Better with Time: Reductions in Mortality in Patients with Acute Exacerbation of Chronic Obstructive Pulmonary Disease

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Although randomized controlled trials remain the cornerstone of our understanding of clinical efficacy, many practices in clinical care change over time, often with large impacts on diagnosis and mortality. The presence (or lack of) standard processes, care bundles, and cultural factors affect diagnosis, treatment, and outcomes in many diseases, accounting for secular trends in patient outcomes. Mortality rates among patients receiving treatment in an intensive care unit (ICU) for various diseases, including sepsis (1), acute respiratory distress syndrome (2), and pneumonia and influenza (3), have decreased over the past decade. However, the patients cared for in our hospitals are increasingly complex and often have multimorbidities, rather than a single diagnosis alone, that account for their overall mortality risk. How these trends intersect in the outcomes for patients with chronic obstructive pulmonary disease (COPD) is illuminated by the report by Berenyi and colleagues (pp. 736–745) in this issue of *AnnalsATS* (4).

The authors present the results of a large multicenter, retrospective, observational study of more than 30,000 patients who were admitted to an ICU with acute exacerbation of COPD (AECOPD) in Australia and New Zealand. Trends of mortality, treatment limitation preferences, and discharge disposition were compared for these patients between 2005 and 2017. In addition, the authors examined the same trends for more than 11,000 patients with asthma to determine whether the observed trends were specific to patients with COPD or applied more generally to those admitted with obstructive lung disease.

The report notes several areas of good news. First, ICU admissions for AECOPD have decreased over time, and patients who are admitted are more likely to survive than they were previously (15.4% in-hospital mortality in 2017). As would be expected, this mortality rate is significantly higher than that observed among patients with asthma (at 1.1%), and, notably, asthma mortality remained stable over the same time period. This reduction in mortality for patients with AECOPD was noted despite a tripling of the number of patients with COPD who had a treatment limitation. More than 19% of patients with COPD had such treatment limitations upon ICU admission in 2017. In this cohort, as in others, patients with treatment limitations had nearly twice the mortality rate as those who did not have treatment limitations (25% vs. 13%). These patients with AECOPD were very sick, with 35% receiving invasive mechanical ventilation within the first 24 hours of ICU admission. However, despite the high acuity, the patients spent fewer than 3 days in the ICU, and were more likely to be discharged to home after hospitalization in 2017 than in 2005.

The overall picture from this report confirms what many clinicians experience firsthand: clinicians and health systems are able to deliver complex care to keep patients alive until they are discharged from the hospital, the majority of these fragile patients are discharged to home, and patients are increasingly aware of what limitations on treatment they want. And although palliative care and treatment limitations for patients with COPD may be more prevalent today than they were a decade ago, the increased number of options for noninvasive ventilatory support and other clinical-care advancements may be contributing to a reduction in overall mortality in these patients despite the lack of invasive mechanical ventilation.

Although this study provides a good look at secular trends among patients admitted to the ICU for AECOPD over the last decade, it has several limitations. Notably, the diagnosis of COPD remains based on coding, and no data on pulmonary function testing or history of tobacco use to validate the diagnosis are available. Although changes in clinical care occur over time, changes in coding and clinical documentation also evolve and may account for some variation in patients with the same diagnostic label. Nevertheless, this lack of pulmonary function test data for patients with a diagnosis of COPD reflects the current reality for most health systems in understanding the population of patients with COPD.

Another limitation of the study is that patients admitted to the ICU with AECOPD frequently have multimorbidities, which may contribute to their worsening respiratory status. These comorbidities, such as congestive heart failure, aspiration, obstructive sleep apnea, and chronic opiate or benzodiazepine use, are often treated concomitantly during the patient's hospitalization. Thus, the lack of pulmonary function tests, secondary diagnoses, and comorbidity data for this cohort of patients means that adjustment for the severity of COPD and the type and number of comorbidities, all of which impact mortality, is not possible.

Data regarding noninvasive ventilation and high-flow nasal canula therapy in the ICU, as well as home noninvasive ventilator therapy after discharge, are also lacking. These advanced therapies and

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how they align with patients' preferences and treatment limitations may be informative as we look ahead at strategies for palliative care in patients with COPD. It is certainly possible that as noninvasive ventilation becomes more broadly accepted by patients (perhaps through increased familiarity with positive airway pressure therapy for treatment of obstructive sleep apnea or home noninvasive ventilation), more patients who would not want or tolerate invasive mechanical ventilation will survive a hospitalization for AECOPD. Whether the observed reduced mortality after hospital discharge is accompanied by a reduced longer-term mortality, fewer hospital readmissions, or improved quality of life remains to be determined.

The overall reduction in mortality for patients admitted to the ICU with AECOPD, as reported in this largest study to date of trends in COPD mortality, is positive news for patients and physicians. The decrease in mortality from AECOPD over the past decade is encouraging as we look ahead. It is notable that the improvement in mortality is observed in patients who are sicker and are more likely to have comorbidities. The mortality for asthma, which was much lower to begin with, has remained unchanged over the past decade. The lack of improvement in asthma mortality may be due to the fact that with such a low rate to begin with, it is hard to observe additional improvement. However, the reduction in mortality in COPD may also suggest that clinicians in ICUs and health systems are getting better at caring for complex patients with multimorbidities. The reduction in AECOPD mortality suggests that we are improving with time, and that is good news for all. ■

Author disclosures are available with the text of this article at www.atsjournals.org.

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More Than Dollars and Cents: Putting a Price on Indwelling Pleural Catheter Drainage

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Malignant pleural effusions (MPEs) are common and seen in up to 15% of patients with cancer (1). They are estimated to affect over 150,000 people per year in the United States, and this is projected to increase as the global incidence of cancer rises and patients' life expectancy improves (2, 3).

MPEs are associated with poor survival, disabling dyspnea, and considerable distress. Approximately 75% of patients experience symptoms, and the mainstay for alleviating these symptoms is effective fluid control (4).

The traditional management paradigm of MPE has been slow and primarily delivered in the inpatient setting, with admission for talc pleurodesis via a chest drain being the mainstay of treatment (5). However, this approach is associated with high levels of healthcare use, with MPEs believed to account for more than 125,000 admissions annually, and more than $5 billion in inpatient-care costs per year in the United States alone (3).

Indwelling pleural catheters (IPCs) are now increasingly used as a first-line intervention for definitive control of fluid recurrence in MPEs. Two randomized controlled trials (RCTs) have demonstrated that they provide a level of dyspnea control equivalent to that obtained with conventional treatment, with lower associated inpatient stays and a reduction in subsequent reinterventions (6, 7). Despite the benefits of these catheters, however, the rates of spontaneous pleurodesis reported in retrospective studies, and more recently in prospective RCTs, have been variable and are typically lower than those achieved by talc pleurodesis via a standard chest drain (8).

In the last few years, three high-quality RCTs have explored optimal IPC drainage strategies and their effects on pleurodesis

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