**Supplemental data**

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| --- | --- | --- | --- |
| **Univariate regression**, clinical variables associated with cardiac dysfunction | | | |
|  | OR | 95% CI for OR | p-value |
| SAPS3, per point | 1.03 | 0.98-1.07 | 0.281 |
| Systolic blood pressure, per 10mmHg | 0.96 | 0.80-1.15 | 0.629 |
| Mean arterial pressure, per 10mmHg | 0.90 | 0.66-1.22 | 0.485 |
| Heart rate, per 10 bpm | 1.08 | 0.90-1.29 | 0.416 |
| Noradrenaline >0.20µg/kg/min | 3.07 | 1.29-7.30 | 0.011 |
| Lactate levels, per 1mmol/l | 1.63 | 0.87-3.05 | 0.124 |
| PaO2/FiO2, per 1 point | 1.00 | 0.96-1.04 | 0.840 |
| Having mechanical ventilation | 1.56 | 0.57-4.33 | 0.389 |
| Peak airway pressure, per 1cmH20 | 1.00 | 0.93-1.07 | 0.941 |
| PEEP, per 1cmH20 | 1.03 | 0.96-1.10 | 0.401 |

SAPS3 = simplified acute physiology score III, bpm = beats per minute, PEEP = positive end-expiratory pressure,

|  |  |  |  |
| --- | --- | --- | --- |
| **Outcome variables other than death** | | | |
| Variable | Normal cardiac function (n=90) | Cardiac dysfunction (n=42) | p-value |
| Use of CRRT | 16 (18) | 16 (38) | 0.016 |
| Days in ICU | 15 (9-23) | 21 (7-32) | 0.509 |
| Days alive outside ICU\* | 13 (0-20) | 0 (0-10) | 0.042 |
| Days in hospital | 29 (20-48) | 31 (14-49) | 0.659 |

CRRT = continuous renal replacement therapy, ICÙ = intensive care unit

\* Refers to days alive outside ICU first 30 days from admission

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| **Troponin and NTproBNP in patients with LV and RV dysfunction** | | | | | |
|  |  |  | Cardiac dysfunction | | |
|  | Normal cardiac function |  | LV dysfunction |  | RV dysfunction |
| Troponin, times over upper ref | 0,81 (0,51 - 1,64) |  | 2,07 (1,46 - 4,99)\* |  | 2,42 (0,77 - 20,46)\* |
| NTproBNP, g/L | 268 (139 - 504) |  | 817 (346 - 2545)\* |  | 1220 (225 - 12100)\* |

LV; left ventricle, RV; right ventricle, NTproBNP; N-terminal pro b-typ natriuretic peptide. \* p < 0.05

**Patient treatment**

Patients were treated according to each ICU´s local guidelines and upon a clinician’s judgement. Prone positioning was used routinely in all sites in patients with FiO2 > 60%. Noradrenaline was the vasopressor of first choice. Anti-coagulants were administered to all patients without absolute contraindications and generally in higher doses than standard thromboprophylaxis. LMWH was the first drug of choice. Corticosteroid treatment with betamethasone 6mg daily for five days was immediately adopted as routine after a press release of the Recovery Study on 16 June [Horby P et al, NEJM, 2020]. No patient was treated with remdesivir or hydroxychloroquine during the study period.

**Study site description and participation**

The study was performed at the following hospitals:

1. Sahlgrenska University Hospital/Östra, Gothenburg, Sweden

2. Sahlgrenska University Hospital/Sahlgrenska, Gothenburg, Sweden

3. Sahlgrenska University Hospital/Mölndal, Gothenburg, Sweden

4. NU hospital group, Trollhättan, Sweden

5. Södersjukhuset Ane/IVA, Stockholm, Sweden

**Sites 1-3**

The Sahlgrenska University Hospital is a hospital conglomerate consisting of four hospital located in different parts of Gothenburg. All patients with symptoms of COVID-19 were admitted to the Clinic of Infectious Diseases located at Sahlgrenska University Hospital/Östra (Site 1). This clinic has a dedicated ICU for the treatment of infectious diseases to which patients with COVID-19 and respiratory failure with impending risk of intubation were admitted. After intubation, patients were transported to the general ICU at Sahlgrenska University Hospital/Östra (Site 1) or any of the ICU´s at Sahlgrenska University Hospital/Sahlgrenska or Sahlgrenska University Hospital/Mölndal (Sites 2 or 3). Both Sites 2 and 3 were equipped with temporary ICU units designated for COVID-19 patients only. These three sites held a total of 77 patients. The majority of patients were examined by echocardiography at site 2 and site 3 (n=71).

**Site 4**

The ICU at the NU hospital group, Trollhättan, received patients who had been admitted from the hospital´s emergency department or from its COVID-19 ward. The site included 30 patients.

**Site 5**

The ICU at Södersjukhuset received patients admitted from its emergency department or from the COVID-19 wards. The site followed the study protocol by taking an echocardiogram and measuring cardiac biomarkers of all patients after 11 April. However, the site was not formally included in the study until 20 July, following a second approval from the ethics review authority. Admission rates at that time were low but the center retrospectively included a total of 30 patients who had followed the study protocol.

Another three sites that were approved for participation in the study did not have sufficient resources to set up and maintain the study due to heavy clinical workloads.

**Bedside protocol echocardiography COVID-19**

*Echocardiography*

ECG synchronization should preferably be used. Save loops with at least three heart beats.

Parasternal long axis

* Loop
* Measure left chamber in diastole and systole; measure LVOT
* Color doppler over aortic and mitral valves

Parasternal short axis

* Aortic plane
* Mitral plane
* Papillar plane
* Apical plane
* If present, measure tricuspid regurgitation peak velocity with continuous doppler
* If no TR present, pulse-wave doppler over pulmonary valve, measure acceleration time

Apical four/five chamber view

* Loop
* Measure TAPSE in 2D or M-mode
* TVI loop
* Measure tissue velocity free right chamber wall, s’
* Measure septal e´, lateral e´ with tissue velocity
* Loop with color doppler over mitral, aortic and tricuspid valves
* Trace pulse-wave doppler LVOT
* Measure E/a ratio over mitral inflow with pulse-wave doppler
* Continuous doppler over aortic valve, measure max. velocity
* If present, measure tricuspid regurgitation velocity with continuous doppler

Apical two chamber

* Loop

Apikal long axis

* Loop

Subcostal

* Loop
* V. cava, measure diameter on inspiration and expiration
* Short axis projections if not possible in standard views