

# Validity of ISARIC 4C prediction model for Severe coronavirus (COVID-19) respiratory failure



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## Introduction

The International Severe Acute Respiratory and emerging infections Consortium- Coronavirus Clinical Characterization Consortium (ISARIC 4C). Mortality Score is a risk stratification score that predicts in-hospital mortality for hospitalised Corona Virus Disease 2019 (COVID-19) patients, produced by the ISARIC 4C consortium.<sup>1</sup> ISARIC 4C Mortality score is an easy to use eight variable score (Table 1) that helps in accurate stratification of hospitalized COVID-19 patients by mortality risk at hospital presentation and if applied within the validation cohorts could guide clinician decisions including escalation of care plans.<sup>1</sup> It is unknown whether this score is validated for patients with most severe form of the disease. We aimed to evaluate its efficacy in a cohort of patients who all required invasive prone ventilation.

## Objectives

1. Validate ISARIC 4c score for a subset of patients admitted to Critical Care, Royal Preston Hospital, requiring invasive ventilation and proning
2. Compare predicted mortality at hospitalization and at Intensive care unit (ICU) admission, with the actual observed mortality.

## Methods and Materials

We analysed 96 patients from our electronic patient record (Quadramed) requiring invasive ventilation and proning, and calculated ISARIC 4c scores and predicted mortality at hospitalization and at ICU admission. We classified them into 4 groups, depending on their scores, as shown in table 2.

Factors variable		4C Mortality score points
Age (in years)	≥50	0
	50-59	+2
	60-69	+4
	70-79	+6
	≥80	+7
Sex at birth	Female	0
	Male	+1
Number of co-morbidities	0	0
	1	+1
	≥2	+2
Respiratory rate (breaths/min)	<20	0
	20-29	+1
	≥30	+2
Peripheral oxygen saturation on room air (%)	≥92	0
	<92	+2
Glasgow coma scale	15	0
	≤15	+2
Urea (mmol/L)	≤7	0
	>7	+1
CRP (mg/dl)	<14	+3
	<50	0
	50-99	+1
	≥100	+1

Table 1. Variable factors in ISARIC 4c score.

4C Score	Risk Group	%Mortality
≥15	Very High Risk	61.5%
9-14	High Risk	31.4%
4-8	Intermediate Risk	9.9%
≤3	Low Risk	1.2%

Table 2. Interpretation.

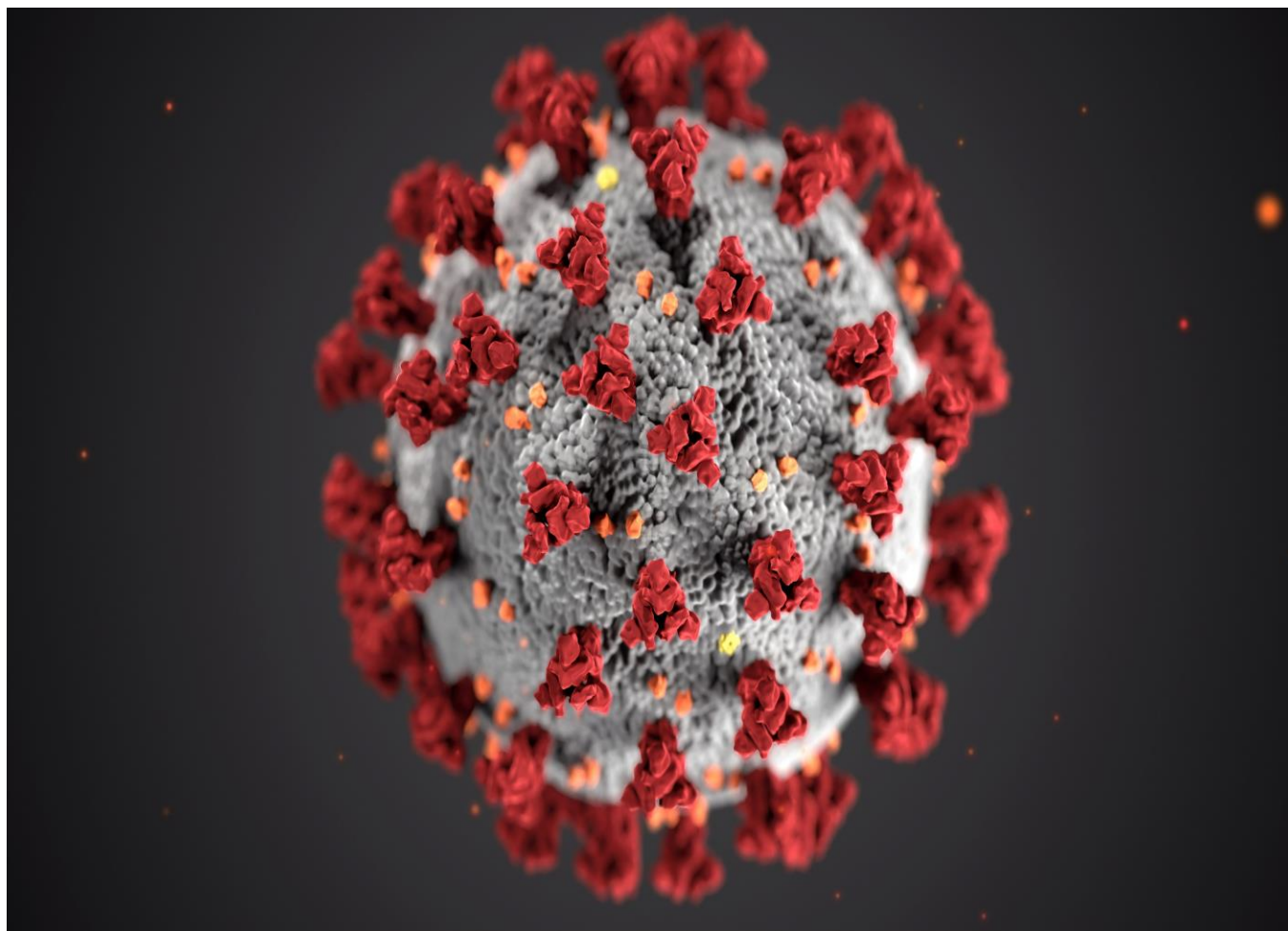


Figure 1. An image of Coronavirus 19. (Copyright free download from internet).

## Results

1. 55% of patients were admitted to ICU on same day of hospitalization, 29% within 3 days and 16% beyond 3 days.
2. Overall observed mortality for this cohort of patients was 57(59%) excluding outcome for 11 patients who were transferred out to Other ICUs.
3. The number of patients with predicted low, intermediate, and high risk of death seemed to underestimate the risk of death as their actual mortality was close to 50%. The mortality rate was close to predicted rate in the very high-risk group (Graph 1).

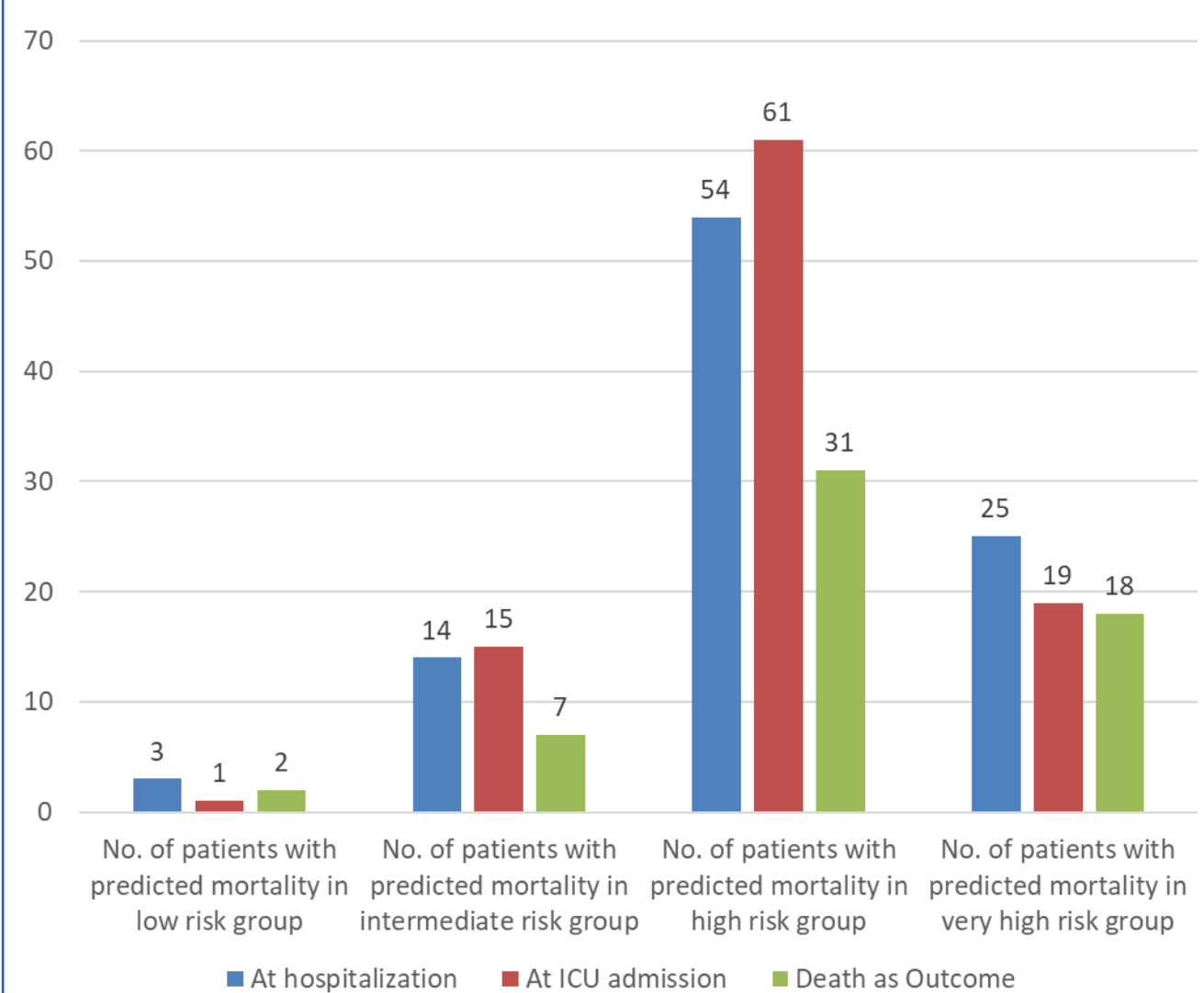


Chart 1. Comparative results.

## Conclusions

•The ISARIC 4C score-based prediction did not accurately reflect the actual observed mortality rates in this cohort of patients, particularly in the low, intermediate, and high risk of death groups. A very high risk of death, as predicted by the score correlated well with the actual mortality. In our opinion the ISARIC 4C scores underestimated the risk of death in this cohort of critically ill patients.

•The reasons for the underestimation could be inherent in the pathophysiology of the disease, causing unpredictable progression of disease and development of secondary complications in ICU. It would be interesting to determine if traditional ICU mortality prediction scores like APACHE<sup>2</sup> and SOFA<sup>3</sup> scores fare any better than ISARIC 4C. Further evaluation on a larger cohort of critically ill patients will be necessary.



Figure 2. A Healthcare warrior in PPE. (Copyright free download from internet).

## References:

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