Clinically integrated ultrasound for decreasing the number of chest x-rays in the intensive care unit: It is high time to move forward a “global” use of ultrasound

We read with interest the article by Lee et al [1] reporting a decreased use of computed tomographic scan and magnetic resonance imaging, associated with an increased use of bedside ultrasound (US) in intensive care unit (ICU) without negative effects on patients’ outcomes. This article shows that US is emerging as an effective tool allowing intensivists to correctly schedule advanced imaging being advantageous especially in terms of radiation exposure, and it gives us a unique opportunity to contribute to the ongoing discussion about different chest x-rays (CXRs) strategies in ICU [1]. One large multicenter randomized trial and other studies confirmed that performing an on-demand CXRs strategy instead of a daily routine CXR strategy allows to decrease the total number of CXRs significantly without any increase in adverse events [1-3]. Based on these data, several investigators recommend that each ICU design a clear protocol regarding their CXRs indications [3]. We agree that a strict standardized protocol is needed to avoid unnecessary CXRs without altering patients’ outcome and enhancing safety. However, we believe that such a protocol should be based not only on medical history, physical examination, and chemical and microbiological findings but also on a clinically integrated and goal-directed US examination performed during morning rounds at bedside.

As reported by Lee et al [1], in recent years, US has been increasingly used in ICU because it is a nonionizing and noninvasive imaging technique, easily available, and easily repeatable at bedside.

In comparison with CXRs, pleural and lung US (PLUS) is more accurate for the diagnosis of pneumothorax, pleural effusion, and cardiogenic and noncardiogenic pulmonary edema, and it may also be more effective, when appropriately clinically driven, to differentiate atelectasis from pneumonia [4]. By allowing both static and dynamic real-time evaluation of the lungs during the whole respiratory cycle, PLUS provides information to titrate the best positive end-expiratory pressure, and it may also be used to measure the thickening fraction of the diaphragm as a noninvasive estimation of the work of breathing [5,6]. As a result, PLUS can be used to assess and monitor lung disease progression evaluating the efficacy of ongoing therapies [7].

Chest x-rays are also performed to confirm correct position of central venous catheters and enteral feeding tubes. Again, US represents a reliable alternative. As a “tip navigation” technique for central venous catheter positioning, US can directly visualize J-guidewire traveling throughout the homolateral brachiocephalic vein toward the cavoatrial junction, ruling out misdirections into the US-explorable superior vena cava tributary veins [8]. As a “tip location” technique, correct placement of catheter tip at the cavoatrial junction can be confirmed through a subcostal bicaudal view [8]. Finally, US allows to assess whether an enteral feeding tube is properly placed in the stomach with a sensitivity of 97% [9].

Routine US utilization has few limitations including the presence of subcutaneous emphysema for PLUS and bowel overinflation for subcostal bicaudal view. More important is the need for an appropriate training given that US interpretation is dependent on operator experience.

Finally, we strongly believe that clinically integrated US is a harmless and powerful tool that can help to correctly schedule not only computed tomographic scan and other advanced imaging but especially on-demand CXRs allowing to abandon routine daily CXR strategy safely. Therefore, it is time for all intensivists to become proficient in the “global” use of critical US to decrease radiation exposure and to increase safety and cost-effectiveness.

Competing interests

All authors declare that they have no competing interests.

Authors’ contributions

DGB conceived the idea of the letter and prepared the main manuscript; he also guided and supervised literature search; SLC performed literature search and contributed to the manuscript preparation; AP performed literature search; FC supervised the entire work giving important intellectual contribution and valuable suggestions. All authors have read and approved the final manuscript.

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