



Chinese and British Hospitalised Patients with COVID-19—a Comparative Case Series Analysis

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Abstract

The COVID-19 pandemic initially started in China then spread to Europe. It is not known whether COVID-19 affects patients differently across the two continents. We aimed to describe our cohort of patients admitted to a single British centre with COVID-19 in comparison to a Chinese cohort of similar size and admitted over a similar time period to Chinese centres. We present a comparison of 62 Chinese and 71 British cases hospitalised for COVID-19. Cases in both sites were confirmed by a positive RT-PCR of nasopharyngeal swabs. Comparison analysis highlighted some differences between both populations. The most striking difference is the significantly older age of the British population (72% of the British ≥ 66 years compared to only 3% of the Chinese patients, difference of 69%, 95% confidence interval (CI) 68.3% to 69.7%, respectively) and the associated significant premorbid conditions (85% of patients vs 32%, difference of 53%, 95% CI 52 to 54%, respectively). Gastrointestinal and general symptoms were more common clinical presentation in the British while respiratory symptoms were more prominent in the Chinese cohort. Mortality was significantly higher in the British cohort 14% compared to none in the Chinese cohort (difference of 14%, 95% CI 13.7 to 14.3%). We conclude that COVID-19 does present differently in these two cohorts, but the apparent differences in the clinical presentations could be explained by the inherent differences in the demographics and case mix between both countries.

Keywords COVID-19 · Clinical symptoms · Chinese · British · Cohort

Introduction

In December 2019, a respiratory disease caused by the severe acute respiratory syndrome coronavirus-2 COVID-19 was initially reported in China. The disease later spread to Europe to cause a global pandemic. Affected patients usually present with respiratory, gastrointestinal or general and non-specific

symptoms. Mortality is high especially in those with premorbid chronic conditions. Because the pandemic started first in China, most of the literature on COVID-19 describes Chinese populations. In this analysis, we aimed to describe a comparative analysis between a Chinese and a British cohort to explore the differences of COVID-19 patients across Asia and Europe.

Key points

- Baseline characteristics between the Chinese and British cohorts were different.
- Clinical presentation of COVID-19 is slightly different across the Chinese and British cohorts.
- Apparent differences in clinical presentation are likely due to inherent differences in the demographics and case mix between the two countries.

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Case Series

In this case series, we aimed to describe a comparative analysis between a Chinese and a British cohort to explore the differences of COVID-19 patients between the two countries. Data were collected on patients admitted with COVID-19 to a single district general hospital in the UK. For comparison, we used a published Chinese case series of similar population size, similar methodology and similar data collection period [1]. Cases on both sites were confirmed by a positive RT-PCR of nasopharyngeal swabs. British cohort included 71 patients

(70 White British) and the Chinese 62 patients (all Chinese). The most striking difference was the significantly older age of the British population (72% of the British were ≥ 66 years old compared to only 3% of the Chinese patients, difference of 69%, 95% confidence interval (CI) 68.3% to 69.7%, respectively). The pre-existing morbidities were also significantly higher in the British compared to the Chinese cohort (85% of patients vs 32%, difference of 53%, 95% CI 52% to 54%, respectively). However, the only comorbidity which was higher in the Chinese cohort was the chronic liver disease (11% vs 7% difference of 4%, 95% CI 3.5 to 4.5%). Gastrointestinal and general symptoms were more common clinical presentations in the British while respiratory

symptoms were more prominent in the Chinese cohort (Table 1). Mortality was significantly higher in the British cohort of 14% compared to none in the Chinese cohort (difference of 14%, 95% CI 13.7 to 14.3%).

Discussion

The significant older age in the British cohort is likely due to the fact that the prevalence of older people (≥ 65 years) is higher in the UK than in China (18% vs 11%) [2]. Similarly, the larger number of comorbidities in the British cohort is likely related to the higher prevalence of older age groups.

Table 1 Comparison between the Chinese and the British cohorts

Parameter	Chinese	British	Difference (95% CI)
Setting	7 hospitals, Zhejiang province, China	1 district general hospital, UK	
Collection period	10–26 January 2020	23 March to 4 April, 2020	
Patient number	62	71	
Demographics (%)			
Age range, Y			
≤ 18	8%	0%	8% (7.8 to 8.2)
19–65	89%	28%	61% (60.1 to 61.9)
≥ 66	3%	72%	69% (68.3 to 69.7)
Gender, males	56%	58%	2% (0.5 to 3.5)
Any comorbidity	32%	85%	53% (52 to 54)
Hypertension	8%	45%	37% (36 to 38)
DM	2%	23%	21% (20.4 to 21.6)
COPD	2%	33%	31% (30.3 to 31.7)
CVD	2%	34%	32% (31.6 to 32.6)
CKD	2%	12.6%	10.6% (10.2 to 11)
CLD	11%	7%	4% (3.5 to 4.5)
Presentation (%)			
Fever	77%	59%	18% (16.4 to 19.6)
Cough	81%	55%	26% (24.5 to 27.5)
Expectoration	56%	12.6%	43.4% (42.3 to 44.5)
Haemoptysis	3%	1.4%	1.6% (0.2 to 3)
Fatigue/myalgia	52%	55%	3% (1.5 to 4.5)
Headache	34%	5.6%	28.4% (27.9 to 28.8)
Diarrhoea	8%	9.8%	1.8% (1.3 to 2.3)
Bilateral CXR opacifications	84%	37%	47% (45.9 to 48.1)
Outcomes			
Discharged home	2%	25%	23% (22.4 to 23.6)
ICU admission	2%	13%	11% (10.6 to 13.4)
Died	0	14%	14% (13.7 to 14.3)
Still in hospital	96%	48%	48 (47.2 to 48.8)

CI confidence interval, Y years, DM diabetes mellitus, COPD chronic obstructive pulmonary disease, CVD cardiovascular disease, CKD chronic kidney disease, CLD chronic liver disease, CXR chest X-ray, ICU intensive care unit

The only comorbidity that was significantly more common in the Chinese cohort was the chronic liver disease which reflects the higher prevalence of liver cirrhosis in Asia than in Europe [3]. Respiratory symptoms were more prominent in the Chinese cohort probably due to the fact that the Chinese media and national advocacy have instructed patients with fever, cough, expectoration and other upper respiratory tract symptoms to go to the hospital at an early stage, while in UK, social distancing and self-isolation at home was more encouraged [1]. The British cohort presented with slightly more gastrointestinal symptoms such as diarrhoea and general symptoms such as myalgia and fatigue which may represent atypical clinical presentation of COVID-19 infection in the elderly [4]. The mortality rate was significantly higher in the British cohort reflecting their older age and the associated higher comorbid conditions.

Older age was identified as a risk factor for mortality from COVID-19 pneumonia in a previous study (odds ratio (OR) 1.10, 95% CI 1.03 to 1.17, $p = 0.004$) [5]. Ageing appears to play a significant role in mortality rate differences between countries affected. For example, the overall case fatality rate in Italy (7.2%) is substantially higher than that in China (2.3%) but when data are stratified by age groups, the case fatality rate in Italy and China appear very similar up to the age of 69 years. Individuals aged ≥ 70 years represent 37.6% of cases in Italy and only 11.9% in China which may explain that the higher overall case fatality rate is due to the high prevalence of older age groups in Italy compared to China [6]. Also, in an initial British report of 20,133 patients with severe COVID-19 who were hospitalised, median age was 73 years (IQR 58, 82). Increased age was a strong predictor of in-hospital mortality after adjusting for comorbidity, reference age < 50 years, 50–69 years (hazard ratio (HR) 4.02, 95% CI 2.88 to 5.63, $p < 0.001$), 70–79 years HR 9.59 (6.89 to 13.34, $p < 0.001$), ≥ 80 years HR 13.59 (CI 9.79 to 18.85, $p < 0.001$) [7].

In a Chinese nationwide analysis of 1590 hospitalised patients with COVID-19, a minimum one comorbidity was present in only 25.1% of patients. Two or more comorbidities were reported in 8.2% of patients, and the number of comorbidities proportionally increased the risk of adverse outcomes [8]. In Europe, the prevalence of comorbidities was much higher. For example, early on of the outbreak in Italy in February 2020, when most cases were in the Northern region, case fatality rates were similar between Italy and China of 2.3%. Travel-related cases were the main source of COVID-19 cases during that period of the epidemic in Italy. In both countries, fatalities appear to affect mostly individuals with known comorbidities. However, case fatalities in Italy were more common in older people. For example, 57% of people who died were ≥ 80 years old in Italy compared to only 20% in China [9]. Later on, a report for Italy, published in April 2020, showed that mortality rate has risen to 12%, most cases that died were > 70 years old, a male to female ratio of 3:1

with at least 1 comorbidity and cardiovascular disease was the highest risk condition. These data were different from the epidemiologic results observed in other Asian countries at that time where mortality rate ranged between 1 and 8% and a male/female ratio of 2:1. This variation can be explained by the difference in the local demography due to the higher prevalence of cardiovascular disease both in Italy compared to China and in men compared to women [10].

A chart review of 355 patients who died with COVID-19 in Italy, the mean (SD) number of comorbidities was 2.7 (1.6). Overall, 99.2% of patients had comorbidities, 25.1% had one comorbidity, 25.6% had 2 comorbidities and 48.5% had ≥ 3 comorbidities suggesting that mortality is proportional to the number of comorbidities [6]. Similarly, in the British report of 20,133 patients hospitalised with severe COVID-19, 77% of patients had a documented comorbidity which was associated with increased hospital mortality [7]. This suggests that older age and comorbidities were more common in European cohorts affected by COVID-19 than in China, and they have a significant impact on mortality difference between the two continents. Table 2 summarises age and comorbidities of COVID-19 patients reported from China, UK and Italy.

The main difference in this comparison was the significantly older age of the British population and its associated significant pre-morbid conditions. This may reflect the fact that the prevalence of older people (≥ 65 years) is higher in the UK than in China (18% vs 11%) [2]. The larger number of comorbidities such as hypertension, diabetes mellitus, chronic obstructive pulmonary disease, cardiovascular disease and chronic kidney disease was much more common in the British cohort likely related to the higher prevalence of older age group. The only comorbidity that was significantly more common in the Chinese cohort was the chronic liver disease which also reflects the higher prevalence of liver cirrhosis in Asia than in Europe [3]. Respiratory symptoms dominated in the Chinese cohort which may be due to the fact that Chinese media and national advocacy have instructed patients with fever, cough, expectoration and other upper respiratory tract symptoms to go to the hospital at an early stage while in the UK, social distancing and self-isolation at home was encouraged [1]. The British cohort presented with slightly more gastrointestinal symptoms like diarrhoea and general symptoms like myalgia and fatigue which may represent atypical clinical presentation of COVID-19 infection in older age groups [4]. The mortality was significantly higher in the British cohort which is likely related to old age and morbidities. Older age was identified as a risk factor for mortality from COVID-19 pneumonia in a previous study (odds ratio (OR) 1.10, 95% confidence interval (CI) 1.03 to 1.17, $p = 0.004$) [5]. We conclude that COVID-19 clinical presentation of hospitalised patients across China and UK appears to be similar. The apparent differences in presentations are likely due to the inherent differences of the demographic features and case mix between the two countries.

Table 2 Data on COVID-19 patients' characteristics from China, Italy and the UK

Country	Population	Main findings
China [8]	1590 patients	A. Mean (SD) age was 48.9 years (16.3) B. 25.1% have ≥ 1 comorbidity C. Prevalent comorbidities were hypertension (16.9%) and diabetes (8.2%) D. Mortality risk increased by comorbidity (HR 1.79, 95% CI 1.16 to 2.77) for ≥ 1 comorbidity and 2.59 (1.61 to 4.17) for ≥ 2 comorbidities
Italy [6]	1625 died patients	A. Overall case fatality rate 7.2%, 52.3% were ≥ 80 years old B. Analysis of subsample of 355 patients 1. Mean (SD) age 79.5 years (8.1) 2. Mean (SD) number of comorbidities 2.7 (1.6) 3. 99.2% of patients had ≥ 1 comorbidity. 4. Comorbidities were diabetes mellitus (35.5%), ischaemic heart disease (30%), atrial fibrillation (24.5%), active cancer (20.3%), stroke (9.6%) and dementia (6.8%). 4. Presence of comorbidities increased risk of mortality.
UK [7]	20,133 patients	A. Median age 73 years (IQR 58, 82) B. 77% had documented comorbidity. C. Common comorbidities were cardiac disease (31%), uncomplicated diabetes (21%), non-asthmatic chronic respiratory disease (18%) and CKD (16%). D. Mortality rate 26% E. Increased age and morbidity predicted mortality

DS standard deviation, HR hazard ratio, CI confidence interval, IQR interquartile range, CKD chronic kidney disease

Conclusion

We conclude that COVID-19 clinical presentation of hospitalised patients across China and UK appears to be slightly different; however, these apparent differences could be due to the inherent differences of demographic features and case mix between the two countries. Literature review suggests that this demographic pattern may also extend to represent the difference between other European countries and China.

Future Perspectives

The aged population is currently concentrated in the wealthier developed countries, which are able to absorb the financial impact of the pandemic and limit its spread to other countries. With the global demographic shift towards old age, the sector of older people will exponentially expand, especially in low- and middle-income countries where health care resources to face a future pandemic are limited and thus increases the risk of uncontrollable global spread. Therefore, WHO and governments around the world must consider this potential threat in health care planning. Also, uncertainty about COVID-19 trajectories remains substantial. Comparative measures are still required, in addition to the traditional deaths per-capita method, to calculate COVID-19 deaths and to compare progression of the disease across different countries. Current projections seem to underestimate the eventual impact of COVID-19 on the annual life expectancy at birth. Indirect standardization as

an alternative to death per capita has estimated that in the USA, the COVID-19 impact would reach twice that of HIV infections or opioid overdoses, reducing the 2020 life expectancy to its lowest level since 2008 [11].

Compliance with Ethical Standards

Conflict of Interest None.

Ethical Approval Approved by The Rotherham Hospital Foundation Trust research and development department.

Informed Consent N/A

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