

## Early View

### Research letter

# Impact of COVID-19 on COPD and Asthma admissions and the pandemic from a patient's perspective

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# **Impact of COVID-19 on COPD and Asthma admissions and the pandemic from a patient's perspective**

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# Impact of COVID-19 on COPD and Asthma admissions and the pandemic from a patient's perspective

## Introduction

The COVID-19 pandemic has led to an overall reduction in hospital admissions in the United Kingdom (UK) with national data showing a decline in emergency admissions for respiratory illness [1, 2].

Asthma and Chronic Obstructive Pulmonary Disease (COPD) patients are considered at increased risk of dying from COVID-19 and were therefore subject to UK government shielding advice. While this may have protected against respiratory viruses; adverse effects, including reduced physical activity, social isolation, and increasing anxiety have been recognised consequences [3]. Airways disease management is multidisciplinary and there may also be pervasive deleterious effects due to suspension of clinical services including out-patient clinics, smoking cessation support, and pulmonary rehabilitation (PR) [4]. A recent national survey found that up to 23% of patients with lung conditions have experienced worsening symptoms during the pandemic [5].

We examine admissions with exacerbations of asthma and COPD to Hull University Teaching Hospitals NHS Trust (HUTH) during the 1st wave of the COVID-19 pandemic and compare them to previous years. We then explore the patients' perspective of the pandemic and how it affected their physical and mental health.

## Methods

### *Asthma and COPD exacerbation hospitalisations*

All admissions to HUTH (an NHS Trust with 2 large hospital sites) with a diagnosis of asthma or COPD between 23rd March and 1st June 2020 were identified from hospital electronic records. Data were collected using identical search criteria for aligned dates in 2018 and 2019. Electronic health records were reviewed for all identified admissions to ascertain those with a primary diagnosis of asthma or COPD exacerbation. Data collected included, demographics, diagnosis, level of care received, length of stay, and acute treatment.

### *Structured Interviews with COPD and Asthma patients*

COPD patients under active clinical follow-up by the local integrated COPD service were contacted and provided verbal consent to undertake a structured interview consisting of 20 questions relating

to their experience of their COPD and its treatment during the COVID-19 pandemic. Interview questions related to subjective disease control, mental health impacts, patient physical activity, and medication use. Local data from the UK Severe Asthma Registry (UKSAR) study, examining the experience of severe asthma patients during the pandemic, were also collated [6].

All data were analysed using IBM SPSS Statistics 26, differences in proportions were analysed using Chi-square testing, comparisons of means were analysed using ANOVA, and all results are presented descriptively.

## **Results**

### *Effect of the COVID-19 pandemic on Asthma and COPD hospitalisations*

Data are presented in Table 1.

We identified 4665 all-cause admissions for patients with a diagnosis of asthma or COPD during the studied period, of which 883 were for exacerbations. The mean number of all-cause admissions per week in our study period fell significantly from 173 and 179.7 in 2018 and 2019 respectively to 113.8 per week in 2020 ( $p<0.001$ ). Mean number of airways disease exacerbations per week also reduced from 36 and 36.6 per week in 2018 and 2019 respectively to 15.7 per week in 2020 ( $<0.001$ ).

No difference was observed in the proportion of patients hospitalised with exacerbations requiring admission to critical care. However, there was a significant reduction in the proportion of patients admitted to the respiratory high-dependency unit (HDU) in 2020 ( $p=0.03$ ).

Oral corticosteroids were prescribed in a lower proportion of patients hospitalised with an exacerbation in 2020 compared with earlier years (80.1% in 2020 vs. 88.1% in 2019 and 88.4% in 2018,  $p=0.004$ ). No difference was observed in inpatient mortality.

### *Effect of the COVID-19 pandemic on COPD and Asthma from a patient's perspective*

Fifty COPD patients were interviewed. One patient had recovered from COVID-19. Eight (16%) had been hospitalised with exacerbations during the study period. 48% ( $n=24$ ) reported that the pandemic had a negative impact on their mental health.

Of the patients interviewed, 32% ( $n=16$ ) reported worsening of their COPD control. Reduction in daily exercise was reported in 46% ( $n=23$ ), and 57% ( $n=13$ ) of these patients reported their COPD control as worse. Increased use of 'reliever' inhalers was reported in 48% ( $n=24$ ), and 22% ( $n=11$ ) of patients disclosed that at least one occasion over the pandemic they felt as though they were exacerbating and didn't seek medical help.

Eighty-two severe asthma patients were interviewed with the UKSAR COVID questionnaire, of which 34.1% (n=28) reported their disease control to be worse. 18.3% (n=15) of patients reported the pandemic having a negative effect on their mental health. Only 1 patient interviewed had a hospital admission for an asthma exacerbation in 2020.

## **Discussion**

We confirm a significant reduction in all-cause and exacerbation related hospitalisations for asthma and COPD patients during the first wave of the COVID-19 pandemic. This is in keeping with national emergency admission data [2] and similar data from other countries [7, 8].

There are several possible explanations for the observed reduction in hospitalisation with airways disease exacerbations. Patient's response to respiratory symptoms may have been altered by the COVID-19 pandemic, making them less likely to seek care. Indeed, a national survey conducted by the British Lung Foundation reported 70% of patients did not feel safe seeking treatment due to fear of COVID-19. [5] This may have impacted all-cause admissions, but we feel it is unlikely that this adequately explains the reduction in exacerbations given that no change was observed in the acuity of the admitted patients. Conversely, we observed a reduction in the proportion of hospitalised asthma and COPD patients requiring HDU level care and there was no change in ICU admission or in-patient mortality. This suggests that those being hospitalised with exacerbations were not more unwell than during previous years.

We demonstrated a significant reduction in inpatient steroid prescriptions for patients presenting with asthma and COPD exacerbations in 2020 when compared to 2019 and 2018 combined (80.1% vs 88.3%,  $p=0.004$ ). There are many possible explanations for this. The studied period predates the preliminary reports of dexamethasone utility in COVID-19 from the RECOVERY trial [9] and concern about potential adverse effects of steroids in COVID-19 were prevalent, potentially influencing prescribing practice. Our data do not allow us to draw firm conclusions about the reason for the observed reduction in steroid prescribing and therefore should be considered hypothesis-generating.

In our study, 32% of COPD patients and 34.1% of Asthma patients reported a subjective decline in their condition. Many reported exercising less and using their reliever inhaler more often. Deconditioning is a common cause of increased symptom burden in COPD and is likely a contributing factor in our cohort. Similar results were observed in a recent study by McAuley et al. with an overall reduction in physical activity in COPD patients leading to general deconditioning [3]. A sedentary lifestyle is associated with worse outcomes including mortality in COPD patients and it is therefore

essential that this trend is reversed as we recover from the COVID-19 pandemic. PR is known to improve quality of life and exercise capacity in COPD and should be a key priority for health systems [10, 11]. Our data do not identify the reason for the apparent discordance between perceived disease control and reduction in exacerbations requiring hospital admission among severe asthma patients. This relationship is worthy of further study.

The impact of the COVID-19 pandemic and its sequelae i.e. social distancing, shielding, and national 'lockdowns' on mental health was evident in our study [12]. This was particularly apparent in our COPD cohort with almost half (48%) patients reporting a negative impact of the pandemic on their mental health. This contrasts with 18.3% of interviewed severe asthma patients. The link between depression, anxiety, and COPD is well reported, with evidence to suggest that more severe COPD increases the likelihood of psychological morbidity [13].

The limitations of our study include it being single-centre and the relatively small sample of patients interviewed. Asthma patient's perspectives were obtained from a cohort participating in the UKSAR study and therefore only severe asthma patients were included, limiting generalisability to a broader asthma population. We were unable to account for confounding factors in the management strategies for airways disease patients', so cannot draw definitive conclusions regarding the observed reduction in steroid prescribing. However, we report robust, in-depth analysis, of admission data during the pandemic compared to date-matched periods in previous years and provide insights into patients' experiences.

## **Conclusion**

We report a significant reduction in all-cause and exacerbation related asthma and COPD admissions during the 1st wave of the COVID-19 pandemic in the UK. Despite a reduction in exacerbation related admissions, patients report a subjective decline in their disease control and describe a negative impact on their mental health which is most profound amongst COPD patients.

## **Declarations**

The authors declare no conflicts of interest.

## References

1. <https://www.england.nhs.uk/statistics/statistical-work-areas/hospital-activity/monthly-hospital-activity/> - Last Accessed 21/09/2020
2. <https://www.gov.uk/government/publications/emergency-department-weekly-bulletins-for-2020> - last accessed 23/09/2020
3. McAuley H, Hadley K, Elneima O, et al. COPD in the time of COVID-19: An analysis of acute exacerbations and reported behavioural changes in patients with COPD. ERJ Open Res 2020; in press (<https://doi.org/10.1183/23120541.00718-2020>)
4. Deslée G, Zysman M, Burgel PR, Perez T, Boyer L, Gonzalez J, Roche N. Chronic obstructive pulmonary disease and the COVID-19 pandemic: reciprocal challenges. Respiratory Medicine and Research. 2020 May 11;78
5. <https://www.blf.org.uk/taskforce/press-release/over-a-third-of-people-with-lung-conditions-felt-pressure-to-avoid-or-delay-seeking-treatment> - Last Accessed 28/09/2020
6. Smith SJ, et al. Impact of COVID-19 on Severe Asthma in the UK. 2020. In press. ERJ Open Research
7. Chan KP, Ma TF, Kwok WC, Leung JK, Chiang KY, Ho JC, Lam DC, Tam TC, Ip MS, Ho PL. Significant reduction in hospital admissions for acute exacerbation of chronic obstructive pulmonary disease in Hong Kong during coronavirus disease 2019 pandemic. Respiratory medicine. 2020 Sep 1;171
8. Berghaus TM, Karschnia P, Haberl S, Schwaiblmair M. Disproportionate decline in admissions for exacerbated COPD during the COVID-19 pandemic. Respiratory medicine. 2020 Aug 14.
9. Horby P, Lim WS, Emberson JR, Mafham M, Bell JL, Linsell L, Staplin N, Brightling C, Ustianowski A, Elmahi E, Prudon B. Dexamethasone in Hospitalized Patients with Covid-19-Preliminary Report. The New England journal of medicine. 2020 Jul.
10. Furlanetto KC, Donária L, Schneider LP, Lopes JR, Ribeiro M, Fernandes KB, Hernandez NA, Pitta F. Sedentary behavior is an independent predictor of mortality in subjects with COPD. Respiratory Care. 2017 May 1;62(5):579-87.
11. Cote CG, Celli BR. Pulmonary rehabilitation and the BODE index in COPD. European Respiratory Journal. 2005 Oct 1;26(4):630-6.
12. Pierce M, Hope H, Ford T, Hatch S, Hotopf M, John A, Kontopantelis E, Webb R, Wessely S, McManus S, Abel KM. Mental health before and during the COVID-19 pandemic: a longitudinal probability sample survey of the UK population. The Lancet Psychiatry. 2020 Jul 21.
13. Yohannes AM, Alexopoulos GS. Depression and anxiety in patients with COPD. European Respiratory Review. 2014 Sep 1;23(133):345-9.

	2018	2019	2020	P-value
<b>Age (SD)*</b>	69.6 (14.8)	68.9 (15.1)	66.8 (15.2)	0.136
<b>% Female</b>	62.2	61.5	60.5	-
<b>Total Admissions</b>	1730	1797	1138	-
<b>COPD diagnosis (%)</b>	1072 (62.0)	1095 (60.9)	666 (58.5)	-
<b>Asthma diagnosis (%)</b>	665 (38.4)	715 (39.8)	477 (41.9)	-
<b>Mean Admission Per Week (SD)</b>	173.0(13.2)	179.7 (12.9)	113.8 (13.0)	<0.001
<b>COPD Admissions Per Week (SD)</b>	107.2 (8.7)	109.5 (6.2)	66.1 (9.0)	<0.001
<b>Asthma Admissions Per Week (SD)</b>	66.5 (8.7)	70.0 (9.6)	47.7 (9.4)	<0.001
<b>Total Exacerbation Admissions (% of total admissions)</b>	360 (20.8)	366 (20.3)	157 (13.7)	<0.001
<b>COPD Exacerbation (%)</b>	292 (81.1)	288 (78.7)	126 (80.8)	-
<b>Asthma Exacerbation (%)</b>	68 (18.9)	78 (21.3)	31 (19.2)	-
<b>Mean Exacerbations Per Week (SD)</b>	36 (6.8)	36.6 (7.9)	15.7 (2.9)	<0.001
<b>COPD Exacerbations Per Week</b>	29.2 (6.3)	29.4 (6.4)	12.6 (3.2)	<0.001
<b>Asthma Exacerbations Per Week</b>	6.8 (3.0)	7.8 (2.2)	3.0 (1.5)	<0.001
<b>Level of Care</b>				
<b>Ward admission (%)</b>	321 (82.7)	331 (83.8)	150 (87.7)	0.326
<b>COPD</b>	254	258	122	-
<b>Asthma</b>	67	73	28	-
<b>HDU admission (%)</b>	56 (14.5)	52 (13.2)	13 (7.6)	0.028
<b>COPD</b>	54	48	13	-
<b>Asthma</b>	2	4	0	-
<b>ICU admission (%)</b>	11 (2.8)	12 (3.0)	8 (4.7)	0.245
<b>COPD</b>	10	10	5	-
<b>Asthma</b>	1	2	3	-
<b>Admission and Treatment</b>				
<b>Steroid Prescription (%)</b>	343 (88.4)	348 (88.1)	137 (80.1)	0.004
<b>Median Length of Stay (range)</b>	3.0 (1-73)	3.0 (1-120)	3.0 (1-32)	0.540
<b>Deaths (%)</b>	22 (5.7)	26 (6.6)	9 (5.3)	0.788

**Table 1.** Detailing the number of admissions and admission related information from March 23 – June 1 in 2018, 2019, and 2020.

\*Standard Deviation