NATIONAL UNIVERSITY OF LESOTHO

FACULTY OF HEALTH SCIENCES

BACHELOR OF PHARMACY (HONOURS)

PHA4312 - CLINICAL PHARMACY II

SUPPLEMENTARY EXAMINATION

AUGUST 2023

TOTAL MARKS: 100 MARKS **DURATION: 3 HOURS**

This examination paper consists of two sections, Section A (50 marks) and Section B (50 marks).

INSTRUCTIONS

- Answer all questions.
- Start each question on a new page.

SECTION A **50 MARKS**

Q1. CASE STUDY [15 marks]

Mrs JP is a 45-year-old female who is brought to the emergency department in a coma. According to the relatives she had complained of palpitations, sweating and confusion and had started demonstrating strange behaviour since that morning (about 1 hour ago). She had fallen unconscious on the way to the hospital few minutes after reporting unquenchable thirst, hunger and the repeated need to urinate. On physical examination, she looks dehydrated and is slightly disoriented with a fruity smelling acetone odour on the breath. Vital signs on admission: body temperature 37.5 ºC; BP 100/70 mmHg; HR 132 b/m; RR 28 breaths/minute. Laboratory findings on admission: random blood sugar 22.6 mmol/l; HbA1c 6%; Anion gap-elevated (>16 mEq/L); Urine ketone +++ (positive).

I. What could be the provisional diagnosis for Mrs JP? [1 mark] Justify your answer [4 marks]
II. Discuss the pathophysiology of the signs and/or symptoms of the condition diagnosed above [5 marks]
III. Design an appropriate treatment of the condition diagnosed above [3 marks]. Provide the rationale behind your answer [2 marks].

Additional Information
Drugs available in the pharmacy:
- Actrapid 100 IU/ml solution for injection
1 vial contains 10 ml equivalent to 1,000 IU human insulin (fast-acting human insulin)
- Actraphane 30/70 (30% soluble, 70% isophane/intermediate acting insulin)
Actraphane is a dual-acting human insulin, a biphasic formulation containing both fast-acting and intermediate-acting insulin
1 vial contains 10 ml equivalent to 400 IU, 1 ml suspension contains 40 IU soluble insulin human/ isophane (NPH) insulin human in the ratio 30/70
-Sodium chloride 0.9%w/v in 1L [intravenous infusion]

Q2. Dosing calculations [20 MARKS]:
a). Mr KK is a 57-year-old, 70-kg male with atrial fibrillation for less than 24 hours. His current serum creatinine is 0.9 mg/dL, and it has been stable over the last 7 days since admission. Mr KK has a good renal function, does not have moderate to-severe heart failure and is not obese.

I. Compute an intravenous for digoxin loading dose [4 marks] to achieve a steady-state digoxin concentration equal to 1.2 µg/L and explain how the dose should be given in the treatment of atrial fibrillation (rapid digitalisation) [6 marks]

Additional Information: digoxin F = 1
. Digoxin Vd = 7 L/kg
: Estimated digoxin clearance = 240.48 L/day or 167 ml/min before conversion

b). Acetaminophen poisoning can cause gastroenteritis within hours and hepatotoxicity 1 to 3 days after ingestion especially in patient with history of chronic alcohol consumption. The most common symptoms of acute poisoning include anorexia, nausea and vomiting which can be treated with N-acetylcysteine (NAC) with 8 hours following ingestion.

i. Calculate the loading dose [3 marks] and maintenance dose [4 marks] of N-acetyl cysteine (NAC) to be give via intravenous route (IV) for acute acetaminophen poisoning for 65 kg man with history of chronic alcohol consumption].
ii. Explain mechanism of N-acetylcysteine (NAC) in treating acute acetaminophen poisoning [3 marks]

Q3. Apply your knowledge of clinical pharmacokinetics to explain the following. [15 marks]

i. Although Epson salts contains magnesium sulphate Heptahydrate BP 100%w/w, it cannot be used for the treatment of convulsions due to hypomagnesaemia but its indicated to relieve constipation [1 mark].
ii. Metoclopramide and domperidone are both anti-dopaminergic drugs used to treat nausea and vomiting. However, domperidone is less likely than metoclopramide to induce dystonic reactions. [1 mark].
iii. Although it causes urine alkalinisation, acetazolamide is not used to treat aspirin [1 mark].
iv. Adco-Simvastatin® 20mg should be taken once a day at bedtime as a prophylaxis for hyperlipidemia [1 mark].
v. High than normal dose of thiopental is required for acute anaesthetic induction in obese patients [1 mark].
vi. Heparin is administered iv for treatment and sc for prophylaxis of DVT, the initial dose should be accompanied by an IV bolus injection of heparin, [1 mark].
vii. Although Clotrimazole lozenges 10mg USP (Zolte®) is effective against candida albicans, Clotrimazole lozenges 10mg USP cannot be administered for systemic treatment of candida albicans infection [candidemia], but can be used for the treatment of oropharyngeal candidiasis skin [1 mark].
viii. The following drug regimens are “equally effective” for treating early syphilis**:** benzathine penicillin 2.4 mu im stat (single dose) OR procaine penicillin 0.6 mu im daily for 10 days [1 mark].
ix. Vancomycin, a highly polar glycopeptide antibiotic with oral bioavailability < 1% is administered orally for treatment of antibiotic-associated pseudomembranous colitis [1 mark].
x. Penicillin penetration into the CNS is poor, however benzylpenicillin is used to treat bacterial meningitis
xi. Amoxicillin may decrease the contraceptive efficacy of combined oral contraceptives [1 mark].
xii. Tyramine containing food should be avoided while taking phenelzine
xiii. Hydrochlorothiazide causes hyperuricaemia [1 mark].
xiv. The risk of metformin-induced lactic acidosis is higher in patients with renal insufficiency [1 mark].
xv. Aspirin should not be used to relieve pain and inflammation in gout [1 mark].

SECTION B **50 MARKS**

ADVERSE DRUG REACTIONS, DRUG MONITORING AND TOXICOLOGY [50 marks]

Q1.

Mr Tall, a security guard, presents to the OP emergency department with a chief complaint of a hand wound received while defending himself during an attempted robbery. Physical examination reveals a man in moderate distress with a deep laceration on the palm of his right hand, requiring suturing. Mr Tall has multiple scars from wounds obtained from car accident 2 years ago. He has no known allergies. The wound is cleansed and 1% lidocaine is infiltrated around the laceration in preparation for suturing. Four minutes after lidocaine injections, Mr Tall notes tingling and pruritus of both his hands and feet, and appears flushed. Three minute later he complains of light-headedness, difficulty breathing, and a lump in his throat. His vital signs at this time are blood pressure (BP) 85/65 mm Hg (normal, 120/80); heart rate 70 beats/minute (normal, 60); and respiratory rate 27 breaths/minute (normal, 12). Chest auscultation reveals restricted airflow and stridor.

i. What is the diagnosis of the above drug-induced adverse reaction? [1 mark].

ii. Outline the pathophysiology of the signs and/or symptoms of the above drug-induced adverse reaction [3 marks] and discuss the appropriate pharmacological treatment (including the rational for the drugs given) [3,3 marks]

Q.2 Discuss the mechanisms underlying the follow drug-induced side effects [10 marks]

i. Digoxin induced first degree heart block [2 marks]
ii. Isoniazid induced peripheral neuropathy [2 marks]
iii. Methyldopa induced haemolytic anaemia [2 marks]
iv. Phenytoin induced ataxia [2 marks]
v . Heparin induced bleeding [2 marks]

Q3. Provide the antidotes [1 mark] for the underlying poisoning in the statements below and describe their mechanisms [1 mark] underlying the use in treating such poisoning:

i. Mr. SAS had undergone an unspecified hand surgery. Immediately after the procedure, unknown analgesic was administered. Few minutes he complains of difficulty in breathing, shallow breathing, slow and laboured breathing, nausea and vomiting. [2 marks]

ii. A depressed patient was prescribed two antidepressants drugs. The patient decides to commit the suicide and ingested 10 tablets of one drug prescribed. After sometimes the following signs and/symptoms of poisoning were noted, hypotension (low blood pressure), impaired coordination, drowsiness and respiratory depression (slowed breathing). [2 marks]

iii. A patient was injected accidentally with high dose of unknown solution during anaesthesia and shortly experience anticholinergic symptoms such as mydriasis, tachycardia, cardiac arrhythmias, delayed gastric emptying, dry mouth [2 marks]

iv. An 80-year-old male patient was brought to causality with the complaints of vomiting fresh blood in large quantities coupled with nose bleeding. He was tired and had light-headedness. He consumed unknown drug three times in a day for past 2 weeks. The laboratory results revealed INR = 3.8, (normal = 2.0-3.0) [2 marks]

v. A 12-year boy accidentally ingestion unspecified amount of unknown alcoholic beverages while visiting his mother's at work. He later vomited and presented 3 tonic-chronic generalized convulsive, irritability, distal cyanosis and bilateral mydriasis. The laboratory results revealed increased anion gap (metabolic acidosis) [2 marks]

Q4. A 65 kg man consume 30 aspirin tablets as an attempt for suicide. Later the patient had severe vomiting, tinnitus, confusion, hyperpnea (fast breathing) and lethargy which are common signs/symptoms of respiratory alkalosis and metabolic acidosis.

i. Discuss the pathophysiology of salicylate induced primary respiratory alkalosis [3 marks] and primary metabolic acidosis [3 marks]

ii. Outline the appropriate treatment protocol for acute salicylate poisoning for 65 kg man above (i.e., specific drug and/or drugs or electrolytes to be given) [4marks].

Q5. Digoxin is cardiac glycoside with a narrow therapeutic index 0.8 - 2.0 nmol/l. Digoxin-induced cardiac toxicity may be increased due to interaction with other drugs such as diuretics. A patient was give Furosemide 80mg iv bd and Digoxin 0.25 µg for congestive cardiac failure (CCF)

i. Discuss the mechanism of drug-drug interaction between drugs above [3 marks]

ii. Explain the therapeutic monitoring (include the sampling time & clinical monitoring parameters) of digoxin when administered via iv with furosemide 80mg iv during the management of congestive cardiac failure [7 marks]