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Article

Impact of COVID-19 on Diagnosis of Respiratory Diseases in the Northern Metropolitan Area in Barcelona (Spain)

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ABSTRACT

Objective:

Several authors have analyzed the impact of the pandemic on the incidence rates of different conditions. Our aim was to analyze the impact of the COVID-19 pandemic on primary care new diagnoses of respiratory diseases.

Methods:

This was an observational retrospective study performed to describe the impact of COVID-19 pandemic on primary care new diagnosis of respiratory diseases other than lung cancer. Incidence rate ratio between pre-pandemic and pandemic period was calculated.

Results:

We found an decrease in the incidence of respiratory conditions (IRR 0.65) during the pandemic period. When we compared the different groups of diseases according to ICD-10, we found a significant decrease in the number of new cases during the pandemic period, except in the case of pulmonary tuberculosis, abscesses or necrosis of the lungs and other respiratory complications.

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Instead, we found increases in new diagnoses of flu and pneumonia (IRR 2.17) and respiratory interstitial diseases (IRR 1.41).

Conclusion:

There has been a decrease in new diagnosis of most respiratory diseases during the COVID-19 pandemic. The real clinical impact of this situation is still unknown. Large-scale real-life studies will make it possible to evaluate the long-term true impact of COVID-19 pandemic on the respiratory diseases management.

Keywords: COVID-19; diagnose; primary care; respiratory disease

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INTRODUCTION

Apart from its massive mortality and morbidity rates, the COVID-19 pandemic has had a great impact on the management of diseases other (except COVID-19), especially chronic diseases (1). The pandemic has impacted usual medical activities by limiting the access to primary care and to several diagnostic procedures. This reduction has been described to be higher in cardiovascular, respiratory, endocrine and gastrointestinal diseases (2,3).

Several authors have analyzed the impact of the pandemic on the incidence rates of different conditions, finding an overall decline in new diagnoses of most diseases (4,5).

Nevertheless, few authors have focused on the impact of the pandemic on the incidence of respiratory diseases in general.

Our aim was to analyze the impact of the COVID-19 pandemic on primary care new diagnoses of respiratory diseases other than lung cancer.

METHODS

Setting

This was an observational retrospective study performed to describe the impact of COVID-19 pandemic on primary care new diagnosis of respiratory diseases. The study was conducted with administrative data obtained from the primary care system in the Northern Metropolitan Region (one of the health administrative regions of Catalonia, Spain) affiliated with the Catalan Institute of Health, representing 63.4% of all primary health teams in the region. The Northern Metropolitan Region covered 1.393.366 patients according to 2021 data.

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Pandemic period definition

For the purpose of the study, we defined as pandemic period months from March 14th 2020 to March 13th 2021. Thus, pre-pandemic period was defined from March 14th 2019 to March 13th 2020.

New diagnosis

The way we identified new diagnoses has already been described in a previous article (4). Briefly, we identified new diagnoses by two different approaches. We flagged a diagnosis as new if within the list of diagnoses associated to a certain patient's visit with primary healthcare team there is a diagnosis that is not in the list of the preexisting active diagnoses of the patient. Diagnoses were also considered to be new if they were added to the list of active diagnoses across patient visits, between two consecutive visits. Diagnoses and health problems were recorded by physicians using the International Classification of Diseases, 10th Revision (ICD-10).

Definition of respiratory disease

We used all diseases classified as group J (respiratory system diseases) in the ICD-10. Arbitrarily, we also included in the analysis as respiratory diseases G47 (Obstructive sleep apnea) and A15 (pulmonary tuberculosis) codes, as they are mainly treated by respiratory physicians in our area.

Statistical analysis

Incidence rate ratio (IRR) and 95% confidence intervals between pre-pandemic and pandemic period were calculated using the *ir* command of the version 15 of STATA. Our results were corrected for multiple testing.

RESULTS

The IRR of new respiratory diagnoses between periods can be seen in Table 1. When we compared as a whole the incidence of new respiratory diagnoses between the pandemic and the pre-pandemic period we found a decrease in the incidence (IRR 0.65, 95% CI 0.64-0.66, p=0.0000). When we compared the different groups of diseases according to ICD-10, we found a significant decrease in the number of new cases during the pandemic period, except in the case of pulmonary tuberculosis (A15), abscesses or necrosis of the lungs (J85-86) and other respiratory complications (J95). On the other hand, we found increases in new diagnoses of flu and pneumonia (excluding COVID-19 infection) (J09-18) (IRR 2.17, 95% CI 1.89-2.50, p=0.0000) and respiratory interstitial diseases (IRR 1.41, 95% CI 1.13-1.76, p=0.0015).

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The heatmap (Figure 1) presents by month the ratio of new diagnosis during the pandemic period compared to new diagnosis during the pre-pandemic period by ICD-10 groups. Interestingly, we found a peak in new diagnoses of flu and pneumonia in March and April of 2020, with a relevant decrease in the IR of all the other conditions except for respiratory interstitial diseases. In those conditions with decreased number of new diagnoses during the pandemic period, the ratio very rarely reached the levels of the same month previous to the COVID-19 pandemic.

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The number of the new diagnosis of respiratory diseases for the pre-pandemic and the pandemic period and its IRR can be seen in Table 2.

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We found a decrease in new diagnoses during the pandemic period. Data on group J40-47 (chronic diseases of the lower respiratory tract) were especially relevant. The number of new diagnoses was lower either for emphysema (J43, IRR 0.64, 95% CI 0.52-0.80, p=0.0000), chronic obstructive pulmonary disease (COPD) (J44, IRR 0.45, 95% CI 0.41-0.48, p=0.0000), asthma (J45, IRR 0.61, 95% CI 0.58-0.65, p=0.0000), and bronchiectasis (J47, IRR 0.54, 95% CI 0.47-0.63, p=0.0000).

DISCUSSION

Our study describes a decrease in primary care new diagnoses of respiratory diseases for most of the groups, except for those referring to respiratory infections (flu and pneumonia) and respiratory interstitial diseases.

These findings are in line with previous reports, that despite not being exclusively focused on respiratory diseases, had described a decline in respiratory diseases in general (4) or specific decreases on incidence rates of asthma or COPD (5). Despite not focusing on new diagnoses, several authors have described a decrease in primary care visits for chronic conditions such as respiratory diseases (2,3), hospital admissions due for respiratory diseases (6,7) or exacerbations of chronic respiratory diseases (8,9) during the COVID-19 pandemic.

There can be several explanations to these findings. First, the use of face masks and social distance has been useful to reduce transmittable causes of exacerbations of respiratory diseases such as

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asthma. Secondly, the pandemic impacted usual medical activities by limiting the access to most diagnostic procedures. For example, sleep laboratories decreased their diagnostic capacity in order to minimize the risk for infection (10) and, simultaneously, the performance of lung function testing was restricted to the diagnosis, differential diagnosis and before interventional procedures or surgery, always with a previous RT-PCR test for SARS-CoV-2 (11). Thirdly, depending on the severity of the pandemic, sometimes it has been difficult to access primary care and specialized doctors. In their study, Doe and cols described an increase in the time lapse for diagnosis in patients complaining of breathlessness (12). Chest physicians changed their usual clinical activities, being actively involved in the management of patients with respiratory failure and SARS-CoV-2 pneumonia, and several visits end exams were postponed or cancelled.

In a situation where between 18.1 and 45.2% of the general population reported being afraid of being infected with COVID-19 (13), healthcare centers could have been seen as dangerous places, and people could have been afraid of seeking for health care due to the fear of getting infected (14). In other cases, people could have perceived their problems as less important when compared with the overall situation due to the COVID-19 pandemic. Moreover, self-medication increased significantly as it can be extracted from the increase of adverse effects (15). These situations may have also had its role in the decrease in the number of new diagnoses of chronic respiratory diseases.

What will be the real impact of this decrease in respiratory diagnoses on the prognosis of respiratory conditions is still to be determined. There have been attempts to predict the health impacts of COVID-19 in oncologic patients, which have estimated, for example, a 4.8-5.3% increase in the number of deaths for lung cancer, corresponding to between 1,235 to 1,372 additional deaths in the UK (16). Surely a decrease in respiratory diagnoses will not have the impact on mortality it could have in patients with cancer who do not get a diagnose, or get delayed diagnose or treatment. Nevertheless, those without diagnose will certainly not receive the optimal treatment, be it an inhaler or a biologic treatment (17) and this can have long-term effects.

Respiratory care physicians will face two main challenges in the post-pandemic era. First of all, they will have to care for those patients with respiratory symptoms after SARS-CoV-2 infection. Secondly, they will have to treat all those patients with respiratory conditions which have been missed or worsen during the pandemic. Apart from an increase in face-to-face visits and examinations, innovation will be needed in order to achieve normality again. Telemedicine has played a role during the pandemic (18) and will certainly play its role in the post-pandemic

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period, with virtual visits, wearables or mobile devices applications being used to follow these patients up (19).

The main limitation of our study is the fact that it is based on codification in primary care. Patients requiring being hospitalized who did not attend their primary care physician after discharge, or those who died in hospital, have not been included in the analysis. Thus, acute conditions with elevated mortality could be underestimated.

CONCLUSIONS

There has been a decrease in new diagnosis of respiratory diseases during the COVID-19 pandemic. The real clinical impact of this situation is still unknown. Large-scale real-life studies will make it possible to evaluate the long-term true impact of COVID-19 pandemic on the respiratory diseases management.

Conflict of interest:

The authors do not have any financial or personal relationships with people or organizations that could inappropriately influence their work in the present article.

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Figure 1. The heatmap presents by month (x-axis) the ratio of new diagnosis during the pandemic period compared to new diagnosis during the pre-pandemic period by ICD-10 groups (y-axis). Severe drops in diagnosis in the pandemic period are in red, similar diagnoses are in yellow, and increases in diagnoses are in green.

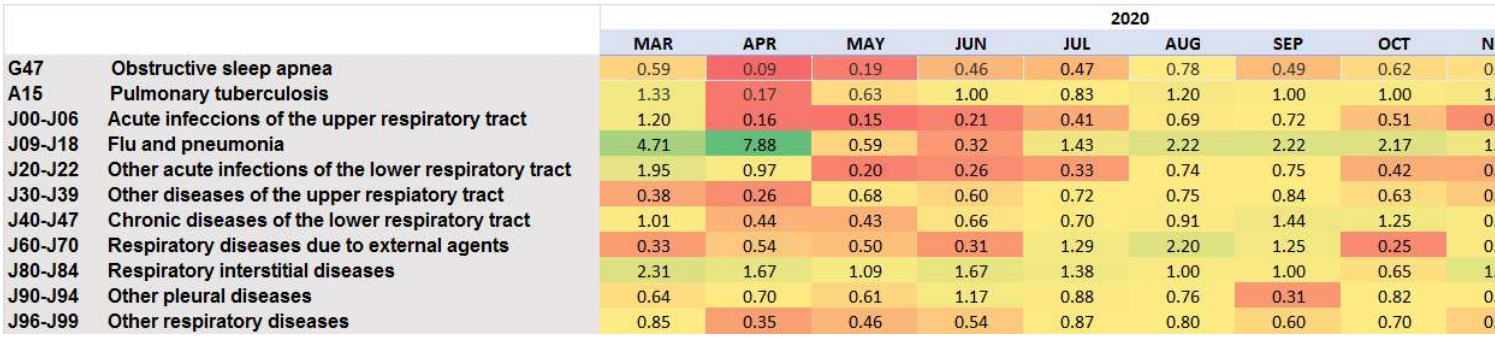

Table 1. Absolute number of new diagnoses for each period, and the IRR of new respiratory diagnoses between pre-pandemic and pandemic periods.

		Number of new diagnoses			
Disease/condition ICD-10 Code	Description	Prepandemic	Pandemic	IRR (95% CI)	P-value
G47	Obstructive sleep apnea	1,821	873	0.48 (0.44-0.48)	0.0000
A15	Pulmonary tuberculosis	66	50	0.72 (0.52-1.01)	0.0504
J00-J06	Acute infeccions of the upper respiratory tract	885	581	0.60 (0.53-0.66)	0.0000
J09-J18	Flu and pneumonia	300	677	2.17 (1.89-2.50)	0.0000
J20-J22	Other acute infections of the lower respiratory tract	1,338	755	0.56 (0.51-0.61)	0.0000
J30-J39	Other diseases of the upper respiratory tract	13,696	7,682	0.56 (0.55-0.58)	0.0000
J40-J47	Chronic diseases of the lower respiratory tract	7,375	6,154	0.83 (0.80-0.86)	0.0000
J60-J70	Respiratory diseases due to external agents	130	85	0.64 (0.48-0.85)	0.0013
J80-J84	Respiratory interstitial diseases	145	203	1.41 (1.13-1.76)	0.0015
J85-J86	Abscess/necrosis of the lungs	23	12	0.52 (0.24-1.09)	0.0652
J90-J94	Other pleural diseases	341	254	0.74 (0.63-0.88)	0.0030

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J95	Other respiratory complications	2	2	1.00 (0.07-13.79)	0.0500
J96-J99	Other respiratory diseases	1,822	1,019	0.56 (0.51-0.60)	0.0000
Total		27,994	18,347	0.65 (0.64-0.66)	0.0000

ICD-10: International Classification of Diseases, 10th Revision; *IRR*: incidence rate ratio

Table 2. Absolute number of new diagnoses for each period, and the IRR of new respiratory diagnoses between pre-pandemic and pandemic periods.

Disease/condition ICD-10 Code Description for Group J Diseases	Number of new diagnoses	
	Prepandemic	Pandemic
J00-J06 Acute infeccions of the upper respiratory tract		
J00 Acute nasopharyngitis	445	249
J01 Acute sinusitis	47	34
J02 Acute pharyngitis	97	74
J03 Acute tonsillitis	200	104
J04 Acute laryngitis and tracheitis	53	39
J05 Acute obstructive laryngitis [croup] and epiglottitis	4	2
J06 Acute upper respiratory infection	36	24
J09-J18 Flu and pneumonia		
J09 Influenza due to identified influenza virus	5	0
J11 Influenza due to unidentified influenza virus	37	19
J12 Viral pneumonia. unspecified	1	339
J13 Pneumonia due to *Streptococcus pneumoniae*	2	3
J15 Pneumonia due to other specified bacteria	27	32
J17 Pneumonia in diseases classified elsewhere	2	0
J18 Other pneumonia. unspecified organism	226	255
J20-J22 Other acute infections of the lower respiratory tract		
J20 Acute bronchitis	429	156
J21 Acute bronchiolitis	27	9
J22 Unspecified acute lower respiratory infection	882	582
J30-J39 Other diseases of the upper respiratory tract		
J30 Vasomotor and allergic rhinitis	9,580	5,410
J31 Chronic rhinitis. nasopharyngitis and pharyngitis	526	516
J32 Chronic sinusitis	685	364
J33 Nasal polyp	310	165
J34 Other specified disorders of nose and nasal sinuses	733	390
J35 Chronic disease of tonsils and adenoids	1,600	691
J36 Peritonsillar abscess	2	7
J37 Chronic laryngitis and laryngotracheitis	5	2
J38 Diseases of vocal cords and larynx	211	121
J39 Disease of upper respiratory tract	43	14

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J40-J47	**Chronic diseases of the lower respiratory tract**		
	J40 Bronchitis. not specified as acute or chronic	1,081	2,598
	J41 Simple and mucopurulent chronic bronchitis	10	4
	J42 Unspecified chronic bronchitis	341	266
	J43 Emphysema	214	138
	J44 Chronic obstructive pulmonary disease. unspecified	2,098	941
	J45 Asthma	3,124	1,915
	J47 Bronchiectasis	490	267
J60-J70	**Respiratory diseases due to external agents**		
	J60 Coalworker's pneumoconiosis	1	1
	J61 Pneumoconiosis due to asbestos and other mineral fibers	33	10
	J62 Pneumoconiosis due to silica	4	1
	J63 Pneumoconiosis due to other specified inorganic dusts	2	1
	J64 Unspecified pneumoconiosis	7	5
	J66 Airway disease due to other specific organic dusts	27	15
	J67 Hypersensitivity pneumonitis due to other organic dusts	7	1
	J68 Respiratory condition due to chemicals. gases. fumes and vapors	14	0
	J69 Pneumonitis due to inhalation of other solids and liquids	31	46
	J70 Respiratory conditions due to external agent	4	3
J80-J84	**Respiratory interstitial diseases**		
	J80 Acute respiratory distress syndrome	2	4
	J81 Pulmonary edema	5	17
	J84 Other specified interstitial pulmonary diseases	137	181
J85-J86	**Abscess/necrosis of the lungs**		
	J85 Abscess of lung and mediatinum	5	1
	J86 Pyothorax	18	11
J90-J94	**Other pleural diseases**		
	J90 Pleural effusion. not elsewhere classified	299	217
	J91 Malignant pleural effusion	12	7
	J92 Pleural plaque	4	1
	J93 Pneumothorax	15	19
	J94 Pleural condition	12	10
J95	**Other respiratory complications**		
	J95 Other respiratory complications	2	2
J96-J99	**Other respiratory diseases**		
	J96 Respiratory failure	101	74
	J98 Other diseases of bronchus	1,708	939
	J99 Respiratory disorders in diseases classified elsewhere	13	2

ICD-10: International Classification of Diseases, 10th Revision; *IRR*: incidence rate ratio