treatment for COVID-19–associated angioedema in combination with β1R and β2R blockade. Furthermore, LMWH might become the preferred anticoagulant in patients with COVID-19 with angioedema and hypercoagulability concerns.

Recently Published Similar Cases

At this time, we have noted several publications associating facial, tongue, eye, and lips swelling with COVID-19; however, none of them made a definitive association with race (5–8).

Conclusions

With the second wave of increase in cases of COVID-19, we can anticipate additional reports of angioedema in patients with COVID-19. ■

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

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References

1. Batarseh E, Kersten BP, Pinelo AC, Nadler JN, Schwartz SA. Angioedema in African American patients hospitalized for COVID-19 [letter]. *Am J Respir Crit Care Med* 2020;202: 1581–1584.
2. Polak SB, Van Gool IC, Cohen D, von der Thüsen JH, van Paassen J. A systematic review of pathological findings in COVID-19: a pathophysiological timeline and possible mechanisms of disease progression. *Mod Pathol* 2020;33:2128–2138.
3. Dasgupta SK, Rivera S, Thiagarajan P. Lisinopril-induced angioedema in a patient with plasma prekallikrein deficiency. *TH Open* 2020;4: e33–e35.
4. Cañas CA. The triggering of post-COVID-19 autoimmunity phenomena could be associated with both transient immunosuppression and an inappropriate form of immune reconstitution in susceptible individuals. *Med Hypotheses* 2020; 145:110345.
5. Abasaeed Elhag SA, Ibrahim H, Abdelhadi S. Angioedema and urticaria in a COVID-19 patient: a case report and review of the literature. *JAAD Case Rep* 2020;6:1091–1094.
6. Adeliño R, Andrés-Cordón JF, Aracelis De La Cruz Martínez C. Acute urticaria with angioedema in the setting of coronavirus disease 2019. *J Allergy Clin Immunol Pract* 2020;8: 2386–2387.
7. Azmy V, Benson J, Love K, Steele R. Idiopathic nonhistaminergic acquired angioedema in a patient with coronavirus disease 2019. *Ann Allergy Asthma Immunol* 2020;125: 600–602.
8. Grewal E, Sutarjono B, Mohammed I. Angioedema, ACE inhibitor and COVID-19. *BMJ Case Rep* 2020;13:e237888.

Apparent Increase in Chronic Obstructive Pulmonary Disease Mortality Is Likely an Artifact of Changes in Documentation and Coding

To the Editor:

As the developers of the Centers for Medicare and Medicaid Services' Chronic Obstructive Pulmonary Disease (COPD) Hospital Mortality and Readmission measures, we read with interest the recent paper by Neira and colleagues (1). The authors document a substantial increase in 30-day mortality for patients hospitalized for COPD between the years 2006–2010, 2010–2014, and 2014–2017, corresponding with the period before, in the run-up to, and after the implementation of Medicare's Hospital Readmissions Reduction Program. Over this same period, 30-day readmission rates were observed to decline, raising concerns that hospital efforts intended to prevent readmissions might have inadvertently led to harm. As part of their analysis, the authors estimate that some 1,196 deaths might be attributable to this federal program.

Although unintended consequences of the Hospital Readmissions Reduction Program are one potential explanation for the apparent increase in 30-day mortality, our own analysis of Medicare claims data for this same period suggests that the increase was an artifact of recent changes in hospital documentation and coding practices. In 2016, hospitals received updated coding instructions for cases in which a patient is admitted for a COPD exacerbation complicated by pneumonia. In such instances, hospitals were guided to use COPD—rather than pneumonia—as the principal diagnosis (2). Within the span of 1 year, we observed a large increase (both in absolute and relative terms) in patients entering the COPD Measure Cohort who carried a secondary diagnosis of pneumonia. Between 2015–2016 and 2016–2017, the COPD cohort grew by approximately 47,000 cases, a figure almost entirely accounted for by an additional 48,000 cases with pneumonia who previously would have been counted in the pneumonia measure (Figure 1).

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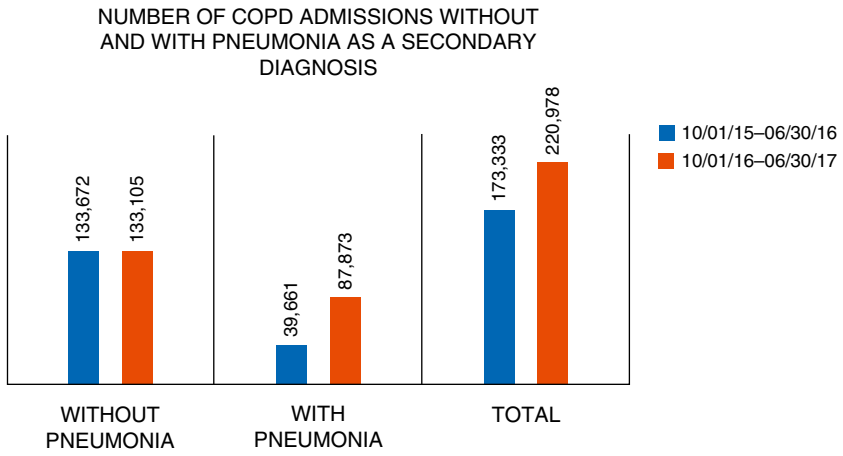

Figure 1. Changes in the number of hospitalizations for chronic obstructive pulmonary disease with and without pneumonia in 2015–2016 versus 2016–2017. COPD = chronic obstructive pulmonary disease.

This alteration in the composition of the COPD cohort is critical to interpreting changes in COPD mortality. Patients hospitalized for COPD who carry a secondary diagnosis of pneumonia have a 30-day mortality rate nearly twice as high as patients who do not (Figure 2). To further illuminate this issue, we stratified the COPD Measure Cohort according to the presence or absence of pneumonia and compared mortality rates in the 2015–2016 and 2016–2017 time periods. We observed that the mortality rate was stable among patients with COPD without pneumonia and appeared to actually decrease modestly among those with pneumonia (Figure 2).

Temporal changes and variations between hospitals in documentation and coding are well-established sources of bias in efforts to track mortality rates over time and to compare outcomes across hospitals (3, 4). We believe that the apparent increase in mortality demonstrated by Niera and colleagues is yet another example of the challenges inherent in measuring clinical outcomes using claims data. ■

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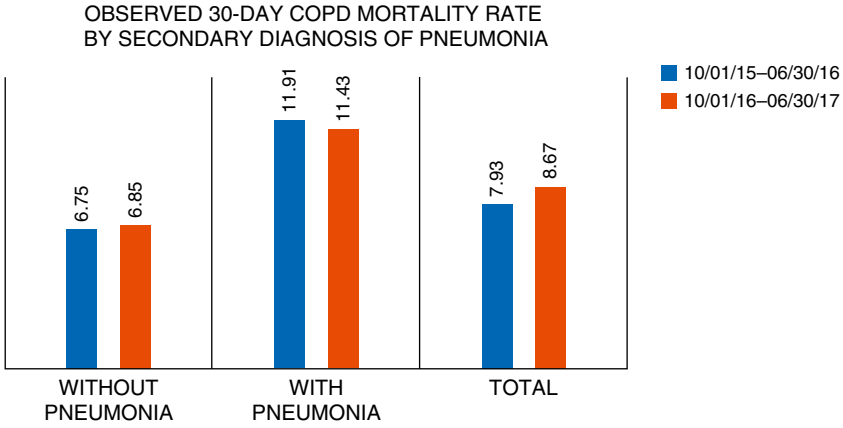

Figure 2. Observed 30-day mortality among cases hospitalized for chronic obstructive pulmonary disease with and without pneumonia in 2015–2016 versus 2016–2017. COPD = chronic obstructive pulmonary disease.

References

1. Puebla Neira DA, Hsu ES, Kuo YF, Ottenbacher KJ, Sharma G. Readmissions reduction program, mortality and readmissions for chronic obstructive pulmonary disease. *Am J Respir Crit Care Med* 2021;203:437–446.
2. Coding Clinic. Third Quarter: 15-16. Acute exacerbation of chronic obstructive pulmonary disease with pneumonia. Chicago, IL: American Hospital Association. 2016.
3. Lindenauer PK, Lagu T, Shieh M-S, Pekow PS, Rothberg MB. Association of diagnostic coding with trends in hospitalizations and mortality of patients with pneumonia, 2003-2009. *JAMA* 2012; 307:1405–1413.
4. Rothberg MB, Pekow PS, Priya A, Lindenauer PK. Variation in diagnostic coding of patients with pneumonia and its association with hospital risk-standardized mortality rates: a cross-sectional analysis. *Ann Intern Med* 2014;160: 380–388.

Reply to Lindenauer *et al.*

From the Authors:

We thank Dr. Lindenauer and colleagues for their letter in reference to our publication (1). The authors suggest that the increase in chronic obstructive pulmonary disease (COPD) hospital-level 30-day postdischarge mortality (from here on out: 30-day mortality) found in our study during the Hospitals Readmission Reduction Program (HRRP) implementation period (October 2014 to November 2017) may be associated with changes in coding practices for COPD and pneumonia discharges, specifically, the guidelines published in the fall of 2016 by the American Hospital Association (AHA) regarding COPD with acute lower respiratory infection (International Classification of Diseases, tenth revision [ICD-10], code J44.0) (2). The guidance specified that for patients hospitalized with COPD and pneumonia, the ICD-10 code J44.0 needed to be used as principal discharge diagnosis, followed by the ICD-10 code to identify pneumonia. Therefore, that hospitalization would be counted toward the COPD measure (not the pneumonia measure) for the HRRP. Further guidance by the AHA in October 2017 allowed hospitals to code pneumonia as a primary discharge diagnosis (over COPD) if clinical documentation by providers supported that the patient with COPD was hospitalized for pneumonia (3).

Interestingly, the clinical presentation of an acute exacerbation of COPD (AECOPD) and community-acquired pneumonia may be indistinguishable (4, 5). Bacterial and viral infections can trigger AECOPD, and chest radiography that can help distinguish these two conditions has poor interobserver reliability for the diagnosis of pneumonia (6). In addition, the treatment of both illnesses involves steroids, bronchodilators, and antibiotics, making the final determination of a principal discharge diagnosis more thought-provoking (4, 5). The true impact of coding recommendations in the COPD cohort is unclear.

Dr. Lindenauer and colleagues propose that the additional patients added to the HRRP COPD measure (because of change in coding practices) may have contributed to the increase in the COPD mortality rates found in our analysis. Why is it important to separate AECOPD with and without pneumonia? Patients with pneumonia-related COPD exacerbations have a greater 30-day mortality than those with nonpneumonic COPD exacerbations. To evaluate this possible source of bias, we excluded from our cohort all COPD index admissions with ICD-10 codes J40.0 and J44.1 as a primary discharge diagnosis and those with any secondary ICD code for pneumonia during the HRRP periods that corresponded with the announcement and implementation. The percentages of index admissions excluded from our cohort were 21.25% (137,684 of 647,815), 18.29% (115,442 of 631,118), and 25.60% (175,346 of 685,027) during the announcement (January 2013 to August 2014), early implementation (October 2014 to April 2016), and late implementation (May 2016 to November 2017) periods of HRRP for COPD, respectively. The 30-day mortality rates for COPD (without pneumonia) were 6.03%, 6.39%, and 7.0%, correspondingly, compared with our published 30-day mortality rates of 6.71%, 6.81%, and 7.30% for the same periods. There was a modest reduction in the magnitude but a similar trend for an increase in mortality during the HRRP implementation period for COPD (Table 1).

We agree with Dr. Lindenauer and colleagues that the COPD HRRP cohort may have been altered during the short period when coding guidelines changed for COPD and pneumonia. However, as illustrated in the analysis of various cohorts obtained by combinations of COPD and pneumonia as primary discharge diagnosis, the trend in 30-day death rates was similar to that published in our study (1). This is irrespective of the principal discharge diagnosis (COPD or pneumonia) (Table 1).

Administrative claims are good for studying trends and can be useful in generating hypothesis for outcomes. Centers for Medicare and Medicaid Services should include the balancing measure of mortality, as they penalized hospitals using administrative claims for higher 30-day readmissions. ■

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