LEARNING CURVE OF NOVICE SONOGRAPHERS TO ANSWER BINARY LUNG ULTRASOUND QUESTIONS IN COMPANION ANIMALS

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Introduction

Studies have shown cardiovascular veterinary point of care ultrasound (VPOCUS) performed by non-specialists helps differentiate cardiac from respiratory disease, and that a short hands-on training course including interpretation of cineloops improves novice sonographer cardiac VPOCUS accuracy. Studies evaluating sonographer interpretation of lung ultrasound (LUS) cineloops in companion animals are lacking. This study evaluated the accuracy of novice sonographer interpretation of LUS using a binary question approach over a 3 month period. We hypothesized that hands on VPOCUS training and cineloop interpretation will increase novice sonographer accuracy to answer binary LUS questions.

Methods

Twelve interns, with minimal prior ultrasound experience, received a 5hour (1 theory, 4 practical) course on LUS, using a binary question approach. Learner performance to assess LUS findings was assessed prior to (T0), immediately following (T1), and 3 months after training (T3). Between T1 and T3, interns had access to scan clinical patients using VPOCUS, and to record cineloops for review by an experienced VPOCUS clinician.

Figure 1: List of the LUS findings assessed using a binary question approach.

Results

The accurate/inaccurate/unanswered (mean(SD)) responses to binary LUS questions increased from 36,3%(12,8); 15,3%(4,1); 48,4%(13,3) at T0 to 64,6%(9,2); 10,7%(2,8); 24,7%(11,3) at T1 to 85,9%(5,8); 9,8%(3,4); 4,3%(6,2) at T3, respectively. Accuracy for detection of pleural effusion, B-lines presence, and B-lines quantification was 67,4%(2,6), 74,31%(3,1), and 71,5%(3,1) at T0. Accuracy for the curtain sign, Z lines, lung point, shred sign, double curtain sign and I lines was lower at 29,2%(1,4), 22,9%(0,9), 16,7%(0,8), 6,9%(0,4), 4,9%(0,6), and 2,1%(0,4), respectively.

At T1, the accuracy of detecting curtain signs, Z lines, double curtain sign and lung point increased to > 50%, but remained low for I lines (7,6%(0,9)) and the shred sign (18,1%(1)), with 80% of novices leaving I line and shred sign questions unanswered. At T3 all binary questions were accurately answered > 75% of the time, with > 90% accuracy for double curtain sign (98,6%(0,4)), pleural effusion (93,8%(1,5)), shred sign (93,8%(0,9)), and curtain sign (91%(1,2)).

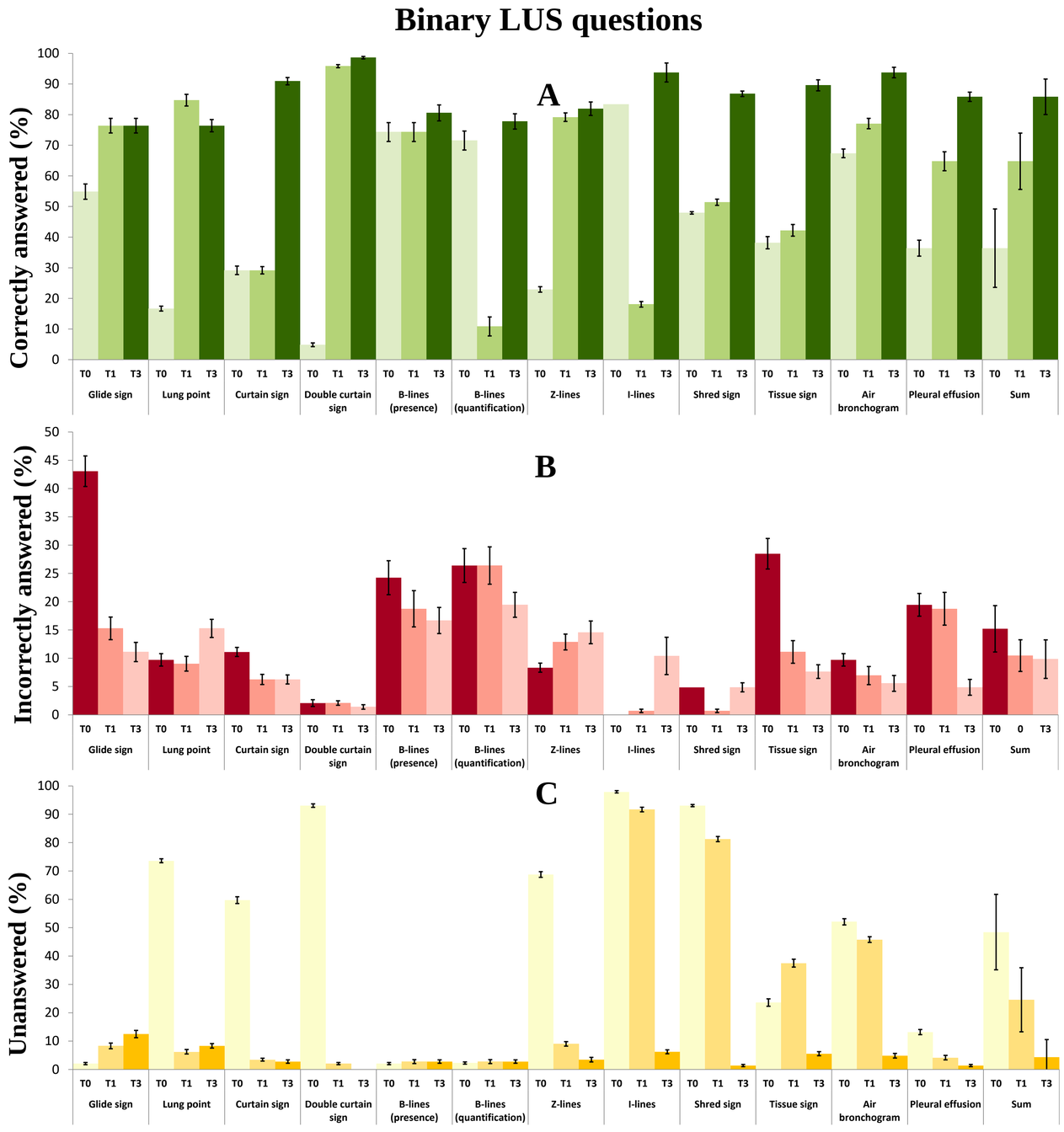

Figure 2: Bar charts representing the mean of accurate (A)/inaccurate (B)/ unanswered (C) responses to different binary LUS questions (%) at T0, T1 and T3. The standard deviations are represented by the black error bars.

Conclusion

Novice sonographers can rapidly answer most binary questions on LUS with high accuracy following a brief hands-on training session and 3 months of clinical practice. Given the difficulty of identifying I-lines and the shred sign, these may be areas requiring greater training. Capture and interpretation of cineloops during clinical practice, with feedback from an experienced VPOCUS operator, appears to improve novice sonographer learner performance rapidly.