



# Point-of-care ultrasound image archiving and quality improvement: not “If?” or “When?”...but “How?” and “What Next...?”

David Lewis<sup>1,2</sup> · Rawan Alrashed<sup>1</sup> · Paul Atkinson<sup>1</sup>

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Point-of-care ultrasound (POCUS) has become an indispensable tool for many emergency physicians. It is often described as an extension of the clinical examination, a rapid bedside adjunct that can quickly narrow the differential diagnosis and guide emergency management. This rationale has fueled a widespread belief that POCUS image archiving is not necessary. Other objections include “it slows me down”, “I don’t save recordings from my stethoscope” and even “I don’t want to get sued”. Despite a national drive for POCUS quality improvement and clear recommendations for POCUS image archiving from CAEP [1, 2], changing this mindset has proven challenging.

In this edition of CJEM, Asper et al. [3] report a quality improvement (QI) program that resulted in a physician group transitioning from no image archiving to more than 80% of all scans being archived over a 9-month period. These impressive results were achieved by utilizing standard plan-do-study-act QI methodology. Over four cycles, they introduced image archiving software and training, streamlined the process, provided billing guidelines for POCUS, and focused on achieving a cultural shift. Plan-do-study-act methodology has a proven track-record in process improvement, but we wonder whether, in centres without the ability to bill for scans, if the results would be so successful? This study adds weight to those who advocate for an improved financial model to encourage best practice.

There are, as the authors describe, other very good reasons for promoting POCUS image archiving. The very act of recording a representative quality image or clip encourages the physician to optimize image acquisition and to carefully consider what is being demonstrated. This self-awareness of optimizing image acquisition is further strengthened if combined with a process of quality assurance review and feedback and contributes to quality improvement for POCUS beyond archiving.

Almost all emergency departments (ED) use morbidity and mortality (M&M) rounds to review adverse events and promote good practice. Misinterpreted radiographs and ECGs are common fodder for these the most well-attended sessions in our academic calendars. Despite the widespread use of POCUS in the ED, how often are cases presented where POCUS misinterpretation has occurred? Imagine presenting a missed STEMI case without an image of the ECG? The absence of POCUS image archiving is preventing us from learning and improving our skills as a result of respectful review of the errors of others.

Emergency physicians who report their POCUS findings to other specialties are well aware of the variable comfort levels in accepting these findings. Hansen et al. [4] confirmed that comfort levels with emergency medicine POCUS findings were low, especially amongst general surgeons and reported that the limited access to POCUS images was a significant barrier to POCUS utilization. They conclude that by integrating POCUS image archiving into the picture archiving and communication systems (PACS), allowing consulting services to personally review POCUS results at any time, clinical utilization and POCUS confidence may improve.

Resident and fellowship training in POCUS also benefits from comprehensive and accurate archiving. The ability to review normal and pathological images and clips with learners and to review and feedback on scans they perform when not under direct supervision is invaluable. Incorporating remote or archived review into curriculum requirements is

✉ David Lewis  
David.Lewis@dal.ca

Rawan Alrashed  
Rw406061@dal.ca

Paul Atkinson  
Paul.Atkinson@dal.ca

<sup>1</sup> Department of Emergency Medicine, Dalhousie University, Horizon Health Network, Saint John, NB, Canada

<sup>2</sup> Department of Emergency Medicine, Saint John Regional Hospital, Saint John, NB E2L 4L2, Canada

widely recommended and depends upon a culture of careful image archiving and notation [5].

Physicians who express concern about image archiving and the subsequent risk of litigation are likely to be in the same camp as those who feel protected by illegible handwriting. Neither defense stands up to legal scrutiny. Stolz et al. [6] reviewed USA lawsuits that related to POCUS in the ED between 2008 and 2012. Of the five cases reported, all were related to either failure to perform POCUS or failure to perform it in a timely manner. None were related to misinterpretation. More recent studies in other specialties using POCUS have reported similar findings. We suggest that, for many presentations to the ED, the use of POCUS is now an accepted standard of care. Being able to demonstrate that it has been appropriately performed, through routine image archiving will afford a better defense than an illegibly scribbled, or even carefully typed report.

Despite these reasons for image archiving, one of the biggest barriers to implementation remains the cost of POCUS archiving software. Several vendors provide dedicated POCUS archiving software solutions; however, the average cost is more than CAD\$25,000 per year. This does not include the annual cost of local server space for the images, which can rapidly mount up. One solution, utilized by some ED's, is to collaborate with the Department of Diagnostic Imaging to develop a POCUS archiving section within the existing PACS. This solution may lack some of the POCUS specific reporting and credentialing applications offered by vendors; however, it is more affordable and does provide some potential advantages relating to hospital-wide specialty access.

What advances could we see in emergency medicine in an era of widespread POCUS image archiving? Physicians in many tertiary level EDs use image archiving across their health zones to provide support to rural and remote emergency physicians. Will the POCUS image archive become part of the health system electronic medical record, available to all specialties? Is it inconceivable that a general surgeon could admit a patient with cholecystitis based on an emergency medicine diagnosis supported by POCUS, which might later be confirmed (if required) by a radiologist over-reading the images that we acquire and archive to PACS?

Finally, for both academic and clinical departments, we have both an opportunity and duty to improve the practice

of POCUS and to explore new and better ways to use it to improve emergency care. Both QI and research programs will grow to rely on image archiving as they strive to push the boundaries of POCUS further within emergency medicine and beyond.

The widespread adoption of POCUS image archiving is inevitable, either by gradual evolution or because of accreditation mandates. It is not a matter of “if?”, or even “when?”, the questions we now face are “how?” and “what next?” Asper et al. [3] provide some answers to the ‘how?’ and we hope to have stimulated some debate with respect to the ‘what next?’.

## Declarations

**Conflict of interest** No conflict of interest.

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