

Treatment costs and number needed to treat (NNT) with budesonide/formoterol to avoid one exacerbation of COPD

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ABSTRACT

Rationale: Budesonide (BUD)/formoterol (FORM) in a single inhaler (Symbicort®) has been shown to reduce the frequency of exacerbations and improve health-related quality of life (HRQL) in patients with COPD (GOLD stage III–IV). Lower exacerbation frequency consistently correlates with better HRQL. Further, the cost of an exacerbation has been estimated to be US\$2732.¹ This analysis was undertaken to determine the number of patients needed to treat (NNT) with BUD/FORM vs FORM to avoid one COPD exacerbation.

Methods: Data for COPD patients (mean age: 64 years; FEV₁: 0.99 L, 36% of predicted normal) participating in two randomized, clinical trials were analyzed (n=812 and n=1022, respectively). The mean total number of exacerbations was about the same in both studies (BUD/FORM 1.4, FORM 1.9). The NNT to avoid one exacerbation requiring medical intervention (use of antibiotics and/or oral steroids and/or hospitalization) in 1 year was calculated. Medication costs were also recorded.

Results: The NNT values for avoiding one exacerbation using BUD/FORM instead of FORM were 2.4 and 2.1 in each study, respectively. The mean total Swedish unit cost of medication per patient per year was estimated as \$1126 (BUD/FORM) and \$874 (FORM).

Conclusions: This analysis shows that treating 21 and 24 patients in the two studies with BUD/FORM in a single inhaler instead of FORM avoids 10 exacerbations of COPD requiring medical intervention in 1 year. Given the large costs of an exacerbation and the small difference in total medication costs with BUD/FORM and FORM, this NNT analysis suggests a potential for considerable cost savings with the use of BUD/FORM.

1. Andersson F, et al. Respir Med 2002;96:700–708.

BACKGROUND

Chronic obstructive pulmonary disease (COPD) is a progressive disease associated with recurrent exacerbations that place a significant economic burden on healthcare resources and adversely affect patients’ health-related quality of life (HRQL).¹ Furthermore, acute exacerbations — a key driver of hospitalization — are associated with increased in-hospital mortality rates.² Prevention of exacerbations is therefore an important goal of COPD management.³ Budesonide/formoterol in a single inhaler (Symbicort®) has been shown to reduce the frequency of exacerbations and improve HRQL in patients with COPD.^{4,5}

Aim

To determine the number of patients needed to treat (NNT) with budesonide/formoterol in a single inhaler (Symbicort®) versus formoterol alone to avoid one exacerbation requiring medical intervention and to assess the cost implications of these data in patients with COPD.

METHODS

Study design

- Two double-blind, placebo-controlled studies of 12-months’ duration^{4,5} comparing the effects of budesonide/formoterol in a single inhaler versus monocomponents in patients diagnosed with COPD (GOLD stages III–IV³).

Inclusion criteria

- Patients aged ≥40 years with COPD for >2 years; smoking history of ≥10 pack-years.
- Forced expiratory volume in 1 second (FEV₁) ≤50% of predicted normal and FEV₁/vital capacity (VC) ≤70% (both pre-bronchodilator).
- At least one COPD exacerbation requiring medical intervention (defined as the need for oral steroids and/or antibiotics and/or hospitalization due to respiratory symptoms) 2–12 months before study entry.

Assessments

- The primary assessment was the number of exacerbations requiring medical intervention (Szafranski) or time to first exacerbation (Calverley). Number of exacerbations was a secondary assessment in the Calverley study. Exacerbations were recorded at each visit after randomization.
- Differences in medication costs were analyzed using unit costs from Sweden for 2001 (expressed as US dollars) (US\$:SEK exchange rate = 1:7.82).

Statistical analysis

- A Poisson regression model was used to calculate exacerbation rates. Country and baseline adjustments were made as appropriate.
- The NNT to avoid one exacerbation requiring medical intervention in 1 year was calculated.

RESULTS

Patient demographics

- Baseline demographics determined at entry were similar in both studies (Table 1).

	Szafranski	Calverley
No. of randomized patients	812	1022
Men, %	79	75
Mean age, years (range)	64 (40–92)	64 (41–86)
Median time since diagnosis, years	5	6
Use of inhaled corticosteroids, % of patients (mean daily dose, µg)	26 (850)	48 (840)
Smoking history		
Current/past smokers, %	34/66	34/66
Mean No. of pack-years (range)	44 (10–210)	39 (10–240)
Lung function		
Mean FEV ₁ , L	0.99	0.99
Mean FEV ₁ , % predicted	36.1	36.1
Mean reversibility, % predicted	6.0	6.0
Mean FEV ₁ /VC, %	42.5	43.5

FEV₁ = forced expiratory volume in 1 second; VC = vital capacity.

Exacerbations

- Budesonide/formoterol treatment reduced the absolute number (Table 2) and rate of exacerbations compared with the long-acting β₂-agonist (LABA), formoterol, or placebo in both studies (Figure 1).

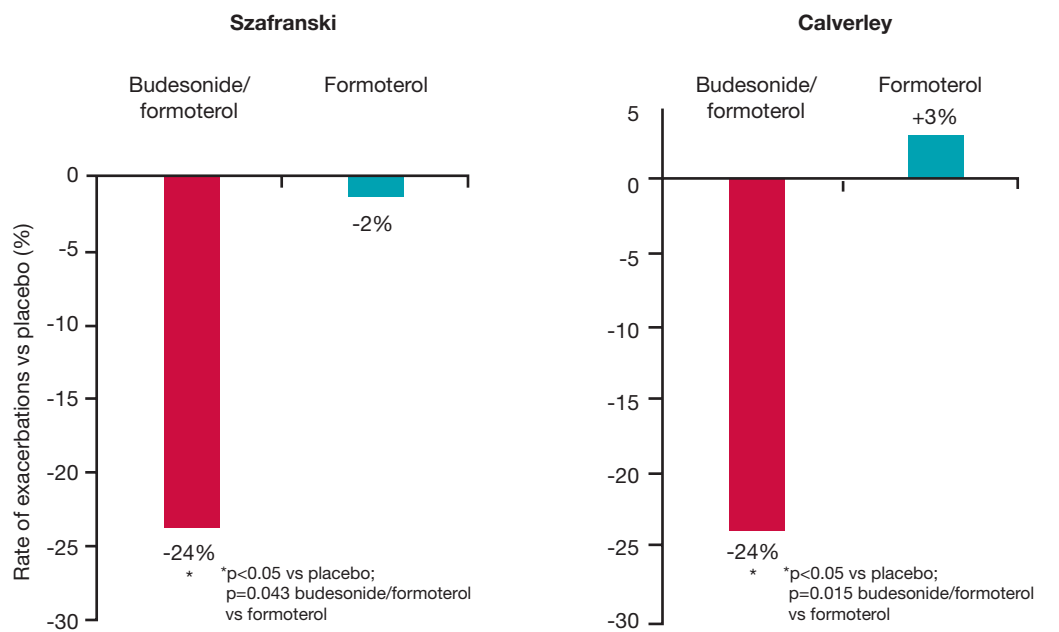
Table 2. Budesonide/formoterol reduced the number of exacerbations requiring medical intervention compared with formoterol alone

	Mean number of exacerbations/patient/year	
	Szafranski	Calverley
Budesonide/formoterol	1.4 ^a	1.4 ^b
Formoterol	1.8	1.9

^ap<0.05 vs placebo; p=0.043 budesonide/formoterol vs formoterol.

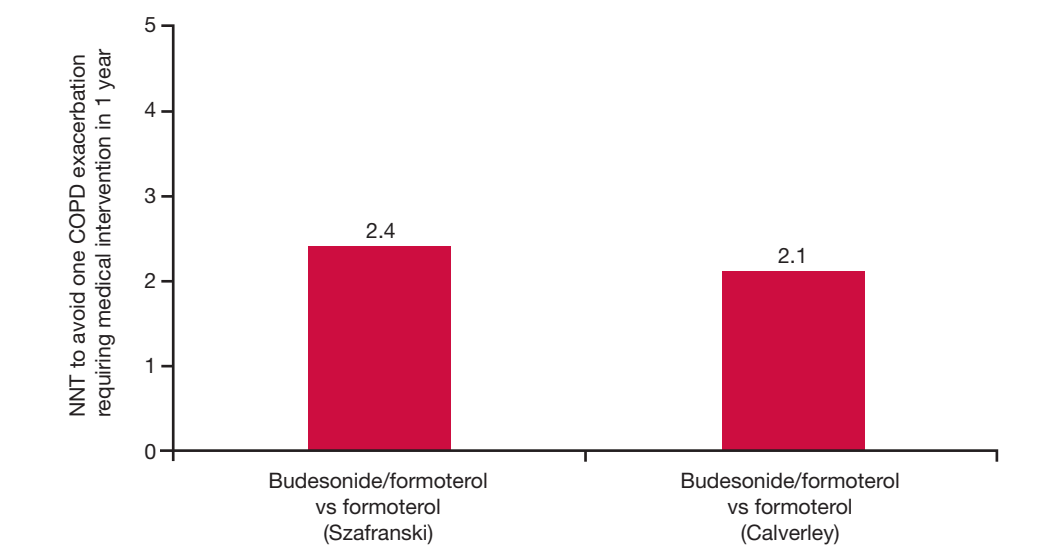
^bp<0.05 vs placebo; p=0.015 budesonide/formoterol vs formoterol.

Figure 1. Budesonide/formoterol reduced the rate of exacerbations requiring medical intervention compared with formoterol alone.



- The NNT for avoiding one exacerbation requiring medical intervention in 1 year with budesonide/formoterol versus formoterol was 2.4 in the Szafranski study and 2.1 in the Calverley study (Figure 2). Thus, treating 24 and 21 patients, respectively, in the two studies with budesonide/formoterol in a single inhaler instead of formoterol avoids 10 exacerbations of COPD requiring medical intervention in 1 year.

Figure 2. Number needed to treat (NNT) to avoid one COPD exacerbation requiring medical intervention in 1 year. Data calculated from two randomized, double-blind, placebo-controlled studies.^{4,5}



- In a recent study (which employed a similar design to the Szafranski study) the NNT value for avoiding one exacerbation requiring medical intervention with salmeterol/fluticasone versus the LABA, salmeterol, in 1 year was approximately 14 in patients with an FEV₁ of ≤70% of predicted normal.⁶ In a subanalysis of patients with an FEV₁ of <50% of predicted normal, the NNT value for avoiding one exacerbation was 10.⁷

Treatment costs

- The mean total cost of study medication per patient per year used in the two studies was estimated as \$1126 for budesonide/formoterol and \$874 for formoterol — a net difference of \$252.
- Thus, to avoid one exacerbation requiring medical intervention in 1 year, the difference in drug cost between budesonide/formoterol and formoterol alone would be \$534 (based on the results of the Szafranski study [\$252 x 2.1]) and \$609 (based on the results of the Calverley study [\$252 x 2.4]).
- A recent study showed that the average healthcare cost of treating an exacerbation in COPD patients was \$1578 in those with an FEV₁ an <40% of predicted normal and \$472 in patients with an FEV₁ of 40–59% of predicted normal.⁸

CONCLUSIONS

- Treating 21 and 24 patients in the two studies with budesonide/formoterol in a single inhaler (Symbicort®) instead of formoterol avoids 10 exacerbations of COPD requiring medical intervention in 1 year. These data compare favorably with those calculated for other ICS/LABA combinations when compared with treatment using the corresponding LABA.
- Given the large costs attributed to COPD exacerbations and the small difference in medication costs with budesonide/formoterol in a single inhaler compared with formoterol alone, this NNT analysis suggests that budesonide/formoterol is likely to be a cost-saving treatment for patients with severe COPD.

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