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RESEARCH METHODOLOGY

Application of research evidence in family practice: a case discussion of a patient with exacerbation of chronic obstructive pulmonary disease

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Introduction

There is a large gap between what is known and what is being practised in family medicine. This usually results in unwanted variations in clinical practice. Due to variations, misuse of diagnostic tests & drugs occur to the detriment of our patients. This gap may be reduced by promoting change in decision-making among family physicians. Models have been proposed to promote a 'change' environment in family practice¹ but these are generalized and need to be demonstrated that they will work under specific situations. The objective of this paper is to explore gaps in the implementation of research evidence in the management of a case of chronic obstructive pulmonary disease (COPD) in family practice

Case scenario

A 64-year-old man with a history of heavy smoking presented with difficulty breathing of 5 years duration. He was prescribed salbutamol inhaler which relieved the symptoms. A year ago, he noted progression of the severity of symptoms and his medications were shifted to fixed combination ipratropium-salbutamol inhaler. A week prior to admission, his difficulty in breathing worsened. There was productive cough, easy fatigability and basilar rales. He was given inhaled budesonide at a community clinic with slight relief. He was eventually admitted in a tertiary hospital with a diagnosis of COPD with acute exacerbation, pneumonia in the elderly and a possible cor pulmonale. Cefuroxime and azithromycin, intravenous hydrocortisone and ipratropium-salbutamol inhalation were given. Clinical improvement was noted after 3 days.

Clinical issues in the scenario

Chronic obstructive pulmonary disease is characterized by irreversible obstruction of the airway caused by emphysema or chronic bronchitis or both. The objective of management is accurate assessment, adequate pharmacological and non-pharmacological treatment, prevention of deterioration and maintenance of quality of life. Our patient was treated with a beta-agonist and later with the addition of an anticholinergic agent mainly for symptom relief. He was also given steroids and antibiotics.

As a family physician the issue of what interventions to prioritize so that progression of the symptoms of COPD can be at least delayed is important. These interventions can lead to rational use of medical resources. Several questions may arise from the management of the case in our scenario. What other strategies can a family physician undertake to prevent disease progression? Should all patients with exacerbation be admitted to a hospital? What is the best drug for relief of symptoms?

Delaying the progression

Smoking cessation is the only measure that will slow down the progression of COPD.² The US Lung Health Study has shown that smoking cessation and not the administration of ipratropium delays the progression of COPD.³ Several strategies have been shown to promote smoking cessation but most of the evidence relies on replacement therapies such as nicotine patches rather than cessation. A meta-analysis done almost a decade ago showed that patients who quit smoking benefit greatly.⁴ However, the use of such a strategy has not gained popularity. Availability and issues about cost may be some of the reasons. Lack of interest about this intervention among physicians may be another reason. A study on a counselling strategy was shown to decrease cigarette consumption and increase intention to quit among hospital employees.⁵ However, follow-up studies or improvement in the counselling strategy have been minimal.

Rational use of resources

Self-management programs through health education and training have also been proven to reduce hospital admissions by almost 40% and improvement in quality of life scores.⁶ Patient satisfaction has also been shown to be higher among COPD patients given educational intervention.⁷ These educational interventions do not have to be intensive or time-consuming. It may be a simple booklet that outlines the management and action plan of the patient based on his/her own symptoms.⁸ However, there is no evidence that this is widely given in usual family practice. The following are probable reasons: time limitations; materials needed for self-management are not available; lack of technical skills and expertise; and differing patient preferences.

Home care has been shown to be more cost-effective than hospital care in the treatment of chronic diseases in family practice.⁹ In the treatment of COPD, a nurse-administered home care for exacerbation of COPD was offered as an alternative to hospital admission.¹⁰ At the end of the study, there were no significant differences in FEV1 after a 2-week and a 3-month treatment period. There was also no significant difference in terms of mortality between the two groups. This evidence suggests that home care is a practical alternative to hospital admission for the treatment of COPD exacerbations. Despite this, current practice such as in our case, still shows a preference for hospital-based treatment.

Drug treatment

In some instances, a family physician may be confronted with the question of whether to prescribe a beta-agonist or an anticholinergic. A systematic review that compared the two classes of bronchodilators showed that improvement in FEV1 was greater with ipratropium compared with various beta-agonists.¹¹ Randomized trials have shown that there is small improvement in terms of lung function with the absence of additional adverse events when these two classes of bronchodilators are combined. In terms of the physician's decision-making in our case, the shift to combination treatment was done promptly. It

seems that when it comes to pharmacological treatment, family physicians seem to apply the latest evidence. Pharmaceutical promotions and continuing medical education sponsored by the drug industry may play an important role in this observation.

The use of inhaled or systemic corticosteroids in acute exacerbation of COPD is a common practice among physicians. In one randomized controlled trial to test the use of systemic steroids on the exacerbation of COPD, the authors noted a statistically significant difference in terms of cure rate after 3–6 months of treatment.¹² There was a minimal effect in terms of hospital stay, 8.5 days in the steroid group versus 9.7 days in the placebo group. However, these benefits were not evident after 6 months and there was a significantly higher rate of hyperglycemia requiring treatment among patients who received steroids: 15% versus 4%, respectively. This evidence suggests that the benefit associated with steroid treatment can only be achieved on a short-term basis and must be weighed against the possible complication of hyperglycemia and other long-term adverse events requiring treatment. Inhaled steroids have not been shown to provide short or long-term benefits among patients with exacerbation of COPD.¹³ The initial administration of inhaled budesonide in a community hospital for our patient may indicate overuse of inhaled steroids in family practice.

The use of antibiotics in patients with exacerbation of chronic bronchitis with purulent sputum seems to be a common practice. This is supported by a meta-analysis showing that antibiotics like amoxicillin, cotrimoxazole and tetracycline increase in peak flow rates by about 10 L/min, a statistically significant but very small benefit.¹⁴ There is no evidence to show that newer and more expensive antibiotics are warranted. More recent evidence also suggests that exacerbation is often caused by viral infection rather than a bacterial one. The neutrophilia shown in sputum stains that often accompany exacerbation may actually be part of the overall inflammatory process in COPD rather than an evidence of bacterial infection.¹⁵ Our patient was diagnosed as having concomitant pneumonia, so the administration of an antibiotic combination of cefuroxime and azithromycin may be warranted. However, unless there are more accurate methods of diagnosing bacterial infection in patients with COPD, the use of antibiotics should still be applied with caution in family practice.

Practice guidelines to address variations

Clinical practice guidelines have been proposed to remedy practice variations among family doctors. However, care must also be taken on which guidelines to adopt. The [Table 1](#) shows the differences in the recommendations of four practice guidelines for COPD. Notice that the questions and issues raised in our case, such as the choice of bronchodilators, the role of steroids and antibiotics, are also issues at variance in different guideline recommendations. There is also a significant variation on how the recommendations in these guidelines were formulated.

Conclusion

In summary, this case indicates that the application of research evidence in decision-making was not satisfactory. There is inadequate implementation of non-drug intervention that is proven to delay the progression of the disease and promote rational use of resources, but drug treatment is based on published evidence and recommendations. The possible reasons are: the effect of the difference in health care settings and financing; technical skills of physicians; availability of materials; industry-sponsored continuing education; and pharmaceutical promotions. To promote the use of evidence in family practice, one must consider the other factors that influence clinical decisions.

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Table 1 Recommendations from four COPD guidelines¹⁶

	British Thoracic Society	American College of Chest Physician	European Respiratory Society	GOLD
Date	1997	2001	1995	2001
Method of Development	Consensus	Evidence-based	Consensus	Evidence-based
Diagnosis	X-ray, ABG, CBC, electrolytes, BUN, ECG, spirometry, sputum culture	X-ray, spirometry not recommended	X-ray, ABG, CBC, electrolytes, BUN, ECG, spirometry, sputum culture	X-ray, ABG, Hct, electrolytes, ECG, sputum culture
Bronchodilator	Beta-agonist, anticholinergic or both	Anti-cholinergic, add beta-agonist if	Beta-agonist, anticholinergic or both,	Beta-agonist, add anticholinergic if no

		no response	IV aminophylline in severe cases	response
Corticosteroids	Not recommended for outpatient	Systemic corticosteroid for 2 weeks	Systemic corticosteroid for 2 weeks	Systemic corticosteroid for 2 weeks
Antibiotics	Moderate to severe exacerbation (amoxicillin, cotrimoxazole, tetracycline)	Not clear	Moderate to severe exacerbation (amoxicillin, cotrimoxazole, tetracycline)	Increase sputum volume and purulence (antibiotics for Strep, Hemophilus and Moraxella)

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