STUDY REPORT SYNOPSIS

Impact of the Pulmonary and Critical Care Medical(PCCM) standardized management on healthcare management among Asthma or COPD or Asthma-COPD overlap patients: a retrospective descriptive analysis (PCCM-IMPACTS)

A Multi-centre, retrospective study describing the impact of PCCM standardized implementation on healthcare management among Asthma or COPD or Asthma-COPD overlap patients in Tianjin city of China, using real world electronic medical record database collected in local health care settings

Milestones:	Protocol Final	Oct 2021
	EC approval	*** 2021
	Contract signature	*** 2021
	HGR approval	Nov 2021
	Data extraction	Dec 2021
	Analysis report	Sep 2022
	CSR	June 2023
Sponsor:	AstraZeneca	
Author:	Yingyu Wang Medical advisor	

Background/rationale:

Asthma and chronic obstructive pulmonary disease (COPD) are currently health problem in respiratory departments in China. Asthma prevalence is increasingly affecting all age groups, and still imposes an unacceptable burden on health care systems. COPD burden is projected to increase in coming decades because of continued exposure of risk factors and aging of the population. Asthma-COPD overlap (ACO) is a common disease in clinical practice, and it is currently poorly characterized with no clear diagnostic definition, yet it has been associated with worse health outcomes and high healthcare costs compared with COPD or Asthma alone. Asthma or COPD or ACO represent an important public health challenge that is both preventable and treatable.

In 2017, the Chinese Thoracic Society and the Chinese Association of Chest Physicians co-sponsored the Pulmonary and Critical Care Medicine (PCCM) standards and specifications program, aiming to promote the homogenization and standards of PCCM in respiratory departments across regions and all hospitals. Since 2018, the National Health Commission issued "Guideline for Medical Service Capability of Pulmonary Medicine", which promoted PCCM standards and specifications to embody the state will.

There is no study in China demonstrate the PCCM impact on the healthcare management, clinical and economic consequence of Asthma or COPD or ACO patients in real world setting so far. It is necessary to carry out a well-designed study to understand impact of PCCM program and its association with diagnosis and treatment, clinical outcomes, healthcare resource utilization (HRU), costs among Asthma or COPD or ACO patients.

Objectives and Hypotheses:

Primary objective

- To describe the impact of PCCM on the diagnosis and treatment among Asthma or COPD or ACO patients in tertiary or secondary hospitals.

Secondary objective

- To describe demographics, clinical characteristics, treatment pattern among all Asthma or COPD or ACO patients and among Asthma or COPD or ACO patients with exacerbations history in tertiary or secondary hospitals.
- To describe the impact of PCCM on clinical outcomes among all Asthma or COPD or ACO patients and among Asthma or COPD or ACO patients with exacerbation history in tertiary or secondary hospitals
- To describe the impact of PCCM on HRU and costs among all Asthma or COPD or ACO patients and among Asthma or COPD or ACO patients with exacerbation history in tertiary or secondary hospitals.

Exploratory objectives

- To describe demographics, clinical characteristics and treatment pattern among Asthma or COPD or ACO patients.

- To describe clinical outcomes, HRU and costs among Asthma or COPD or ACO patients.

- To describe demographics, clinical characteristics and treatment pattern among Asthma or COPD or ACO patients escalating to triple therapy or initiating triple therapy.

- To describe clinical outcomes, HRU and costs among Asthma or COPD or ACO patients escalating to triple therapy or initiating triple therapy (see section 4.3 definition of different triple therapies).

Methodology

This is a multi-center retrospective study to describe the impact of PCCM on healthcare management of Asthma or COPD or ACO patients in Tianjin healthcare big data platform database in China from Jan 01, 2014 to Dec 31, 2020. The impact of PCCM on healthcare management among Asthma or COPD or ACO patients was explored. Analyses were performed separately by disease, by hospitals with or without PCCM implementation, by period (pre-PCCM vs post-PCCM period) and by hospital grade. Patients enrolled into pre-PCCM period who also had post-PCCM visit(s) were counted separately in two periods. The statistical analyses of this study were primarily descriptive in nature and did not attempt to test any specific a priori hypotheses unless otherwise specified. Details please see Section 5.

Data Source(s):

The Tianjin healthcare big data platform database was used for this study; this structured database comprises data collected routinely from daily clinical practice in 24 municipal health centers of 14 districts of geographic remit that covers most part of all 16 districts of Tianjin city. Data mainly come from Hospital Information System(HIS), Electronic Medical Record (EMR), Laboratory Information Management System(LIS). In this retrospective study, all outpatient and inpatient visits for Asthma or COPD or ACO patients across 24 centers were available during Jan 01, 2014 to Dec 31, 2020, including 14 tertiary hospitals (6 PCCM hospitals and 8 non-PCCM hospitals) and 10 secondary hospitals (4 PCCM hospitals and 6 non-PCCM hospitals).

Study Population:

Subjects with following criteria were included in the study: patients with a clinical diagnosis of Asthma or COPD or ACO in database during Jan 01, 2015 to Dec 31, 2020. Asthma or COPD or ACO patients with exacerbation history will be defined according

to the Global Initiative for Asthma (GINA) or Global Initiative for Chronic Obstructive Lung Disease (GOLD) guideline 2020.

Planned sample size: The rough sample size of study population was estimated to be approximately 90000 patients with COPD, 150000 patients with Asthma and 50000 patients with ACO. The population of all-cause visit from respiratory department was estimated to be approximately 1128890 patients. The sample size was estimated based on current database count in secondary and tertiary hospitals.
Actual sample size: a total of 24 hospitals was included in the study. There were 75965 Asthma patients, 43517 COPD patients, 22975 ACO patients in main cohort in post-PCCM period.

Diagnosis and main criteria for inclusion/exclusion

Subjects had to meet the following criteria:
1. Male or female with 18 years of age and older, inclusive.
2. Any subject who meet one of three criteria, inclusive
   a) Diagnosis of Asthma according to the International Classification of Disease 10th edition (ICD-10) codes 145, 145.x, 146, 146.x.
   b) Diagnosis ofCOPD according to the International Classification ofDisease 10th edition (ICD-10) codes144 and 144.x (including the other clinical diagnostic records for COPD diagnosis codes: the other clinical diagnostic records were defined as chronic bronchitis or emphysema or chronic wheeze bronchitis+ at least one of the following prescribed medicine which will be defined as ICS, LABA, LAMA, ICS/LABA, LABA/LAMA, ICS/LABA/LAMA, theophylline (sustained), systemic glucocorticoids (IV/Oral), SAMA, SABA, SABA/SAMA).
   c) Diagnosis of concurrent COPD and Asthma in a single record or within one year according to the International Classification of Disease 10th edition (ICD-10) codes144, 144.x, 145, 145.x, 146 and 146.x.

Exposure(s):

The PCCM-IMPACTS was a retrospective study which was based on implementation of PCCM standards and specifications for exposure. The treatment of Asthma or COPD or ACO patients was part of routine clinical practice and determined by physicians.

Criteria for evaluation:

Primary endpoint:

- Diagnosis and treatment: proportion of newly diagnosed, absolute number and proportion of Asthma or COPD or ACO patients, diagnostic accordance rate, proportion of prescription of inhaled medicine, and proportion of lung function tested.

Secondary endpoint:

- Demographics, clinical characteristics, treatment pattern (See the section 2.2 variables).
- Clinical outcomes: proportion of standardized treatment, proportion of Asthma or COPD or ACO patients with moderate or severe exacerbation frequency, rate of exacerbations and time to fast moderate/severe exacerbation, all-cause mortality.
- HRU and costs: average length of stay, inpatient visits, OPD visits, ED visits, average daily medical costs and per capita medical costs.

Statistical Analysis:

Full Analysis Set (FAS) was the primary analysis set. All subjects with diagnosis record of Asthma or COPD or ACO according to the International Classification of Disease 10th edition (ICD-10) in the database from Jan 01, 2015 to Dec 31, 2020 were included in FAS. FAS was used for all analyses. Of note, in analysing cohort-based secondary endpoints, any subjects who did not fulfil the criteria for that cohort was not included in the analyses using the FAS for the given cohort. No imputation of missing data was used. All statistical analyses were carried out on non-missing data only.

Descriptive analysis was performed of all collected data except data collected only for the purpose of data cleaning. The analysis of continuous variables included number, mean, median, standard deviation, minimum and maximum. Frequency counts and percentages at each category were analysed for categorical variables.

Exploratory hypothesis testing was carried out at the two-sided significance level of 0.05, unless otherwise specified; 2-sided 95% confidence intervals was presented, if applicable. Descriptive statistics as well as 95% confidence intervals was provided for the primary endpoints by PCCM implementation (PCCM vs non-PCCM vs PCCM and non-PCCM referrals), period (Pre-PCCM vs post-PCCM), and by hospital grade (i.e. tertiary or secondary or referrals from secondary to tertiary or referrals from tertiary to secondary) for COPD, asthma and ACO.

For secondary endpoints, descriptive analysis was also conducted for proportion of standardized treatment, proportion of patients with moderate or severe Asthma or COPD or ACO exacerbation frequency. Rate of exacerbation was estimated under the Poisson distribution assumption. The mean and standard error of the exacerbation rate was presented. Kaplan-Meier model was used to estimate first moderate/severe exacerbation and all-cause mortality. If neither exacerbation nor death event had been observed by the cut-off date, the subject was recorded as censored data. Average length of stay, inpatient visits, OPD visits, ED visits, average daily medical costs and per capita medical costs were presented.

The analysis for exploratory endpoints was performed in the similar way as the secondary endpoints.

Summary-Conclusions

Results:

A total of 269,740 patients (PCCM group in pre-PCCM period, n=79,456; PCCM group in post-PCCM period, n=67,952; Non-PCCM group pre-PCCM period, n=59,978; Non-PCCM group post-PCCM period, n=67,154; PCCM and Non-PCCM referrals group in pre-PCCM period, n=6,647; PCCM and Non-PCCM referrals group in post-PCCM period, n=7,351) from 24 hospitals were included in the study.

Conclusion

This is the first big-data based study to evaluate PCCM implementation effect.

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