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VALIDATION OF QUICK COVID SEVERITY INDEX IN COVID PATIENTS ADMITTED THROUGH EMERGENCY DEPARTMENT OF A PRIVATE TERTIARY CARE HOSPITAL IN WEST BENGAL, INDIA

Emergency Medicine

Dr. Harsimran Singh Das MEM PGY3, Peerless Hospital And B.K.Roy Research Centre, Kolkata.

ABSTRACT

Introduction:qCSI (Quick COVID severity index) is a clinical tool established recently post pandemic to predict respiratory failure within 24 hours of admission in COVID-19 patients; respiratory failure being explain as increased oxygen requirement greater than 6L/min by low flow device, high flow device, noninvasive or invasive ventilation to maintain spO2 of greater than or equal to 94%, or death.

Aim: To verify and validate the application of the qCSI in Emergency Department in Indian demographic for evidence-based guidance to aid physician decision making in safely dispositioning adult patients with COVID-19 with oxygen requirement less than or equal to 6L/min via low flow devices including nasal cannula and oxygen mask

Materials and methods: This is an observational, retrospective study from Emergency Department in a private tertiary care hospital of admitted adult patients with COVID-19 disease. Clinical parameters in qCSI and disposition of 210 patients admitted through Emergency Department included in this study selected randomly was sought on admission and clinical status with level of care 24 hours following admission was recorded and compared with prediction based on qCSI from a period of 1 May 2020 to 31 October 2020.

Result: We found that19(9.0%) patients Initial qCSI Score was Low, 80(38.1%) patients Initial qCSI Score was Low-intermediate, 84(40.0%) patients Initial qCSI Score was High-intermediate and 27(12.9%)patients Initial qCSI Score was High.qCSI Score after 24 hours 16(11.4%) patients were Low, 43(30.7%) patients were Low-intermediate, 63(45.0%) patients was High-intermediate and 18(12.9%) patients was High.Out of 210(100.0%) patients, 70 (33.3%) patients were critically ill.

Conclusion: In conclusion these data show that the quick COVID-19 Severity Index provides easily accessed risk stratification relevant to Emergency Department provider.

KEYWORDS

COVID-19,Quick COVID severity index,Emergency Department,spO2.

INTRODUCTION

In late December 2019, China officially identifies the presence of the virus, called Covid-19, on its soil. In January 2020, the virus spread very quickly, reaching a peak in China in mid-February 2020. In January and February 2020, other neighboring nations or those trading with China, especially in Asia and Europe, were affected by the epidemic.[1]

On January 30, 2020, the World Health Organisation (WHO) announced a public health emergency of international scope. On March 11, 2020, the Covid-19 epidemic was validated by the WHO as a pandemic, since by that date it had circulated throughout the vast majority of countries worldwide.

The human cost of the COVID-19 pandemic continues to increase with, as of midMay 2020, more than four million four hundred officially confirmed cases worldwide by the WHO with approximately three hundred thousand reported deaths from the disease.

At the starting of March 2020, Asia accounted for more than 60% of coronavirus-related deaths. Consideration at that point turned to Europe, with Italy, Spain, Great Britain and France being the new global hot spots. In spite of the fact that Europe still accounts for more than half of worldwide deaths, consideration is now turning to the United States, where the number of fatalities rose fast in April. The United States at present has the highest number of new cases in the world. In Africa, there are approximately 81,000 confirmed cases of coronavirus and nearly 2,700 deaths as of May 17, 2020.

All this information comes from the WHO database, which publishes every day the pandemic situation in each country where the virus is circulating, using all available official statistics.

An examination of the accessible figures demonstrate that some countries are facing a favourable trend (with a concomitant slowing down of new infections, a continuous increase in recoveries and a decrease in disease-related deaths), whereas others are still struggling to control the development of the virus and its negative consequences on the lives of the sick.

We felt it required, consequently, to build a synthetic index that summarizes the respective performances of countries in their strategy for fighting the virus. The approach assumed in this document can be applied to any epidemic. Thus, it is a universal index.

Quick COVID severity index was managed to assess the condition of countries concerning the disease, at any time, to estimate instantly the severity of the pandemic in different countries and to identify groups of performing countries, in order to draw up a severity assessment at the end of the pandemic. It will at that point be possible to study, using robust statistical methods, the factors of resilience that may have been at the origin of the successes achieved by some countries, in order to draw lessons from the conduct of Covid-19 response techniques and for the development of public health policies throughout the world.qCSI (Quick COVID severity index) is a clinical tool established recently post pandemic to predict respiratory failure within 24 hours of admission in COVID-19 patients; respiratory failure being explain as increased oxygen requirement greater than 6L/min by low flow device, high flow device, noninvasive or invasive ventilation to maintain spO2 of greater than or equal to 94%, or death.In a retrospective cohort study done in Yale University hospital in Connecticut from march 1 to april 17,2020 in which 9 ED operating hospitals get involved,qCSI outperformed Elixhauser Mortality Index, CURB-65 and qSOFA in predicting critical illness in COVID patients in 24 hours. A low qCSI score was related with less than 5% risk for respiratory decompensation in the validation cohort.

OBJECTIVE

The objective of this study is to verify and validate the application of the qCSI in Emergency Department in Indian demographic for evidencebased guidance to aid physician decision making in safely dispositioning adult patients with COVID-19 with oxygen requirement less than or equal to 6L/min via low flow devices including nasal cannula and oxygen mask.

MATERIALS AND METHODS

- This is an observational, retrospective study from Emergency Department in a private tertiary care hospital of admitted adult patients with COVID-19 disease.
- Clinical parameters in qCSI and disposition of 210 patients admitted through Emergency Department included in this study selected randomly was sought on admission and clinical status with level of care 24 hours following admission was recorded and compared with prediction based on qCSI from a period of 1 May 2020 to 31 October 2020

INCLUSION CRITERIA:

- COVID 19 positive status (RT-PCR or GeneXpert)
- Age greater than or equal to 18 years

- Oxygen requirement less than or equal to 6L/min

EXCLUSION CRITERIA:

- Oxygen requirement greater than 6L/min in Emergency Department either via low flow, high flow, noninvasive or invasive ventilation

STATISTICALANALYSIS:

For statistical analysis data were entered into a Microsoft excel spreadsheet and then analyzed by SPSS 24.0. and GraphPad Prism version 5. A chi-squared test ($\chi 2$ test) was any statistical hypothesis test wherein the sampling distribution of the test statistic is a chi-squared distribution when the null hypothesis is true. Without other qualification, 'chi-squared test' often is used as short for Pearson's chi-squared test. Unpaired proportions were compared by Chi-square test or Fischer's exact test, as appropriate. p-value ≤ 0.05 was considered for statistically significant.

RESULT AND DISCUSSION

This is an observational, retrospective study from Emergency Department in a private tertiary care hospital of admitted adult patients with COVID-19 disease.Clinical parameters in qCSI and disposition of 210 patients admitted through Emergency Department included in this study selected randomly was sought on admission and clinical status with level of care 24 hours following admission was recorded and compared with prediction based on qCSI from a period of 1 May 2020 to 31 October 2020

In our study, majority was present in age group of 51-60 years [81(38.6%)] Rest of 15(7.1%) patients were ≤40 years old, 42(20.0%) patients were 41-50 years old, 58(27.6%) patients were 61-70 years old and 14(6.7%) patients were 71-80 years old. The mean Age (mean± s.d.) of patients was 56.6476± 9.0717 years. Numbers of male patients were higher compared to female patients.

In our study out of 210(100.0%) patients, most of the patients [140(66.7%)] had no critical illness. Only 70 (33.3%) patients were critically ill.

We found that in without Critical Illness patients' group, 11 (7.9%) patients were ≤40 years old, 29 (20.7%) patients were 41-50 years old, 58 (41.4%) patients were 51-60 years old, 35 (25.0%) patients were 61-70 years old and 7 (5.0%) patients were 71-80 years old. In Critically ill patients' group, 4 (5.7%) patients were ≤40 years old, 13 (18.6%) patients were 41-50 years old, 23 (32.9%) patients were 51-60 years old, 23 (32.9%) patients were 61-70 years old and 7(10.0%) patients were 71-80 years old. Association of Age vs Critical Illness was not statistically significant (p=0.3941). The mean Age (mean± s.d.) of critically ill patients was [58.1429± 9.1339 years] higher than the mean Age (mean± s.d.) of without Critical Illness patients [55.9000± 8.9798 years] which was not statistically significant (p=0.0913).

We examined that 45(32.1%) female patients and 95(67.9%) male patients had no Critical Illness where 24 (34.3%) female patients and 46(65.7%) male patients had Critical Illness which was not statistically significant (p=0.7552).

Haimovich AD et al [2](2020) found that 1,792 patients were admitted with COVID-19, 620 (35%) of whom had respiratory failure in the ED. Of the remaining 1,172 admitted patients, 144 (12.3%) met the composite endpoint within the first 24 hours of hospitalization.

We found that 51(24.3%) patients Initial Respiratory Rate was <23breaths/min, 85(40.5%) patients Initial Respiratory Rate was 23-28 breaths/min and 74(35.2%) patients Initial Respiratory Rate was >28 breaths/min. Most of the patients [107(51.0%)] Respiratory Rate after 24 hours was >28 breaths/min. 32(15.2%) patients Respiratory Rate after 24 hours was <23 breaths/min, 71(33.8%) patients Respiratory Rate after 24 hours was 23-28 breaths/min.

It was found that in without Critical Illness group, 36 (25.7%) patients Initial Respiratory Rate was <23 breaths/min, 54 (38.6%) patients Initial Respiratory Rate was 23-28 breaths/min and 50 (35.7%) patients Initial Respiratory Rate was >28 breaths/min. In Critical illness group, 15 (21.4%) patients Initial Respiratory Rate was <23 breaths/min, 31 (44.3%) patients Initial Respiratory Rate was 23-28 breaths/min and 24 (34.3%) patients Initial Respiratory Rate was >28 breaths/min. Association of Respiratory Rate, breaths/min Initial vs Critical Illness was not statistically significant (p=0.6851).

Our study showed that in without Critical Illness group, 18 (12.9%) patients after 24 hours Respiratory Rate was <23 breaths/min, 45 (32.1%) patients after 24 hours Respiratory Rate was 23-28 breaths/min and 77 (55.0%) patients after 24 hours Respiratory Rate was >28 breaths/min. In Critical illness group, 14 (20.0%) patients after 24 hours Respiratory Rate was <23 breaths/min, 26 (37.1%) patients after 24 hours Respiratory Rate was 23-28 breaths/min and 30 (42.9%) patients after 24 hours Respiratory Rate was >28 breaths/min. It was not statistically significant (p=0.1961).

It was found that most of the patients [110(52.4%)] Initial Pulse oximetry level was 89-92,33(15.7%) patients Initial Pulse oximetry level was >92,and 67(31.9%) patients Initial Pulse oximetry level was <89.58(27.6%) patients after 24 hours Pulse oximetry level was >92, 92 (43.8%) patients after 24 hoursPulse oximetry level was 89-92 and 60(28.6%) patients after 24 hours Pulse oximetry level was <89.

We found that in without Critical Illness group, 22 (15.7%) patients InitialPulse oximetry level was >92, 80 (57.1%) patients InitialPulse oximetry level was 89-92 and 38 (27.1%) patients InitialPulse oximetry level was <89. In Critical illness group, 11 (15.7%) patients InitialPulse oximetry level was >92, 30 (42.9%) patients InitialPulse oximetry level was 89-92 and 29 (41.4%) patients InitialPulse oximetry level was <89. Itwas not statistically significant (p=0.0906).

Our study showed that in without Critical Illness group, 39 (27.9%) patients after 24 hoursPulse oximetry level was >92, 66 (47.1%) patients after 24 hoursPulse oximetry level was 89-92 and 35 (25.0%) patients after 24 hours Pulse oximetry level was <89. In Critical illness group, 19 (27.1%) patients after 24 hours Pulse oximetry level was >92, 26 (37.1%) patients after 24 hoursPulse oximetry level was 89-92 and 25 (35.7%) patients after 24 hours Pulse oximetry level was <89. Association of Pulse oximetry after 24 hours vs Critical Illness was statistically significant (p=0.2289).

In our study, 76(36.2%) patients InitialO2 flow rate was <3 L/min, 80(38.1%) patients InitialO2 flow rate was 3-4 L/min and 54(25.7%) patients InitialO2 flow rate was 5-6 L/min. After 24 hours most of the patients [85(40.5%)] patients O2 flow rate was 3-4 L/min. 59(28.1%) patients after 24 hoursO2 flow rate was <3 L/min. and 66(31.4%) patients after 24 hoursO2 flow rate was 5-6 L/min.

We found that in without Critical Illness group, 62 (44.3%) patients InitialO2 flow rate was <3 L/min, 48 (34.3%) patients InitialO2 flow rate was 3-4 L/min and 30 (21.4%) patients InitialO2 flow rate was 5-6 L/min. In Critical illness group, 14 (20.0%) patients InitialO2 flow rate was <3 L/min, 32 (45.7%) patients InitialO2 flow rate was 3-4 L/min and 24 (34.3%) patients InitialO2 flow rate was 5-6 L/min. Itwas statistically significant (p=0.0022). In without Critical Illness group, 38 (27.1%) patients after 24 hoursO2 flow rate was <3 L/min, 60 (42.9%) patients after 24 hoursO2 flow rate was 3-4 L/min and 42 (30.0%) patients after 24 hoursO2 flow rate was 5-6 L/min. In Critical illness group, 21 (30.0%) patients after 24 hoursO2 flow rate was <3 L/min, 25 (35.7%) patients after 24 hoursO2 flow rate was 3-4 L/min and 24 (34.3%) patients after 24 hoursO2 flow rate was 5-6 L/min. whichwas not statistically significant (p=0.6076).

Rodriguez-Nava G et al [3](2021) showed that to the CURB-65 score had the highest numerical AUC to predict in-hospital mortality (AUC 0.781) compared to the qCSI score (AUC 0.711) and the BCRSS prediction rule (AUC 0.663). For ICU admission, the qCSI score had the highest numerical AUC (AUC 0.761) compared to the BCRSS prediction rule (AUC 0.735) and the CURB-65 score (AUC 0.629). The CURB-65 and qCSI scoring systems showed a good performance for predicting in-hospital mortality.

We also found that 19(9.0%) patient's Initial qCSI Score was Low, 80(38.1%) patients Initial qCSI Score was Low-intermediate, 84(40.0%) patients Initial qCSI Score was High-intermediate and 27(12.9%) patients Initial qCSI Score was High. The mean Initial qCSI Score (mean± s.d.) of patients was 6.5619 ± 2.3979. After 24 hours most of the patients [63(45.0%)] qCSI Score was High-intermediate. 16(11.4%) patients after 24 hours qCSI Score was Low, 43(30.7%) patients after 24 hours qCSI Score was Low-intermediate and 18(12.9%) patients after 24 hours qCSI Score was High. The mean qCSI Score after 24 hours (mean± s.d.) of patients was 6.8286 ± 2.4727.

It was found that in without Critical Illness group, 18 (12.9%) patients Initial qCSI Score was Low, 58 (41.4%) patients Initial qCSI Score was Low-intermediate, 53 (37.9%) patients Initial qCSI Score was High-intermediate and 11 (7.9%) patients Initial qCSI Score was High. In Critical illness group, 1 (1.4%) patient Initial qCSI Score was Low, 22 (31.4%) patients Initial qCSI Score was Low-intermediate, 31 (44.3%) patients Initial qCSI Score was High-intermediate and 16 (22.9%) patients Initial qCSI Score was high. It was statistically significant (p=0.0009). In without Critical Illness group, 16 (11.4%) patients after 24 hours qCSI Score was Low, 43 (30.7%) patients after 24 hours qCSI Score was Low-intermediate, 63 (45.0%) patients after 24 hours qCSI Score was High-intermediate and 18 (12.9%) patients after 24 hours qCSI Score was High. In Critical illness group, no patient was present. It was also statistically significant (p<0.0001).

In our study the mean Initial qCSI Score (mean± s.d.) of critically ill patients was [7.6000± 2.1763] higher than the mean Initial qCSI Score (mean± s.d.) of without Critical Illness patients [6.0429± 2.3410] which was statistically significant (p<0.0001).

Table: Association between qCSI Score Initial and after 24 hours group: Critical Illness

		CRITICAL ILLNESS			p-value
		No	Yes	TOTAL	
qCSI Score Initial group	Low	18	1	19	0.0009
	Row %	94.7	5.3	100.0	
	Col %	12.9	1.4	9.0	
	Low-intermediate	58	22	80	
	Row %	72.5	27.5	100.0	
	Col %	41.4	31.4	38.1	
	High-intermediate	53	31	84	
	Row %	63.1	36.9	100.0	
	Col %	37.9	44.3	40.0	
	High	11	16	27	
	Row %	40.7	59.3	100.0	
	Col %	7.9	22.9	12.9	
	TOTAL	140	70	210	
	Row %	66.7	33.3	100.0	
	Col %	100.0	100.0	100.0	
qCSI Score after 24 hours Group	Low	16	0	16	<0.0001
	Row %	100.0	0.0	100.0	
	Col %	11.4	0.0	11.4	
	Low-intermediate	43	0	43	
	Row %	100.0	0.0	100.0	
	Col %	30.7	0.0	30.7	
	High-intermediate	63	0	63	
	Row %	100.0	0.0	100.0	
	Col %	45.0	0.0	45.0	
	High	18	0	18	
	Row %	100.0	0.0	100.0	
	Col %	12.9	0.0	12.9	
	TOTAL	140	0	140	
	Row %	100.0	0.0	100.0	
	Col %	100.0	100.0	100.0	

Table: Difference of mean qCSI Score Initial: Critical Illness

		Number	Mean	SD	Minimum	Maximum	Median	p-value
qCSI Score Initial	No	140	6.0429	2.3410	0.0000	12.0000	6.0000	<0.0001
	Yes	70	7.6000	2.1763	3.0000	12.0000	8.0000	

CONCLUSION

In our study, 15(7.1%) patients were ≤40 years old, 42(20.0%) patients were 41-50 years old, 81(38.6%) patients were 51-60 years old, 58(27.6%) patients were 61-70 years old and 14(6.7%) patients were 71-80 years old.

In our study, 19(9.0%) patients Initial qCSI Score was Low, 80(38.1%) patients Initial qCSI Score was Low-intermediate, 84(40.0%) patients Initial qCSI Score was High-intermediate and 27(12.9%) patients Initial qCSI Score was High.

We found that qCSI Score after 24 hours 16(11.4%) patients was Low, 43(30.7%) patients was Low-intermediate, 63(45.0%) patients was High-intermediate and 18(12.9%) patients was High.

Out of 210(100.0%) patients, 70 (33.3%) patients were critically ill.

In Critical illness, 1 (1.4%) patient Initial qCSI Score was Low, 22 (31.4%) patients Initial qCSI Score was Low-intermediate, 31 (44.3%) patients Initial qCSI Score was High-intermediate and 16 (22.9%) patients Initial qCSI Score was High. This association was statistically significant.

We found that the mean initial qCSI Score was significantly higher in critically ill patients.

We found that Quick COVID Severity Index may offer a route to expanded inclusion criteria for ongoing trials or for early identification of patients who might benefit from therapeutics. Quick COVID-19 Severity Index in Emergency Departmentwas evidence based guidance to aid physician decision making in safely dispositioning adult patients with COVID-19 with oxygen requirement less than or equal to 6L/min via low flow devices including nasal cannula and oxygen mask.

In conclusion these data show that the quick COVID-19 Severity Index provides easily accessed risk stratification relevant to Emergency Department provider.

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