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Management of acute exacerbation of COPD in tertiary care hospital of Peshawar: A retrospective clinical audit

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A B S T R A C T

Background: Chronic obstructive pulmonary disease (COPD) is a major cause of global morbidity and mortality, with acute exacerbations significantly worsening patient outcomes. These exacerbations often lead to hospitalizations and increased healthcare costs. Proper management, guided by the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines, is essential to improving care. However, real-world adherence to these recommendations can vary.

Objective: To assess how acute COPD exacerbations were handled at a tertiary care hospital of Peshawar.

Methodology: In the emergency department of Hayatabad Medical Complex Peshawar, between November 2021 and December 2023, we retrospectively examined clinical data of patients presenting with acute exacerbations of COPD. The management was assessed in light of the GOLD 2019 report's and earlier audits' recommendations.

Results: Total 170 patients (mean age 73 years, range 41–95 years, 54% male) were included. GOLD risk group (A-D) was only documented in 39% of the cases. At the time of presentation, 74% of the patients had their respiratory rate evaluated, and 69% had their blood gas analysis done. In all, 95% of the patients had chest imaging performed. Short-acting bronchodilators were used as initial symptomatic management in 56% of cases. Among them, 92% had systemic steroid therapy implemented.

Conclusion: The GOLD guidelines were not fully followed, particularly in relation to non-invasive breathing, early symptomatic treatment, and severity assessment. These findings highlight the significance of periodic practice revisions on a regular basis, which may raise practitioners' knowledge and enhance the standard of COPD care in the long run.

Keywords: Audit; COPD; Exacerbation; GOLD Guidelines

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Introduction

Chronic obstructive pulmonary disease (COPD) is a common disease that is linked to high rates of morbidity and mortality as well as significant use of healthcare resources.[1] The majority of people who are affected by COPD are smokers and ex-smokers, although there are other risk factors as well.[2,3] It is distinguished by an impermanent restriction of airflow, which results in persistent dyspnea, a cough that frequently produces phlegm, and occasionally emphysema.[4]

Acute exacerbations of COPD (AECOPD) are characterized by a sudden worsening of a patient's pulmonary features, such as shortness of breath, coughing, and/or sputum production, which necessitates further treatment.[5] They can be categorized as mild, which simply requires the use of short-acting bronchodilators, moderate, which also involves the use of oral corticosteroids and/or antibiotics, or severe, which necessitates hospitalization or ER visits. AECOPD are linked to higher rates of morbidity and mortality and are primarily caused by bacterial or viral infections.[6,7] According to earlier research, from twenty-five percent to fifty percent of COPD patients have at least one annual flair that necessitates further medication treatment.[8] AECOPD has a detrimental effect on the overall course of the disease and is the primary cause of hospitalization for COPD patients.[9,10] Reducing these side effects is the main goal of AECOPD treatment.[5]

Recommendations for treatment of COPD at the national and international levels are based on recommendations found in the Global Initiative for Chronic Obstructive Lung Disease (GOLD) regular report. These guidelines are followed worldwide. Patients with COPD are divided into four groups (A, B, C, and D) based on the frequency and severity of exacerbations, as well as the impact of the disease on daily functioning, since the release of the GOLD-report in 2017. The goal of the current GOLD guidelines for COPD base therapy is to lessen symptoms and the chance of flare-ups in the future[11]. These are according to the A-D classification and consist of non-pharmacological therapies, inhaled corticosteroids (ICS), systemic corticosteroids, antimuscarinic antagonists, both short-acting (SAMA) and long-acting (LAMA), as well as long-acting beta-2 agonists (LABA) and short-acting beta-2 agonists (SABA).[11]

The suggested diagnostic procedures for AECOPD include chest X-Ray/CT scan, arterial blood gas analysis and respiratory rate evaluation. The cornerstones of treatment for AECOPD include systemic corticosteroids, oxygen therapy, SABA, and, if needed, antibiotics and/or ventilatory support.[4] Additional suggestions encompass prompt monitoring, quitting smoking and lung rehabilitation, engaging in physical exercise, and receiving influenza and pneumococcal immunizations.[11]

Acute exacerbations of COPD (AECOPD) are critical events that lead to a worsening of patient health, often resulting in hospital admissions and significantly increasing healthcare costs. Despite the availability of standardized treatment guidelines, such as those provided by the Global Initiative for Chronic Obstructive Lung Disease (GOLD), there is often a gap between guideline-based recommendations and real-world clinical practice. This study seeks to evaluate the management of AECOPD in a tertiary care hospital setting, focusing on adherence to GOLD guidelines. By identifying discrepancies in clinical care, the study aims to highlight areas where improvements can be made to ensure more consistent and effective treatment, ultimately enhancing patient outcomes and reducing the burden on healthcare systems. Understanding current practices is essential for developing targeted interventions to improve COPD care in resource-limited settings like Peshawar.

Objective

To check the degree of adherence to current GOLD recommendations in the clinical care of AECOPD at the Medical Teaching Institute, Hayatabad Medical Complex, Peshawar, Pakistan.

Methodology

This audit was performed retrospectively from November 2021 till December 2023 of the patients presented to Emergency Department of Hayatabad Medical Complex Peshawar with AECOPD. The inclusion criteria for this study involved patients with a verified diagnosis of COPD prior to hospitalization. Additionally, only those whose primary diagnosis during the examined visit was acute exacerbation of COPD (AECOPD) were considered. The study focused on adult patients aged 18 years or older who presented with AECOPD to the emergency room between November 2021 and December 2023. Exclusion criteria included patients younger than 18 years and those who verbally or in writing declined participation in the research. Patients presenting with chest conditions unrelated to COPD were also excluded from the study.

Patients who presented with AECOPD were manually screened through the hospital information system. With approval from the relevant hospital authorities, the necessary patient data were collected from digital patient files, manually from the hard copies/files located in the medical record room following the eligibility criteria's verification. Discharge summaries, nursing records, emergency reports, test results, radiological findings, and spirometry data were among them.

The data was subjected to a descriptive analysis using the integrated analysis capabilities of REDCap®. The findings are displayed as interquartile range (IQR), or median mean and standard deviation (SD), absolute and

Table 1. Baseline characteristics of study cases

Recommendations	Indications
Steps for diagnosis	
Assessment of severity	All Acute Exacerbations of COPD
Assessment of respiratory rate	
Perform arterial BGA.	
Evaluation of the use of additional muscles of the pulmonary system	
Evaluation of alterations in mental state (drowsiness, coma, lethargic behavior)	
Chest imaging	All severe, but not life-threatening Acute Exacerbations of COPD.
Respiratory Support	
Supplemental oxygen therapy	Every severe acute COPD exacerbation, with an aim oxygen saturation of 88–92%
Non-invasive ventilation (NIV)	Acidosis (Respiratory) Substantial shortness of breath accompanied with clinical indicators of respiratory muscle fatigue, elevated breathing effort, or both. Persistent hypoxemia in spite of further oxygen therapy.
Mechanical invasive ventilation (MIV)	Unable to bear NIV. Post respiratory or cardiac arrest. Decreased consciousness, Insufficient sedation to control psychomotor agitation. Aspiration or continuous vomiting. ongoing difficulty clearing respiratory secretions. Severe hemodynamic instability that is unresponsive to vasoactive medications or fluids. Severe arrhythmias of the ventricles or supraventricular area. Hypoxemia in people who cannot tolerate NIV that could be fatal
Pharmacological treatment.	
SABA	Initial management for all Acute Exacerbations of COPD
Systemic steroids	All severe Acute Exacerbations of COPD
Antibiotics (5–7 days)	Patients having following 3 main symptoms: • Worsening dyspnea. • Sputum volume increase. • Sputum purulence increase. Patients who have at least one more cardinal symptom in addition to increased purulence. Patients who need mechanical ventilation.

Long-acting beta 2 agonist (LABA) and antimuscarinic antagonists (LAMA) +- Inhaled corticosteroids.	Before being released from the hospital, all AECOPD patients should start or continue.
Review and Prevention	
Review within 4 weeks	All Acute Exacerbations of COPD
Review within 3 months, including spirometry	All Acute Exacerbations of COPD
rehabilitation (pulmonary)	GOLD risk group B, C, and D
Putting off smoking	Currently smokers
Physical workout	Every patient having COPD.
Immunization against influenza and pneumococcal	Influenza: Every COPD patient. Pneumococcal: in those who are older than 65, have significant comorbidities, or have a FEV1 of less than 40%.

SABA: Short acting beta-2 agonist. LABA: Long-acting beta-2 agonist. SAMA: Short acting anti muscarinic antagonist. LAMA: Long acting antimuscarinic antagonists. BGA: Blood gas analysis

relative frequencies, unless otherwise specified. Using R version 4.0.3, the chi-squared test (in-hospital death) and the Mann-Whitney U test (length of hospital stay) were used to assess connections between patient outcomes and adherence to guidelines.

Results

During the study period, 195 cases of AECOPD were reported to the ED. 170 patients were included in the audit after the criteria for eligibility was applied. The patients themselves presented to ED in the most of cases (n = 110, 64%). General practitioners and other medical professionals referred the remaining patients.

Only 39% of the cases (n = 66) had documentation of the GOLD risk group (A–D), despite the fact that this information is essential for discharge recommendations and therapy decisions. In reference to the evaluation of the severity of AECOPD, 74% (n = 125) of the cases had respiratory rate documentation. In almost all cases (n = 166 (98%), oxygen saturation was measured. In 69% of the patients (n = 117), the required arterial BGA was carried out. In 161 cases (95%) chest radiography was done. The results of the most recent spirometry were recorded in 45 cases (27%) (Table 2).

Merely 50% of the cases (n = 95, 56%) were prescribed the initial SABA-based symptomatic therapy. Conversely, systemic steroids were administered to 92% of the cases (n = 156); the median daily dosage was 40 mg prednisone equivalent, and the median duration of treatment was 5 days. Guidelines-adherent systemic steroids were administered for a maximum of 7 days in 96% of the patients (n = 163). Antibiotics were administered in 134 cases (79%) (Table 3).

Discussion

The 170 patients in our study had a mean age of 73 and 54 percent of them were male. Due to this, our population is marginally older than that of the 19 Swiss hospitals included in the 2011 Swiss COPD Audit (mean age of 70.7 years). Our audit's distribution of comorbidities, smoking status, and sex was fairly comparable to the European COPD audit.[12] Most of the patients arrived in the ED on their own initiative. Individual stress levels and coping strategies have a major role in determining whether or not a patient chooses to visit an emergency room. This could have resulted in a study population that was diverse in terms of the severity, objective urgency, and symptoms. But according to GOLD, regardless of the clinical presentation or diagnostic procedures, the exacerbation is automatically classified as "severe" because they went to the ED. Furthermore, the ED visit resulted in hospitalization in 94% of the cases, indicating a need for inpatient care.

Only 39% of the cases in our study had documentation for the GOLD risk category according to the exacerbation history and symptoms, despite 63% of the cases being classified into GOLD stages I–IV based on spirometry. This indicates that the total documentation of GOLD

Table 2. Frequency of side effects experience during study time

Procedure/Records	Performed, n (%)
Overall cases	n = 170
Diagnostics and Records GOLD risk group (A–D)	66 (39)
Vitals and clinical assessment. Respiratory rate Oxygen saturation	 125 (74) 166 (98)
Lab diagnosis Arterial blood gases	117 (69)
Imaging and lung function testing Chest X-Ray/CT scan.	161 (95)
Latest spirometry result	45 (27)

GOLD: Global Initiative for Chronic Obstructive Lung Disease

classification in our study was inadequate. Although recording the GOLD stage or GOLD risk group is not expressly advised by the GOLD recommendations for AECOPD care, it is crucial to comprehend and apply the GOLD risk group in order to treat stable COPD in compliance with the guidelines, which are according to the GOLD ABCD categorization. Recommendations have been made since 2011.[5]

Chest imaging was performed throughout to look for potential infiltrates as well as additional and differential diagnosis including congestion. Assessing the severity of the exacerbation by looking at alterations in mental condition, usage of accessory respiratory muscles, respiratory rate, and arterial BGA performance is one of the 2019 GOLD report's specific recommendations.[13] These tests enable the diagnosis and categorization of potential acute respiratory failure as well as the implementation of a suitable treatment plan. Venous BGA provides a reasonably dependable alternative for measuring pH and pCO2, but the most reliable method for measuring pH, hypercarbia, and hypoxemia is arterial BGA; these values are also essential for determining the NIV indication.[14,15]

Only 74% of the study participants measured respiration rate, despite it being a quick, simple, non-invasive test that is also reasonably priced. This low percentage is noteworthy. We conclude that the true evaluation was completed in high percentages and that the most of the disparity may be attributed to the absence of documentation, given the linked clinical sign was present in every

Table 3. AECOPD treatment in the emergency room and while hospitalized

Treatment	Given n (%)
Overall cases	n=170
Respiratory Support Additional oxygen if the saturation level is low	164 (97)
Pharmacological treatment. Initial treatment with SABA (with or without SAMA) Systemic steroids steroids used systemically Antibiotics	 95 (56) 156 (92) 134(79)

SAMA: short-acting antimuscarinic antagonist. SABA: Short acting beta-2 agonist

case that was documented. An arterial BGA was done in 69% of instances, while a venous BGA was done in 7% of patients, which is too rare considering the previously stated factors.

While adhering to the 2019 GOLD guidelines for addressing acute exacerbations was the audit's exclusive emphasis, other procedures that are not addressed by GOLD may still be essential. Current research has demonstrated the vital importance of managing chronic comorbidities and its impact on clinical results and survival in both acute exacerbations and stable COPD.[16,17] In their study, GOLD allocated a whole chapter to addressing complications in patients with stable COPD, despite the advice from Celli et al. to constantly assess abrupt incidences like cardiac failure, pneumonia, or pulmonary arterial disease or acute decompensations of concurrent disorders as potential causes of the deteriorating pulmonary features.[5,16]

Oxygen saturation is a key component of in-hospital AECOPD treatment. Improving hypoxemia in patients with severe AECOPD is advised, with an ideal oxygen saturation range of 88–92%.[5]

Pharmacological treatment is AECOPD therapy's second major component. One of the main symptoms, dyspnea, is mostly caused by bronchoconstriction,[18] for which short-acting beta-2 agonists that are inhaled (SABA), are the advised first line of treatment.[5] Of the patients in our sample, only half (56%) received this indicated medication at the time of admission. This disparity was already noted in the 2011 COPD audit data from Switzerland, where 75% of the cases had SABA and/or SAMA provided.[12]

Systemic corticosteroids are advised to enhance oxygenation and lessen inflammation once the acute symptoms have subsided.[5] Systemic glucocorticoids have been found in multiple studies to positively affect pulmonary function, recovery time, oxygenation, and hospital stay duration in patients with AECOPD.[19,20] In our study, the advice was effectively followed, with 92% of patients receiving systemic corticosteroids. Compared to 2011, when only 77% of patients in the Swiss COPD assessment had been prescribed systemic corticosteroids, this is a significant increase.

The data showing that individuals with just two categorical manifestations, if a rise in purulence is one of them, as well as those with all three distinctive symptoms—an uptick in sputum amount, an increase in breathlessness, and an increase in sputum purulence—can benefit from antibiotic therapy, taken into consideration the GOLD guidelines for antibiotic treatment.[21,22] Furthermore, antibiotics should be taken by patients using mechanical ventilation.[5] The 2011 Swiss COPD audit found that 73% of cases received antibiotic treatment, compared to our findings of 79%. A prescription for LAMA or LABA, without or with ICS, was given to 82% of patients who were previously on a LAMA and/or LABA regimen at presentation, demonstrating that the GOLD guideline to keep using long-acting bronchodilators for treatment was effectively followed.

On subsequent follow-up, the patient's discharge medication and adherence can be reviewed (within four weeks).[11] Early follow-up appointments lead to low risk of readmissions due to exacerbations, according to research by Gavish et al.[23] It is strongly advised that patients with respiratory illnesses get an early follow-up because there is evidence that they are more likely to experience early rehospitalizations.[24] All our patients were advised follow up visit after 3 weeks.

The best way to reduce mortality and slow down the course of COPD is to stop smoking.[25] The GOLD recommendations state that quitting smoking is an important intervention that need to be supported whenever it is feasible.[5] Of the smokers in our cohort, 30% had documentation of receiving quitting advice. It is important to note that there is proof that even very short therapy sessions can increase the number of people who stop smoking, even if it may have been recommended in more cases than those that are reported.[26] Active smokers should also be informed about options for help quitting, such as medication or nicotine replacement treatment.[11]

There are certain limitations of this clinical audit and retrospective study. Based on the paperwork provided by the treating physicians and nurses, we carried out a retrospective data analysis. In this strategy, accurate and thorough documentation plays a major role in determining data quality and outcomes. Even though it was possible that missing data in factors like respiratory rate and respiratory muscle use had been assessed but not recorded, they were classified as not assessed. Consequently, it's possible that the degree of adherence to guidelines for diagnostic procedures was underestimated. Moreover, we restricted the pharmaceutical therapy we analyzed to antibiotics, systemic corticosteroids, and bronchodilators. The use of extra substances, such as medications with mucolytic properties, was not assessed.

Conclusion

Our audit uncovered serious inadequacies in the way our institution handled AECOPD by applying the GOLD recommendations. These specifically comprised measuring the intensity of the exacerbation, administering BGA, starting short-acting bronchodilators as a first line of treatment, and using NIV as necessary. There is still room for improvement. The findings emphasize the requirement of both mechanisms to enhance the application of guidelines and the significance of routine internal assessments in clinical settings, such as clinical audits. The release of this data could incite other institutions to carry out clinical audits and raise awareness of any potential guidelines' violations.

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