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COVID-19 deaths in a secondary mental health service

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ABSTRACT

We present data on outcomes associated with COVID-19 in a time-limited sample of 1181 patients who were receiving treatment within secondary care services from a mental health and learning disabilities service provider. Unfortunately, 101 (9%) died after contracting COVID-19, though the real death rate is probably lower due to mild, unreported cases. Those who died were more likely to be male, of older age (75.7 vs. 42.7 yrs) and have a diagnosis of dementia (57% vs. 3.4%). We examined Health of the Nation Outcome Scale (HoNOS) scores as possible predictors for COVID-19 outcomes. Although the deceased group had higher HoNOS scores (17.7 vs. 13.2), the differences disappeared when examining only cases of dementia in 65+ age-group, suggesting that diagnosis is key. There has been little information published about people with severe mental health problems within secondary care. Although our sample is small, it does highlight some important inequalities that would benefit from further research.

1. Introduction

The global COVID-19 pandemic has presented an enormous public health challenge. There is a need to get a better understanding of risk of severe outcomes from COVID-19 associated infection, including COVID-19 associated death. This paper focuses on people with significant mental health issues prior to COVID-19.

Some evidence from the US suggests that people with mental health conditions are at increased risk of contracting COVID-19, and subsequently dying from it [1]. Moreover, in a cohort study of adults testing positive for COVID-19 in a large New York medical system [2], adults with a schizophrenia spectrum disorder diagnosis were associated with an increased risk for mortality, but those with mood and anxiety disorders were not. Similarly, in the UK, a population cohort study of 1205 general practices of over 4000 COVID-19 associated deaths, found that those with 'severe mental illness', dementia or learning disability were at greater risk of dying from COVID-19 [3]. Severe Mental Illness' was defined as Bipolar Affective Disorder, Psychosis, Schizophrenia or Schizoaffective Disorder, or severe depression. Furthermore, Livingston et al. [4] report a 15% case fatality rate in older psychiatric UK inpatients and those with dementia.

Less is known about the impact of COVID-19 on people who use secondary care mental health services in the UK. Local health care data, including Health of the Nation Outcome Scale (HoNOS) data, provides an opportunity to explore and describe the distribution of COVID-19 cases among this group [5]. Use of routinely collected information such as diagnosis and HoNOS data may assist in characterizing key risk factors and whether these are similar or different to those already identified in other populations.

The study aim was to describe the distribution of cases of COVID-19 recorded within a UK mental-health trust and, specifically, whether COVID-19 was reported more frequently for certain diagnostic groups. We examined COVID-19-related deaths with a view to understanding key risk factors, and whether these were similar to those seen in the more general population (i.e., age, gender, ethnicity). Finally we examined whether HoNOS was helpful in predicting COVID-19 related deaths.

2. Method

The data for this study was collected by Hertfordshire Partnership University NHS Trust, which provides health and social care for over 400,000 people with mental ill health, physical ill health and learning disabilities across Hertfordshire, Buckinghamshire, Norfolk and North Essex. The majority of services contributing data were in Hertfordshire, which is a semi-rural home county with a population of approximately

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1.2 m people. According to 2015 data, only 24.5% of the county is more deprived than the national average.

We worked with routinely collected clinical data so there were no data collection burdens on NHS patients nor clinicians. Ethical approval was given by the South Central - Oxford C Research Ethics Committee (IRAS 288566), as part of a Health Research Authority (HRA) application. Informed consent was not required for use of specified personal data, as this study was considered to be in the public interest.

We examined all known cases of COVID-19 (suspected and confirmed) reported within the period 1st March to 31st October 2020. The latest time of follow-up was 31st January 2021, in order to capture data on patients who tested positive towards the end of the data collection period. This included data from inpatient units as well as community cases made known to us. The majority of COVID-19 cases were confirmed by swab tests but some of the earlier cases were classed as suspected COVID-19 because they preceded the point at which routine swab testing became available. Nonetheless, all suspected cases were clinically diagnosed based on symptom profiles.

Our Information Department retrieved, using automated processes, the following information for each positive case: (1) age, (2) gender, (3) recorded self-ascribed ethnicity (the number of cases within each individual 'Black, Asian & Minority Ethnic' category was too few to permit meaningful analysis so we collapsed ethnicity data down to, 'BAME' 'white' and 'unstated'), (4) previously recorded HoNOS scores (for 2019, 20 and 21 if available), (5) whether the patient had been an inpatient or community patient (or both) during the period 1st March – 31st October 2020 (people who had experienced one or more inpatient stays, but no spells as a community patient, were categorized as 'inpatients'; People who had not experienced an inpatient stay, but who had received treatment in the community were designated as 'community'; people who had received treatment in the community *and* had one or more inpatient stays were classed as 'both'), (6) primary diagnosis (clinician ascribed, according to ICD-10), (7) date of death (where applicable), (8) COVID-19 status - suspected or confirmed. Data was examined for completeness. In cases where any of the above data was missing, the Electronic Patient Record (EPR) was searched manually to see if that information could be retrieved and added to the database.

HoNOS [6] was developed and published in the 1990s by the Royal College of Psychiatrists. It is a widely used and well-established Clinician Reported Outcome Measure (CROM) in the UK. It comprises 12 items, each rating a dimension of health and social life (1. Overactive aggressive, disruptive or agitated behaviour, 2. Non-accidental self-injury, 3. Problem drinking or drug taking, 4. Cognitive problems, 5. Physical illness or disability problems, 6. Problems with hallucinations and delusions, 7. Problems with depressed mood, 8. Other mental and behavioural problems, 9. Problems with relationships, 10. Problems with activities of daily living, 11. Problems with living conditions, 12. Problems with occupation and activities). Items are rated from 0 (No problem) to 4 (Severe to Very Severe problem), yielding a maximum total score of 48. Missing HoNOS items were few (<0.1%) and were estimated using our predictive model [7], which facilitates interpolation of missing data points using a weighted-means approach. Once complete, the dataset was locked, and anonymized.

The plan of analysis was (i) to present to descriptive data on the cohort, (ii) to compare, using unpaired *t*-tests and Chi-square, those who died with those who survived COVID-19 according to age, gender, ethnicity, location primary diagnosis, HoNOS total and individual HoNOS item scores.

3. Results

There were 1181 cases of COVID-19 reported, with the majority (97%) confirmed by swab testing. Of these, 101 died and 1080 survived, suggesting an apparent fatality rate of approximately 9%. Table 1 provides a breakdown of key sample characteristics. Gender distributions are highly similar for deceased and survived groups, showing a preponderance (6:4) for COVID-19 in males. In line with national statistics, the 'survived' group had a significantly lower mean age (42.7 vs. 75.7 years, $t[1178] = 18.37$, $p < 0.0001$). The distribution of case location was significantly different for the deceased and survived groups (*Chi-square* $[2] = 61.07$, $p < 0.0001$) and the higher proportion of inpatients in the deceased group may reflect some outbreaks of COVID-19 on old-age inpatient wards.

Table 1
Key characteristics of our sample group.

	All Patients	Died from Covid-19	Survived Covid-19
COVID-19 Status			
Confirmed	1145 (97%)	88 (87%)	1057 (98%)
Suspected	36 (3%)	13 (13%)	23 (2%)
Gender			
Male	712 (60%)	60 (60%)	652 (60%)
Female	469 (40%)	41 (40%)	428 (40%)
Age			
Mean		75.7	42.7
SD		14.2	17.7
Location			
Inpatient	54 (5%)	20 (20%)	34 (3%)
Community	972 (82%)	74 (73%)	898 (83%)
Both	155 (13%)	7 (7%)	148 (14%)
Ethnicity			
White	989 (84%)	80 (79.2%)	909 (84.2%)
BAME	151 (13%)	8 (7.9%)	143 (13.2%)
Unknown/unstated	41 (3%)	13 (12.9%)	28 (2.6%)
n	1181	101	1080

It is unclear why the proportion of unstated ethnicities was so high in the deceased group, but these could not be adequately resolved despite EPR searches. We excluded unknown cases from the analysis. The association between ethnicity and outcome in this cohort was not significant (*Chi-square* $[1] = 1.43$, $p > 0.2$). We also looked at primary diagnosis to see whether certain mental health and neurodevelopmental diagnoses were more strongly represented in the different outcome groups. Table 2 provides a breakdown of cases across broad diagnostic groups.

Dementia cases account for 57% COVID-19 deaths but only 3.4% cases in the survived Group. The overall number of dementia cases seemed surprisingly low but on further inspection, this results from the way in which dementia services are configured. People may be in contact with a dementia diagnosis service initially but are then discharged to primary care so would no longer be within secondary care services. Most patients currently open to secondary care mental health services with dementia would be on inpatient dementia wards. These are likely

Table 2
Breakdown of cases by deaths and mental health diagnoses.

Primary diagnosis	All patients	Died from COVID-19	Survived COVID-19
Learning Disability	88 (8%)	12 (14%)	76 (86%)
Bipolar Disorder	97 (8%)	1 (1%)	96 (99%)
Perinatal Disorder	38 (3%)	0 (0%)	38 (100%)
Depression/Anxiety	242 (20%)	7 (3%)	235 (97%)
Schizophrenia/Psychosis	300 (25%)	10 (3%)	290 (97%)
Dementia/Memory Problems	95 (8%)	58 (60%)	37 (40%)
Personality Disorder	123 (10%)	2 (2%)	121 (98%)
Obsessive Compulsive Disorder	13 (1%)	0 (0%)	13 (100%)
Post-Traumatic Stress Disorder/Stress	44 (4%)	0 (0%)	44 (100%)
Substance Use Disorder	18 (2%)	1 (6%)	17 (94%)
Eating Disorder	12 (1%)	0 (0%)	12 (100%)
Unavailable	79 (7%)	8 (10%)	71 (90%)
Other	32 (3%)	2 (6%)	30 (94%)
TOTAL	1181	101 (8.8%)	1080 (91.4%)

to be more severe cases, with associated cognitive decline and frailty.

Of 1181 patients with COVID-19, a recent HoNOS rating (recorded between Jan 2019 and Feb 2020) was available for 668 survivors and 58 deceased patients. Average item scores are displayed in Table 3. Significant item score differences (between deceased and survivors) emerged on total HoNOS score, and the following individual items: 1, 3, 4, 5, 6, and 10.

The group who died from COVID-19 comprised mainly older people, many with a dementia diagnosis (Tables 1 and 2). We focussed firstly on those patients aged 65+ (Table 4) and secondly on those who were 65+ *and* had a dementia diagnosis. When comparing deceased vs. survived in 65+ group, significant differences were still apparent on total HoNOS score, but the number of item scores showing significant differences was reduced to 4 (items 1, 4, 6, 10). However, when focussing on age 65+ *with* a dementia diagnosis (n deceased = 42, n survived = 23), there were no differences in HoNOS at all. So, for people with dementia, HoNOS does not identify increased risk. The numbers here are quite small and, as highlighted earlier, the type of dementia patients in our sample have limited representativeness of dementia more widely.

Finally we looked for patterns in recent HoNOS score changes in the deceased group. For example, were patients whose HoNOS score had increased considerably over the preceding year more at risk of COVID-19 death? We examined 45 patients for whom 2 consecutive HoNOS ratings from approximately one year apart were available. The mean change in total HoNOS score across this group was 2.35 (± 7.06) points. However, as the high standard deviation indicates, there were some patients with large reductions in total HoNOS score too (change in HoNOS score ranged from +21 points to −16 points in this group). Even looking at deceased dementia patients only (n = 33), the picture was still unclear: the mean change in HoNOS score was 3.45 points but ranged from an increase of 21 points to a decrease of 13 points. Change in HoNOS score clearly varies considerably within this patient group, and indeed within the deceased group more generally, so we did not investigate it further.

4. Discussion

COVID-19 is said to be a disease of health inequalities [8] or one that starkly highlights pre-existing inequalities prior to the pandemic. People with severe mental illness have worse life expectancy than the general population [9]. In the UK, secondary care mental-health services are used by some of those with the most severe mental illness and disadvantages. They can experience discrimination, stigma and challenges in accessing physical health care. Understanding how COVID-19 affects this population is critically important to plan appropriate responses to meet health care needs and address inequalities, both now and in the future.

Table 3
Mean HoNOS item scores for those who died from COVID-19 vs. those who contracted but survived it. HoNOS items can be rated from 0 to 4. All p-values were computed using unpaired t-tests and a Bonferroni correction was applied to account for multiple testing.

HoNOS Item	COVID Dec'd (n = 58)	COVID Survived (n = 668)	t [df 724] and p values
1	1.96	0.90	6.66, < 0.0001
2	0.29	0.57	1.98, > 0.01, NS
3	0.12	0.54	3.03, < 0.005
4	2.69	0.62	14.4, < 0.0001
5	2.16	1.41	3.95, < 0.0001
6	1.45	0.95	2.94, < 0.005
7	1.36	1.62	1.61, > 0.1, NS
8	1.98	2.13	0.91, > 0.35, NS
9	1.12	1.30	1.05, > 0.25, NS
10	2.55	1.27	7.80, < 0.0001
11	0.5	0.55	0.38, > 0.7, NS
12	1.52	1.30	1.25, > 0.2, NS
Total (±SD)	17.71 (±7.24)	13.17 (±7.09)	4.67, < 0.0001

Table 4
Mean HoNOS item scores for those aged *65 and over* who died from COVID-19 vs. those aged *65 and over* who contracted but survived COVID-19. HoNOS items can be rated from 0 to 4. All p-values were computed using unpaired t-tests and a Bonferroni correction was applied to account for multiple testing.

HoNOS Item	COVID Dec'd (n = 52)	COVID Survived (n = 109)	t [df 159] and p values
1	2.02	0.96	4.71, < 0.0001
2	0.27	0.20	0.62, > 0.5 NS
3	0.13	0.19	0.59, > 0.5 NS
4	2.87	1.26	7.23, < 0.0001
5	2.15	2.04	0.56, > 0.55 NS
6	1.54	0.87	3.52, < 0.001
7	1.31	1.29	0.07, > 0.95 NS
8	2.04	1.82	1.04, > 0.25 NS
9	1.21	1.03	0.87, > 0.35 NS
10	2.56	1.48	4.96, < 0.0001
11	0.50	0.43	0.42, > 0.65 NS
12	1.54	1.28	1.20, > 0.2 NS
Total (±SD)	18.13 (±7.46)	12.84 (±7.61)	4.14, < 0.0001

The death rate in our sample was just under 9%. We suspect this to be an overestimate, given that milder cases of COVID may have gone undetected, and unreported, during this period. Dementia had by far the worst outcome: the majority of those who acquired COVID-19 experienced a fatal outcome (61%). However, the next most affected group, those with a learning disability, saw the majority of affected individuals survive (86%). By contrast, at the population level Clift and colleagues [3] found that, of the groups we studied, Down's syndrome had the greatest risk of death. The poorer outcomes seen in our dementia sample likely reflect the more severe nature of the condition in those being treated within secondary care services, largely dementia inpatient wards.

The UK vaccination strategy for COVID-19 has been chiefly driven by age. The Department of Health and Social Care's Joint Committee on Vaccination and Immunisation (JCVI) state that 'current evidence strongly indicates that the single greatest risk of mortality from COVID-19 is increasing age and that the risk increases exponentially with age' [10]. Age was a powerful risk factor in our sample too, with the mean age of those dying being over 30 years higher than those who survived.

Severe mental Illness (SMI) is an 'underlying health condition' considered to carry a greater risk of morbidity and mortality by the JCVI [10]. Clift and colleagues [3] report a Hazard Ratio of 1.29 for women and 1.26 for men with severe mental illness. Rates of death of different diagnoses within this group are not widely reported, though Wang and colleagues [1] report a death rate of 8.5% in their US population of people with a recent diagnosis of depression. We found notable differences between diagnostic groups: 3% of those with schizophrenia/psychosis who contracted COVID-19 died, whilst 1% of people with bipolar disorder and 1% of people with depression/anxiety died. Others have also reported an increased risk for schizophrenia [1,4]. Among other diagnoses (not defined as SMI by [3]), a number of groups experienced no COVID-19-associated deaths, including OCD, Eating Disorders, Perinatal Disorders and PTSD/Stress. However the total numbers of cases were relatively small in these groups.

Our previous paper [5] looking at COVID-19 associated death in older people found those who died had a significantly higher HONOS score prior to death compared with a large, age-matched, sample of secondary care mental health patients without COVID-19. The current study examined HONOS scores only in those infected with COVID-19. We examined HONOS scores in the year prior to the pandemic, so that they captured the status of the person prior to infection with COVID-19. For the study population, total HONOS score was significantly higher in the year prior to infection for those who subsequently died. A higher

HONOS score might therefore be considered a risk factor for death in those who subsequently infected with COVID-19, However, the true picture is more complex. Looking closely at item scores, it is notable that those with the greatest difference include 'cognitive problems', 'problems with activities of daily living', 'overactive aggressive, disruptive or agitated behaviour' and problems with 'delusions and hallucinations', all of which would likely be inflated by the presence of dementia. Indeed, when looking only at people aged 65+ with a dementia diagnosis, differences in HONOS scores disappeared. These findings suggest that higher pre-infection HONOS scores may be associated with subsequent death from COVID-19, but that these items are largely explained by age and diagnosis (of dementia). We are therefore cautious about whether HoNOS, on its own, can be used as a reliable predictor of risk. We note also that concerns have been raised about the reliability and validity of HoNOS [11–13]: for example, item agreement can be poor when assessed by raters with different backgrounds and experience; and total HoNOS score is questionable as a measure of illness severity.

This study, although very modest in scale and scope, suggests areas for further work. People with severe mental illness may not have the same underlying risk of death from COVID-19, and there is a need to understand more about whether different diagnostic groups face different risks. Our sample was too small to permit a meaningful analysis of ethnicity, but a larger study pooling data across several organisations would be able to address this, as well as elucidating risk differences between diagnostic groups. Further studies on dementia cases across both primary and secondary care would also help to address some of the limitations of our sample.

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Author contribution

Both authors contributed equally to formulating the research questions, designing the study, carrying it out and writing the article.

Data availability

The data that support this study may be available in anonymised format on request from the corresponding author. The data are not publicly available due to restrictions around confidentiality of information which may compromise the privacy of research participants.

Declaration of interest

None.

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