Identifying inequalities in vaccination amongst covid-19 inpatients at Manchester Royal Infirmary during the 3rd wave of infection in central Manchester

Authors: Samir Y, Nowell G, Lynch M, Bull T, Davenport R
Manchester Royal Infirmary, Manchester Foundation Trust

NHS Manchester University NHS Foundation Trust

Introduction

Background:

As of June 2021, all 18 years olds in England became eligible for Covid-19 vaccination. In recent months, spread of the Delta variant have seen a third wave of infection take hold with an increase in Covid-19 admissions. In June, Manchester Foundation Trust (MFT) experienced the highest number of Covid-19 admissions in the North-west of England. In line with this, we noted that many of our inpatients at the Manchester Royal Infirmary (MRI) remained unvaccinated.

Aim/Methods:

The aim of this analysis was to identify and highlight inequalities in vaccination amongst our inpatients, relate this to severity of disease and compare this to the wider community demographic. We retrospectively analysed data from inpatients with a positive PCR for SARS-CoV-2 who were residing in hospital during the week beginning 21st-27th June. Where available, details regarding patient demographics, illness severity, vaccine status, treatment and outcomes were obtained from electronic/paper records. Cut-off for analysis of outcome data was 7th July 2021.

MFT Covid

During the week beginning 21st June, there were 1426 patients admitted with Covid-19 or diagnosed as an inpatient in England. 411 (28.8%) of these were in the North-west, and of these 83 were at MFT. Thus 20.2% of all Covid-19 inpatients in the North-west during that week were at a single trust. MFT had the highest number of beds occupied by Covid-19 patients out of 58 trusts in the region, 22.3% of all beds occupied by Covid-19 patients in the North-west.[1]

Patient demographics

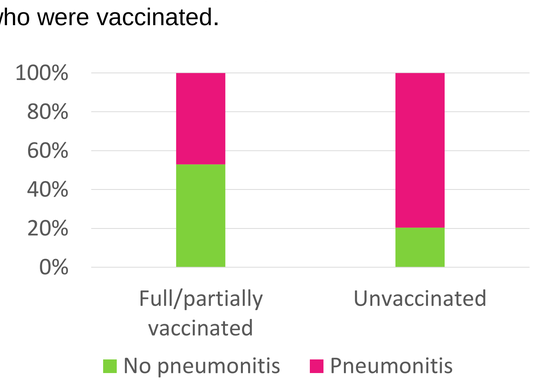
72 inpatients with positive PCR for SARS-CoV-2 were residing at the MRI site during the study week, with a mean age of 54.9yrs (range 19-94yrs). 59.7% were male vs 40.3% female. Where results of sequencing were available, 100% of cases were confirmed as the B.1.617.2 (Delta) variant.

Vaccination status

	Fully Vaccinated	1x vaccine dose	Unvaccinated
%	23.6%	18.1%	58.3%
Mean age	61.8yrs		49.9yrs
Vaccine producer	60% - Oxford–AstraZeneca 26.7% - Pfizer-BioNTech 6.7% - Moderna 6.6% - Unknown		

Covid pneumonitis

- 73.6% of patients had evidence of covid pneumonitis
- 57.9% had received at least 1 vaccine, 47.4% both doses.
- Amongst non-vaccinated/partially vaccinated patients, 79.6% developed covid pneumonitis vs 47.1% of those who were vaccinated.



ICU admission

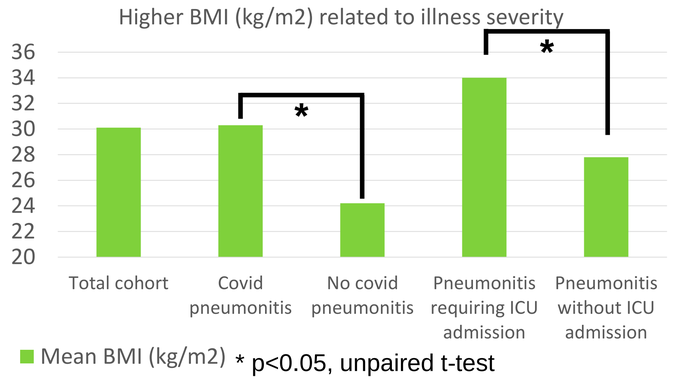
	ICU patient demographics
Mean age	48.9yrs, range 24-73yrs
Gender	60% male, 40% female
Mean BMI	34kg/m2
Vaccine status	Fully vaccinated: 6.6% Partially vaccinated: 20% Unvaccinated: 73.3%

- 28.3% of those with pneumonitis required ICU admission, 1.5:1 males to females, the majority unvaccinated.

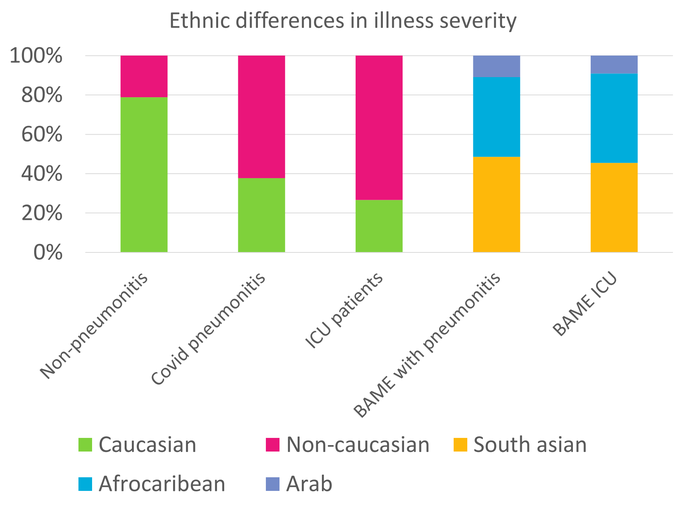
Mortality/length of stay

- Of those who were admitted to hospital from the community with Covid-related illness, mean length of stay was 8.5 days for unvaccinated vs 7 days for vaccinated patients (no statistically significant difference).
- 6 patients (8.3%) died in hospital, all ≥60yrs mean age 79.5yrs vs 54.9yrs for the total cohort. 50% were unvaccinated.

Body mass Index

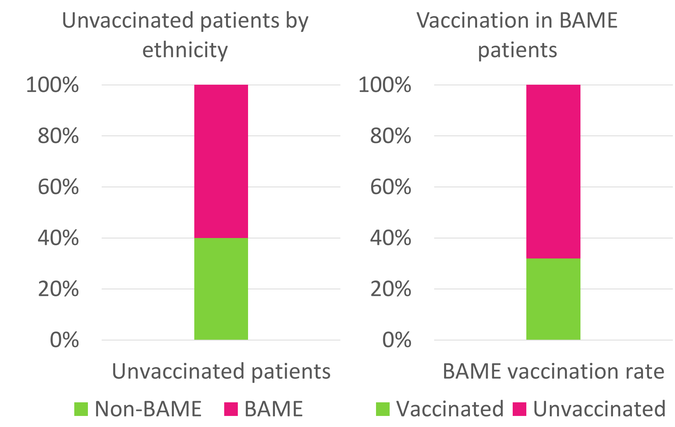


Ethnicity



- Amongst patients with covid pneumonitis - 62.3% were non-caucasian, predominantly South Asian and Afro-Caribbean ethnicities (48.6% and 40.5% respectively).
- 73.3% of ICU admissions were non-caucasian from a BAME background.

Vaccination by ethnicity



- 68% of patients from a non-caucasian background were unvaccinated, representing 60% of unvaccinated patients.

Calculations based on Office for National Statistics (ONS) demonstrated that:

- 73% of white Caucasians covered by Greater Manchester Health/Social Care Partnership ICS had been vaccinated with at least one vaccine. This was comparable to the expected proportion of white Caucasians in Manchester (66.6% white Caucasian according to the latest census).
- By comparison, 8.7% from an Asian background and 2.7% from a black Afro-Caribbean background had received at least one vaccine dose. This is much lower than the expected proportion of BAME patients residing in the local community in Manchester for both ethnicities (at least 17% Asian, 8.6% Afro-caribbean). Compared to the white Caucasian population, vaccination rates appear to be much lower in people from a BAME background in Manchester. [2,3]
- Although vaccine uptake amongst BAME patients has improved compared to the initial rollout phase, patients from a BAME background are still more likely to have reservations about vaccination than white Caucasian patients . Higher levels of mistrust and lower confidence in the vaccine alongside cultural and religious factors play a significant role in perception of vaccination and hesitancy.[4]

Discussion

58.3% of our patients were unvaccinated, with significantly higher rates of pneumonitis. Vaccinated patients were less likely to develop covid pneumonitis. This reflects data published by PHE which suggests that the vaccine is protective against more severe disease/hospitalisation and this extends to the Delta variant.[5] In correlation with vaccination status, the mean age of those who did not develop pneumonitis was higher: this may reflect higher rates of vaccination in older age groups and support a protective effect against severe disease.

73.3% of those requiring ITU admission were unvaccinated vs 58.3% total unvaccinated. Again, this appears to support the fact that vaccination is protective against more severe disease.

Age: Lower mean age of unvaccinated patients likely reflects graded rollout of the vaccination programme and prioritisation of the elderly population - this demographic will likely change as more younger people take up vaccination. 53.8% of over 40s were unvaccinated in a cohort where 72% of patients were ≥40yrs and eligible for vaccination for at least 7 weeks prior to admission. Thus, our low vaccination uptake amongst inpatients cannot be explained by eligibility alone. Other factors may have contributed to this including lower perceived risk from covid-19 in younger age groups.

Gender: More males were hospitalised and required ICU admission vs females. According to the global covid-19 sex disaggregated Data Tracker, males demonstrate a higher number of confirmed cases, hospitalisations, ICU admissions and greater mortality globally (57% mortality with covid-19 vs 43% in women).[6] In England, 3.91% of males vs 2.85% of females with covid have lost their lives to covid-19 with a ratio of 1:1.4 deaths in females:males. Moreover, male vaccination coverage in England has been inferior to that of their female counterparts; this is also in line with global trends.[6] Lower antibody responses in men coupled with lower rates of vaccine uptake may continue to propagate covid-19 gender inequalities.[7]

BMI: Patients with covid pneumonitis had a greater BMI than those without pneumonitis whilst ICU patients had a higher mean BMI overall, consistent with previous findings which established high BMI as risk factor for severe covid disease.

Ethnicity: Patients from the BAME community have been disproportionately affected by Covid-19 since the early days of the pandemic. Our analysis demonstrated that 62.3% of those with Covid pneumonitis and 73.3% of ICU admissions were from a BAME background. 68% of patients from a BAME background were unvaccinated, representing 60% of unvaccinated patients. This small snapshot of data suggests that vaccine hesitancy remains prevalent amongst patients from a BAME background in central Manchester. Lower vaccine uptake appears to be contributing to persisting ethnic inequalities associated with Covid-19 in our local area.

Local deprivation: Manchester CCG oversees the largest population in the North-west (552,858 people, 429,944 18+). As of June 21st, only 43.5% of the total population >18 covered was fully vaccinated. 71.7% had been vaccinated with one dose. We recognise that our study population reflects inpatients with more severe disease requiring hospitalisation and therefore more likely to be unvaccinated, however our analysis of data from ONS demonstrated that that 76.9% of over 40s covered by Manchester CCG who have been eligible for the vaccine since at least April have received 2 doses. This figure is lower than regional (82.2%) and national average (83.1%) which supports higher rates of vaccine hesitancy in the local area. [8–10] Manchester LA ranks as the 5th most deprived LA in England in the health deprivation and disability domain with 52.1% of LSOAs being in the top 10% of national deprivation, and the most health-deprived area in Greater Manchester. This deprivation appears to extend to Covid-19 vaccine uptake which remains suboptimal in our local area.

Conclusion

Healthcare inequalities continue to influence Covid-19 outcomes in our local area. Vaccine hesitancy remains an issue in our community, contributing to higher rates of severe covid-19 illness. BAME patients in particular are still being disproportionately affected by Covid-19 in central Manchester with admission rates higher than expected to reflect the local population and higher rates of ICU admission. Lower vaccine uptake and ongoing vaccine hesitancy appears to be contributing to persisting ethnic disparities. Measures to improve local vaccine uptake should include a specific focus on targeting this group of patients, which represent at least 33.4% of the local population.

REFERENCES: 1) NHS England. COVID-19 daily situation report COVID-19 admissions estimates and beds occupied by patients with COVID-19 in England. [Online] 2021. Available from: https://www.england.nhs.uk/statistics/statistical-work-areas/covid-19-hospital-activity/ 2) NHS England. Covid-19 vaccinations. [Online] 2021. Available from: https://www.england.nhs.uk/statistics/statistical-work-areas/covid-19-vaccinations/ 3) Manchester City Council. Manchester's population, ethnicity and migration. [Online] Available from: https://secure.manchester.gov.uk/info/200088/statistics_and_intelligence/438/population 4) Iyengar KP, Vaishya R, Jain VK, Ish P. BAME community hesitancy in the UK for COVID-19 vaccine: Suggested solutions. [Online] Postgraduate Medical Journal. 2021. Available from: doi:10.1136/postgradmedj-2021-139957 5) Gov UK. Vaccines highly effective against hospitalisation from Delta variant. [Online] Available from: https://www.gov.uk/government/news/vaccines-highly-effective-against-hospitalisation-from-delta-variant 6) Global Health 50/50. The covid-19 sex-disaggregated data tracker - june update report. [Online] 2021. Available from: https://globalhealth5050.org/wp-content/uploads/June-2021-Data-Tracker-Update.pdf 7) Madhumita Shrotri A, Fragaszy E, Geismar C, Nguyen V, Beale S, Braithwaite I, et al. Spike-antibody responses following first and second doses of ChAdOx1 and BNT162b2 vaccines by age, gender, and clinical factors - a prospective community cohort study (Virus Watch). medRxiv. 2021; 8) Stefan Noble, David McLennan, Michael Noble, Emma Plunkett, Nils Gutacker M, Wright S and G. The english indices of deprivation 2019. [Online] 2019. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/833947/IoD2019_Research_Report.pdf 9) Manchester City Council. Deprivation: data and intelligence. Available from: https://www.manchester.gov.uk/info/200088/statistics_and_census/2168/statistics_on_deprivation 10. NHS Test and Trace. Weekly statistics for NHS Test and Trace (England): 17 June to 23 June 2021. [Online] Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/998427/Test_and_Trace_Week56.pdf