THE HEALTH ECONOMIC IMPACT OF OPTIMIZING POST-HOSPITALIZATION MANAGEMENT FOR AN EXACERBATION IN COPD PATIENTS IN CHINA

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Abstract

OBJECTIVES: A recent publication has shown the prevalence of chronic obstructive pulmonary disease (COPD) in China is higher than previously thought (13.7%). Therefore, economic burden is also expected to be higher, particularly for COPD patients at risk for exacerbations. Long-acting inhaled controller therapy (LAICT) reduces the risk of exacerbations in COPD. In China, most COPD patients are not chronically treated with LAICT. We estimated the number of exacerbations and deaths avoided and potential cost savings by optimizing treatment with LAICT in COPD patients hospitalized for an exacerbation in China. **METHODS:** A 2 health states (alive-dead) Markov model with 1-month cycles and 12-month time horizon was developed. After discharge following a hospitalized (=severe) exacerbation, patients are at risk for a moderate/severe (fatal-non fatal) exacerbation or death during each cycle. The current scenario in which 38.5% of patients are treated with LAICT post-discharge was compared to a scenario in which all patients were treated. Average number of exacerbations per patient per year (1.21), risk reduction with LAICT (20-30%), exacerbation hospitalization rate (±17%), case fatality, monthly mortality, and the cost of an exacerbation requiring either inpatient or outpatient treatment were obtained from literature. **RESULTS:** Based on the prevalence of COPD in China, the annual estimated number of patients hospitalized for an exacerbation was 8.16 million. Applying the above assumptions, it was estimated that 1.69 million exacerbations and 7,318 deaths could be avoided annually with optimized treatment, leading to cost savings of 6.4 billion CNY. The most sensitive factor in the model was the exacerbation hospitalization rate. Other literature sources show a hospitalization rate of up to 50%, which would increase the number of deaths avoided and costs savings by a factor of 3. **CONCLUSIONS:** Optimizing post-hospitalization management of COPD patients in China could lead to considerable savings for payers and reduced patient burden.

Introduction

- COPD is a significant clinical and economic burden. Hospitalization costs represent more than 70% of all COPD-related costs.[1]
- A recent study from Wang et al (2018) reported a COPD prevalence of 13.7% which is higher than previous published values.[2]
- The GOLD guidelines recommend prescribing long-acting inhaled controller treatment (LAICT) as first line for COPD patients since they are more effective at symptom relief and result in fewer exacerbations.[3]
- Currently, COPD patients in China receive inhaled controller treatment only during hospitalization for an acute severe exacerbation. After discharge, only few patients continue receiving LAICT. The rest of the patients do not receive LAICT and so are at higher risk of being hospitalized again due to a recurrent exacerbation.

Objective

To estimate the short-term cost savings, and avoided exacerbations and deaths by optimizing treatment with LAICT in COPD patients who were hospitalized for an exacerbation in China.

Methods

- A policy analysis tool was developed to compare two scenarios (Figure 1): (1) **Current scenario** where only a proportion of patients are receiving LAICT after hospital discharge due to a hospitalized exacerbation; and (2) **Future scenario** where all patients are treated with LAICT after hospital discharge due to a hospitalized exacerbation.
- In both scenarios the same treatments are used but proportion of patients per treatment is different (Table 1). The proportions per treatment for the current scenario was obtained from the Chinese Insurance Database. In the Future Scenario, no patients will be on the "no inhaled controller treatment" with the original percentage repartitioned to the other treatments.
- The Markov cohort model has two health states, namely Alive and Dead (Figure 2). Patients in the Alive health state can experience a mild/moderate or severe exacerbation (can be fatal) or death due to all other causes. In case of death, patients move to the "death" state.
- Time horizon is 1 year and cycle length is 1 month.
- The Chinese healthcare payer perspective was taken.

Figure 1: Model Structure
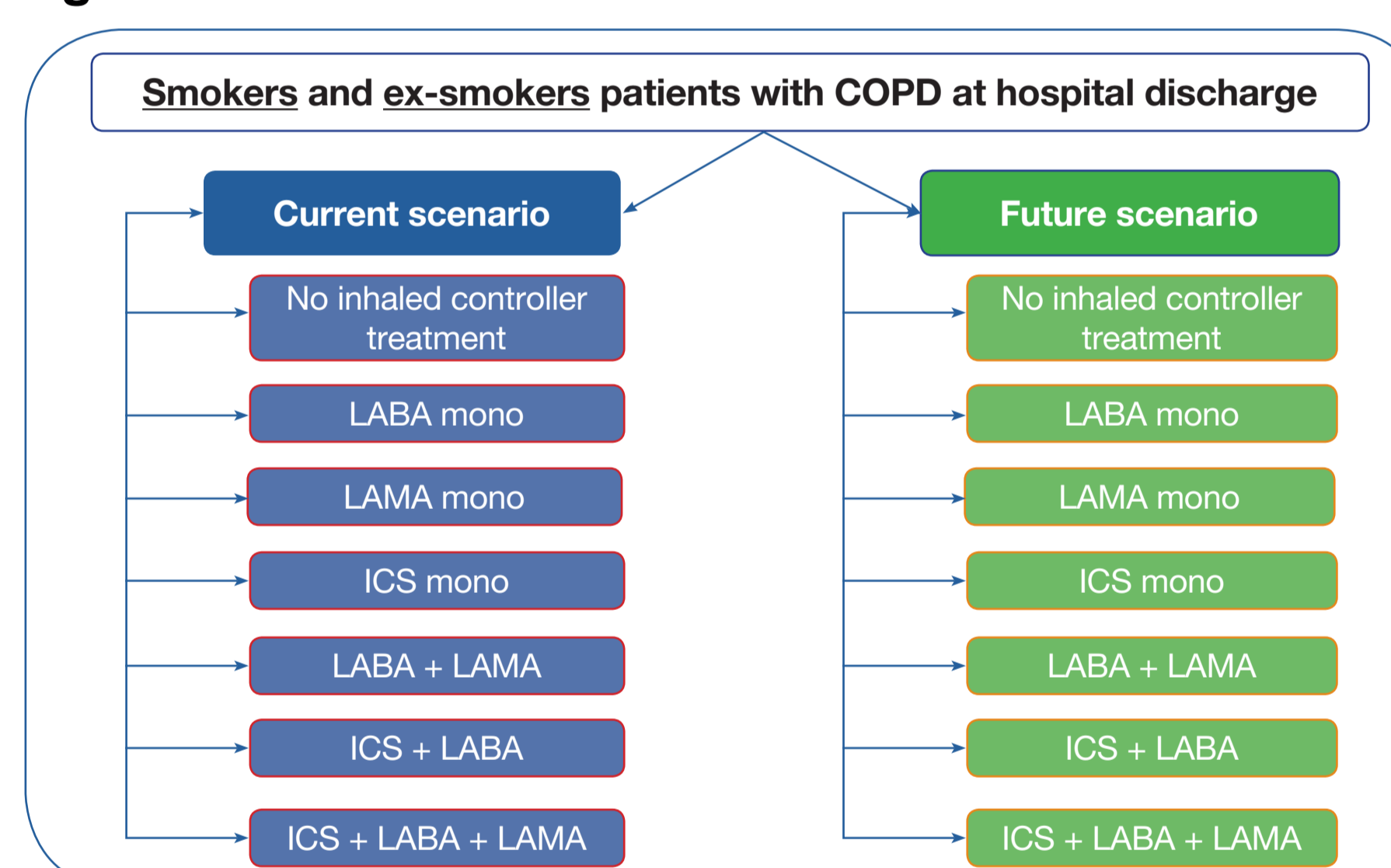
LAICT: LABA, LAMA, ICS, or any of their combinations

Figure 2: Markov Model
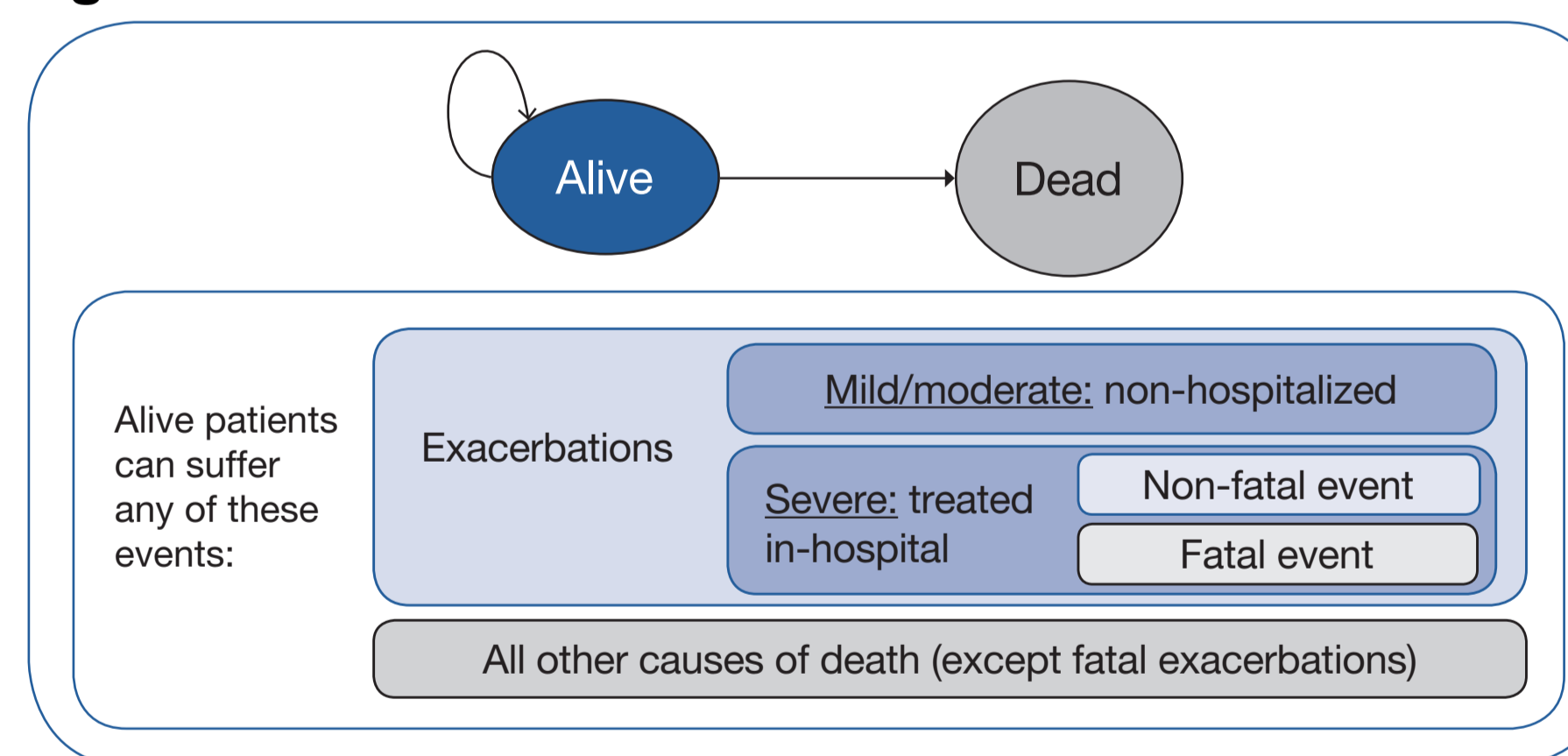
- The risk of a recurrent exacerbation after hospital discharge as well as the impact of the different LAICT was provided by a literature search (Table 2).[4] The proportion of exacerbations being severe was also taken from literature (16.8% – 17.8%).[5]
- The target population is Chinese COPD patients after hospital discharge due to a severe exacerbation. Using the recently published prevalence of 13.7%, a total of 8.16 million hospitalized COPD patients due to an exacerbation was calculated.[2]
- The population includes smokers and ex/non-smoker COPD patients. Smokers have a higher risk of a COPD exacerbation and a higher incidence of exacerbations.[6]
- Specific events costs for mild/moderate and severe exacerbation were taken from the literature (Table 3).[7-8]

Table 1: Proportion of patients per treatment

Treatment	Current scenario	Future scenario
LABA alone	0.04%	0.10%
LAMA alone	6.71%	17.42%
ICS alone	3.51%	9.11%
LABA + LAMA	0%	0%
ICS + LABA	21.54%	55.96%
ICS + LABA + LAMA	6.71%	17.41%
No controller treatment	61.50%	0%

Table 2: Exacerbation per treatment per patient-year and risk reduction[4]

Treatment	Absolute treatment effects (mean exacerbation per patient-year)	Risk reduction compared to no treatment
No treatment	1.21	-
LABA alone	1.01	0.83
LAMA alone	0.89	0.74
ICS alone	0.96	0.79
LABA + LAMA	0.97	0.80
ICS + LABA	0.83	0.69
ICS + LABA + LAMA	0.82	0.68

Table 3: Costs of events[7-8]

Costs	Unit Costs (CNY)
Cost of severe exacerbation	
Hospitalization cost per acute COPD exacerbation	24,373
Cost of moderate exacerbation	
Outpatient visit	319
Cost of fatal severe exacerbation	24,373

Results

Table 4: Proportion of patients dying

Outcome	Current scenario	Future scenario
Proportion of patients dying	12.45%	12.36%

Figure 3A: Results – Health outcomes and costs

Results: Current versus Future scenario of using LAICT after Hospital Discharge
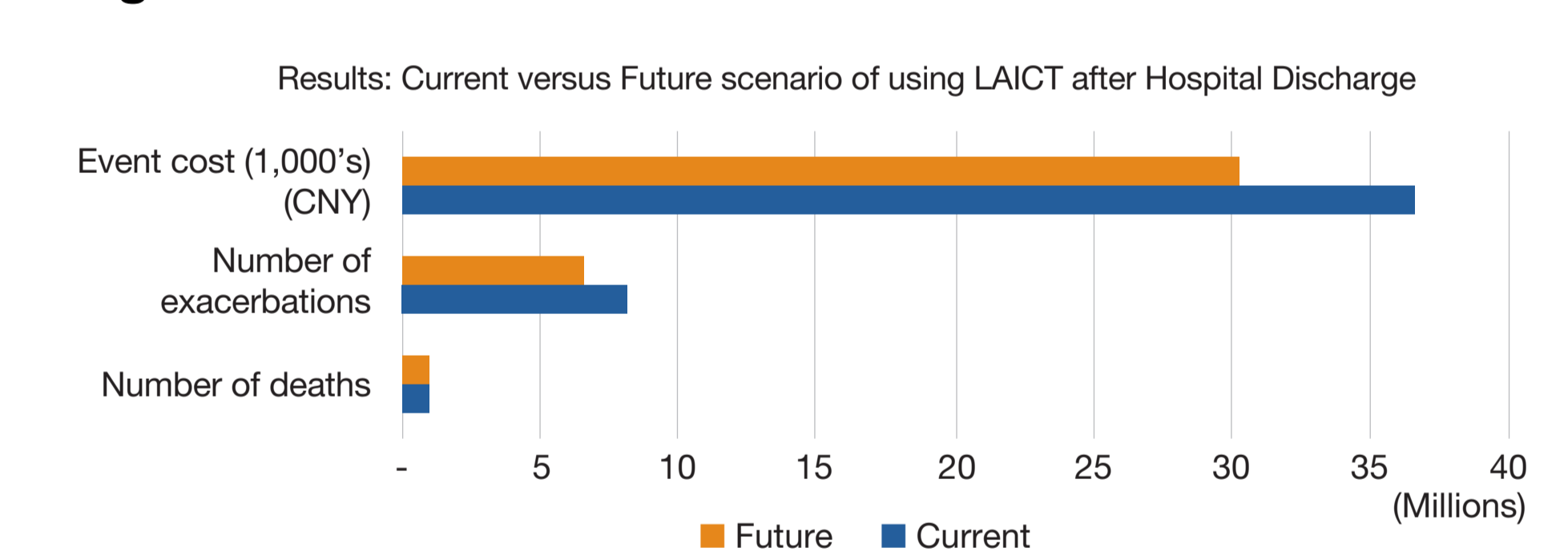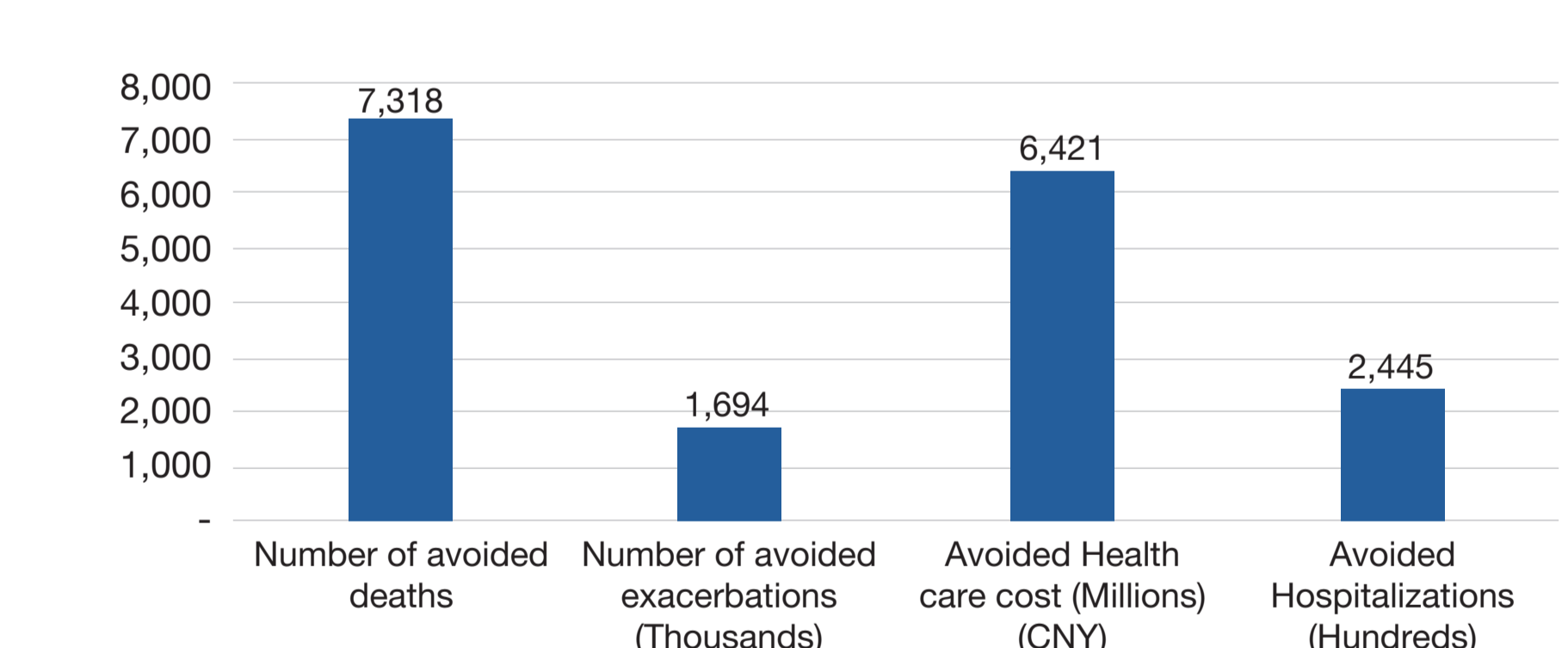
Figure 3B: Results – Avoided deaths, exacerbations and costs

Conclusions

The conducted analysis shows that using LAICT for COPD patients at hospital discharge for an exacerbation can help avoid a considerable number of deaths and recurrent exacerbations, and as such healthcare costs for the Chinese healthcare payers.

References

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