. By comparison, therapeutic paracentesis samples in patients without symptoms of infection do not need to be cultured [71,72].

An adequate volume of ascitic fluid (generally 10 mL per bottle, but the amount varies according to the manufacturer of the bottle) should be inoculated into aerobic and anaerobic blood culture bottles at the bedside; this method is more sensitive for detecting bacterial growth in ascitic fluid than conventional culture methods [63]. Bedside inoculation of the blood culture bottles is preferable to delayed inoculation of the bottles in the microbiology laboratory [73]. (See "Spontaneous bacterial peritonitis in adults: Diagnosis".)

- **Glucose concentration** – The ascitic fluid glucose concentration is similar to that in serum unless glucose is being consumed in the peritoneal cavity by white blood cells or bacteria [66]. Malignant cells also consume glucose; thus, the concentration of glucose may be low in peritoneal carcinomatosis [58]. In the setting of bowel perforation (eg, perforated ulcer or diverticulum) into ascitic fluid, glucose may be undetectable [69,70].
- **Lactate dehydrogenase concentration** – Because lactate dehydrogenase (LDH) is a much larger molecule than glucose, it enters ascitic fluid less readily [74]. The ascitic fluid/serum (AF/S) ratio of LDH is approximately 0.4 in uncomplicated ascites due to cirrhosis. In SBP, the ascitic fluid LDH level rises such that the mean ratio approaches 1.0 [66]. If the LDH ratio is more than 1.0, LDH is being produced in or released into the peritoneal cavity, usually because of infection, bowel perforation, or tumor.
- **Gram stain** – Although a Gram stain of ascitic fluid is frequently ordered when SBP is suspected, careful inspection of the centrifuged sediment of 50 mL of ascites is only 10 percent sensitive in visualizing bacteria in early detected SBP [63,75], and a Gram stain of uncentrifuged fluid is positive in only 7 percent [63]. In one report, a Gram stain was positive in only 31 of 796 fluid samples; sensitivity and specificity for SBP were estimated to be 10 and 98 percent, respectively [75]. Choice of antibiotics was changed in only one patient, while 16 of 31 positive samples occurred in patients without SBP and were thought to have represented contaminants.

Approximately 10,000 bacteria/mL are required for detection by Gram stain, while the median concentration of bacteria in SBP is only one organism/mL [63]. Thus, a Gram stain of ascitic fluid is analogous to a Gram stain of blood in bacteremia; it is only positive when there is an enormous colony count. The Gram stain is most helpful in ruling in free perforation of the bowel into ascites, in which case sheets of multiple bacterial forms can be seen (picture 1). A syringe or tube of fluid must be submitted to the laboratory in addition to the culture bottles when requesting a Gram stain.

- **Amylase concentration** – The mean ascitic fluid amylase concentration is about 40 int. unit/L in uncomplicated ascites due to cirrhosis, and the AF/S ratio of amylase is approximately 0.4 [76]. The ascitic fluid amylase concentration rises above this level in the setting of pancreatitis or bowel perforation into ascites [70,76]. In pancreatic ascites, the ascitic fluid amylase concentration is approximately 2000 int. unit/L, and the AF/S ratio is approximately 6.0 [76]. (See "Chylous, bloody, and pancreatic ascites".)
- **Tests for tuberculous peritonitis** – A variety of tests have been used for the detection of tuberculous peritonitis. When there is high suspicion of tuberculous peritonitis, peritoneoscopy with mycobacterial culture and histology of a biopsied tubercle is the most rapid route to the diagnosis. (See "Tuberculous peritonitis".)

- **Direct smear** – The direct smear of ascitic fluid has only 0 to 2 percent sensitivity for detecting mycobacteria [77]. We have not encountered a single true positive ascitic fluid Mycobacterial smear.
- **Culture** – When one liter of fluid is cultured, sensitivity for Mycobacteria reportedly reaches 62 to 83 percent [77,78]. However, most laboratories can only process 50 mL of ascitic fluid for Mycobacterial culture.
- **Peritoneoscopy** – Peritoneoscopy with culture of a biopsy specimen has a sensitivity for detecting tuberculous peritonitis that approaches 100 percent [79]. Fluid and tissue can be sent for PCR for tuberculosis [80].
- **Cell count** – Tuberculous peritonitis can mimic the culture-negative variant of SBP, but mononuclear cells usually predominate in tuberculosis. (See "Spontaneous bacterial peritonitis variants".)
- **Adenosine deaminase** – Adenosine deaminase is a purine-degrading enzyme that is necessary for the maturation and differentiation of lymphoid cells. Adenosine deaminase activity of ascitic fluid has been proposed as a useful non-culture method of detecting tuberculous peritonitis; however, patients with tuberculous peritonitis who also have cirrhosis usually have falsely low values [79]. This test is useful in countries such as India, but it is of very limited utility in the United States because most patients in the United States with tuberculous peritonitis also have cirrhosis [79].
- **Cytology** – Almost 100 percent of patients with peritoneal carcinomatosis will have positive ascitic fluid cytology due to the presence of viable malignant cells exfoliating into the ascitic fluid [58]. However, only about two-thirds of patients with malignancy-related ascites have peritoneal carcinomatosis. The remaining patients have massive liver metastases, chylous ascites due to lymphoma, or hepatocellular carcinoma; these patients usually have negative cytology [58]. As a result, the overall sensitivity of cytology smears for the detection of malignant ascites is 58 to 75 percent [81,82]. Hepatomas rarely metastasize to the peritoneum [83,84]. (See "Malignancy-related ascites".)

Some cytology laboratories prefer that specimens be submitted in alcohol fixative, while others prefer fresh unfixed specimens. It is best to coordinate this with the local laboratory to maximize the sensitivity of the cytology.

- **Carcinoembryonic antigen concentration** – Measurement of carcinoembryonic antigen (CEA) in ascitic fluid has been proposed as a helpful test in detecting malignancy-related ascites [85]. However, the study that validated CEA was small and did not subgroup patients based on the type of cancer. CEA may be of some utility in ascitic fluid analysis, but its precise value remains unclear.
- **Triglyceride concentration** – A triglyceride concentration should be obtained on ascitic fluid that is milky. Chylous ascites has a triglyceride content greater than 200 mg/dL (2.26 mmol/L) and usually greater than 1000 mg/dL (11.3 mmol/L) [41,55].
- **Bilirubin concentration** – The bilirubin concentration should be measured in patients with brown ascites. As mentioned above, an ascitic fluid bilirubin value greater than the serum suggests bowel or biliary perforation into ascites [60]. (See 'Appearance' above.)
- **Serum pro-brain natriuretic peptide concentration** – Measurement of pro-brain natriuretic peptide in serum can help distinguish ascitic fluid due to cirrhosis from ascitic fluid due to heart failure. In one report, median values were significantly higher in heart failure compared with cirrhosis, with very little overlap (6100 versus 166 pg/mL). Patients with both heart failure and cirrhosis have values in the heart failure range [86].
- **Useless tests** – Some tests of ascitic fluid appear to be useless. These include pH, lactate, and "humoral tests of malignancy" such as fibronectin, cholesterol, and many others [64,87].

Question 7 (12 marks)

a. List four (4) drugs for which multiple dose charcoal may be of benefit. (4 marks)
- **Carbamazepine**
- **Quinine**
- **Theophylline**
- **Phenobarbitone**
- **Dapsone**

b. List four (4) drugs for which charcoal is not indicated, independent of the time of ingestion. (4 marks)
- **Ethanol**
- **Isopropyl alcohol**
- **Ethylene glycol**
- **Methanol**
- **Lithium**
- **Iron**
- **Potassium**
- **Lead**
- **Arsenic**
- **Mercury**
- **Acids**
- **Alkali**

c. List four (4) drugs for which haemodialysis is the elimination method of choice in the management of severe toxicity overdose. (4 marks)
- **Ethylene glycol**
- **Methanol**
- **Theophylline**
- **Salicylate**
- **Lithium**
- **Phenobarbitone**
- **Metformin**
- **Sodium Valproate**
- **Carbamazepine**
- **Potassium salt overdoses**

Additional Q:

Q: List four (4) indications for charcoal use in paracetamol poisoning. (4 marks)
- **< 2/24 in standard release**
- **< 4/24 or Modified release**
- **< 4 /24 in OD > 30g**
- **<24/24 in OD > 30g of modified release**

Question 8 (8 marks)

A 34 year old woman presents to your emergency department with a history of abdominal pain, vomiting and diarrhoea for two weeks.

An arterial blood gas has been performed and is shown in the props booklet.

a. Provide two (2) calculations to help you to interpret these results. (2 marks)

Derived value 1: **AG = 12 NAGMA**
Derived value 2: **expected CO2 = 26 +/- 2 resp acidosis**

b. Using the scenario and the derived values, define the primary acid/base abnormality/s. (2 marks)
   - **NAGMA**

c. Using the scenario and the derived values, define the secondary acid/base abnormality/s. (2 marks)
   - **Respiratory acidosis**

d. State one (1) unifying explanation for these results. (2 marks)

- **NAGMA due to diarrhoea and/or renal failure secondary to pre-renal causes i.e. dehydration**
- **HypoK due to GU losses with hyperCl secondary to electrical equilibrium or NS resuscitation**
- **Rest acidosis due to altered conscious state and/or fatigue 2° hypoventilation or aspiration or respiratory muscle weakness secondary to HypoK**

Question 9 (18 marks)

A 20 year old female presents after a marine envenomation.

a. List two (2) historical findings that are consistent with Box Jellyfish envenomation. (2 marks)
   - **Tentacles seen**
   - **Sting immediately intensely painful**
   - **Arrest on beach**

b. List two (2) examination findings that are consistent with Box Jellyfish envenomation. (2 marks)
   - **Screaming**
   - **Irrational behaviour**
   - **Wheals/ vesicles/ red-brown whip like marks**
   - **HT**
   - **Tachycardia**
   - **Muscle spasm/ paralysis**

c. List two (2) historical findings that are consistent with Irukandji envenomation. (2 marks)
   - **No stinger/jelly fish seen**
   - **Pain- not initially severe**
   - **No tentacles seen**
   - **Skin erythema- no wheal**
   - **Systemic symptoms delayed 30min-2/24**
   - **Muscle aches/ spasm**
   - **Headache**
   - **Sweating, restlessness, agitation**
   - **N/V**
   - **Respiratory difficulty**
   - **Weakness**
   - **Collapse**
   - **Feeling of "impending doom"**

d. List three (3) examination findings that are consistent with Irukandji envenomation. (3 marks)
   - **Sweating**
   - **HT**
   - **Tachycardia**
   - **CCF/APO**

e. Complete the table below, listing the role of each management modality. (10 marks)

	Box jellyfish	**Irukandji**
Mainstay of treatment	**Prolonged ACLS if arrest**	**AntiHT**
Role of application of ice	**N**	**N**
Role of vinegar application	**Y**	**N/Y different recommended texts disagree !!**
Role of pressure immobilisation	**N**	**N**
Role of antivenom	**Controversial**	**N**

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Emergency Medicine

Is there a role for the use of pressure immobilization bandages in the treatment of jellyfish envenomation in Australia?

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Abstract

Background: The aim of this paper was to review the literature relating to the use of pressure immobilization bandages in the first aid management of jellyfish sting in Australia and to attempt to make a recommendation about their use based on the current literature.

Methods: A descriptive review of all published cases of jellyfish envenomation in Australia was performed, with specific focus on the discussion of pressure immobilization bandages in the management of such cases. A Medline search was performed using the key words listed for this article. Selected articles were reviewed and further publications were identified from the published reference lists given in the selected articles.

Results: The published articles were grouped into three groups: *in vitro* evidence, case reports and editorial comment (either in journals or book). Fifteen references were identified that discussed the use of pressure immobilization bandages in the management of jellyfish envenomation. Other articles were identified that had significant management issues discussion.

Conclusion: Most of the 'jellyfish' literature is in relation to envenomation by *Chironex fleckeri*. This jellyfish is usually found in tropical Australia and has resulted in the deaths of 67 people in Australia. The last death was near Cairns in 2000. Unfortunately, there are few good data on marine envenomations, with most of the literature being *Chironex* envenomation case reports. There are minimal data on the effect of pressure immobilization bandages on other jellyfish envenomations. There is no good evidence to support the use of pressure immobilization bandages in the management of jellyfish sting in Australia.

Key words: *box jellyfish, box jellyfish/antivenom,* Chironex fleckeri, *Irukandji, jellyfish/Australia, pressure immobilization bandage, pressure immobilization bandage/jellyfish.*

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EMA

First aid for jellyfish stings: Do we really know what we are doing?

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Abstract

Jellyfish stings remains a common envenoming, and yet confusion appears to exist in the community as to the correct first aid. Current guidelines from the Australian Resuscitation Council still recommends ice for most jellyfish stiings, although there appears to belittle evidence to support this. There is more evidence supporting the use of hot water. More research is required to simplify first aid for jellyfish stings.

Key words: *first aid, hot water, ice, jellyfish.*

A 'stinger' season has passed since Loten *et al.*[1] published their randomized trial (a rarity in toxicology) comparing ice packs with hot water immersion (at 45°C) to treat patients stung by *Physalia* sp. (Bluebottles or Portuguese man-of-war). The many hundreds of people stung by *Physalia* sp. on south-eastern Queensland beaches in the 2006/2007 summer were still being treated with ice packs. They were following guidelines as recommended by the Australian Resuscitation Council (ARC).[2]

The ARC gives separate advice for tropical and non-tropical stings, and recommends vinegar for tropical jellyfish stings, and the application of cold packs or wrapped ice pain relief for all jellyfish stings. For non-tropical blue bottle, stings, the ARC now recommends rinsing the area with sea water and placing the stung area in hot water. If the pain is unrelieved or hot water is unavailable, ice is recommended. Despite these recommendations, a prospective study of 107 patients stung by jellyfish contacting the Western Australian Poison Information Centre found 12 different first aid treatments were used.[3,4] This suggests that recommended first aid treatments might not be effective, and/or there is confusion about the most appropriate one to use.

Vinegar has been demonstrated to prevent nematocysts firing in laboratory *Chironex fleckeri* (the 'Box jellyfish') models.[5] However, vinegar will not have an effect on the nematocysts that have fired or the venom released, and will only prevent further undischarged nematocysts from firing. Currently, it is recommended and routinely used for first aid treatment in *C. fleckeri* stings to prevent life-threatening envenoming. It is assumed that it might be effective for other types of box jellyfish, and is also recommended for Irukandji syndrome. Vinegar might precipitate nematocyst firing with *Chrysaora quinquecirrha* (American sea nettle)[6] and some other types of jellyfish, so it is not recommended for other types of jellyfish.

The evidence for ice being recommended as a first aid for pain in jellyfish stings appears to be based on one uncontrolled study of 143 patients stung by *Physalia* on

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EMA

Incorrect Acticoat application causing iatrogenic injury to a child with a palmar burn

Acticoat (Smith and Nephew, Melbourne, Vic., Australia) is a nanocrystaline silver dressing which has broad spectrum antimicrobial and anti-inflammatory actions.[1,2] This dressing must first be moistened with sterile water to become effective.[3] Acticoat has been shown to significantly reduce the need for skin grafting in children with partial thickness burns and we recommend its use in the ED setting.[4,5]

Iatrogenic injury caused by the incorrect application of Acticoat to palmar burns is seen frequently in our Burns Clinic. This letter highlights a recent case and we provide recommendations for the prevention of this injury.

A 9-month-old boy presented to the Royal Children's Hospital Outpatient Burns Clinic, Melbourne, Australia, 3 days after sustaining a partial thickness contact burn to his left palm. The initial injury was confined to the hypothenar eminence. He was first seen in an ED where Acticoat was applied (Fig. 1). Saturated circumferential applications of Acticoat and an overlying plastic wrap resulted in maceration of the entire hand and interdigital shearing (Fig. 2).

To protect non-injured skin when dressing hand burns with Acticoat, we recommend that:

1. Acticoat should be moistened with sterile water, but not dripping wet.
2. Acticoat and overlying occlusive dressings should not extend further than 1 cm beyond burn margins (Fig. 3).
3. Digits must first be separated before the hand is bandaged (Fig. 4).

EDs play a vital role in treating the vast majority of partial thickness burn injuries. Knowledge of the

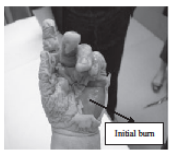

Figure 2. Maceration of the entire hand and shearing of interdigital skin.

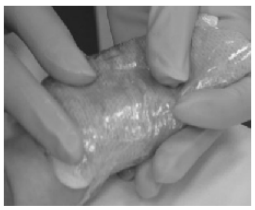

Figure 1. Circumferential and overly wet dressings with no separation of fingers.

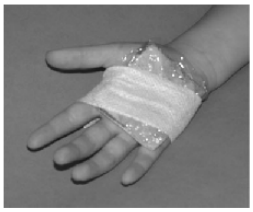

Figure 3. Minimizing Acticoat and the plastic wrap to the area of injury.