



entire transfused population. The incidence rate of TRALI in the critically ill population, as might be common at the Mayo Clinic, has been estimated to be between 5.1 and 15%.<sup>4,5</sup> Also, by combining highly probable cases with actual cases, the incident rates that were calculated have the potential to be artificially high. However, requiring imputability or identification of transfusion as the sole causal factor in acute respiratory failure from adult respiratory distress syndrome and circulatory overload results in underappreciation of the disease. Coinciding with underrecognition, the Mayo Clinic researchers limited their results to 6 h posttransfusion. This was intentionally done; however, expanding their definition of the perioperative period may have identified an even greater incidence. The postoperative period can range from 6 to 24 h depending on the disease studied. In an effort to generalize these results, multicenter efforts using the Mayo Clinic natural language-processing software could be used, and the definition of the postoperative period standardized. Highlighted in this study is the use of computer automation to examine thousands of records in an electronic database. In this study, language-processing software retrospectively identified low-incident, high-morbidity processes with astounding fidelity. Will it be possible for this same software to perform concurrent searches during a patient's hospital stay to detect disease patterns and assist in decision making? The potential for this type of technology is extraordinary.

Transfusion-related acute lung injury and TACO are the number one and two causes of transfusion-related deaths in the United States. In 2013, the Federal Drug Administration reported that 38 and 24% of the deaths after transfusion were attributable to TRALI and TACO. Transfusion could not be ruled out as the cause in an additional 32% of deaths (approximately 21 of 71 cases in FY2013).<sup>6</sup> Thus, recognition of the adverse reaction and accurate reporting are crucial in mitigating risk to patients. Through identification of patients with TRALI and TACO, risk stratification regimens can be better constructed. Epidemiological studies such as these studies pave the way for tailored transfusion practices for patients at high risk for TRALI or TACO. Importantly, recognition of blood components that have caused TRALI will allow for future exclusion of those donors. As well, blood component traits can be identified that put patients at higher risk for these disease processes.

Whether transfusion-related adverse reactions are not reported due to human error or underrecognition, the risk to patients remains high. Through use of intelligent automation, Clifford *et al.* have identified the overall risk of TRALI at 1.4% and TACO at 4.3% in the perioperative patient. For TRALI, dramatic underrecognition of the disease was identified. In addition, increasing volume transfused and increasing age was clinically predictive of developing TRALI. The Mayo Clinic study identified increased risk of TACO with certain surgical procedures, increased transfusion volume, and total operative fluid balance. This coincides with known risk factors published by the TRALI Study Group.<sup>7</sup> When transfusion-related adverse reactions occurred, hospital stay was prolonged and mortality was augmented (odds ratio, 15.6 for TRALI).

The landscape of hemotherapy is ever-changing. Clinicians should seek to better recognize adverse transfusion reactions. The goal of minimizing transfusions to limit patient exposure to adverse reactions is reasonable and practical. To accomplish this, patient blood management strategies are being widely implemented and have been successful in reducing blood transfusions in tertiary care centers.<sup>8</sup> The principles of patient blood management are based on the three pillars concept: optimizing preoperative erythropoiesis, reducing operative blood loss, and harnessing the patient's physiological tolerance of anemia.<sup>9</sup> Anesthesiologists should recognize this changing landscape as we are often on the front lines of blood transfusion.

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