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Evidence summary for average length of stay in the intensive care unit for COVID-19

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The Health Information and Quality Authority (HIQA) has developed a series of 'Evidence Summaries' to assist the Clinical Expert Advisory Group (EAG) supporting the National Public Health Emergency Team (NPHE) in their response to COVID-19. These summaries are based on specific research questions.

This evidence summary was developed to address the following research question:

What is the average or median length of stay in the intensive care unit (ICU) for affected persons?

The processes as outlined in HIQA's protocol (available on www.hiqa.ie) were followed. Relevant databases of published literature and pre-print servers were searched. Below is the summary of the evidence published between 30 December 2019 and 19 March 2020 identified as relevant to this review. Data published by national agencies are not included.

Results

Four studies were identified.⁽¹⁻⁴⁾ The first study⁽¹⁾ reports a retrospective cohort study of patients in two hospitals, of whom 50 were admitted to ICU, in Wuhan, China with a definitive outcome (discharge or death) up to 31 January 2020. The second study⁽²⁾ reports a retrospective analysis of 101 deceased patients in one intensive care unit in Wuhan, China up to 16 February 2020. The third study describes the first 18 cases of COVID-19 identified in Singapore, of which two patients were admitted to ICU. The fourth study describes the first 12 cases of COVID-19 identified in the United States, of which one received ICU level of care.

ICU length of stay

The median length of ICU stay for deceased patients was similar in both studies based in Wuhan, China, with a median of eight days (interquartile range [IQR] 4 to 11 days)⁽²⁾ and eight days (IQR to 12 days)⁽¹⁾. Zhou et al.⁽¹⁾ reported the median length of ICU stay for all included patients as eight days (IQR to 12 days); with a slightly shorter stay for those patients who survived of seven days (IQR 2 to 9 days). Young et al.'s study⁽³⁾ included two patients admitted to the ICU in Singapore, with lengths of stay between five and seven days. The US-based study reported that one patient received 'intensive care level monitoring' for five days⁽⁴⁾ (Table 1).

Use of mechanical ventilation

The proportion of those admitted to ICU who were treated with invasive mechanical ventilation was reported by the studies from Wuhan, China. This comprised 79 patients (78.2%)⁽²⁾ in the study limited to deceased patients with a median duration of five days (IQR 2.0-8.0), and 32 patients (64%)⁽¹⁾ in the study reporting outcomes for all patients admitted to ICU. For the study from Singapore,⁽³⁾ one of the two patients admitted to ICU was treated with invasive mechanical ventilation.

Study quality and quality of the evidence

The quality of the evidence is low, and two studies^(2, 4) have not been peer-reviewed. One of the included studies⁽²⁾ was based on a mix of cases confirmed by laboratory reverse transcription-polymerase chain reaction (RT-PCR) (56.4%), with the remaining 43.6% based on clinical diagnostic criteria only. Given the time frame, it is highly likely that some patients were included in both of the studies from Wuhan, China.

Discussion

The median length of ICU stay reported is around seven days for survivors and eight days for non-survivors. This summary is limited to papers that explicitly reported ICU length of stay. Papers reporting overall duration of hospital stay, or the proportion of patients admitted to ICU only⁽⁵⁾, are excluded. It is unknown if differences in the proportion of patients admitted to ICU⁽⁶⁾ leads to differences in ICU length of stay. The evidence is limited to four studies, two of which have not been peer-reviewed, with two studies including very small numbers of patients admitted to ICU. The two studies with the largest number of patients focus on two hospitals in Wuhan, China at the beginning of the outbreak. A report published on 20 March 2020 by the Intensive Care National Audit and Research Centre⁽⁷⁾ included data on 33 patients with confirmed COVID-19 admitted to critical care units in England, Wales and Northern Ireland with definitive outcomes (discharge or death). The median length of stay in critical care was three days for both survivors and non-survivors (IQR 1 to 5 days for survivors and 1.5 to 6 days for non-survivors).

Conclusion

Median length of stay in ICU has been reported to be approximately seven days for patients who survive COVID-19, and eight days for those who do not survive, with shorter lengths of stay reported in the UK. However, the evidence is currently limited.

References

1. Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z, et al. *Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study*. The Lancet. 2020.
2. Chen J, Fan H, Zhang L, Huang B, Zhu M, Zhou Y, et al. *Retrospective Analysis of Clinical Features in 101 Death Cases with COVID-19*. medRxiv. 2020:2020.03.09.20033068.
3. Young BE, Ong SWX, Kalimuddin S, Low JG, Tan SY, Loh J, et al. *Epidemiologic Features and Clinical Course of Patients Infected With SARS-CoV-2 in Singapore*. JAMA. 2020.
4. Kujawski SA, Wong KK, Collins JP, Epstein L, Killerby ME, Midgley CM, et al. *First 12 patients with coronavirus disease 2019 (COVID-19) in the United States*. medRxiv. 2020:2020.03.09.20032896.
5. Guan W-j, Ni Z-y, Hu Y, Liang W-h, Ou C-q, He J-x, et al. *Clinical Characteristics of Coronavirus Disease 2019 in China*. New England Journal of Medicine. 2020.
6. Grasselli G, Pesenti A, Cecconi M. *Critical Care Utilization for the COVID-19 Outbreak in Lombardy, Italy: Early Experience and Forecast During an Emergency Response*. JAMA. 2020.
7. ICNARC. *ICNARC report on COVID-19 in critical care*. London: Intensive Care National Audit and Research Centre 2020.

Table 1. Summary of included studies

Author	Population setting	Primary outcome results		
Country	Patient demographics			
Study design	Clinical characteristics			
F. Zhou	Population setting 191 adult inpatients from Jinyintan Hospital and Wuhan Pulmonary Hospital in Wuhan, China who had been discharged or died by Jan 31, 2020.	ICU length of stay	Non-invasive/invasive Mechanical ventilation ECMO	Other relevant findings
China		26% of sample (n=50) admitted to ICU.	Non-invasive mechanical ventilation n=26 (14%).	Ventilator-associated pneumonia occurred in (n=10, 31%) of 32 patients requiring invasive mechanical ventilation.
Retrospective cohort	Demographics Median age 56 years (IQR 46–67; range 18 to 87 years). 62% male.	Median LOS 8 days (IQR 4-12).	Invasive mechanical ventilation n=32 (17% of total, 64% of those admitted to ICU).	
	Clinical characteristics Most common symptoms on admission were fever and cough, followed by sputum production and fatigue.	For survivors, median 7 days (IQR 2-9).	Median time from illness onset to invasive mechanical ventilation: 14.5 days (12–19).	
	Underlying diseases 91 (48%) patients had a comorbidity: Hypertension (n=58, 30%), diabetes (n=36, 19%), coronary heart disease (n=15, 8%).	For non-survivors, median 8 days (IQR 4-12).	ECMO n=3 (2%).	

Author	Population setting	Primary outcome results		
Country	Patient demographics			
Study design	Clinical characteristics			
H. Fan/ J. Chen	Population setting 101 deceased patients admitted to the ICU, Wuhan Jinyintan Hospital.	ICU length of stay	Non-invasive/invasive Mechanical ventilation ECMO	Other relevant findings
China	Demographics 64 males, 37 females. Mean age 65.5 years (SD 9.7, range 24-83).	Median 8 days (IQR 4-11).	Non-invasive ventilator or high-flow oxygen therapy n=84 (83.2%). Invasive mechanical ventilation n=79 (78.2%) ECMO n=7 (6.9%) CRRT n=8 (7.9%).	Median time from ARDS to invasive mechanical ventilation was 3 days (IQR 0-6). Duration of invasive mechanical ventilation was 5 days (IQR 2-8).
Case series	Clinical characteristics Symptoms included fever (91, 90.1%), cough (69, 68.3%) and dyspnoea (75, 74.3%). Underlying diseases Hypertension (42.57%), diabetes (22.77%), neurological disease (9.90%), malignant tumour (4.95%), and respiratory disease (4.95%). N = 50 (49.50%) patients showed acute respiratory distress syndrome (ARDS) on admission. Median time from onset to ARDS was 12 days (IQR 9-14). Diagnosis 56.4% of patients were laboratory confirmed by RT-PCR, 43.6% were consistent with clinical diagnostic criteria.			

Author Country Study design	Population setting Patient demographics Clinical characteristics	Primary outcome results		
		ICU length of stay	Non-invasive/invasive Mechanical ventilation ECMO	Other relevant findings
B.E. Young Singapore Case series	<p>Population setting First 18 patients at 4 hospitals in Singapore, followed up to 25 February 2020</p> <p>Patient demographics Median age 47 years. N=9 (50%) women.</p> <p>Clinical characteristics Clinical presentation was an upper respiratory tract infection in 12 (67%). Fever (n=13, 72%), cough (n=15, 83%), and sore throat (n=11, 61%) were common symptoms.</p>	N=2 (11%) patients required intensive care.	1 patient required invasive mechanical ventilation.	All 18 patients survived.
		LOS in ICU was 5 days and 7 days for the two patients.		
S. Kujawski United States Case series	<p>Population setting 12 U.S. patients with COVID-19.</p> <p>Demographics Median age 53 years (range: 21–68). 8/12 male.</p> <p>Clinical characteristics Commonly reported signs and symptoms at illness onset were fever (n=7) and cough (n=8). Over the course of illness, patients reported cough (n=12), subjective or measured fever (n=9), diarrhoea (n=3), and vomiting (n=2).</p>	1 hospitalised patient received “intensive care-level monitoring” for 5 days.		5 patients received only outpatient care, 7 were hospitalised.

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For further information please contact:

Health Information and Quality Authority

George's Court

George's Lane

Smithfield

Dublin 7

D07 E98Y

+353 (0)1 8147400

info@hiqa.ie

www.hiqa.ie

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