Case 10

You are an F2 working in the paediatric emergency department at General Hospital. Your consultant is Dr Bain.

Your bleep number is 2282

Patient name: Kelly Hawkins

Date of birth: 12th February 2008

Patient number: X354657098

Ms Hawkins has presented with acute shortness of breath. She appears acutely short of breath and is unable to provide a history due to her breathlessness.

On examination the patients lips appear blue and her skin is pale. Her airway appears patent and a widespread expiratory wheeze can be heard on auscultation. She is using her accessory respiratory muscles. Heart sounds are I - II + 0, with a peripheral capillary refill time of <3 seconds. Her abdomen is soft and non-tender.

Investigations

Pulse	122 beats per minute
Blood pressure	100/65 mmHg
Respiratory rate	26 breathes per minute
Oxygen saturations	89% (room air)
Temperature	35.6 degrees Celsius

The patient is started on oxygen 15L/min through a non-rebreather mask.

Chest x-ray and routine blood tests pending.

Arterial blood gas results are below:

Blood Gas

Identification		
Patient ID	X354657098	
Date of Birth	12th February 2006	
Patient Last Name	Hawkins	
Patient First Name	Kelly	
FO2	91% (*on 15L O2*)	
Sample Type	Arterial	
Blood Gas Values		
pH	7.29	(7.35 – 7.45)
PO2	8.3	(11 – 13 kPa)
pCO2	7.7	(4.7 – 6.0 kPa)
Acid Base Status		
Bicarbonate	29.8	(22 – 26 mmol/L)
Base Excess	+3.5	(-2 to +2 mmol/L)
Electrolyte Values		
Sodium	131	(133–146 mmol/L)
Potassium	3.9	(3.5–5.3 mmol/L)
Chloride	96	(95-108 mmol/L)
Metabolite Values		
Glucose	4.4	(3.0-7.8 mmol/L)
Lactate	1.2	(0.5 – 2.2 mmol/L)

Task

Please report and interpret the results of the arterial blood gas on hospital notepaper.

Make sure to include the most likely diagnosis and what the next steps in management should be.

Hospital: General Hospital

Ward: Paediatric ED

Consultant: Dr Bain

Patient name: Kelly Hawkins

Date of birth: 12/02/2006

Hospital number: X354657098

Date/Time	Documentation
21/03/2023	FRED JONES FY2
1000	Report on ABG results for Kelly Hawkins, DOB 12/02/2006,
i.e. today's date	taken today (21/03/23) at 0950 due to presentation with
	acute shortness of breath and hypoxia (SpO2 89% room air).
	Report:
	pH 7.29 – acidotic
	PaCo2 7.7 – hypercapnic
	PaO2 8.3 – hypoxic
	HCO3 29.8 – raised
	Results show:
	1. Respiratory acidosis with partial metabolic compensation
	2. Type 2 respiratory failure
	Impression:
	Life-threatening exacerbation of asthma
	Plan:
	1. Nebulised salbutamol
	2. Nebulised ipratropium bromide
	3. Oral prednisolone or IV hydrocortisone
	4. Seek senior input *F. Jones*
	FRED JONES (FY2)
	Bleep: 2282

Explanation

Despite the lack of history, this patient is displaying signs and symptoms suggestive of life-threatening asthma (SpO2 <92%, poor respiratory effort, agitation, cyanosis etc.)

Regarding her ABG results, the patient is acidotic (pH <7.35) with elevated PaCO2 and bicarbonate. This suggests that the acidosis is respiratory with the high bicarb demonstrating partial (rather than full) metabolic compensation. The low PaO2 and high PaCO2 are indicative of type 2 respiratory failure.

If you are struggling with ABG interpretation, this RCP article by Graham Burns is massively helpful(!): https://www.rcpjournals.org/content/clinmedicine/14/1/66

Management of life-threatening asthma should include high-flow O2 (aiming for 94-98% SpO2), nebulised B2 agonists, ipratropium bromide and prednisolone/IV hydrocortisone. MgSO4 may also be given. Given the severity of the presentation, senior input should be sought asap and escalation to ITU should be considered early for invasive ventilation.

You can use the mnemonic **O SHIT ME**: **O**xygen, **S**albutamol, **H**ydrocortisone (preferably pred if they can swallow), **I**pratropium, **T**heophylline (preferably aminophylline) infusion, **M**agnesium sulphate and **E**scalation.

NICE guidelines on the management of an acute exacerbation of asthma can be viewed here:

https://cks.nice.org.uk/topics/asthma/management/acute-exacerbation-of-asthma/

BNF treatment summary on management of acute asthma in children:

https://bnfc.nice.org.uk/treatment-summaries/asthma-acute/

BTS Asthma guidelines:

https://www.brit-thoracic.org.uk/quality-improvement/guidelines/asthma/