

# COVID-19: A Hubei Data Story - How would the UK prepare for the peak demand on hospital resources

An on-going comparative study using data from Hubei Province in China to estimate the likely demand on hospital beds and facilities in the UK

**Updated date: 30 March 2020**

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Hubei province in China has a population of 59 million, comparable to that of the UK (68 million). The first 41 confirmed COVID-19 cases, including 1 death, were reported from its capital city Wuhan on 10<sup>th</sup> January 2020. The total confirmed COVID-19 cases in Hubei reached a plateau on 17<sup>th</sup> March, with the current figure standing at 67,801.

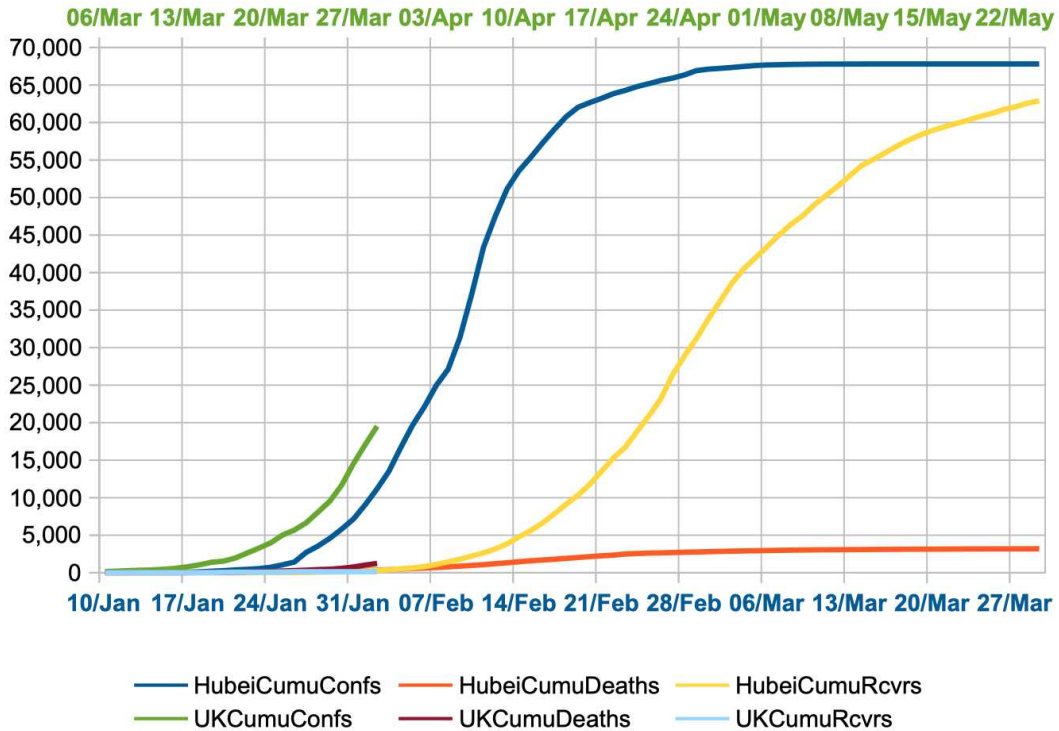
The UK reported its first confirmed COVID-19 cases on 31 January 2020, with the first UK death relating to COVID-19 reported on 6 March, 56 days later than that of Hubei in China.

If we compare the UK numbers with Hubei 56 days earlier, we have some key numbers corresponding to points on the curves in Figure 1:

	<b>UK to date 29 March</b>	<b>Hubei 56 days earlier 2 February</b>	<b>Hubei to date 29 March</b>
<b>Cumulative confirmed</b>	<b>19,522</b>	<b>11,177</b>	<b>67,801</b>
<i>Daily confirmed</i>	<i>2,433</i>	<i>2,103</i>	<i>0</i>
<b>Cumulative deaths</b>	<b>1,228</b>	<b>350</b>	<b>3,186</b>
<i>Daily deaths</i>	<i>209</i>	<i>56</i>	<i>4</i>
<b>Cumulative recoveries</b>	<b>135</b>	<b>295</b>	<b>62,882</b>
<i>Daily recoveries</i>	<i>0</i>	<i>80</i>	<i>317</i>

## Figure 1 - UK compares with Hubei Province in China 56 days earlier

Curves show cumulative confirmed cases, cumulative deaths and cumulative recoveries. All curves end on 29 March 2020, where UK curves are pushed to the left by 56 days.



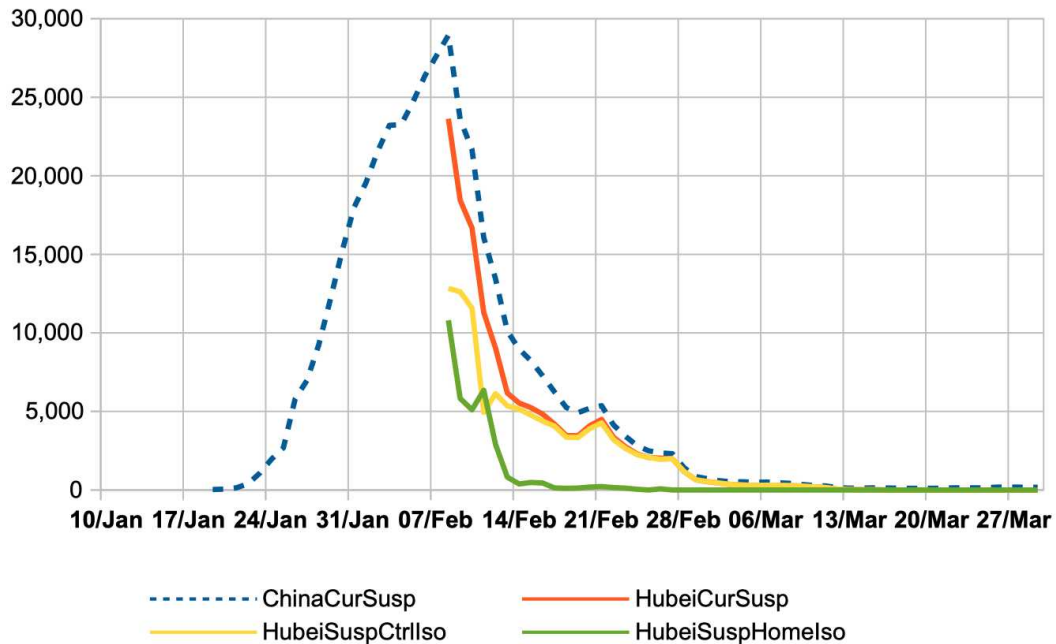
The curves in Figure 1 give a general indication that the UK's eventual total number of confirmed COVID-19 cases could be between 1x and 2x the current Hubei number.

Data published by Hubei provincial Health Commission give some insight to how hospital beds and external facilities have been used. It is generally the case that any patient diagnosed as a confirmed COVID-19 case must be admitted in designated hospitals, or for mild symptom patients in temporary isolation facilities for such (confirmed mild symptom) patients. However, suspected patients were not usually admitted in such hospitals and facilities, instead they were admitted in isolation stations for suspected patients as long as capacity allowed, the remaining were doing self-isolation at home.

Figure 2 shows the remaining suspected case numbers in Hubei on any given day. Hubei's suspected data were not available until they reached the peak on the 8<sup>th</sup> of February, we therefore added China's published suspected data (not including Hong Kong, Macau or Taiwan) in the blue dotted curve.

## Figure 2 - Hubei Suspected Cases

From bottom to top: Hubei home isolation, Hubei controlled isolation, Hubei total, and China total remaining suspected cases on day



In Figure 2 we can see that at the peak of suspected cases on the 8<sup>th</sup> of February, there were 23,638 suspected patients, of which 12,831 were in controlled isolation facilities, the remaining 10,807 were self-isolating at home.

For the 8 days between 8<sup>th</sup> - 15<sup>th</sup> February, a total of 17,410 highly suspected patients were clinically diagnosed as COVID-19 confirmed, enabling them to be admitted. As the result, it dramatically reduced the daily outstanding suspected cases, and with the speeding up of laboratory testing, there have been no more home isolation patients since 27<sup>th</sup> February. The daily number of suspected patient staying in isolation stations reduced from its peak of 12,831 on 8<sup>th</sup> February to 0 on 17<sup>th</sup> of March.

Key figures in Hubei:

	<i>Start date</i>	<i>Peak date</i>	<i>Peak number</i>
<i>Suspected patients in home isolation:</i>	- 27 <sup>th</sup> Feb	8 <sup>th</sup> Feb	10,807
<i>Suspected patients staying in controlled isolation facilities:</i>	- 17 <sup>th</sup> Mar	8 <sup>th</sup> Feb	12,831

### Figure 3 - Hubei Active Confirmed Cases

From bottom to top: In controlled isolation facilities for mild confirmed patients,  
In designated hospitals, Total beds in use on day

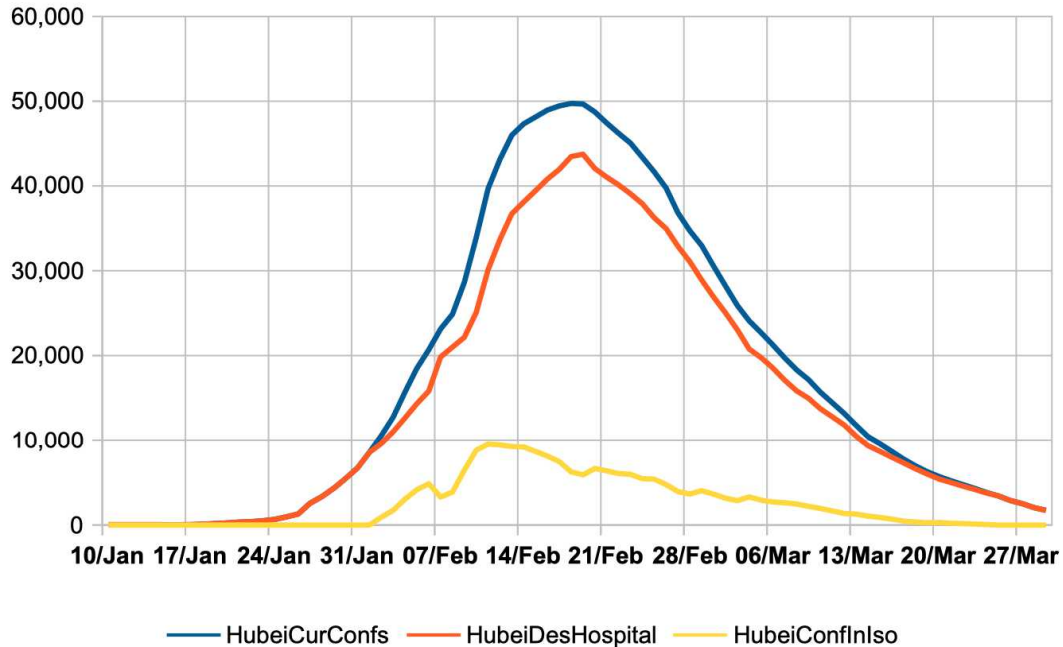


Figure 3 reveals that the temporary isolation facilities for mild confirmed cases started receiving patients on 2<sup>nd</sup> February, reaching its peak of holding 9,562 patients on 11<sup>th</sup> February. The number of patients gradually came down until it becomes zero on 25<sup>th</sup> of March.

The daily remaining active confirmed cases reached its peak of 49,738 on 18<sup>th</sup> February, while the number of confirmed patients in designated hospitals reached its peak of 43,745 on 19<sup>th</sup> February.

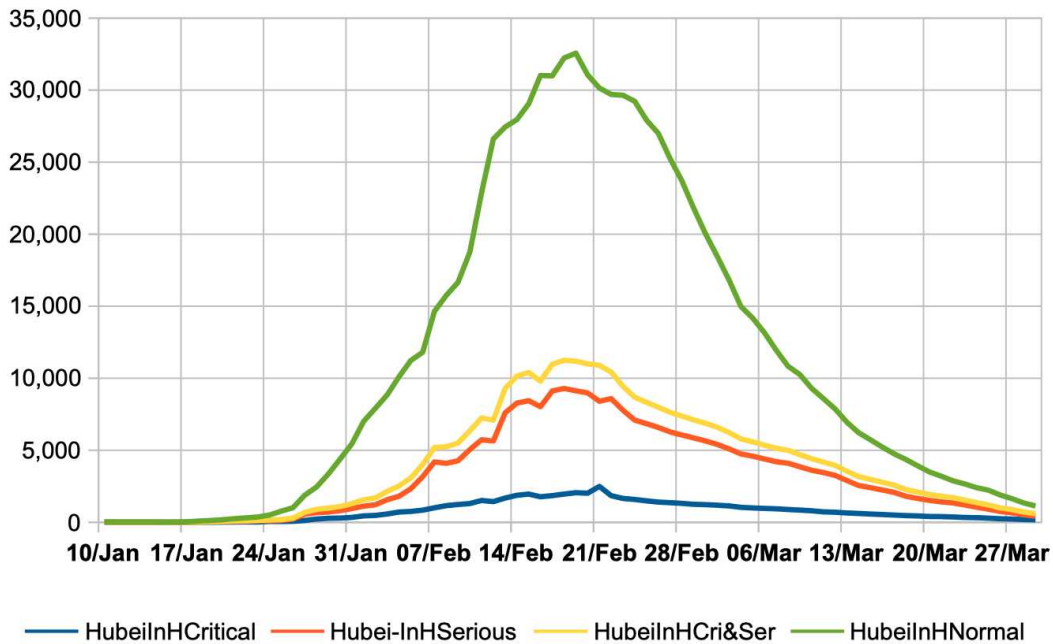
Key figures in Hubei:

	<i>Start date</i> <i>End date</i>	<i>Peak date</i>	<i>Peak number</i>
<i>Mild confirmed patients in temporary isolation facilities</i>	<i>2<sup>nd</sup> Feb</i> <i>25<sup>th</sup> Mar</i>	<i>11<sup>th</sup> Feb</i>	<i>9,562</i>
<i>Confirmed patients in designated hospitals</i>		<i>19<sup>th</sup> Feb</i>	<i>43,745</i>

Hubei provincial Health Commission published the numbers of critical and serious ill patients on a daily basis, allowing the curves in Figure 4 to be generated.

**Figure 4 - Hubei In-hospital Active Confirmed Cases**

Curves from bottom to top: Critical, Serious, Critical+Serious, Normal not including mild confirmed patients staying in controlled isolation facilities



Key figures shown in Figure 4 for Hubei:

	<i>Start date</i>	<i>Peak date</i>	<i>Peak number</i>
<i>Isolation beds in designated hospitals for confirmed COVID-19 patients</i>		<i>19<sup>th</sup> Feb</i>	<i>43,745</i>
<i>Of which ICU beds for seriously ill or critically ill COVID-19 patients</i>		<i>18<sup>th</sup> Feb</i>	<i>11,246</i>

**Conclusions.** In the hypothetical scenario that the UK COVID-19 situation followed Hubei at 1x rate (we suggest earlier that it could be between 1x and 2x), and the same approaches as in Hubei were adopted, the UK would be needing the following hospital resources and out of hospital facilities at peak days.

	<i>Start date</i> <i>End date</i>	<i>Peak date</i>	<i>Peak number</i>
<i>Suspected patients staying in isolation stations:</i>	- 12 <sup>th</sup> May	4 <sup>th</sup> April	12,831
<i>Mild confirmed patients in temporary isolation facilities</i>	29 <sup>th</sup> March 20 <sup>th</sup> May	7 <sup>th</sup> April	9,562
<i>Isolation beds in designated hospitals for confirmed COVID-19 patients</i>		15 <sup>th</sup> April	43,745
<i>Of which ICU beds for seriously ill or critically ill COVID-19 patients</i>		14 <sup>th</sup> April	11,246

**Notes:**

The Hubei and China data are based on daily published figures by Hubei Health Commission and China National Health Commission for 24 hourly period from -8h to +16h GMT. China time zone is +8h.

The suspected case numbers in China do not include confirmed cases.

About Hubei data, for a period from 8<sup>th</sup> February, in a bit to speed up treatments of a large number of suspected COVID-19 patients who were not yet laboratory tested due to capacity issues, the Hubei Health Authorities undertook an excise of clinically diagnosing 17,410 patients as COVID-10 positive, allowing them to be admitted and treated. Subsequently only 895 of them were laboratory tested as COVID-19 negative and excluded from the reported numbers. In the middle of the excise, on 12<sup>th</sup> February, a cumulative total of 13,332 of such cases (diagnosed between 8<sup>th</sup> and 12<sup>th</sup>) were added to the reported statistics, resulting in a huge spike in many published plots of China data. In our figures, we adopted the approach of accepting the clinically diagnosed cases day by day subtracting the subsequently laboratory test negative cases also day by day, resulting in smoother plotting curves which are closer to the reality in Hubei hospitals.