QUIZ 3rd May 2017 (answers below)

1. **What are the 5 views in a BELS (basic echo in life support) examination?**

2. **What pathology can be identified in a BELS examination?**

3. **What is the "string of pearls" sign on AXR?**

4. **What are the causes of a non-anion gap metabolic acidosis?**

5. **Describe and interpret the following blood gas result.**

RADIOMETER ABL800 FLEX

ABL827 Emergency
PATIENT REPORT Syringe - S 250uL Sample #

Identifications

Patient ID	
Patient Last Name	
Patient First Name	
Sex	Male
Sample type	Arterial
T	37.0 °C
$FO_2(I)$	21.0 %
PEEP	cmH2O
Pressure Support	cmH2O
SIMV	Rate
Liter Flow	L/min
Note	
Operator	
Accession No.	

Blood Gas Values			
↑ pH	**7.490**		[7.350 - 7.450]
↓ pCO_2	**28.0**	mmHg	[32.0 - 45.0]
↑ pO_2	**121**	mmHg	[75.0 - 105]
Oximetry Values			
*c*tHb	**152**	g/L	[130 - 180]
sO_2	**98.9**	%	[95.0 - 99.0]
*F*COHb	**0.9**	%	[0.0 - 1.5]
*F*MetHb	**0.7**	%	[0.0 - 1.5]
Electrolyte Values			
↓ cNa^+	**119**	mmol/L	[137 - 146]
cK^+	**4.6**	mmol/L	[3.5 - 5.0]
↓ cCa^{2+}	**1.10**	mmol/L	[1.15 - 1.30]
↓ cCl^-	**92**	mmol/L	[98 - 106]
Metabolite Values			
*c*Glu	**5.5**	mmol/L	[3.0 - 7.8]
*c*Lac	**0.9**	mmol/L	[0.0 - 2.2]
*c*Crea	**69**	µmol/L	[60 - 120]
Calculated Values			
ABE_C	**-0.5**	mmol/L	[-]
$cHCO_3^-(P)_C$	**21.1**	mmol/L	[-]

Notes

↑	Value(s) above reference range
↓	Value(s) below reference range
c	Calculated value(s)
	0293: Warning: HbF detected and compensated for

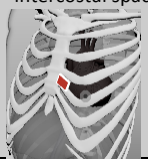
QUIZ answers 3rd May 2017

1. What are the 5 views in a BELS (basic echo in life support) examination?

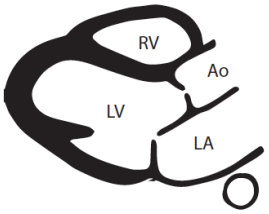
The five views are the parasternal long axis, parasternal short axis, apical four chamber, subcostal and subcostal IVC views. Below are diagrams of each of the 5 views and are taken from The Alfred ICU Echocardiography resources.

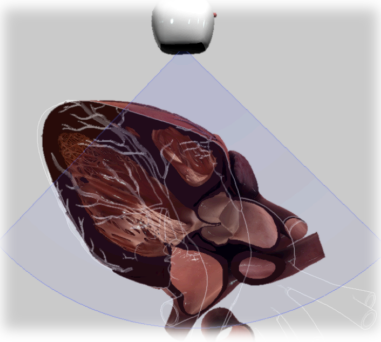
I) Parasternal long axis (PLAX)

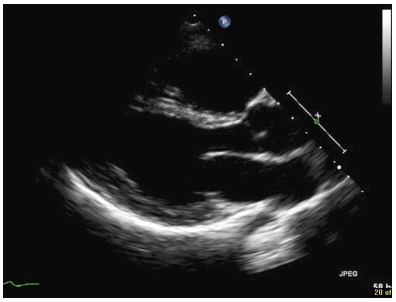
PARASTERNAL: 3rd-5th intercostal space, left parasternal edge



PLAX
Transducer perpendicular to chest wall, probe marker towards patient's right shoulder (11 o'clock)

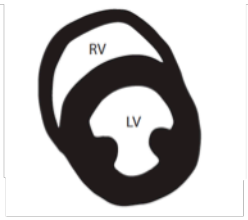


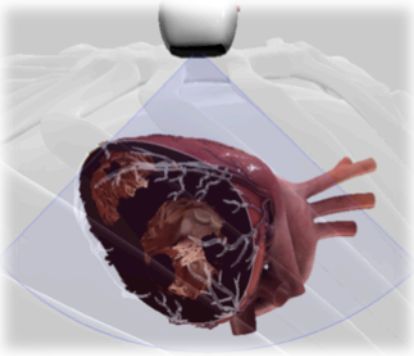


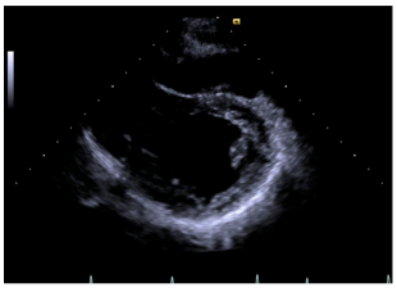


II) Parasternal short axis (PSAX) as mid papillary level

From the PLAX, rotate the probe clockwise through 90 degrees so that the probe marker now points to the patient's left shoulder

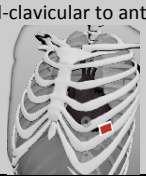






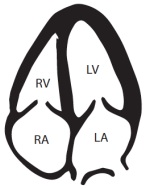
III) Apical four chamber view (A4C)

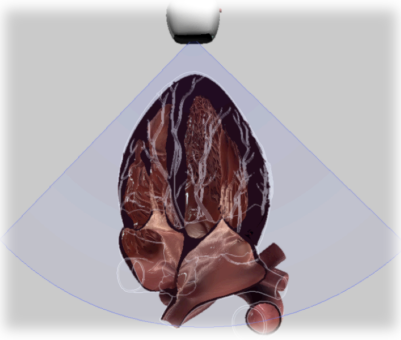
APICAL: 5th intercostal space, mid-clavicular to anterior axillary line (apex beat pulse)

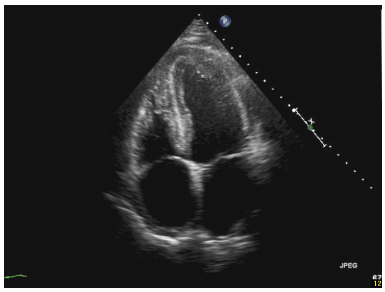


A4C

Ultrasound beam directed superiorly through the heart from apex to base, probe marker rotated approximately 3 o'clock





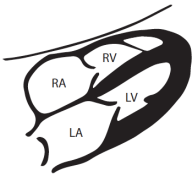


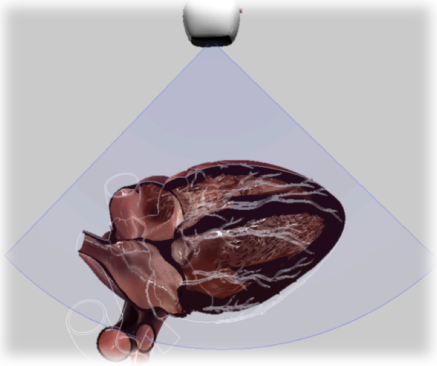
IV) Subcostal view

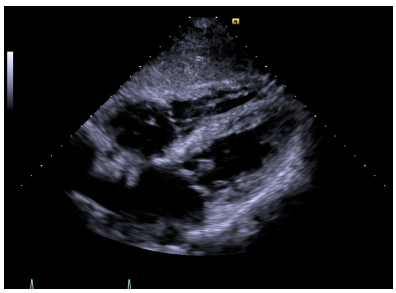
SUBCOSTAL: subxiphoid position, inferior to sternum along the midline or slightly to the patient's right

Subcostal 4C

In the subxiphoid position, rotate the probe marker to about 3 o'clock. Tilt the probe anteriorly, with the ultrasound beam directed between the suprasternal notch and left clavicle



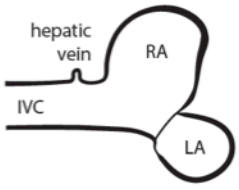


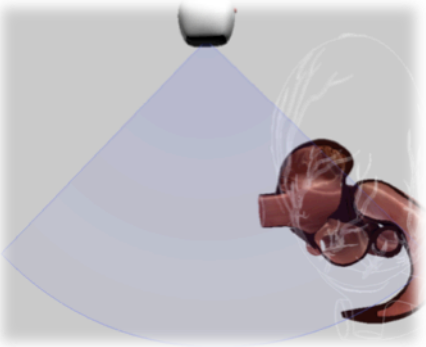


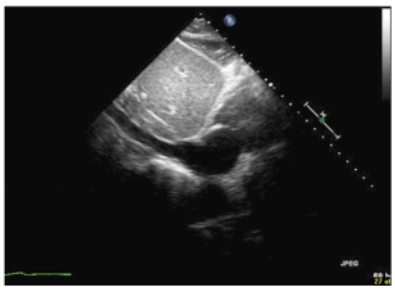
V) Subcostal IVC

Subcostal IVC

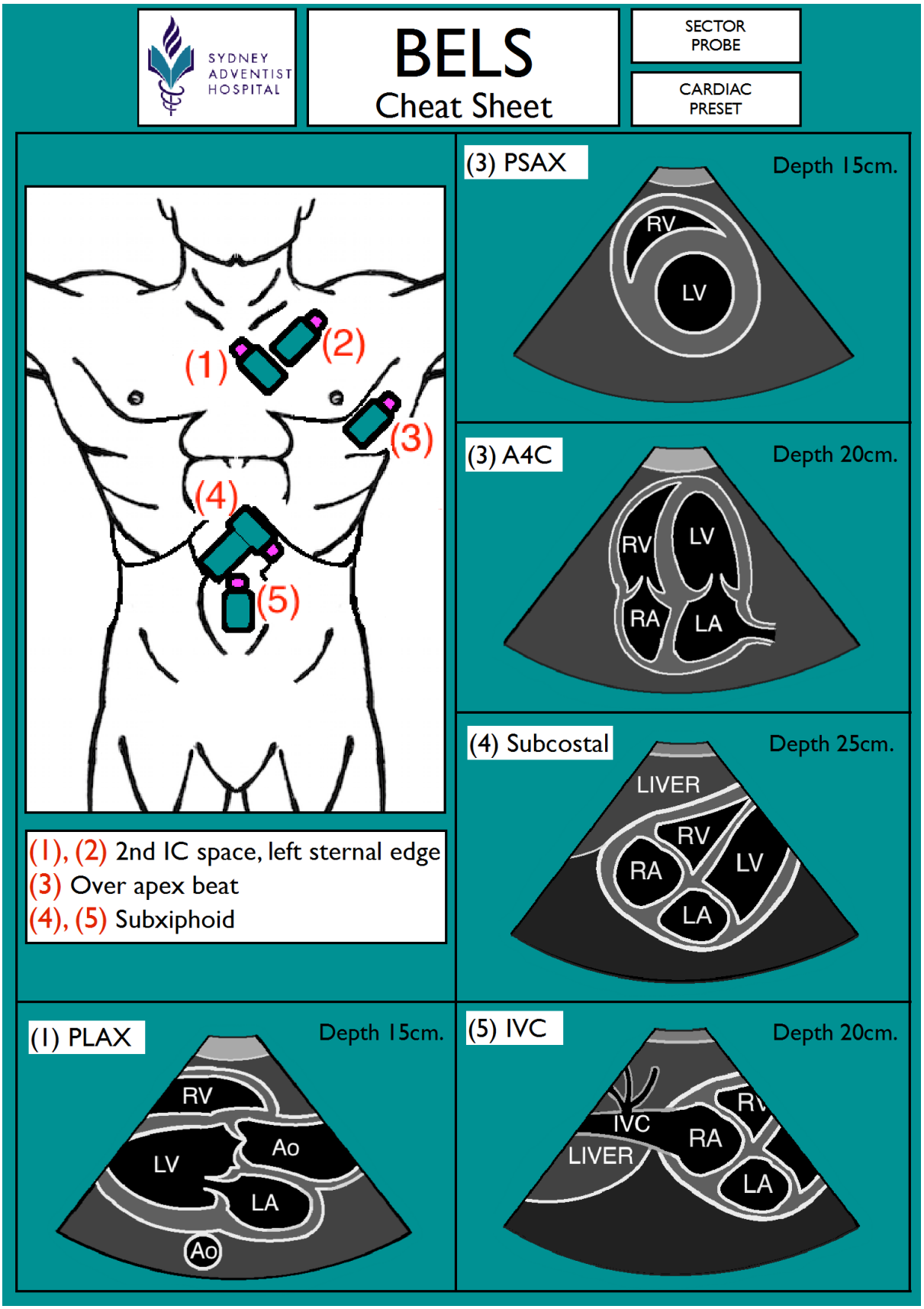
From the Subcostal view, rotate the probe anticlockwise 90 degrees so that the marker is at 12 o'clock







And this is Justin Bowra's BELS cheat sheet.

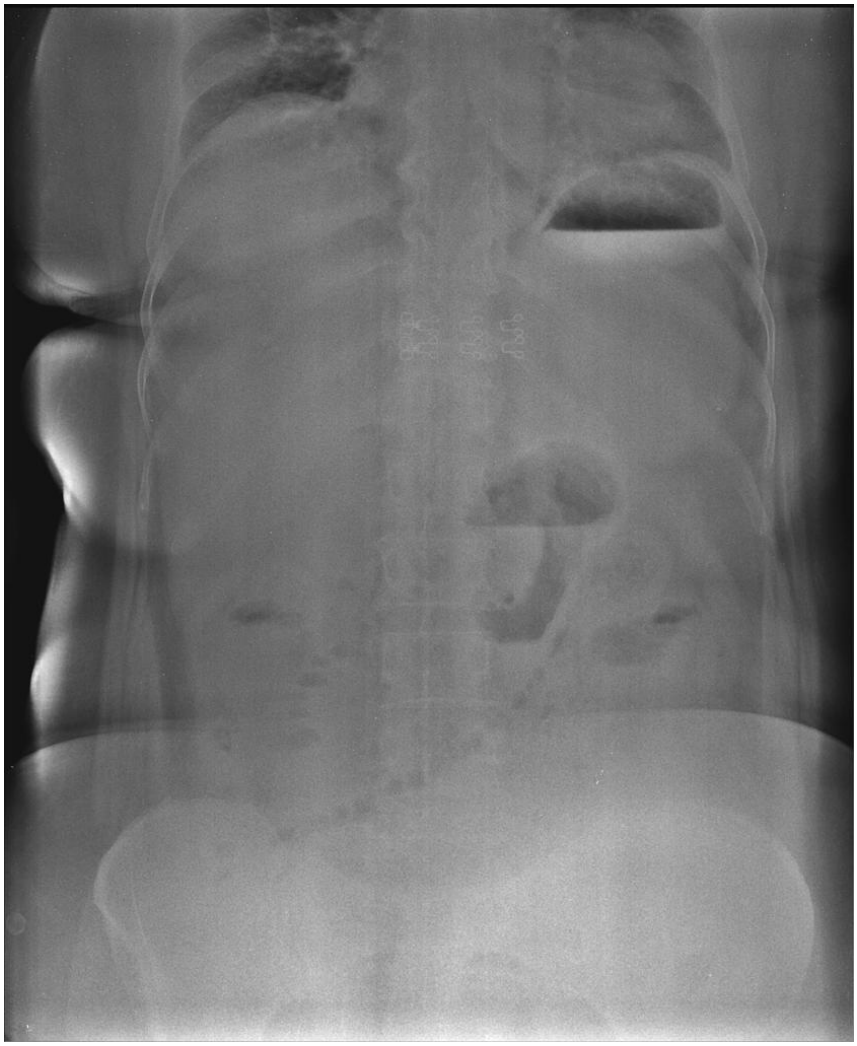


2. **What pathology can be identified in a BELS examination?**

As per ASUM (Australian Society for Ultrasound in Medicine), basic echocardiography in life support can demonstrate sonographic signs of cardiac tamponade, cardiogenic shock, massive pulmonary embolus, hypovolaemia and cardiac motion (or lack there of) in cardiac arrest.

3. **What is the "string of pearls" sign on AXR?**

The "string of pearls" sign is a row of small gas bubbles in the abdomen, representing small pockets of gas along the superior wall of the small bowel that are trapped between the valvulae conniventes. The inferior margins of these bubbles have an ovoid appearance due to the meniscal effect of the intraluminal fluid. The sign indicates small bowel obstruction.



Case courtesy of Dr Maulik S Patel, Radiopaedia.org, rID: 13853

4. What are the causes of a non-anion gap metabolic acidosis?

Normal anion gap metabolic acidosis occurs when the anion of the accumulated acid is chloride. This can occur from bicarbonate loss, as the kidneys retain volume by reabsorbing more sodium chloride, or from addition of chloride.

GIT bicarbonate loss eg.

- *Severe diarrhoea*
- *Pancreatic, biliary, intestinal fistulas or drains*
- *Laxative abuse*

Renal bicarbonate loss

- *Renal tubular acidosis (hence the name)*
- *Acetazolamide therapy*

Exogenous chloride

- *0.9% sodium chloride administration, particularly DKA treatment*

5. Describe and interpret the following blood gas result.

Alkalosis pH 7.49
pCO_2 28 mmHg = respiratory alkalosis

In acute respiratory alkalosis, for every fall of 10mmHg of pCO_2, there is a subsequent fall of 2mmol/L of HCO_3^- due to cellular buffering. A pCO_2 28mmHg is a fall of 12, which should result in a fall in HCO_3^- by 2.4mmol/L, which should then equal 21.6mmol/L. Here, HCO_3^- is 21.1mmol/L, so is consistent with acute cell buffering from acute respiratory alkalosis.

There is also a significant hyponatraemia Na 119mmol/L with a normal glucose level.

➔ **Acute respiratory alkalosis**
Hyponatraemia