Point-of-care ultrasound in foals: Is the execution comparable among operators with varying levels of experience?

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INTRODUCTION

Point-of-care ultrasound (POCUS) in equine medicine is intended to be performed not only by experienced ultrasonographers but also by field veterinarians, emergency physicians, and intensivists as a first-line diagnostic and screening tool. Thus, it is essential to assess whether novice operators are capable of correctly identifying sonographic windows and reliably performing standardized POCUS protocols *(Busoni et al., 2011; Kaffas et al., 2024).*

AIM OF THE STUDY

This study compared the prevalence and execution speed of image acquisition in a point-of-care ultrasound (POCUS) protocol performed on foals by three operators with varying experience levels: expert (A), intermediate (B), and beginner (C).

MATERIALS AND METHODS

The POCUS protocol was performed on 18 foals (aged 2-73d) and included abdominal, thoracic, and cardiac views *(Kidd et al.. 2014).*

For each view, a cineloop sonogram was recorded. Successful image acquisition, time required per view, and total imaging time were recorded.

Chi-square test → successfully collected views from different operators

Kruskal-Wallis test → compares the total imaging time between the operators and evaluates changes in timing over repeated sessions

Cohen's Kappa test → inter-operator agreement in image acquisition

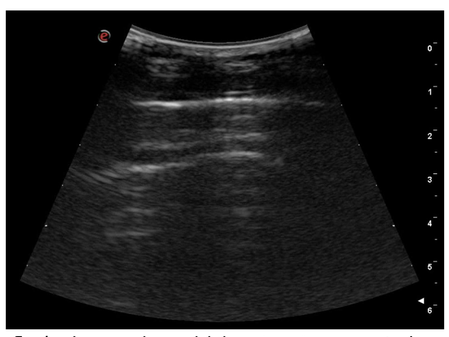

Fig. 1 – Lung: medio-caudal thoracic region, convex probe, longitudinal in the intercostal space

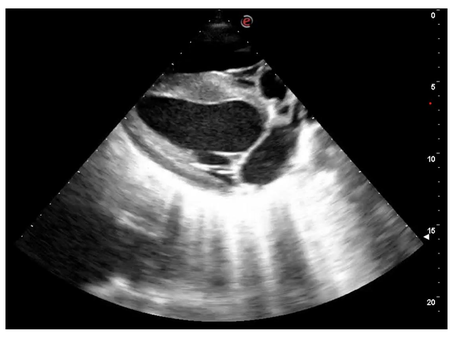

Fig. 2 – Right 4-chamber: phased-array probe parasternal in the fourth intercostal space, rotated to the 1 o'clock position

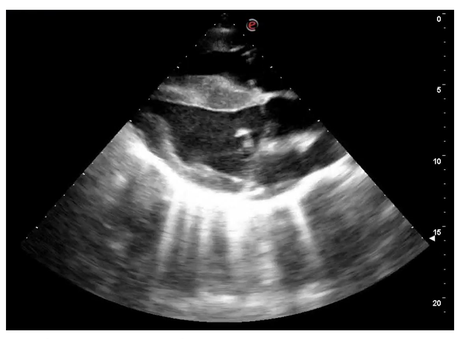

Fig. 3 – Ventricular outflow tract: phased-array probe parasternal in the fourth intercostal space, rotated to the 2 o'clock position

Fig. 4 – Duodenum: convex probe longitudinal in the 14th intercostal space in the mid-abdomen

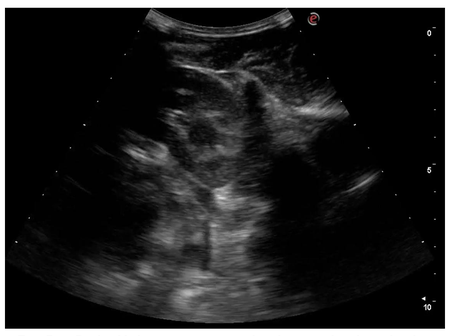

Fig. 5 – Right Kidney: convex probe, longitudinal in the last intercostal space or paralumbar fossa

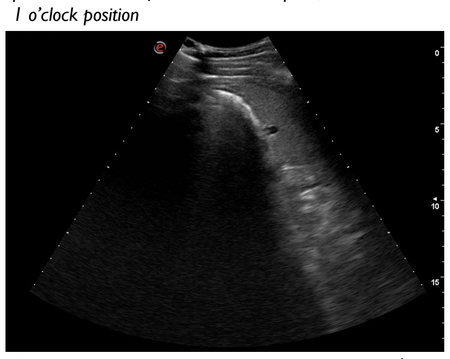

Fig. 6 – Stomach: convex probe longitudinal in the 10th intercostal space, in the third middle of the abdomen

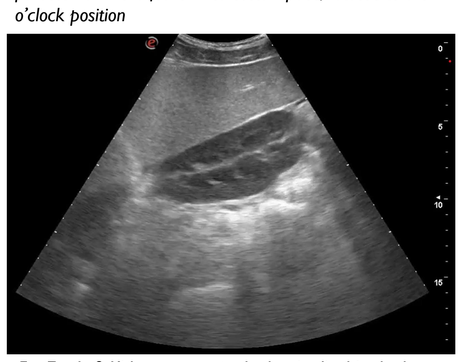

Fig. 7 – Left Kidney: convex probe longitudinal in the last intercostal space or paralumbar fossa

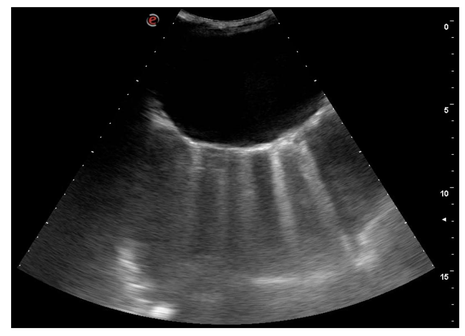

Fig. 8 – Bladder: convex probe in the inguinal region

RESULTS

Operator	Prevalence	Median time of execution
A (Expert)	93.8%	124s
B (Intermediate)	92.2%	174.5s
C (Beginner)	92.8%	191s

	A vs. C	B vs. C	A vs. B
Right 4-chamber view	κ=0.634	κ=1	κ=0.634
Left ventricular outflow tract view	κ=0.634	κ=1	κ=0.634

Prevalence of acquired images was similar between operators (p=0.920)
Operator A was significantly faster vs. C (p=0.038)
No changes in time over repeated sessions

Cohen's K is not valuable for all the other US views due to a lack of statistical variability → All operators succesfully visualized all the ultrasound views

DISCUSSIONS

The prevalence of acquired images was similar between operators, suggesting a limited influence of experience on outcome *(Eberhardt and Schwarzwald, 2022)*. The expert operator's faster performance suggests that while basic skills are quickly acquired, experience improves efficiency *(Witchel et al., 2022).*

A substantial agreement was evaluated when comparing expert vs. beginner and expert vs. intermediate in the right 4-chamber view and in the left ventricular outflow tract view. However, all the operators successfully visualized all the other ultrasound views. Thus, the agreement was not valuable due to a lack of statistical variability.

CLINICAL RELEVANCE

POCUS is a valuable but highly operator-dependent tool, and safe and effective use relies on proper training.

Further studies are needed to define the necessary training.

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