

Appendix/supplementary materials

Table S1: Timeline, topics and details of the theoretical lectures for the POCUS workshop

Time	Topic	Details/Learning Objectives
30 minutes	Introduction and evolution of POCUS	<ul style="list-style-type: none"> · define POCUS · discuss how POCUS has evolved · discuss how POCUS differs from comprehensive ultrasound exams · advantages of a binary approach to identifying pathology · describe when to apply POCUS
1 hour	Point-of-care-abdominal ultrasound	<ul style="list-style-type: none"> · describe the 5 main sites of abdominal POCUS and normal findings · justify what binary question to ask based on clinical presentation and clinical findings · common pathologies (effusion, ileus, bladder volume, pneumoperitoneum, halo sign, renal pelvic dilation) · modifications based on patient position and type of pathology · pitfalls that may result in false negative or false positive results · describe the formula used to calculate urinary bladder volumes · three key findings used to diagnose pneumoperitoneum · technique used to sonographically identify post-operative ileus · explain the advantages of using both long and short axis window
1 hour	How to ultrasound the pleural space and lung	<ul style="list-style-type: none"> · define pleural and lung ultrasound (PLUS) and describe how it is performed · explain why knowing PLUS borders is important · identify the pleural line and the glide sign · describe the normal findings of PLUS · explain the limitations of PLUS
1 hour	Paradigm shifts in diagnosing pneumothorax, pleural effusion, and lung pathology with point-of-care-ultrasound	<ul style="list-style-type: none"> · modifications based on patient position and type of pathology · recent modifications to techniques to maximise diagnostic accuracy of pneumothorax · newer approaches to PLUS to maximise diagnostic sensitivity for pleural effusion · find lung borders to maximise finding pleural space pathology based on patient positioning · advantage of turning the probe parallel to the ribs vs. keeping it perpendicular to the ribs · sail sign and ski slope sign in relation to positive and negative findings of pleural effusion · different pathologies (pleural effusion, pneumothorax, AIS, lung consolidations)
1 hour	Cardiovascular ultrasound made easy	<ul style="list-style-type: none"> · 3 key cardiac windows when performing cardiac POCUS · use of caudal vena cava to estimate intravascular volume status · use of left atrial aortic ratio · echocardiographic variables used to assess hyper and hypovolaemia · describe windows used to identify pericardial effusion · use of pericardio-diaphragmatic window to differentiate pericardial from pleural effusion

1 hour The particularities of cats

30 Case reviews!

minutes

· test the knowledge of attendees through a series of video clips

Table S2: Number of scans in the year before the course (N=88)

POCUS scans performed	Number (%)
0 scans	18/85 (21.2)
1-3 scans	39/85 (45.9)
4-10 scans	17/85 (20.0)
11+ scans	11/85 (12.9)

Table S3: Confidence level pre-practical course (N=88)

Variable	N	Not confident	Somewhat confident	Confident	Very confident
		Number (%)	Number (%)	Number (%)	Number (%)
Confidence in performing a PLUS exam on cat or dog	86	54 (62.8)	26 (30.2)	4 (4.7)	2 (2.3)
Confidence in diagnosing pleural effusion with ultrasound	86	41 (47.7)	30 (34.9)	9 (10.5)	6 (7.0)
Confidence in diagnosing pneumothorax with ultrasound	80	60 (75.0)	13 (16.3)	7 (8.8)	0 (0.0)
Confidence in diagnosing interstitial-alveolar with ultrasound	82	52 (63.4)	21 (25.6)	7 (8.5)	2 (2.4)
Confidence in performing an abdominal POCUS exam on a cat or dog	87	38 (43.7)	36 (41.4)	8 (9.2)	5 (5.7)
Confidence in diagnosing free abdominal effusion with Ultrasound	82	21 (25.6)	27 (32.9)	24 (29.3)	10 (12.2)
Confidence in diagnosing free abdominal air (pneumoperitoneum) with ultrasound	82	71 (86.6)	10 (12.2)	1 (1.2)	0 (0.0)
Confidence in performing a basic cardiac POCUS exam on a cat or a dog	87	68 (78.2)	13 (14.9)	4 (4.6)	2 (2.3)
Confidence level in locating and subjectively assessing the left Atrial/aortic ratio in a cat or dog	82	63 (76.8)	14 (17.1)	4 (4.9)	1 (1.2)
Confidence in performing ultrasound guided catheter placement in a cat or dog	87	74 (85.1)	12 (13.8)	1 (1.1)	2 (2.3)

Table S4 : Confidence level post-practical course (N=90)

Variable	N	Not confident	Somewhat confident	Confident	Very confident
		Number (%)	Number (%)	Number (%)	Number (%)
Confidence in performing a PLUS exam on cat or dog	90	0 (0.0)	27 (30.0)	54 (60.0)	9 (10.0)
Confidence in performing a APOCUS exam on a cat or dog	90	2 (2.2)	23 (25.6)	48 (53.3)	17 (18.9)
Confidence in performing a basic cardiac POCUS exam on a cat or a dog	90	1 (1.1)	39 (43.3)	38 (42.2)	12 (13.3)
Confidence in performing ultrasound guided catheter placement in a cat or dog	88	2 (2.3)	30 (34.1)	47 (53.4)	9 (10.2)
Confidence in diagnosing pleural effusion with ultrasound	90	1 (1.1)	19 (21.1)	45 (50)	25 (27.8)
Confidence in diagnosing pneumothorax with ultrasound	90	4 (4.4)	41 (45.6)	33 (36.7)	12 (13.3)
Confidence in diagnosing interstitial-alveolar with ultrasound	90	4 (4.4)	31 (34.4)	42 (46.7)	13 (14.4)
Confidence in diagnosing free abdominal effusion with ultrasound	90	2 (2.2)	14 (15.6)	45 (50.0)	29 (32.2)
Confidence in diagnosing free abdominal air (pneumoperitoneum) with ultrasound	90	19 (21.1)	41 (45.6)	28 (31.1)	2 (2.2)
Confidence level in locating and subjectively assessing the left Atrial/aortic ratio in a cat or dog	90	2 (2.2)	29 (32.2)	47 (52.2)	12 (13.3)

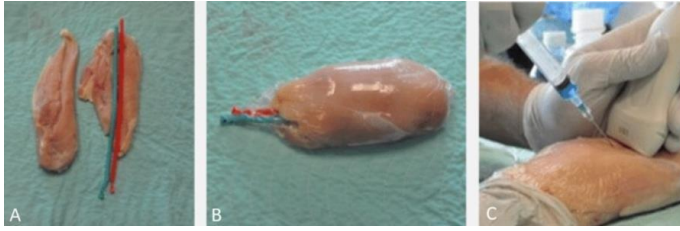


Figure S1: Chicken phantom for the training of POCUS-guided IV access (adapted from *Nachshon et al. 2017*). A: A chicken breast is cut in half and 2 water-filled balloons are placed in the center of the chicken breast. B: The chicken breast is closed and wrapped in transparent film. C: Under ultrasound guidance the water-filled balloons can be punctured by needle or venous catheter.

Reference: Nachshon A, Mitchell JD, Mueller A, Banner-Goodspeed VM, and McSparron JI. Expert Evaluation of a Chicken Tissue-based Model for Teaching Ultrasound-guided Central Venous Catheter Insertion. *J Educ Perioper Med* 2017;19:E503.

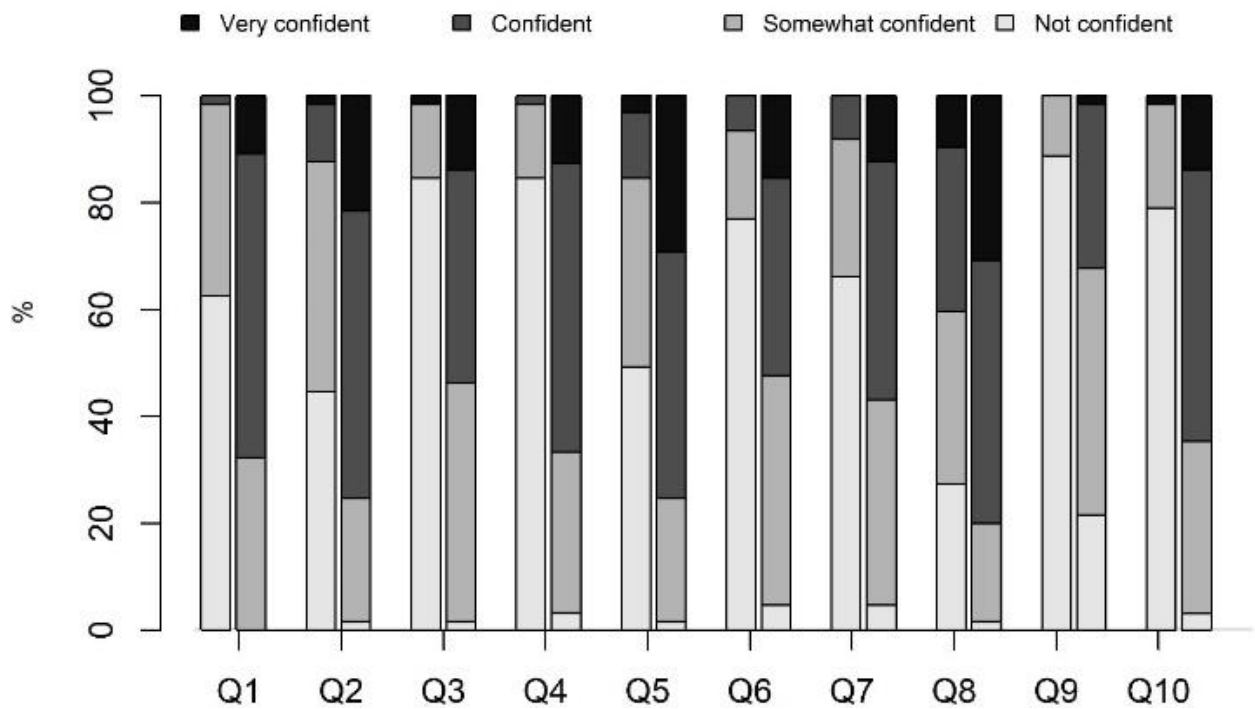
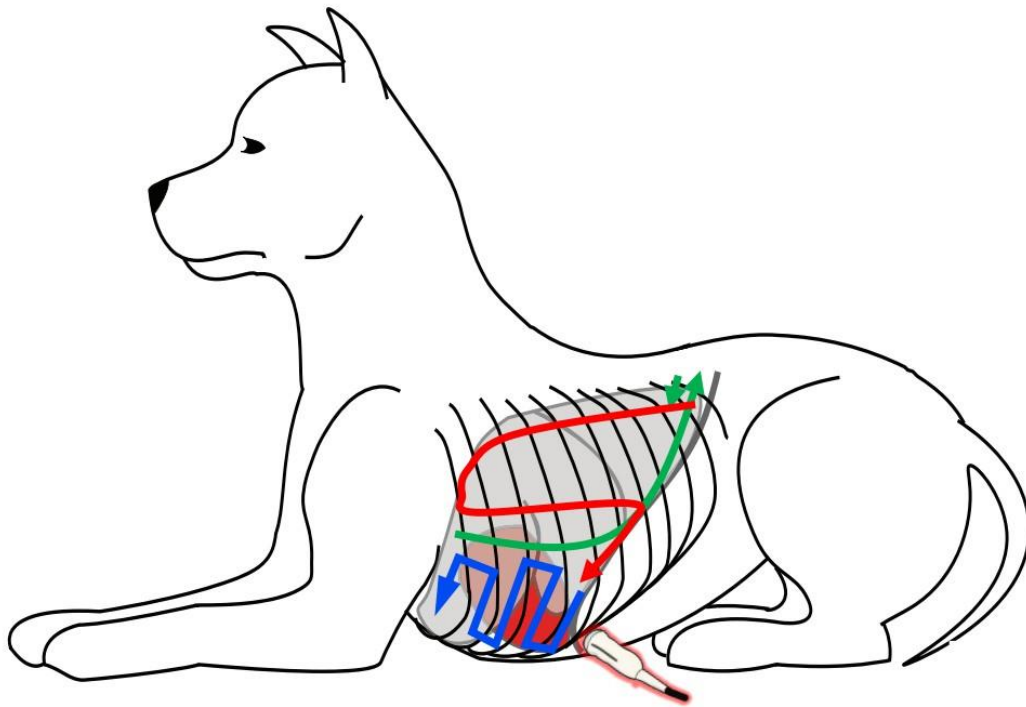


Figure S2: Confidence level for each question* (pre-practical course = left bar and post-practical course = right bar) for VPs who answered both questionnaires (N=65))

*Q1=Confidence in performing a PLUS exam on cat or dog; Q2=Confidence in performing an abdominal POCUS exam on a cat or dog; Q3=Confidence in performing a basic cardiac POCUS exam on a cat or a dog; Q4=Confidence in performing ultrasound guided catheter placement in a cat or dog; Q5=Confidence in diagnosing pleural effusion with ultrasound (US); Q6=Confidence in diagnosing pneumothorax with US; Q7=Confidence in diagnosing interstitial-alveolar with US; Q8=Confidence in diagnosing free abdominal effusion with US; Q9=Confidence in diagnosing free abdominal air (pneumoperitoneum) with US; Q10=Confidence level in locating and subjectively assessing the left Atrial/aortic ratio in a cat or dog

Appendix 1: Detailed description of the different hands-on POCUS stations during the practical part of the course.

Station 1: Live dog PLUS overview including the subxiphoid site



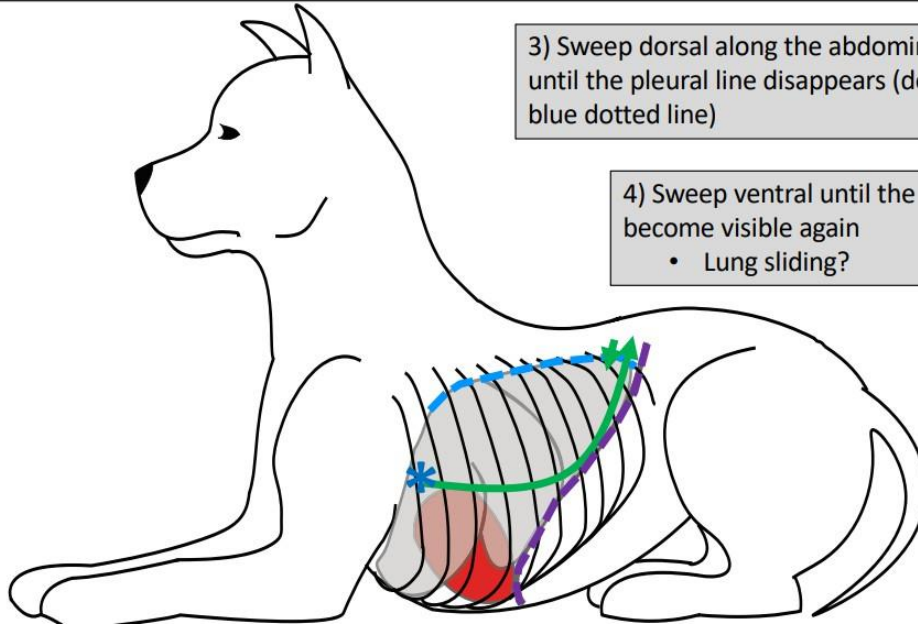
Station 1 Live dog PLUS: Objective A – Pneumothorax?

- 1) Start roughly mid-thorax just behind the front limb (blue Asterix)
 - Is there lung sliding at this site?
 - Tricks for lung sliding: Fan, "dead bat", lower gain, decrease depth, turn off artifact reduction

- 2) Slide caudal to identify the abdominal curtain sign (purple dotted line - caudal lung border)
 - Normal or abnormal curtain sign?

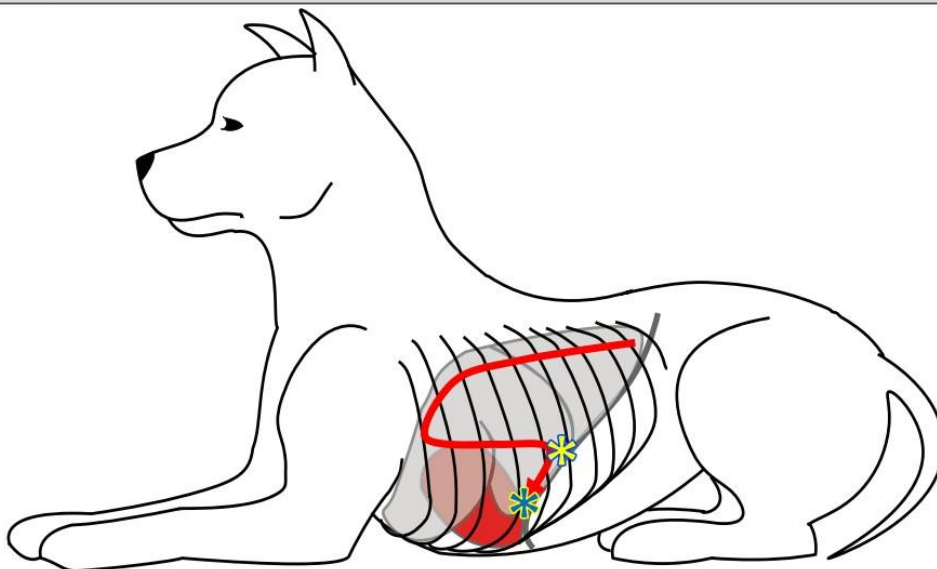
- 3) Sweep dorsal along the abdominal curtain sign until the pleural line disappears (dorsal border – blue dotted line)

- 4) Sweep ventral until the pleural line just become visible again
 - Lung sliding?



Station 1 Live dog PLUS : Objective B – Lung Pathology?

- 1) Start at the most caudo-dorsal site
- 2) Scan lung surface for B-lines and consolidations within cranial and caudal borders using a sliding "S" or "Z" pattern (red curved arrow)



- 3) Stop when you reach the abdominal curtain sign in the mid-thorax (yellow Asterix)

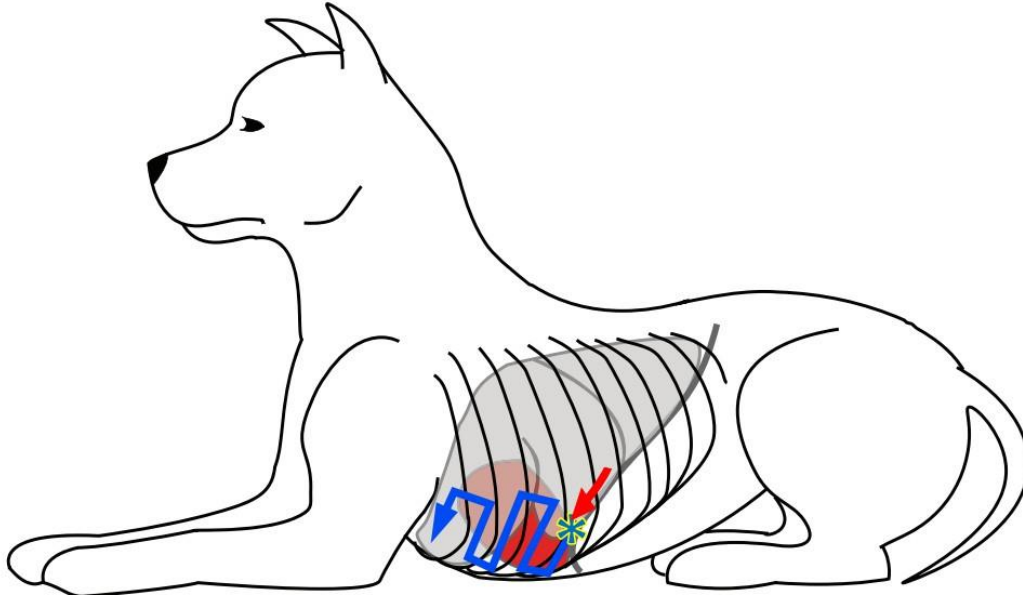
- 4) Follow the curtain sign cranial ventrally to the pericardio-diaphragmatic window (Blue Asterix)

Station 1 Live dog PLUS– Pleural Effusion?

1) Follow the curtain sign and follow it cranial ventrally to the pericardio-diaphragmatic (PD) window (Blue and yellow Asterix)

2) If no pleural effusion at the PD window turn the probe parallel to the ribs and slide ventrally until the sternal muscles fill 1/3 to 1/2 of the ultrasound image (“ski jump sign” in healthy animals).

3) Keeping the probe parallel to the ribs, advance (sweep) the probe cranially one intercostal space at a time, sliding from the ventral sternal to the ventral lung border at each intercostal space (Blue curved arrow)



Station 2: Live dog cardiac

CPOCUS: Objective A - Cardiac right parasternal short axis views

Mercedes and the whale

Fish mouth!
Behlebelebeluh

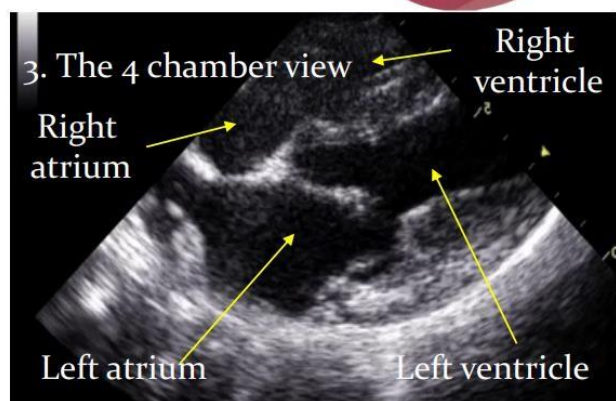
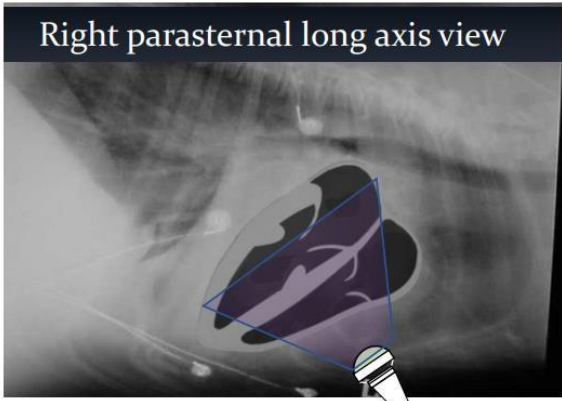
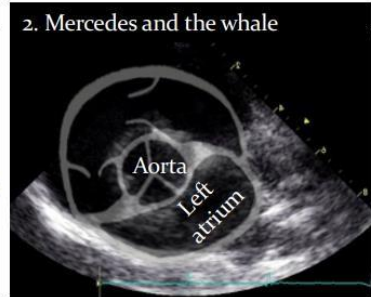
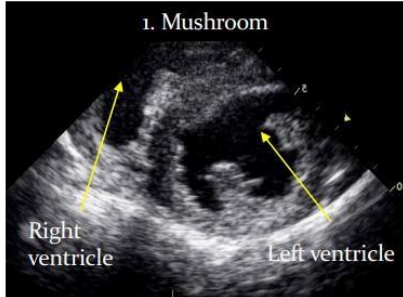
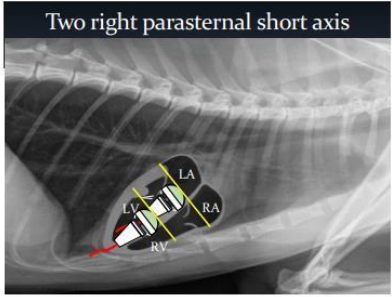
Stop sweeping and fan

Good volume assessment

Good papillary
= mushroom

Don't confuse for
hypovolemia

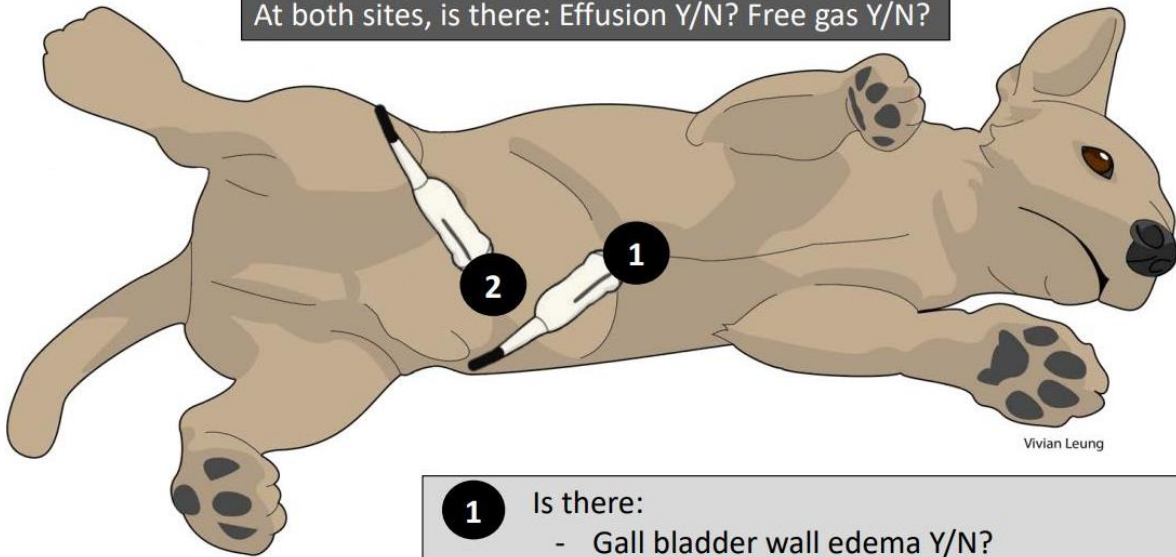
Left apex



Station 3: Live dog abdominal

APOCUS objective A: Subxiphoid and umbilical sites

At both sites, is there: Effusion Y/N? Free gas Y/N?



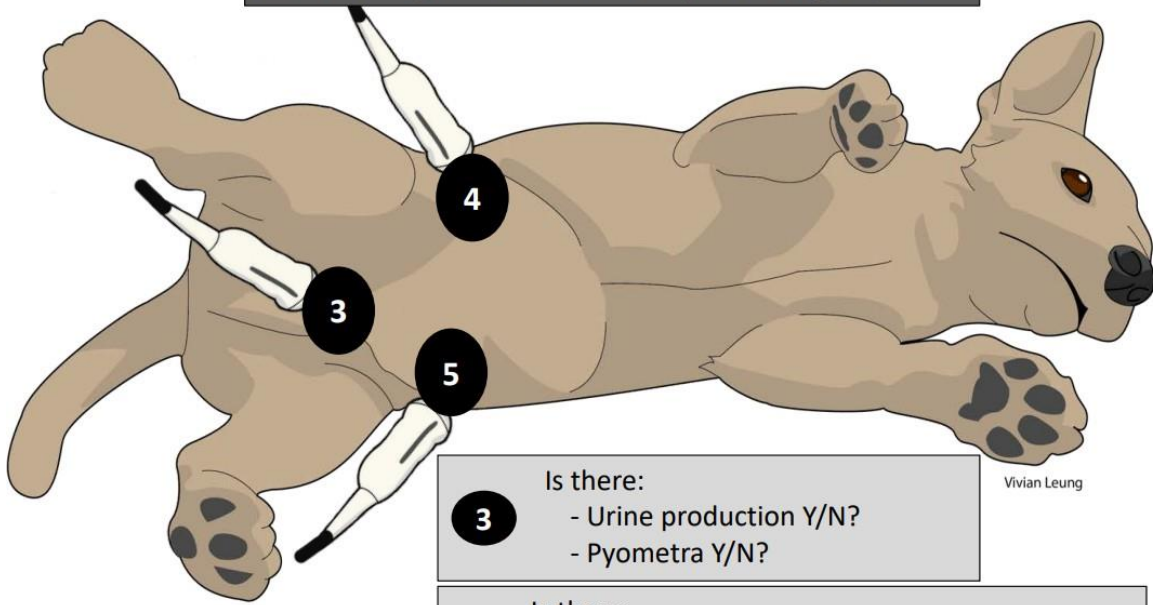
2 Is there:
- A splenic mass Y/N?

1 Is there:

- Gall bladder wall edema Y/N?
- CVC changes – OK to give a fluid bolus Y/N?
- Pericardial effusion Y/N?
- CPR cardiac activity Y/N?
- Pleural effusion Y/N?
- Caudal lung lobe pathology Y/N
- Gastric ileus +/- fluid distention Y/N?

APOCUS objective B: Left and right paralumbar sites and the urinary bladder sites

At all 3 sites, is there: Effusion Y/N? Free gas Y/N?



3 Is there:
- Urine production Y/N?
- Pyometra Y/N?

4 Is there:
- Generalized ileus Y/N (duodenum)?
- Renal pelvic dilation Y/N?

5 Is there:
- Renal pelvic dilation Y/N?

Station 4: US-guided IV access

Appendix 2: Surveys answered by the participants pre- and post-practical course training.

Pre-practical course survey only

- Prior experience about US (learning and techniques): text not available for this statistical analysis
- Skill level in performing US techniques (1 = No Skill (0 scans), 2 = Low Skill (1-3 Scans), 3 = Moderate Skill (4-10 Scans), 4 = High Skill (11+ Scans))

Pre- and post-practical course surveys

For the following questions, the answers were: 1=Not confident, 2=Somewhat confident, 3=Confident, 4=Very confident

- Confidence in performing a PLUS exam on cat or dog
- Confidence in performing an abdominal POCUS exam on a cat or dog
- Confidence in performing a basic cardiac POCUS exam on a cat or a dog
- Confidence in performing ultrasound guided catheter placement in a cat or dog
- Confidence in diagnosing pleural effusion with ultrasound
- Confidence in diagnosing pneumothorax with ultrasound
- Confidence in diagnosing interstitial-alveolar with ultrasound
- Confidence in diagnosing free abdominal effusion with ultrasound
- Confidence in diagnosing free abdominal air (pneumoperitoneum) with ultrasound
- Confidence level in locating and subjectively assessing the left atrial/aortic ratio in a cat or dog

Post-practical course survey only

- Out of your whole experience today, what was most useful to your learning of the POCUS?
- Out of your whole experience today, what was least useful to your learning of the POCUS?