Correspondence

Hospitalization period of COVID-19 for future plans in hospital
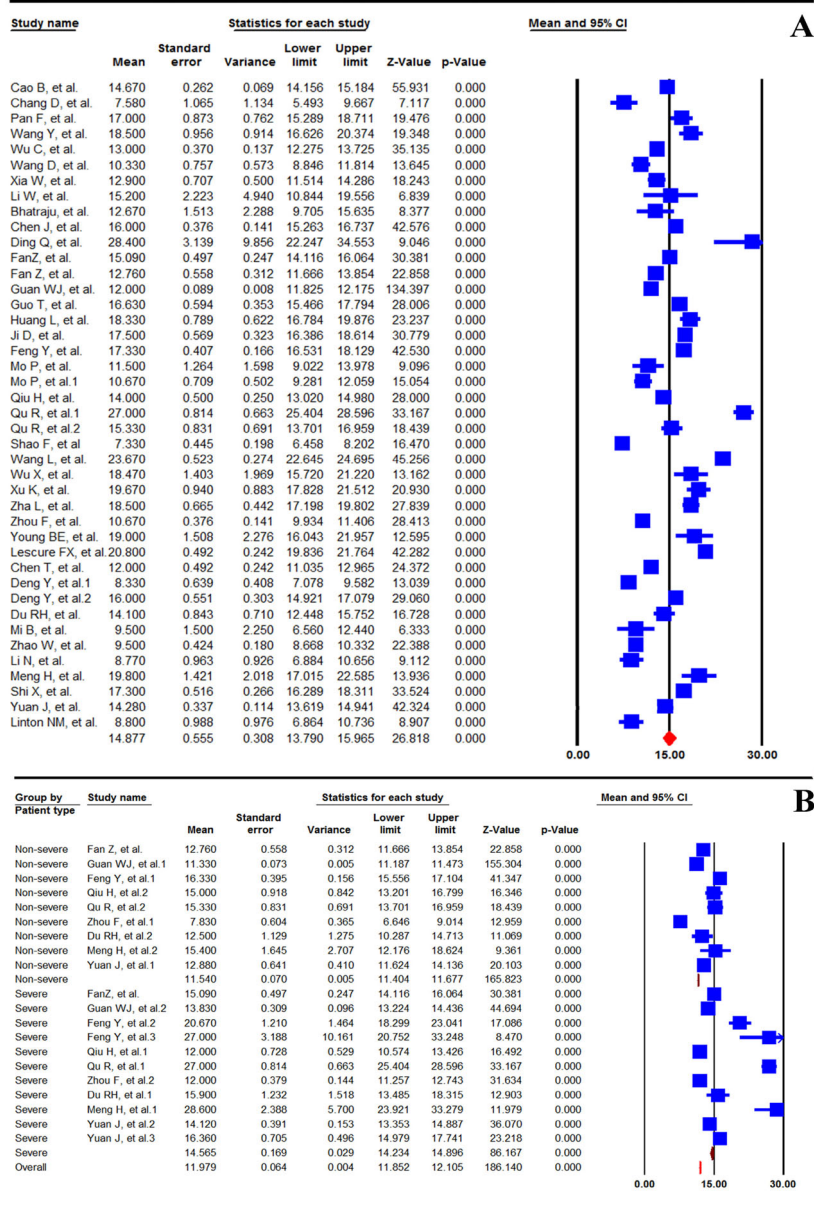
Editor

The ongoing pandemic (COVID-19) effects can be seen as collateral health effects on countries' health care systems[1], however, hidden aspects of management such as hospitalization period (HP) and effects on treatment facilities such as the number of hospital and critical care beds (CCBs) have not been duly acknowledged. Therefore, shortfalls of the hospitals under different scenarios like COVID-19 epidemic can be predicted. Most pandemic outcomes unfortunately start from the hospital front lines. In addition, HP is an impor-

Fig. 1 Random effect model meta-analysis of hospitalization period for COVID-19 patient A) combined value ($I^2 = 98.18$, $P < 0.001$); B) subgroup value: severe and non-severe ($I^2 = 97.89$, $P < 0.002$). Mean values show hospitalization period in COVID-19 patients. Lower and upper limit is 95 per cent confidence intervals =95 per cent CI, I-squared: percentage of total variation across studies. For each study, areas of blue Square are proportional to weight, horizontal line shows 95 per cent CI, and red diamonds sign indicate combined effect measures. For each study, brown diamond shows mean subgroup

A

Study name	Mean	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Cao B, et al.	14.670	0.262	0.069	14.156	15.184	55.931	0.000
Chang D, et al.	7.580	1.065	1.134	5.493	9.667	7.117	0.000
Pan F, et al.	17.000	0.873	0.762	15.289	18.711	19.476	0.000
Wang Y, et al.	18.500	0.956	0.914	16.626	20.374	19.348	0.000
Wu C, et al.	13.000	0.370	0.137	12.275	13.725	35.135	0.000
Wang D, et al.	10.330	0.757	0.573	8.846	11.814	13.645	0.000
Xia W, et al.	12.900	0.707	0.500	11.514	14.286	18.243	0.000
Li W, et al.	15.200	2.223	4.940	10.844	19.556	6.839	0.000
Bhatraju, et al.	12.670	1.513	2.288	9.705	15.635	8.377	0.000
Chen J, et al.	16.000	0.376	0.141	15.263	16.737	42.576	0.000
Ding Q, et al.	28.400	3.139	9.856	22.247	34.553	9.046	0.000
FanZ, et al.	15.090	0.497	0.247	14.116	16.064	30.381	0.000
Fan Z, et al.	12.760	0.558	0.312	11.666	13.854	22.858	0.000
Guan WJ, et al.	12.000	0.089	0.008	11.825	12.175	134.397	0.000
Guo T, et al.	16.630	0.594	0.353	15.466	17.794	28.006	0.000
Huang L, et al.	18.330	0.789	0.622	16.784	19.876	23.237	0.000
Ji D, et al.	17.500	0.569	0.323	16.386	18.614	30.779	0.000
Feng Y, et al.	17.330	0.407	0.166	16.531	18.129	42.530	0.000
Mo P, et al.	11.500	1.264	1.598	9.022	13.978	9.096	0.000
Mo P, et al.1	10.670	0.709	0.502	9.281	12.059	15.054	0.000
Qiu H, et al.	14.000	0.500	0.250	13.020	14.980	28.000	0.000
Qu R, et al.1	27.000	0.814	0.663	25.404	28.596	33.167	0.000
Qu R, et al.2	15.330	0.831	0.691	13.701	16.959	18.439	0.000
Shao F, et al	7.330	0.445	0.198	6.458	8.202	16.470	0.000
Wang L, et al.	23.670	0.523	0.274	22.645	24.695	45.256	0.000
Wu X, et al.	18.470	1.403	1.969	15.720	21.220	13.162	0.000
Xu K, et al.	19.670	0.940	0.883	17.828	21.512	20.930	0.000
Zha L, et al.	18.500	0.665	0.442	17.198	19.802	27.839	0.000
Zhou F, et al.	10.670	0.376	0.141	9.934	11.406	28.413	0.000
Young BE, et al.	19.000	1.508	2.276	16.043	21.957	12.595	0.000
Lescure FX, et al.	20.800	0.492	0.242	19.836	21.764	42.282	0.000
Chen T, et al.	12.000	0.492	0.242	11.035	12.965	24.372	0.000
Deng Y, et al.1	8.330	0.639	0.408	7.078	9.582	13.039	0.000
Deng Y, et al.2	16.000	0.551	0.303	14.921	17.079	29.060	0.000
Du RH, et al.	14.100	0.843	0.710	12.448	15.752	16.728	0.000
Mi B, et al.	9.500	1.500	2.250	6.560	12.440	6.333	0.000
Zhao W, et al.	9.500	0.424	0.180	8.668	10.332	22.388	0.000
Li N, et al.	8.770	0.963	0.926	6.884	10.656	9.112	0.000
Meng H, et al.	19.800	1.421	2.018	17.015	22.585	13.936	0.000
Shi X, et al.	17.300	0.516	0.266	16.289	18.311	33.524	0.000
Yuan J, et al.	14.280	0.337	0.114	13.619	14.941	42.324	0.000
Linton NM, et al.	8.800	0.988	0.976	6.864	10.736	8.907	0.000
	14.877	0.555	0.308	13.790	15.965	26.818	0.000

B

Group by Patient type	Study name	Mean	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Non-severe	Fan Z, et al.	12.760	0.558	0.312	11.666	13.854	22.858	0.000
Non-severe	Guan WJ, et al.1	11.330	0.073	0.005	11.187	11.473	155.304	0.000
Non-severe	Feng Y, et al.1	16.330	0.395	0.156	15.556	17.104	41.347	0.000
Non-severe	Qiu H, et al.2	15.000	0.918	0.842	13.201	16.799	16.346	0.000
Non-severe	Qu R, et al.2	15.330	0.831	0.691	13.701	16.959	18.439	0.000
Non-severe	Zhou F, et al.1	7.830	0.604	0.365	6.646	9.014	12.959	0.000
Non-severe	Du RH, et al.2	12.500	1.129	1.275	10.287	14.713	11.069	0.000
Non-severe	Meng H, et al.2	15.400	1.645	2.707	12.176	18.624	9.361	0.000
Non-severe	Yuan J, et al.1	12.880	0.641	0.410	11.624	14.136	20.103	0.000
Non-severe		11.540	0.070	0.005	11.404	11.677	165.823	0.000
Severe	FanZ, et al.	15.090	0.497	0.247	14.116	16.064	30.381	0.000
Severe	Guan WJ, et al.2	13.830	0.309	0.096	13.224	14.436	44.694	0.000
Severe	Feng Y, et al.2	20.670	1.210	1.464	18.299	23.041	17.086	0.000
Severe	Feng Y, et al.3	27.000	3.188	10.161	20.752	33.248	8.470	0.000
Severe	Qiu H, et al.1	12.000	0.728	0.529	10.574	13.426	16.492	0.000
Severe	Qu R, et al.1	27.000	0.814	0.663	25.404	28.596	33.167	0.000
Severe	Zhou F, et al.2	12.000	0.379	0.144	11.257	12.743	31.634	0.000
Severe	Du RH, et al.1	15.900	1.232	1.518	13.485	18.315	12.903	0.000
Severe	Meng H, et al.1	28.600	2.388	5.700	23.921	33.279	11.979	0.000
Severe	Yuan J, et al.2	14.120	0.391	0.153	13.353	14.887	36.070	0.000
Severe	Yuan J, et al.3	16.360	0.705	0.496	14.979	17.741	23.218	0.000
Severe		14.565	0.169	0.029	14.234	14.896	86.167	0.000
Overall		11.979	0.064	0.004	11.852	12.105	186.140	0.000

tant factor for health systems which can be effective in estimation of the required mechanical ventilators, supplies and staff[1,2]. Therefore, we estimated HP of COVID-19 using a systematic review and meta-analysis approach.

A registered systematic review and meta-analysis (CRD42020176951) using the PRISMA guidelines was conducted in the PubMed, Scopus and Web of science Databases. All the published peer-reviewed ducuments (Original research, short survey, and case series) on COVID-19 patients since inception till 18 April 2020, during which HP was reported or calculated (mean/median period with standard deviation (±SD) or 95 per cent CI), were included in our work. The data was quantitatively analyzed using comprehensive meta-analysis software (CMA, version 2.2.064).

According to our results (*Fig 1a*), the mean Combined HP (14·88 days (95 per cent CI 13·79-15·96)) is approximately similar to that of reported for Middle East Respiratory Syndrome (MERS) (mean: 13-17 days) and longer than of Severe acute respiratory syndrome (SARS) (median 10 days; IQR: 6-15). Although clinical features COVID-19 is not very different SARS, its own clinical parameter studied, and therefore the required treatment facilities, is almost similar to that of MERS. For this reason, and according to review of studies, the lessons learned from SARS and MERS can be based to take the efficient treatment and/or preventive measures in healthcare settings[3,4]. High hospitalization and case-fatality rates for COVID-19, implies on an emergence to provide sufficient hospital-based supplies. Furthermore, the mean HP was 14·56 days (95 per cent CI 14·23 to 14·90) in severe patient's categories and 11·54 days (95 per cent CI 11·40 to 11·70) in non-severe category (*Fig 1b*). This result is important for hospital managers and government to prepare financial and hospital resources in intensive care wards[2]. There is a large gap between need for hospital services and available capacity, especially for inpatient and ICU beds, which may dictate the biggest challenge in time

of outbreaks due to difficulty in triaging, allocation, and shortage of both trained staff and high-level care beds[2,3]. This study develops the current clinical knowledge on COVID-19. Depending on the HP and disease incidence rates, governments and policy makers can consider various programs to prevention and control of this pandemic such as increase financial resources, social distancing, providing personal protective equipment, isolation and quarantine program and hospital equipment[5].

Conflict of interest statements

The authors have disclosed that they do not have any conflicts of interest.

Contributions

VKM, MS, MF and SK conceived of the manuscript; MS, TSHA, SN, MR and VKM contributed to data collection; MS, MF, and VKM contributed to data analysis and interpretation; and MS, SK, MF, TSHA, MR, VKM and SN drafted the document. All authors agree with the contents presented in this study.

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Supporting information

Additional supporting information can be found online in the Supporting Information section at the end of the article.