

APPENDIX 1

An electronic surveillance system for acute lung injury – the ‘ARDS sniffer’

In order to facilitate timely recognition of ARDS, we have previously developed an automated electronic screening algorithm termed the ‘ARDS sniffer’ (1). This surveillance system incorporates a Boolean search of key phrases within radiology reports suggestive of bilateral lung infiltrates along with laboratory measures of hypoxia ($\text{PaO}_2/\text{FiO}_2$ ratio ≤ 300 mmHg on arterial blood gas analysis). This algorithm was validated in multiple intensive care units at our institution and has an excellent negative predictive value, ranging from 98% in mixed medical-surgical ICU’s to 100% in cardiac surgery, neurology, pediatric and heart/lung transplant ICUs. The algorithm has a more modest positive predictive value, ranging from 24% in a heart-lung transplant ICU, to 64% in the medical ICU (1). Consequently, given these test characteristics, this algorithm is an excellent screening tool for identifying patients with possible ARDS, the final ascertainment of which is determined by manual review. This algorithm has been utilized extensively in numerous research studies at our institution (2-5).

Specifically, data are retrieved from the Mayo Epidemiology and Translational Research in Intensive Care (METRIC) database, a SQL-based integrative database that accumulates data in near real-time from its entry into the electronic medical record. The two items required for the algorithm are the text of the finalized radiology report of the chest X-ray (at our institution this is entered into the electronic medical record within 2 hours of the chest X-ray being taken) and PaO_2 and FiO_2 data from arterial blood gas analysis. A subject is considered screen-positive if the following criteria are both met within a 24-hour period:

1. Arterial blood gas analysis shows a $\text{PaO}_2 / \text{FiO}_2$ ratio ≤ 300 mmHg, and
 2. Chest radiograph report contains one of two trigger words/phrases. Either a) ‘bilateral’ and ‘infiltrate’ or b) ‘edema’.
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