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Critical Care Outreach Team During COVID-19: Ventilatory Support in the Ward and Outcomes

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BACKGROUND: During the coronavirus disease 2019 (COVID-19) outbreak, a critical care outreach team was implemented in our hospital to guarantee multidisciplinary patient assessment at admission and prompt ICU support in medical wards. In this paper, we report the activity plan results and describe the baseline characteristics of the referred subjects. METHODS: We retrospectively evaluated data from 125 subjects referred to the critical care outreach team from March 22 to April 22, 2020. We considered subjects with a ceiling of care decision, with those deemed eligible assigned to level 3 care (ward subgroup), and those deemed ineligible admitted to the ICU (ICU subgroup). Quality indicators of the outreach team plan delivery included number of cardiac arrest calls, number of intubations in level 2 areas, and ineffective palliative support. RESULTS: We enrolled 125 consecutive adult subjects with a confirmed diagnosis of COVID-19. We did not report any emergency endotracheal intubations in the clinical ward. In the care ceiling subgroup, we had 2 (3.3%) emergency calls for cardiac arrest, whereas signs of ineffective palliative support were reported in 5 subjects (12.5%). Noninvasive forms of respiratory assistance were delivered to 40.0% of subjects in the ward subgroup (median 3 d [interquartile range (IQR) 2–5]), to 45.9% of subjects in the care ceiling subgroup (median 5 d [IQR 3–7]), and to 64.7% of subjects in the ICU subgroup (median 2.5 d [IQR 1–3]). Thirty of the 31 ward subjects (96.7%), 26 of the 34 ICU subjects, (76.4%), and 19 of the 61 ceiling of care subjects (31.1%) were discharged. CONCLUSIONS: In the context of a hospital and ICU surge, a multidisciplinary daily plan supported by a dedicated critical care outreach team was associated with a low rate of cardiac arrest calls, no emergency intubations in the ward, and appropriate palliative care support for subjects with a ceiling of care decision. *Key words: COVID-19; critical care outreach; ethics; noninvasive ventilation; intensive care; high-flow nasal cannula; continuous positive airway pressure*. [Respir Care 0;0(0):1–●. © 0 Daedalus Enterprises]

Introduction

Soon after identifying a secondary transmission cluster of coronavirus disease 2019 (COVID-19) in the Lombardy region of Italy on February 20, 2020, the public health authorities established an emergency task force to coordinate the response plan.[1,2] One of the force's first directives was to cohort these patients at the ward or unit level. Receiving hospitals were asked to create dedicated wards and level 3 ICU beds.[1] This decision substantially impacted the surge capacity and ward organization of Humanitas Research Hospital (Rozzano, Milan, Lombardy, Italy), a multidisciplinary 700-bed academic hospital primarily focused on cancer and

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The authors have disclosed no conflicts of interest.

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immune disorder care. Upon reaching the plateau of the outbreak in Italy in the second week of April 2020, 7 wards were dedicated to high-dependence units, counting approximately 100 beds: 50 level 2 beds managed by non-ICU medical teams equipped with multiparametric monitors, blood gas analysis, and the capacity to deliver forms of noninvasive ventilatory assistance to patients admitted with ARDS (ie, CPAP, noninvasive ventilation [NIV], and high-flow nasal cannula [HFNC]); and 50 level 3 beds dedicated to patients with COVID-19 in dedicated ICUs staffed with a maximum nurse:patient ratio of 1:3 and 6-h medical shifts of trained intensivists supported by a weekly senior coordinator.[3]

Our ICU team's mission, together with the hospital, was to provide intensive care to whoever needed level 3 care. To address both the massive influx of unstable, critically ill patients and the limited capacity in our level 3 areas, we decided to deliver intensive care outside of the level 3 ICU by implementing a COVID-19 critical care outreach team in level 2 areas.

The outreach team provided senior ICU decision support along with clinical and logistic assistance to non-ICU physicians and nurses, providing forms of respiratory support in the COVID-19 areas.[4] The team was involved in a daily multidisciplinary ward round, performed within 24 h of admission, to define the goals of care with the attending team. Finally, the team helped in the multidisciplinary decision-making process regarding end of life by individualizing each patient's care pathway according to the predicted benefit of ICU admission.

This primary aim of this research is to assess the efficacy of our critical care outreach during the COVID-19 pandemic outbreak on the basis of the predetermined quality indicators to monitor the delivery of the team's plan in the medical wards: the number of cardiac arrest calls, the number of intubations in level 2 areas prior to ICU admission, and signs of respiratory discomfort or pain in subjects undergoing forms of noninvasive respiratory support and having a ceiling of care decision.

Moreover, we describe data regarding in-hospital management of noninvasive ventilatory support forms in medical wards along with the outcomes of patients with COVID-19 referred to our outreach team.

QUICK LOOK

Current knowledge

Critical care outreach teams help provide prompt ICU support to acutely ill adult patients in medical wards by sharing critical care expertise and knowledge. The goals of the outreach team are to ensure early recognition and effective local response to all deteriorating critically ill adult patients in clinical wards.

What this paper contributes to our knowledge

In the context of hospital and ICU surge due to the increase in COVID-19 cases, our critical care outreach team provided ventilatory assistance to subjects in medical wards by adopting a semi-quantitative and straightforward protocol to standardize medical data reporting for all referred patients. Outreach team support allowed for proper allocation of ICU resources based on the analysis of quality indicators in the medical wards (ie, number of cardiac arrest calls and number of emergency intubations). The team was involved in individualizing goals of care for every subject with COVID-19 admitted to medical wards, escalating their support and transferring them to the ICU when necessary or providing effective palliative care to those with a ceiling of care decision.

Methods

Patient data was retrospectively obtained from electronic health records (Hospital, Lutech Group, Milan, Italy) of the Humanitas Research Hospital (Rozzano, Milan, Italy) and from the dataset of the outreach ICU team recorded on a dedicated spreadsheet (Excel 2011, Microsoft, Redmond, Washington) from March 22 to April 22, 2020. The local ethics committee approved the use of these data.

For data analysis, we identified 3 subgroups of subjects with COVID-19 referred to the outreach team: subjects admitted to the wards with respiratory symptoms and receiving a ceiling of care decision (care ceiling subgroup); subjects requiring more complex observation or intervention, including noninvasive forms of ventilatory support and considered eligible for ICU care, if needed (ward subgroup); and subjects admitted to the ICU within 24 h of the evaluation by the team (ICU subgroup).

Outreach Team Implementation and Goals

During the first wave of COVID-19 in Italy (February to May 2020), about 100 medical beds of Humanitas Research Hospital were dedicated to suspected or confirmed COVID-19 cases: 50 level 2 care (high-dependence unit) were equipped with multiparametric monitors and the capacity to deliver noninvasive ventilatory assistance to support a single failing organ system (ie, respiratory), and 50 level 3 ICU beds provided advanced respiratory support alone or monitoring and multi-organ support.[3]

The standard organization of the ICU team of the Department of Anesthesia and Intensive Care of Humanitas Research Hospital provides a specialist in anesthesia and intensive care at all times for the response to urgent/emergent calls from the emergency department and wards. Ceiling of care decisions are usually discussed with a senior ICU consultant in charge for the entire week.

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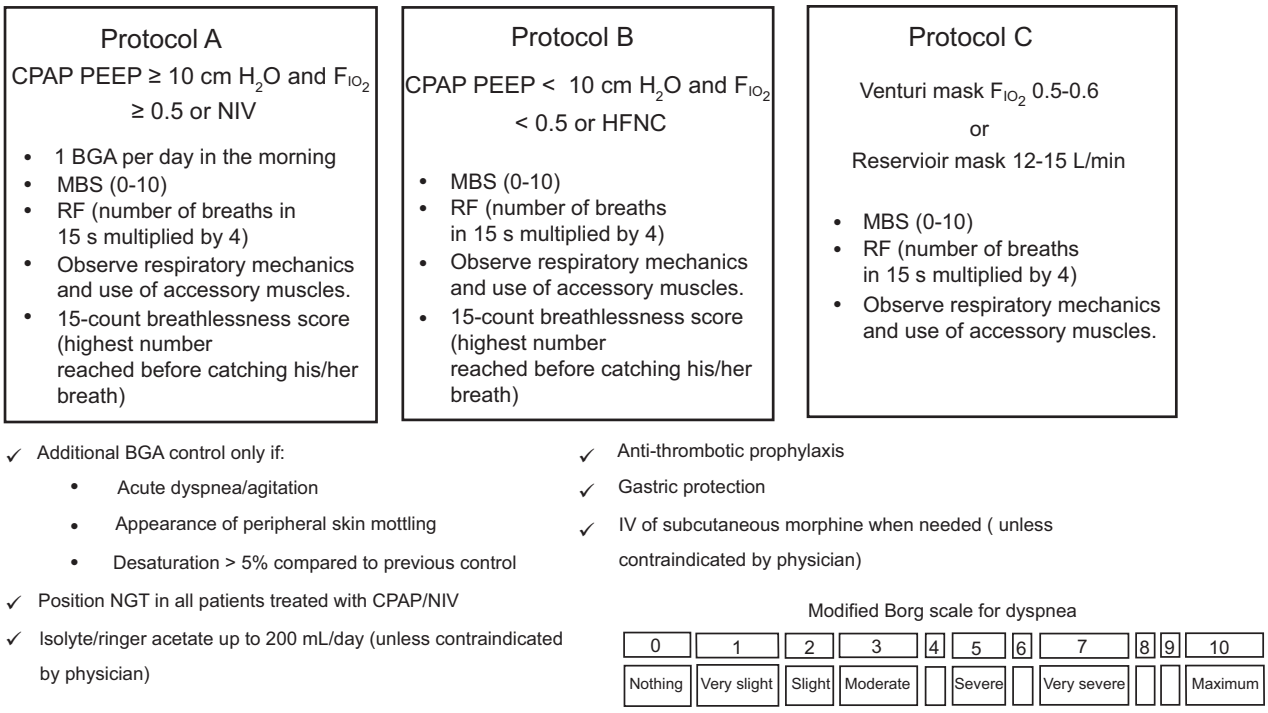

Fig. 1. COVID-19 ventilator support escalation/de-escalation protocol. The 3 different noninvasive respiratory support protocols adopted in the wards for the daily assessment of COVID-19 subjects. The critical care outreach team recorded the Respiratory Distress Observation Scale to quantify patient respiratory distress in the ward. BGA = blood gas analysis; MBS = modified Borg scale; RF = respiratory frequency; NGT = nasogastric tube; NIV = noninvasive ventilation; HFNC = high-flow nasal cannula.

Due to the increasing number of COVID-19 hospital admissions in the first few weeks of the outbreak, the decision was made to increase critical care support outside the ICU by implementing a specific COVID-19 critical care outreach team on March 22, 2020. The department staffed the team with 2 senior consultants in charge during a day shift (8:00 AM to 8:00 PM) and alternately on-call during the night. This team aimed to ensure constant ICU support to those wards staffed with nurses and doctors who were relocated from their usual workplaces and lacked specific training to manage noninvasive forms of ventilatory support (ie, CPAP, NIV, and HFNC).

According to the available literature, we identified several quality indicators to monitor our team's delivery of care in the medical wards, including the number of cardiac arrest calls from COVID-19 medical wards and the number of emergency intubations in level 2 areas prior to ICU admission.[5] Moreover, we assessed potentially ineffective or insufficient palliative support plans in the subgroup of patients classified as care ceiling and undergoing forms of noninvasive respiratory support in the wards by considering the signs of respiratory discomfort or pain reported in the medical record.[5]

Ventilatory Assistance

The outreach team implemented a protocol for level 2 wards to standardize medical reports. This protocol aimed to provide simple and semi-quantitative data reporting of all the patients referred to the critical care outreach team by nurses and doctors with limited or no specific training in the management of patients with ARDS. We defined 3 different settings of support: protocol A (helmet CPAP with PEEP $\geq$ 10 cm H_2O with $F_{IO_2} \geq 0.5$ or NIV delivered via face mask), protocol B (helmet CPAP with PEEP $<$ 10 cm H_2O or $F_{IO_2} < 0.5$, or HFNC), and protocol C (air-entrainment mask with F_{IO_2} 0.5–0.6 or mask with reservoir of 12–15 L/min) (Fig. 1).

The daily ward round was focused on evaluating the parameters reported in the protocol steps and comparing them with the previous day. The decision to escalate the level of support (ie, from C to B or from B to A) was based primarily on the occurrence of signs and symptoms of respiratory distress, as indicated by a modified Borg scale $>$ 3 points[6] or a worsening 15-count breathless score,[7] avoiding unnecessary blood gas samples if not needed.

All of the subjects who received forms of noninvasive ventilatory support were referred to the critical care outreach team and treated according to predefined goals of care bundles: (1) a senior consultant review within 24 h of admission to the emergency department to establish and agree on the goals of care with subjects, family, and attending teams; (2) all subjects included in protocol A and protocol B received a daily bedside assessment in the morning and another clinical review with the attending ward physicians in the evening to

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optimize the availability of personal protective equipment and to evaluate the need for escalation of care up to level 3 areas or weaning from noninvasive respiratory support.

Helmet CPAP, face mask NIV, and HFNC were delivered continuously for the first 48 h from admission, unless not tolerated. The de-escalation plan was titrated daily; however, subjects received respiratory support cycles of at least 12 h/d. The team reported the Respiratory Distress Observation Scale (RDOS), a surrogate for self-reported dyspnea previously assessed in palliative care,[8,9] to quantify patient respiratory distress in the ward.

Ceiling of Care Decision-Making Process

During the considered period, the plan for escalation to level 3 care was shared among the ward's senior consultants, the critical care outreach team, and those in charge of the COVID-19 ICU area.[10,11] We proposed and discussed an individualized ceiling of care decision-making process that involved patient wishes, the clinical frailty scale, past medical history, and the Sequential Organ Failure Assessment (SOFA) score at admission. Level 3 bed capacity and saturation were not considered a limiting factor in considering ICU admission. Clinical frailty score and past medical history were assessed by interviewing the patient or the nearest family member by telephone. Subjects with a ceiling of care decision received all the medical and respiratory support required. If appropriate, subjects were reviewed and end-of-life care pathways were started in cases of clinical deterioration under maximum support.

Statistical Analysis and Outcome Definitions

Normal distribution of continuous variables was evaluated using the d'Agostino-Pearson test; because some data failed the normality test, results are expressed as median (interquartile range [IQR]). Dichotomous or categorical variables were compared using the chi-square test to compare proportions, whereas continuous variables were compared using one-way analysis of variance on ranks. The Kruskal-Wallis test or Fisher exact test, as appropriate, were applied for between-group comparisons. In-hospital outcomes (ie, death, still in hospital, discharged either to home or rehabilitation facility) were considered upon follow-up at 15 d from the end of the observation period (April 22).

A multiple logistic regression analysis was performed, and the odds ratios with 95% CI are reported, introducing the decision of ceiling of care (yes/no) as the dependent variable and including in the model the following variables, selected a priori: P_{aO_2}/F_{IO_2}, frailty score,[12,13] Charlson comorbidity index,[14] SOFA score,[15] body mass index, age, and RDOS.

Statistical analyses were conducted using GraphPad PRISM 8 (GraphPad Software, San Diego, California). A P value of $< .05$ was considered statistically significant.

Results

From March 22 to April 22, 2020, 125 consecutive adult subjects with a confirmed diagnosis of COVID-19 (ie, a median of 25% [IQR 21–27%] of the overall number of COVID-19 positive patients admitted to the Humanitas Research Hospital) were referred to the critical care outreach team (Fig. 2). Of these, 61 subjects (48.8%) were in the care ceiling subgroup, 30 subjects were in the ward subgroup, and 34 subjects were in the ICU subgroup. Concomitantly, we recorded 25 ICU admissions in our hospital coordinated by the COVID-19 Lombardy network, and no patient was transferred to another hospital due to saturation of level 3 areas.

Demographic characteristics, comorbidities, risk scores, and respiratory variables of subjects are reported in Table 1. As shown, age ($P < .001$), clinical frailty score ($P < .001$), SOFA score ($P < .001$), and Charlson comorbidity index ($P < .001$) were all significantly higher, whereas body mass index ($P = .002$) was significantly lower, in the care ceiling subgroup, as compared to the others. Subjects in the ward had a higher P_{aO_2}/F_{IO_2} than those in the care ceiling group ($P = .001$) and a lower RDOS score compared to both the care ceiling group and the ICU group ($P < .001$ and $P = .027$, respectively).

Quality Indicators

All 34 subjects in the ICU subgroup were planned admissions in level 3 areas, implying that no life-threatening emergency endotracheal intubation in the ward. During the last 24 h before the subject's death in the care ceiling group, the number of inappropriate emergency calls for cardiac arrest was 2 (3.3%), whereas signs of respiratory discomfort or pain were recorded in 5 subjects (12.5%). Overall, 40 subjects in the care ceiling group (65.5%) received pharmacologic support during the disease's final phases.

Noninvasive Respiratory Support in the Wards

The median number of subjects receiving noninvasive respiratory support in the wards (including either helmet CPAP or NIV delivered by face mask or HFNC) was 9 (IQR 4–16) (Fig. 3), with a maximum of 19 subjects on March 28, 2020. Specifically, noninvasive forms of respiratory assistance were delivered to 12 of 30 subjects in the ward subgroup (40.0%; median of 3 d [IQR 2–5]), to 28 of 61 subjects in the care ceiling subgroup (45.9%; median of 5 d [IQR 3–7]), and to 22 of 34 subjects in the ICU subgroup (64.7%; median of 2.5 d [IQR 1–3]).

Outcomes

By the end of the follow-up, 19 subjects in the care ceiling subgroup (31.1%), 29 subjects in the ward subgroup

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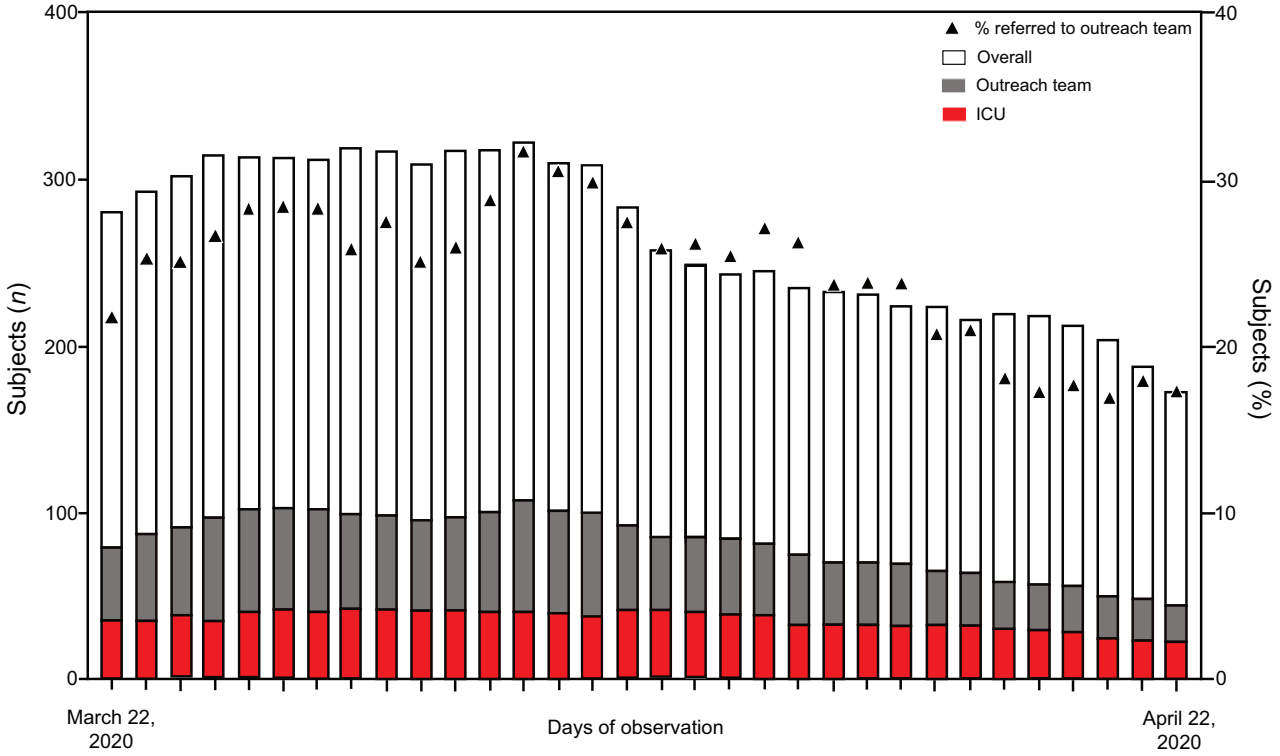

Fig. 2. Critical care outreach team day-by-day workload in the considered period (March 22 to April 22, 2020). Shown are the overall number of COVID-19 positive subjects the number of COVID-19 positive subjects referred to the outreach team, and COVID-19 positive subjects present in ICU. Superimposed triangles represent the percentage of subjects referred to the outreach team.

(96.7%), and 26 subjects in the ICU subgroup (76.4%) were discharged home or to rehabilitation facilities. Moreover, 41 of 61 subjects in the care ceiling subgroup (67.2%) died in the hospital as compared to none in the ward and ICU groups ($P < .001$) (Table 2).

Ceiling of Care Decisions and End-of-Life Treatment

Disagreements between the ICU consultants regarding level 3 area escalation were reported in 2 cases (4.6%), both of which resulted in ICU admission. Subjects receiving a ceiling of care decision had higher frailty scores (odds ratio 168.10 [95% CI 10.86–22,466.28], $P < .01$) and Charlson comorbidity index (odds ratio 5.97 [95% CI 2.00–34.43], $P < .01$), whereas the other considered variables did not have statistical relevance: SOFA score ($P = .07$), age ($P = .10$), body mass index ($P = .50$), and RDOS ($P = .10$).

Discussion

In the context of increasing ICU and hospital surge capacity for the COVID-19 outbreak, the institution of a specific COVID-19 outreach team helped provide appropriate ICU care and expertise. Consequently, we did not report any unplanned ICU admissions nor emergent unplanned intubations in the ward. Moreover, we reported a low rate of inappropriate emergency calls for cardiac arrest or inappropriate palliative support in subjects with ceiling of care decisions.

The COVID-19 outbreak severely affected the Lombardy region, leading to the substantial risk of overwhelming the health care infrastructure, especially ICUs.[1,2] The response plan to a massive influx of patients was primarily based on delivering the appropriate level of care from the emergency department to the ICU. However, the literature does not provide recommendations in balancing surge capacity and allocation of limited resources.[17]

We focused our efforts on a few significant priorities to optimize the daily plan for escalation/de-escalation support for patients with COVID-19: (1) to individualize goals of care for each patient admitted to clinical wards staffed with doctors and nurses with different level of expertise; (2) to ensure quick ICU admission for those potentially deteriorating ward patients; (3) to minimize the number of unexpected or emergent decisions to be made in the wards, which are known to be associated with high rates of complications.[18] In fact, in a context of a massive influx of patients, an emergency call for cardiac arrest could be

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Table 1. Subject Characteristics

	Total ($N = 125$)	Ceiling of care ($n = 61$)	Ward ($n = 30$)	ICU ($n = 34$)	P
Age, y	70 (61–76)	76 (70–81)‡	62 (54–68)	61 (56–70)	< .001
Male	91 (72.8)	43 (70.5)	21 (70.0)	27 (79.4)	.59
Body mass index, kg/m^2	26 (24–30)	25 (23–27)§	28 (26–30)	28 (25–35)	.002
SOFA score	3 (2–5)	4 (3–6)‡	2 (2–3)	2 (2–3)	< .001
Clinical frailty score	3 (2–5)	5 (4–6)‡	2 (2–3)	2 (2–3)	< .001
Charlson comorbidity score	4 (2–5)	6 (4–7)‡	2 (1–3)	2 (1–3)	< .001
Respiratory Distress Observation Scale	5 (2–6)	5 (3–7)	3 (1–5)	5 (3–6)	.005
Shock*	10 (12.5)	7 (11.5)	0 (0.0)	3 (8.8)	.16
Days before admission†	5 (2–7)	3 (1–7)††,‡‡	6 (3–10)	7 (4–8)	.002
pH	7.46 (7.43–7.50)	7.46 (7.43–7.50)	7.48 (7.45–7.50)	7.48 (7.44–7.50)	.68
P_{aO_2}/F_{IO_2}	118 (87–175)	105 (77–160)	144 (118–198)**	112 (80–183)	.01
P_{CO_2}, mm Hg	36 (33–40)	35 (31–43)	38 (34–40)	38 (33–40)	.74
Lactate, mmol/L	1.1 (0.8–1.3)	1.2 (0.9–1.5)	1.0 (0.8–1.2)	1.0 (0.8–1.2)	.07
Breathing frequency, breaths/min	25 (20–29)	25 (22–30)	23 (20–25)	26 (22–30)	.056

Values are presented as median (interquartile range) or n (%). P values refer to subgroup comparisons. Clinical features refer to the arterial blood gas sample and clinical examination obtained at the moment of the outreach team evaluation in the ward.

* Shock was defined as the presence of one of (1) arterial hypotension (defined as systolic blood pressure < 90 mm Hg or mean arterial pressure < 65 mm Hg) or the need for vasopressors to keep the pressures above the predefined limits; or (2) lactate > 2 mmol/L, capillary refill time > 3 s, or widespread skin mottling.[16]

† Days before admission are calculated considered the day of symptoms onset reported by the subject or by the emergency team referring the subject to the emergency department.

‡ $P < .001$ compared to the other groups

§ $P = .01$ compared to the other groups

** $P = .001$ compared to ceiling of care

†† $P = .02$ compared to ward

‡‡ $P = .004$ compared to ICU

SOFA = Sequential Organ Failure Assessment

related to ineffective goals of a care plan leading to either a delay of treatment of patients potentially eligible for the ICU or an inaccurate multidisciplinary palliative pathway for those who are not.

The first priority was achieved by simplifying the daily ward reports (Fig. 1), facilitating a daily senior ICU review of a median of 9 (IQR 4–16) subjects undergoing forms of noninvasive respiratory support, the failure of which is known to be associated with a poor outcome as compared to those receiving intubation as the first choice.[19] In our hospital, 25% of all COVID-19 positive admitted patients were referred to our critical care outreach team, which provided noninvasive respiratory support in the wards to a median of 9 patients (IQR 4–16), with a maximum of 19 patients.

The ceiling of care decision plan established after a multidisciplinary approach[5] is crucial to select the appropriateness of escalation of care levels, which is, unfortunately, often not questioned until patients become critically ill, requiring intervention by the critical care outreach team.[20] Interestingly, the subjects' age did not impact this decision as much as the clinical frailty and Charlson comorbidity scores. Interest regarding the clinical frailty score has grown over the past 10 years, primarily because its assessment shows a good overall level agreement between health care providers.[12,13] Using a quantitative approach for the patient's global frailty may be useful when physicians with different levels of expertise approach a complex clinical scenario, trying to balance the potential beneficial effect of escalating ventilatory support with the allocation of limited resources. Interestingly, baseline features of the ward and ICU subgroups were comparable overall, except for the median RDOS score, which was significantly lower in the ward subgroup (Table 1). Since both of these subgroups presented with moderate to severe ARDS ($P_{aO_2}/F_{IO_2} < 150$ mm Hg), the choice of the outreach team seems to have been mostly related to the clinical bedside assessment of the patient.[21,22]

The mortality of mechanically ventilated subjects with COVID-19 is remarkably high, being reported between 56% and 97% among different case series all over the world.[16,23-26] So far, what is unclear is whether a trial of noninvasive support in the ward is reasonable and appropriate. The Surviving Sepsis Campaign guidelines on the management of patients with COVID-19 in the ICU[27] suggest HFNC as a first-choice treatment after conventional oxygen therapy failure, and an NIV trial only if HFNC is not available. On the contrary, NHS England recommends CPAP as the preferred form of noninvasive support and doesn't suggest using HFNC because of a lack of efficacy (https://www.england.nhs.uk/coronavirus; *Accessed March 26, 2020*). Rather than suggesting one form of ventilatory

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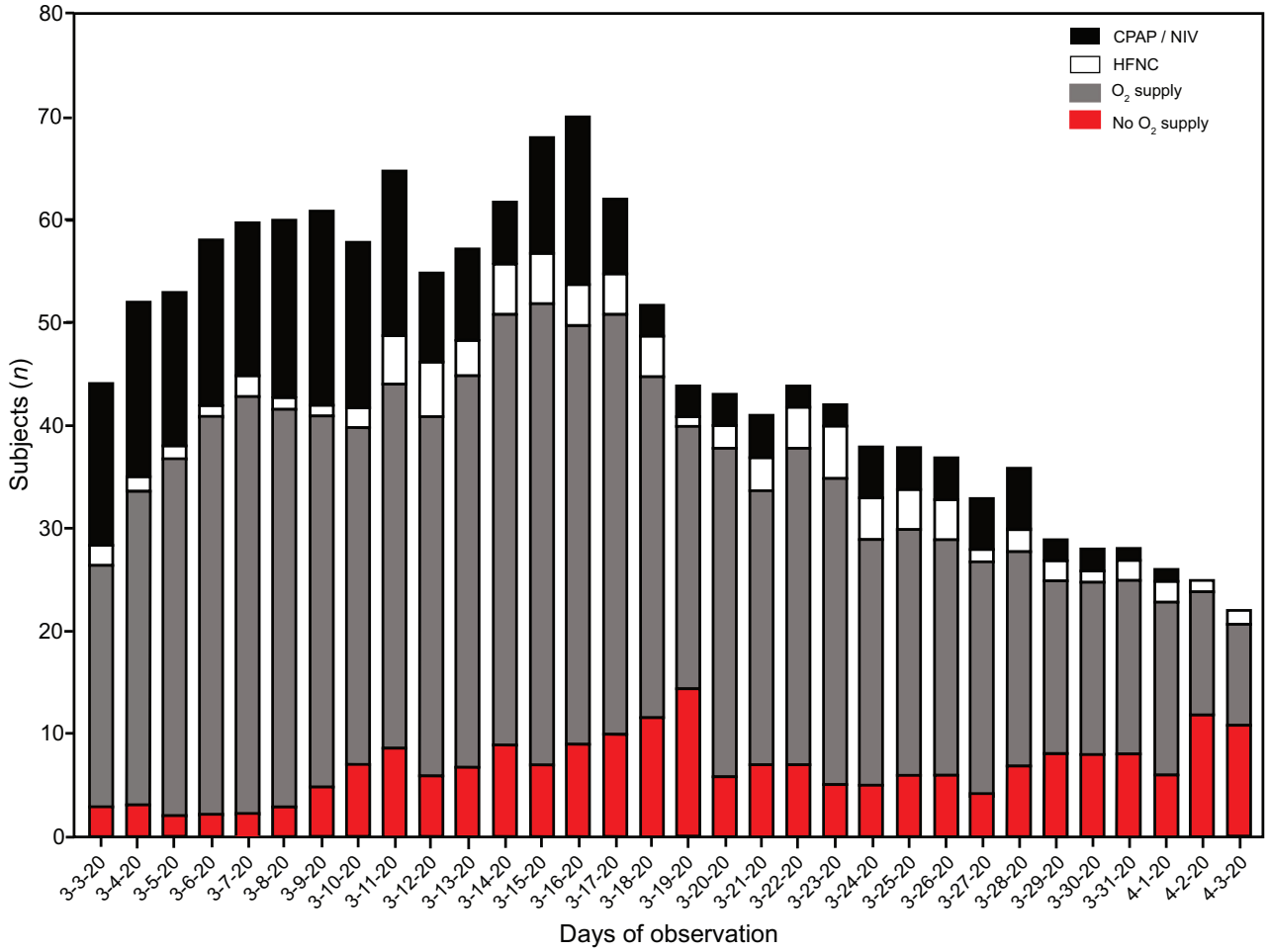

Fig. 3. Overall number of subjects referred to outreach team in the considered period (March 22 to April 22, 2020), subdivided by level of respiratory support. NIV = noninvasive ventilation; HFNC = high-flow nasal cannula.

Table 2. Outcomes at 15-d Follow-Up

Outcomes	Ceiling of care ($n = 61$)	Ward ($n = 30$)	ICU ($n = 34$)	P
Deaths	41 (67.2)[*]	0 (0.0)	0 (0.0)	< .001
Still in hospital	1 (1.6)	1 (3.3)	8 (23.5)[*,‖]	< .001
Discharged	19 (31.1)	29 (96.7)[†,‡]	26 (76.4)	< .001
Hospital length of stay, d	11 (5–20)	15 (11–19)	27 (18–34)[†,§]	< .001

Values are presented as n (%) or median (interquartile range). Subjects were discharged to home or to rehabilitation facilities. Length of hospital stay is time from day of admission to end of the 15-d follow-up period.
[*] $P < .001$ compared to the other groups
[†] $P < .001$ compared to $CCOT_{CEI}$ subgroup
[‡] $P = .034$ compared to $CCOT_{ICU}$ subgroup
[§] $P = .002$ compared to $CCOT_{WARD}$ subgroup
[‖] 6 subjects still in ICU

support over another, we focused on the standardization of ward procedures, considering the staff's heterogeneous expertise and device availability.

The ceiling of care indication was adopted for 48.8% of the referred subjects. The agreement with all the attending medical staff led to minimal incorrect emergency calls for cardiac arrest (3.3%) in the care ceiling subgroup, for whom end-stage comfort was achieved in the vast majority of cases (87.5%). Despite the expected highest mortality rate in this group, 31.1% of the subjects were discharged from the hospital, which could be considered a reasonably positive outcome.

Limitations of the Study

Several limitations of this study should be acknowledged. Ward physicians drove the decision to refer a patient to the critical care outreach team. For this reason, the selection of the subjects could potentially be biased by the triage performed by the attending ward staff.

Our data's reproducibility is affected by the relatively small sample of subjects included and by the particular characteristics of our hospital and ICU team. Our unit has a

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long-standing experience in the practice of noninvasive ventilatory support in the wards. Moreover, the availability of senior assistance from ICU consultants around the clock, providing clinical bedside support up to twice per day, is far from being considered the standard of care. Finally, this was only possible by shutting down all elective activities of our hospital.

Finally, the ICU mortality outcomes should be considered with caution because the follow-up period, which was stopped on April 22, 2020, included 8 of 34 (23.5%) subjects who were still in ICU. Presumably, these patients with prolonged ICU stay (median 27 d [IQR 18–34]) would have a negative in-hospital outcome.

Conclusions

In the context of a hospital and ICU surge, the implementation of a dedicated critical care outreach team to provide ventilatory assistance in the wards was associated with proper allocation of ICU resources, including a low rate of cardiac arrest calls, no emergency intubations in the ward, and an adequate level of palliative care support for subjects with a ceiling of care decision.

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