

**High COVID-19 mortality in the UK: Lessons to be learnt from Hubei Province – Are under-detected “silent hypoxia” and subsequently low admission rate to blame?**

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The United Kingdom not only has the highest Covid-related deaths, but also had the highest level of excess all-cause deaths during the peak months of the Covid pandemic in Europe.<sup>1</sup>

Paradoxically, it had an unexpectedly low level of admissions: not only purpose-built Nightingale hospitals [with a potential to extend to several thousand beds] treated just over 154 patients, but about 42% of oxygen supported Covid beds were also empty during the peak period.<sup>2</sup>

In order to cope with the pandemic approaching the UK, the theoretical numbers of extra beds needed to build up or convert to must have been calculated taking into account epidemiologic data from China’s Hubei Province - China’s epicentre. There, urgently-built 13,000-bedded FangCang Hospitals [China’s Nightingales but with most beds having lower specifications for intensive care than those in the UK] were almost fully used with 12,000 admissions. The majority of Covid-caused deaths was from early outbreak in Wuhan when it was unprepared

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and hospitals overwhelmed. Then, 16 FangCangs were built and 15 used to manage about a quarter of all Covid patients in the provincial capital city. These enabled admissions of most mildly or moderately infected patients. There, vital signs were regularly checked and, based on the Chinese National Guideline for Covid,<sup>3</sup> nasal O<sub>2</sub> was supplied to those whose SpO<sub>2</sub> became ≤93% [but not severe enough for ICU admission]. FangCangs' peak bed usage was over 95%. With centralised isolation and timely treatment to prevent transmission and deterioration of the infection, and with occasional transfers of patients with worsening symptoms to ICU, this drastically decreased the mortality over the entire epidemic in Hubei [Table 1].

*Table 1. Population mortality in the UK and China's Hubei as of 31 July 2020*

Regions	Confirmed cases	Death cases with Covid <sup>+</sup>	Case fatality rate	Approximate population	Population mortality rate	UK / Hubei mortality ratio
UK	303,181	46,119	15.2%	66,650,000	692 / 1M	8.98 *
Hubei	68,135	4,512	6.6%	58,500,000	77 / 1M	

*\* for illustrative purpose as Covid-related deaths may have been registered differently between the UK and Hubei. They have both counted any deaths with positive Covid swab test results. But in Hubei's early epidemic weeks, some patients may have died before reaching hospital thus being uncounted while others were included with "typical" symptoms and x-ray findings but without swab tests. In the UK, separate figures published by the statistics agencies show there have now been 56,400 deaths registered by July 2020 where Covid-19 was mentioned on the death certificate, but with only 46,119 confirmed cases included in this table.*

After a 76-day lockdown was lifted on 8 April and between May 14 and June 1, Wuhan tested 9,899,828 residents to screen "hidden" SARS-COV-2 infections. That was virtually the entire population of the city tested when including those already tested since the outbreak in January and excluding those who had left the city during the Spring Festival from about 10 January and not returned since the lockdown on 23 January. As a result, no new cases were found, with only

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300 asymptomatic infections but with no live coronavirus found in their swab culture.<sup>4</sup> Thus, the 68,135 confirmed cases in Table 1 is a highly reliable reflection of the epidemic in Hubei after the initial chaotic statistics in January.

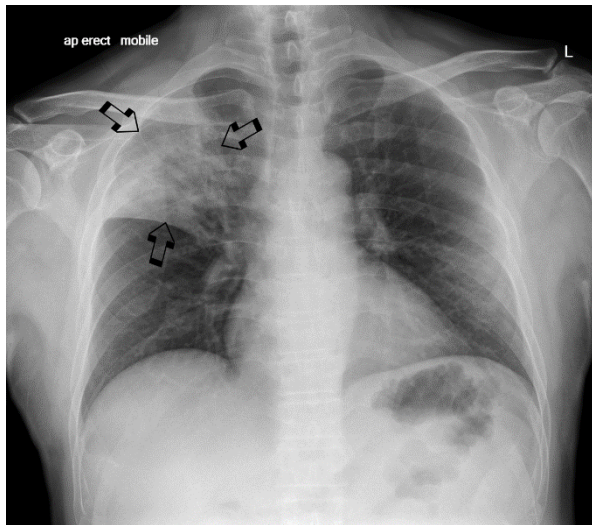
In contrary, the UK had more time to prepare, with a medical system seemingly coped well with the already peaked pandemic. However, by 31 July 2020, it has suffered a population mortality rate that is considerably higher than Hubei has. We should treat the ratio in Table 1 with caution. Nonetheless, the numbers are comparable because the UK and Hubei have similar population and similarly wide spread of SARS-CoV-2. The worst affected areas, London [with 9.3M people] and Wuhan [with 11M] also have similar population. Therefore, such a high ratio cannot be attributed simply to differences between the two regions in statistic methods, population aging, residential housing, cultures, etc.

In order to minimise excess deaths during imminent new UK waves, causes behind the paradox between the high mortality and low admission are worth investigating.

We wonder if under-detected “silent hypoxia”<sup>5,6</sup> is to partially blame. Covid pneumonia starts from peripheral parts of lungs with the airway unblocked.<sup>7,8</sup> This often leads to a false impression: a patient at rest may present a  $SpO_2 > 90\%$  or even normal with a normal respiratory rate, while s/he may already have developed substantial lung infections [Figure 1]. China’s lessons are that patients with  $SpO_2 \leq 93\%$ , if not admitted and with no access to  $O_2$  – a reality in most UK households and care homes, are likely to deteriorate, particularly during the second

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and third weeks. On admission later, their pneumonia and other organ damage become more difficult or even impossible to treat.



*Figure 1. Chest X-ray of a UK Covid patient with bilateral lung infections including a large right lobular atelectasis (arrow). He went to clinic because  $SpO_2 \leq 93\%$  was intermittently detected by a finger oximeter at home. But on physical examination, his  $SaO_2$  at rest was 96~97% (normal) with normal respiratory rate at 17/min and no breathlessness. His lymphocytes and white blood cells were severely decreased (29% and 40% of his own norms, respectively), prompting the x-ray and confirming this “silent hypoxia” case.*

Hence,  $SpO_2$  monitoring should be widely used at home or care homes. There, finger oximeters can be shared among residents with disinfection wiping between each use. Patients found  $SpO_2 \leq 93\%$  (even intermittently) should be given  $O_2$  via nasal cannula as soon as possible, regardless with or without breathlessness.<sup>7</sup> These managements, inexpensive and easy to learn by residents or carers, may save thousands of lives in the future. These patients, if with no other findings to justify intensive care, should be transferred to Nightingales whenever possible.

We share the above lessons and experiences learnt from Hubei and would like to provoke discussion to address the paradox seen in the UK and other regions. For example, by the end of July, New York had most Covid deaths in the US with 32,683 fatalities, yet a “Nightingale” hospital costing \$52 million treated only 79 virus patients.<sup>9</sup> Without effective and safe drugs and/or vaccines facing imminent Covid resurgences, the Hubei approaches may be worth considering.

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