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Healthcare Quality Management and Integrated Care Pathways (ICPs)

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Abstract

Background: Chronic Obstructive Pulmonary Disease (COPD) is one of the largest causes of morbidity and chronic mortality and a public health problem of high importance. In Italy, COPD afflicts 5.6% of adult (3.5 million people) and is responsible for 55% of all deaths related to respiratory diseases. Smokers have a higher risk, in fact up to 40% develop the disease. From the Covid-19 pandemic, the most affected population is the elderly (mean age 80 years old), with previous chronic diseases, in 18% with chronic respiratory.

The aim of the present work was to validate and measure the outcomes produced by the recruitment and care of COPD patients enrolled by an Healthcare Local Authority in the corresponding Integrated Care Pathways (ICPs) in order to measure how a multidisciplinary, systemic and e-health monitored care impacts upon mortality and morbidity.

Materials and Methods: Enrolled patients were stratified through the GOLD guidelines classification, a unified method to discriminate the various degrees of severity of COPD, using specific spirometric cut-points and providing homogeneous classes of patients. Monitoring examinations include simple spirometry, global spirometry, diffusing capacity measurement, pulse oximetry, EGA, 6-minute walk test. Chest Rx, chest CT, ECG may also be required. The severity of COPD identifies the timing of monitoring, which involves a fixed annual re-assessment for mild offset clinical forms, biannually in case of exacerbation, a quarterly cadence in moderate forms that becomes bimonthly in severe forms.

Results: In 2344 enrolled patients (46% women and 54% men, mean age 78 yo) 18% had GOLD severity 1, 35% GOLD 2, 27% GOLD 3 and 20% GOLD 4. In addition, 73% of patients had at least one other chronic comorbidity, mainly diabetes or hypertension, and in 48% both. The data analysis showed that the population followed in e-health presented a 49% reduction in improper hospital admissions and a 68% reduction in clinical exacerbations compared to the

population enrolled in the ICPs but not followed also in e-health. Smoking habits present at the time of patient enrollment in the ICPs remained in 49% of the total population enrolled and in 37% of the population enrolled in e-health. The patients enrolled in GOLD 1 and 2 obtained the same benefits both if treated in e-health and if treated in the clinic. However, GOLD 3 and 4 patients instead presented better compliance if treated in e-health and continuous monitoring allowed punctual and early interventions such as to reduce complications and hospitalization.

Conclusion: The e-health approach made possible to ensure proximity medicine and personalization of care. Indeed, the implemented diagnostic treatment protocols, if properly followed and monitored, are able to control complications and impact the mortality and disability of chronic disease. The advent of e-health and ICT tools are demonstrating a great support capacity for care taking that also allows greater adherence to patient care pathways, even more than the protocols up to now identified, characterized by a monitoring programmed over time, enhancing a patients and their families quality of life improvement.

Background

The Chronic Obstructive Pulmonary Disease (COPD) is one of the largest causes of morbidity and mortality on a global scale, so it is a relevant matter of Public Health.

In Italy, COPD affects about 5.6% of adult-age individuals, accounting for about 3.5 million people, and being responsible for 55% of all deaths related to respiratory diseases, ranking sixth among chronic disorders, while among causes of death it ranks fourth, with an annual rate of 5.5 deaths per 10,000 inhabitants and a total annual number of approximately 3.23 million deaths. Smokers showed a higher risk, in fact the 20-40% of them develops the disease. (1)

The prevalence of respiratory failure among chronic respiratory diseases is dramatically increasing, emerging in fact in 57 percent of total hospitalizations for COPD and reporting an intrahospital mortality rate of 10 percent.

The World Health Organization (WHO) lists exposure to tobacco smoke and indoor air pollution, as well as occupational exposure to dust, fumes and chemicals, as major risk factors.

In fact, due to the high resonance that this disease carries, WHO is in the act of adopting measures to go as far as possible in extending the diagnosis and treatment of COPD in many ways. This includes protocols for assessment, diagnosis, and management of chronic respiratory disease and models for guidance on healthier lifestyles, among whom the most relevant are smoking cessation and self-care. (2)

Under the title "Rehabilitation 2030," a new strategic document was published with a description of an innovative approach for enhancing rehabilitation services and prioritizing them within Health Systems. In fact, respiratory rehabilitation is part of the pool of rehabilitation interventions being developed in COPD patients in this initiative. Other achievements in this context are associated with the WHO Framework Convention on Tobacco Control, as well as some initiatives such as

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"MPOWER" and "mTobacco Cessation," in addition to the activities of the Global Alliance Against Chronic Respiratory Diseases.

Since the Covid-19 pandemic, the elderly represents the most affected population. In fact, the average age of deceased patients is 80 years old and many of these patients were already affected by chronic diseases, including, in 18% of the total, chronic respiratory diseases.

Materials and Methods

COPD is responsible for 55% of deaths from respiratory diseases in Italy. In the pre-Covid-19 period, the raw hospitalization rate for COPD was of 1.85 per thousand, with a total of 102,474 ordinary and 2670 day-hospital admissions.

The correlation between the 30-day mortality rate for exacerbated COPD before 2020 and the same indicator after that year reveals an increase from 9.8% before the Covid-19 pandemic to 13.2% in the year 2020 and 13.8% in the year 2021. Regarding hospitalization for COPD, we note on the other hand a reversal in trend, decreasing from 1.85 per 1,000 population to 1.07 in 2020 and 1.01 in 2021. The same inversion is also reported in the volume of ordinary hospitalizations, which goes from 102,474 in 2019 to 60,640 in 2020 and 56,317 in 2021, as well as to the volume of day hospital admissions, which amounted to 2670 in 2019, to 1477 in 2020 and 2021. (4)

The aim of the present work was to validate and measure the outcomes produced by the recruitment and care of COPD patients enrolled by a Roman Healthcare Local Authority in the corresponding ICPs designed by the Lazio region in order to measure how a multidisciplinary, systemic and e-health monitored care impacts on mortality and morbidity.

Enrolled patients were stratified through the classification proposed by the GOLD guidelines, which is used as a unified method to discriminate the various degrees of severity of this condition.

The GOLD airflow obstruction severity classification uses specific spirometric cut-points and provides homogeneous classes of patients.

➢ SEVERITY CLASSIFICATION OF AIRFLOW LIMITATION IN COPD (BASED ON POST-BRONCHODILATOR FEV_1)		
In patients with FEV1/FVC < 0.70:		
GOLD 1	Mild	$FEV_1 \geq 80\%$ predicted
GOLD 2	Moderate	$50\% \leq FEV_1 < 80\%$ predicted
GOLD 3	Severe	$30\% \leq FEV_1 < 50\%$ predicted
GOLD 4	Very Severe	$FEV_1 < 30\%$ predicted
COPD: Chronic Obstructive Pulmonary Disease; FEV_1: Forced Expiratory Volume in 1 second; FVC: Forced Vital Capacity; GOLD: Global Initiative for Chronic Obstructive Lung Disease.		

***Figure 1**. Severity classification of COPD proposed by the GOLD Guidelines (3).*

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The GOLD Guidelines also identify for each severity class the instrumental tests that can be useful to effectively measure the patient's clinical functional condition, in order to reduce morbidity and mortality associated with this disease, as well as the timelines related to patient monitoring.

Monitoring examinations include: simple spirometry, global spirometry, diffusing capacity measurement, pulse oximetry, EGA, 6-minute walk test. Chest Rx, chest CT, ECG may also be required.

The severity of COPD identifies the timing of monitoring, which involves a fixed annual re-assessment for mild offset clinical forms, biannually in case of exacerbation, a quarterly cadence in moderate forms that becomes bimonthly in severe forms.

The enrolled patients, 2344 including 46% women and 54% men, had a GOLD 1 severity in 18% of cases, GOLD 2 severity in 35% of cases, GOLD 3 severity in 27% of cases, and GOLD 4 severity in 20% of cases. In addition, 73% of patients had at least one other chronic comorbidity, mainly diabetes or hypertension, and in 48% both.

The 69% of the population had an annual income of less than 15,000 euros/year.

The average age of the registered enrolled population was 78 years.

Results

The expenditure related to instrumental and laboratory tests was measured to be about 196.55 euros per year per capita for mild COPD patients and about 393.10 euros per year per capita for individuals with moderate-severe and severe form, in concordance with regional planning and national data.

According to the latest OsMed Report, respiratory drugs are confirmed to be the seventh largest public spending therapeutic category in 2021, amounting to 1,325.5 million euros, thus corresponding to 5.6 percent of total public spending. The annual consumption of therapeutic drugs for COPD was 31 DDD (5).

The average drug cost for enrolled patients was 1738.76 euros.

In order to ensure proximity of care and continuous monitoring of vital parameters, in particular saturation, 976 patients in e-health programs were recruited. Of these, 73% were in GOLD class 3 and 4, the rest in GOLD class 2.

Patients followed up in e-health protocols recorded 1,065,435 parameters with 67,884 values recorded outside the threshold; among these, 38,984 required the intervention of a doctor in teleconsultation to modify the therapy and resolve the critical issues detected, with an amount of only 23 hospital admissions.

The data analysis showed that the population followed in e-health presented a 49% reduction in improper hospital admissions and a 68% reduction in clinical exacerbations compared to the population enrolled in the ICPs but not followed also in e-health.

Smoking habits present at the time of patient enrollment in the ICPs remained in 49% of the total population and in 37% of the population enrolled in e-health, although this population decreased by 78% during monitoring in telemedicine.

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E-health represented the management tool of the multidisciplinary team for systemic monitoring of vital parameters and oximetry, for the provision of tele-rehabilitation services to ensure good motor compliance, for sleep assessment and for monitoring the prescribed therapy and hired.

Discussion

The e-health approach makes it possible to ensure proximity medicine and personalization of care. It also represents a team tool that allows the synergy of interventions and the constant sharing of the outputs of the care processes.

The patients enrolled in GOLD 1 and 2 obtained the same benefits both when in e-health and in clinic treatments. However, GOLD 3 and 4 patients presented better compliance if treated in e-health, since continuous monitoring allowed punctual and early interventions such as reduction of complications and hospitalization.

Conclusions

The aging of the population as well as the increasing incidence of chronic diseases necessitates the enrolling and taking care of an increasing number of patients. The identification of effective tools that improve the outcomes of diagnostic treatment pathways represents the biggest challenge to reduce complications, mortality, and morbidity.

Indeed, the measured data document that the implemented diagnostic treatment protocols, if properly followed and monitored, are able to control complications and impact on mortality and disability that chronic disease can bring.

The advent of e-health and the use of ICT tools are demonstrating a great support capacity for a more aware care that also allows greater adherence to patient care pathways, even more than the current protocols, characterized by an over-time programmed monitoring, the detection of oximetry parameters together with targeted therapy and the maintenance of motor compliance that could be helpful to improve the quality of life of patients and their families.

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