

Ventilator-associated Pneumonia and Lung Ultrasound: Finally, What is between the Ears Matters

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We read the article by Samanta et al. incorporating the use of lung ultrasound (LUS) in the diagnosis of ventilator-associated pneumonia (VAP) with great interest.¹ In the Indian intensive care unit (ICU) setting, despite meeting the standards set by accreditation organizations, the VAP rate is very high in data published from tertiary private ICUs (>30%–50%). As VAP may be associated with no or increased attributable mortality and/or increased morbidity, it needs a specific diagnostic strategy or tool with high sensitivity and specificity.²

Clinical uses of a tool in the evaluation of suspected VAP should help in the following:

- Clinical decision-making at suspicion
- Diagnosis
- Antimicrobial stewardship
- Surveillance

The majority of the hospitals follow CDC algorithm for ventilator-associated events, which is designed for surveillance but not diagnosis.³ The clinical pulmonary infection score (CPIS) is the other most commonly used diagnostic tool. It has undergone a change since its inception and has an addition of change in oxygenation criteria (modified CPIS).⁴ Based on the available literature, CPIS has shown to be beneficial in antimicrobial stewardship but not in other aspects of VAP evaluation, including a meta-analysis noting low specificity for diagnosis.⁴

Samanta et al. used a hybrid version of the above two for the control arm of these ultrasound-based VAP diagnostic criteria and left out the progression in radiological features as one of the criteria. This makes both arms of the study to be experimental.¹ There were few challenges to the ability that this tool could diagnose with high sensitivity and specificity. First being the rapidity at which a Gram staining report could be acquired. Second, Gram staining itself could not improve the sensitivity of the tool (<65%) and had to depend on final culture.¹ Third, relating to studies that have proven that it is the objective and dynamic change in respiratory status (imaging or respiratory parameters) that is more associated with mortality and other outcome data rather than the spot-imaging (LUS) and microbiological data.⁵ ICU doctors who might use LUS are likely to have variable accuracy and lead the evaluation to be more sensitive than specific.⁶ In essence, LUS that is likely to increase the diagnostic sensitivity of the tool (but not on decision-making) might lead to over diagnosis of VAP, resulting in the misuse or abuse of antibiotics.

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Real-world limitations for the tool being implemented are as follows:

- Open ICUs (>90% of Indian ICUs) where decision or evaluation is based on admitting physician or surgeon and not ICU specialists (likely to err more toward overtreatment!).
- Legal aspects: PCPNDT regulation and registration of ICU specialist to be able to do the ultrasound.
- Horizontal transmission of infections in ICU: The horizontal transmission of multidrug-resistant organisms is the commonest mode of hospital-acquired infections in India and is multifactorial but not limited to hand hygiene.² Excessive use of ultrasound provides another avenue to increase the risk of such transmissions. Given that ineffective infection control measures are the most common reason for the horizontal transmission in India, the likelihood of undertaking strict disinfection precautions before and after ultrasound usage in ICU is deemed less likely. Evidence is building for probe and ultrasound gel-related infection transmissions over the years and is more so vital for the Indian scenario.⁷
- Diagnostic test stewardship: A tool with high sensitivity leads to more number and longer duration of antibiotic prescription as mentioned before. It might also be of limited value in stewardship or surveillance.
- Finally, the extra cost implications if done routinely for all ventilated patients.

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