

## Q: Can we reduce the risk of readmission for a patient with an exacerbation of COPD?

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**A:** We think so. Some strategies to reduce readmission rates, such as coordinating care and managing comorbidities, apply to chronic diseases in general, while others are disease-specific. To reduce the need for hospital readmission for chronic obstructive pulmonary disease (COPD), coordinated efforts involving both inpatient and outpatient care are necessary. This can be achieved by using a checklist before discharge (TABLE 1) and by implementing outpatient COPD programs that continue patient education and provide rapid access to medical support if needed.

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There is room for improvement. COPD is common and expensive, with high rates of hospital readmission,<sup>1</sup> and up to 70% of the money we spend on it goes for hospital care.<sup>2</sup> No wonder then that the Centers for Medicare and Medicaid Services has now expanded its Readmissions Reduction Program to include acute COPD exacerbations.<sup>3</sup> Yet in a retrospective study, Yip et al<sup>4</sup> found that fewer than half of patients hospitalized with acute exacerbation of COPD received appropriate vaccinations, counseling on smoking cessation, and long-acting inhalers—all of which are on our checklist.<sup>4</sup>

The following interventions have been demonstrated to be useful in reducing COPD hospital admissions and the risk of death.

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TABLE 1

### Checklist for COPD patients before they leave the hospital

**Counseling on smoking cessation** if the patient is a smoker or is at risk of starting smoking again

#### Appropriate influenza and pneumonia vaccinations

**Long-acting bronchodilators:** an anticholinergic or a beta-agonist, or both (except GOLD group A patients, who have few symptoms and are at a low risk of exacerbations); inhaled steroids for those with previous exacerbations who are at high risk of relapse

**Long-term oxygen therapy,** if indicated, ie, in those with chronic resting hypoxemia (room air  $\text{PaO}_2 \leq 55$  mm Hg or  $\leq 59$  mm Hg with signs of right-sided heart strain or polycythemia)

**Home exercise program or pulmonary rehabilitation referral** after an exacerbation

**Patient education** regarding symptom monitoring and inhaler therapy, including proper inhaler technique (see [http://my.clevelandclinic.org/disorders/Chronic\\_Obstructive\\_Pulmonary\\_Disease/hic\\_Understanding\\_COPD.aspx](http://my.clevelandclinic.org/disorders/Chronic_Obstructive_Pulmonary_Disease/hic_Understanding_COPD.aspx))

**Consider home noninvasive ventilator support** in select patients with recurrent hospitalization for acidotic exacerbation of COPD if the patient qualifies under Centers for Medicare and Medicaid Services guidelines,<sup>20</sup> ie:

- $\text{PaCO}_2 \geq 52$  mm Hg and
- Evidence of nocturnal hypoventilation based on nocturnal oximetry showing sustained desaturation to  $< 89\%$  for  $\geq 5$  min on oxygen use and
- Sleep apnea excluded

COPD = chronic obstructive pulmonary disease; GOLD = Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Lung Disease<sup>6</sup>

### SMOKING CESSATION

Cigarette smoking is the most common and easily identifiable risk factor for COPD exacerbation.<sup>5</sup>

Au et al<sup>15</sup> found that quitting smoking reduces the risk of COPD exacerbation (adjust-

ed hazard ratio 0.78, 95% confidence interval [CI] 0.75–0.87), and the risk keeps decreasing the longer the patient stays off tobacco.<sup>5</sup>

Whether counseling hospitalized patients on smoking cessation reduces the COPD readmission rate has not been well studied. However, a meta-analysis of nine randomized controlled trials, two of which were done in the hospital, revealed higher abstinence rates in COPD patients who received extensive counseling on smoking cessation.<sup>7</sup> For these reasons, hospitalized COPD patients who smoke should be strongly encouraged to quit.<sup>6</sup>

### ■ PNEUMOCOCCAL AND INFLUENZA VACCINATIONS

In a large retrospective study,<sup>8</sup> pneumococcal vaccination was associated with a significantly lower risk of hospitalization for pneumonia in patients with chronic lung disease, including those with COPD (relative risk [RR] 0.57, 95% CI 0.38–0.84). The benefit was even greater with pneumococcal and influenza vaccinations during the influenza season (RR 0.28, 95% CI 0.14–0.58).

Randomized controlled trials indicate that influenza vaccination may reduce the rate of COPD exacerbations, especially in epidemic years when the proportion of exacerbations due to influenza is higher.<sup>9</sup>

Wongsurakiat et al<sup>10</sup> found a significant reduction in the incidence of influenza-related acute respiratory illness in COPD patients in a well-designed randomized, placebo-controlled trial (RR 0.24,  $P = .005$ ).<sup>10</sup>

Similarly, in another randomized controlled trial, pneumococcal vaccination was effective in preventing community-acquired pneumonia in COPD patients under age 65 and in those with severe airflow obstruction, although no statistically significant differences were found among other groups of patients with COPD.<sup>11</sup>

Therefore, influenza and pneumococcal vaccinations are recommended by major COPD guidelines, such as GOLD (Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Lung Disease).<sup>6</sup>

### ■ INHALERS

Inhaler therapy is recommended based on COPD severity according to GOLD classifi-

cation, and appropriate inhaler therapy with proper inhaler technique reduces the number of COPD exacerbations and hospitalizations.<sup>6</sup>

**Long-acting beta-agonists and anticholinergics** reduce the risk of COPD exacerbation and hospitalization and so are preferred over short-acting formulations except for patients in GOLD group A, ie, those who have few symptoms and are at low risk of exacerbations.<sup>6</sup>

Long-term treatment with **inhaled corticosteroids with long-acting bronchodilators** is recommended for patients at high risk of exacerbations (ie, those with two or more exacerbations in the previous year or a forced expiratory volume in 1 second [FEV<sub>1</sub>] less than 50% of predicted).<sup>6</sup>

### ■ OXYGEN THERAPY

Two older randomized controlled trials, the Nocturnal Oxygen Therapy Trial and the Medical Research Council study, reviewed by Stoller et al,<sup>12</sup> provided clear evidence that oxygen therapy reduces the death rate and improves quality of life in COPD patients who have chronic resting hypoxemia (room air Pao<sub>2</sub> ≤ 55 mm Hg, or ≤ 59 mm Hg with signs of right-sided heart strain or polycythemia).

### ■ PULMONARY REHABILITATION

Pulmonary rehabilitation likely reduces hospital admissions by improving exercise capacity.<sup>13</sup> A systematic review of six trials in 230 patients found that respiratory rehabilitation after an acute COPD exacerbation reduced the risk of COPD hospital admission (RR 0.26, 95% CI 0.12–0.54) and the risk of death (RR 0.45, 95% CI 0.22–0.91).<sup>13</sup>

### ■ OTHER INTERVENTIONS

**Home noninvasive ventilator support** reduced hospital and intensive care unit readmissions in select patients recurrently hospitalized for acidotic exacerbations of COPD in one small study.<sup>14</sup>

**Long-term antibiotic therapy.** Although there is evidence that azithromycin, taken daily for 1 year, decreases the frequency of COPD exacerbations,<sup>15</sup> concern persists that this approach promotes antibiotic resistance, and the GOLD guidelines do not recommend

**Needed:  
coordinated  
efforts  
involving both  
inpatient and  
outpatient care**

routinely using antibiotics in patients with clinically stable COPD.<sup>6</sup>

**Roflumilast.** According to the GOLD guidelines, the phosphodiesterase-4 inhibitor roflumilast (Daliresp) may be useful in reducing exacerbations in patients who have an FEV<sub>1</sub> less than 50% of predicted, chronic bronchitis, and frequent exacerbations.<sup>6</sup>

**Referral.** Patients who have severe recurrent COPD exacerbations despite appropriate therapy will likely benefit from referral to a pulmonary specialist for other options such as theophylline, lung-reduction surgery, and lung transplantation.

## PATIENT EDUCATION AND OUTPATIENT COPD PROGRAMS

There is growing evidence that outpatient programs that provide education and medical support significantly reduce the rate of hospitalizations for COPD.<sup>16–18</sup> Patient education includes symptom monitoring, early recogni-

tion of an exacerbation, appropriate use of inhalers and nebulizers, and advice on smoking cessation.<sup>16</sup>

On the other hand, a Veterans Administration randomized controlled trial was stopped early because of a higher rate of death in the group that underwent a comprehensive care-management program of COPD education, an action plan for identification and treatment of exacerbations, and scheduled proactive telephone calls for case management.<sup>19</sup>

Further study is needed to investigate the cost-effectiveness and safety of COPD management programs and whether to adopt such programs on a systematic level.

In conclusion, COPD patients require a comprehensive approach based on studied interventions. This may be achieved through systematic methods that allow each patient to benefit from all possible interventions appropriate for him or her. Hospitalization of COPD patients provides an excellent opportunity to implement this comprehensive approach. ■

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