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CHALLENGES OF RESPIRATORY THERAPY IN PATIENTS WITH SEVERE AND CRITICAL COVID-19 IN RESOURCE-LIMITED COUNTRIES

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Introduction. The COVID-19 pandemic has underscored the critical importance of effective oxygen therapy in managing severe and critical cases of the disease. Hypoxemic respiratory failure remains a hallmark of progressive COVID-19, often necessitating escalating oxygen support—from conventional nasal cannulas to high-flow systems, non-invasive ventilation, and invasive mechanical ventilation. Despite advances in treatment protocols, the optimal strategies for oxygen delivery, timing of escalation, and avoidance of complications such as oxygen toxicity continue to challenge clinicians worldwide.
The aim. To evaluate the strategies and results of respiratory support in patients with severe and critical course of COVID-19.
Materials and methods. This study examined medical records from 1,311 COVID-19 patients admitted to Kyiv City Clinical Hospital No. 17 between September 2020 and December 2021. Of these, 252 cases (19.2 %) were classified as severe or critical according to established disease severity criteria. Following application of predetermined exclusion parameters, the final study cohort consisted of 221 eligible patients (representing 87.7 % of qualifying cases), with a near-equal gender distribution (113 females [51.1 %] and 108 males [48.9 %]). All patients received oxygen therapy during hospitalization and underwent pre-oxygen therapy evaluation upon ICU admission, with baseline parameters. Respiratory status included respiratory rate and SpO_2, gas exchange was assessed via PaO_2/FiO_2 ratio. Disease severity was evaluated using SOFA score and SMART-COP. Clinical/demographic data from medical reports included age, sex, BMI, Charlson Comorbidity Index (CCI), ventilation parameters (PIP, PaO_2/FiO_2, IMV duration), and outcomes (mortality rate, pre-intubation oxygen therapy duration).
Results. Among 221 severe/critical COVID-19 patients, 191 (86.4 %) initially received nasal cannula oxygen/ face masks, but 150 (68.2 %) required escalation due to worsening hypoxemia. Non-invasive ventilation (NIV) was attempted in these patients, succeeding in 45.6 %—more likely in younger (58.7 vs. 61.1 yrs), less obese (BMI 29.8 vs. 31.5), and lower comorbidity (CCI 3.2 vs. 3.93) cases. Mechanical ventilation (MV) was needed in 71 (32.1 %) after NIV failure and 30 (13.6 %) admitted with multiorgan failure and critical course. MV patients were predominantly male, with mean age 61.1 ± 14.3 yrs, BMI 31.5 ± 5.2, and high comorbidity (CCI 3.93 ± 3.32). Severe respiratory failure before MV (PaO_2/FiO_2 136.3 ± 91.1, PIP 25.9 ± 6.6 cm H_2O) reflecting extreme disease severity. Mean IMV duration was 9.8 ± 11.3 days, with 93.1 % mortality.
Conclusion. This study highlights the critical role of respiratory therapy strategies in managing severe and critical COVID-19, demonstrating that clinical outcomes are closely tied to both the timing and modality of respiratory support. Our findings reveal that while non-invasive ventilation (NIV) and nasal oxygen/ face masks can effectively prevent intubation in carefully selected patients. But delayed escalation to invasive mechanical ventilation (IMV) in non-responders is associated with significantly high mortality (93.1 %). The high fatality rate among intubated patients underscores the importance of early recognition of treatment failure and timely intervention, particularly in high-risk populations with comorbidities, advanced age, or severe hypoxemia (PaO_2/FiO_2 <150).

Key words: COVID-19, SARS-Cov2, respiratory therapy, coronavirus disease, hypoxemia, NIV, mechanical ventilation, prone positioning, ARDS, respiratory failure.

The most common initial presenting symptoms of COVID-19 include cough, fever, fatigue, headache, myalgia, and possible gastrointestinal disturbances [1, 2]. Severe disease progression typically develops approximately one week after symptom onset. Dyspnea serves as a key symptom of severe illness and is frequently accompanied by decreased arterial oxygen levels [3]. In a significant proportion of

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patients, respiratory failure progresses rapidly, and soon after the onset of dyspnea and hypoxemia, these patients meet the diagnostic criteria for acute respiratory distress syndrome (ARDS), characterized by sudden bilateral infiltrates, severe hypoxemia, and pulmonary edema not caused by cardiac failure or fluid overload due to increased hydrostatic pressure [4, 5].

Severe COVID-19 in adults is diagnosed by the presence of dyspnea (respiratory rate ≥ 30 breaths per minute), oxygen saturation ≤ 92 %, PaO_2/FiO_2 ratio < 300 mmHg, or lung involvement exceeding 50 % of pulmonary tissue [6]. In a large cohort of COVID-19 patients described early in the pandemic, 81 % had mild disease, 14 % developed severe illness, while 5 % progressed to critical disease with multiorgan failure – among these critically ill patients, in-hospital mortality reached 49 % [6].

One of the defining characteristics of the COVID-19 pandemic has been the sudden surge of critically ill patients with respiratory failure within limited geographic areas [7]. This phenomenon has frequently overwhelmed local healthcare systems, leading to shortages of: skilled medical personnel, mechanical ventilators, intensive care unit beds, oxygen therapy capacity (which became essential for COVID-19 management) [8]. According to WHO analysis from October 2020, 60 % of oxygen delivery systems relied on oxygen concentrators. Notably, these devices provide 80-92 % O_2 concentration depending on required flow rates. Since the pandemic's onset, treatment capabilities for severe COVID-19 have significantly improved through: antiviral medications, immunomodulators and vaccination campaigns, a subset of patients still progress to severe disease requiring intensive interventions [9,10]. The management of oxygen therapy in severe and critical COVID-19 remains a critical challenge in clinical practice, despite three years of pandemic experience. Variations in clinical practice (e.g., when to intubate, PEEP titration) lead to inconsistent outcomes. Prone positioning and oxygen weaning strategies also lack universal guidelines. This article analyzes the data from one center, where severe/critical COVID-19 patients were treated to address these gaps, offering evidence-based strategies to optimize oxygen delivery while balancing resource constraints and risks.

THE AIM

To evaluate the strategies and results of respiratory therapy in patients with severe and critical course of COVID-19.

MATERIALS AND METHODS

Study Population and Selection Criteria

This retrospective cohort study evaluated treatment outcomes among 1,311 PCR-confirmed COVID-19 patients hospitalized at Kyiv City Clinical Hospital No. 17 between September 2020 and December 2021. Eligible participants met the following inclusion criteria: laboratory-confirmed SARS-CoV-2 infection via PCR testing, age ≥ 18 years, severe disease classification (respiratory rate ≥ 30/min, $SaO_2 \leq 92$ %, $PaO_2/FiO_2 < 300$ mmHg, or > 50 % pulmonary infiltrates with 24-48h progression), critical disease presentation (multiorgan failure or Glasgow Coma Scale-documented consciousness impairment) [11].

From the initial cohort, 252 patients (19.2 %) qualified as severe/critical cases. Application of exclusion criteria early in-hospital mortality (<24h; n=30) and active pulmonary tuberculosis (n=1) – yielded a final analytical sample of 221 patients (87.7 %). The study population demonstrated balanced sex distribution (113 females [51.1 %], 108 males [48.9 %]). All patients received respiratory therapy during hospitalization.

All patients admitted to the Department of Anesthesiology and Intensive Care underwent standardized pre-oxygen therapy evaluation. Baseline parameters were recorded within 30 minutes of ICU admission by trained staff using calibrated equipment. Key measurements included: respiratory status – respiratory rate and oxygen saturation, gas exchange – PaO_2/FiO_2 ratio, disease severity – SOFA score [12] and SMART-COP (assessed independently by two physicians) [13]. Clinical and demographic data extracted from electronic medical records (EMRs) included: demographics (age, sex), anthropometrics (body mass index (BMI), obesity (BMI >30 kg/m²), comorbidities (Charlson Comorbidity Index (CCI) score) [14], ventilation parameters: peak inspiratory pressure (PIP, cm H_2O), PaO_2/FiO_2 ratio, duration of invasive mechanical ventilation (IMV, days), outcomes (mortality rate (%), duration of oxygen therapy prior to intubation (days)

Oxygen therapy

To correct acute hypoxemia and prevent progression to full-blown acute respiratory distress syndrome (ARDS), various non-invasive respiratory support strategies were employed, tailored to the severity of the patient's clinical condition. The most widely used method was oxygen therapy, administered both via nasal cannulas/face masks and high-flow systems. Oxygen therapy played a pivotal role in stabilizing patients with severe COVID-19, particularly in cases of rapidly deteriorating pulmonary function.

All patients with severe COVID-19 received oxygen support, primarily via face masks, when feasible, with minimally required oxygen flow, targeting capillary blood oxygen levels > 92% as measured by pulse oximetry (SpO_2). Oxygen flow rates were titrated under continuous pulse oximetry monitoring and periodic blood gas analysis. When

desaturation below 92 % occurred, oxygen delivery was increased using reservoir masks with one-way valves that accumulated oxygen during inhalation. Reservoir masks served as a crucial adjunctive oxygen therapy method, often combined (based on patient needs) with standard face masks or NIV as key components of the respiratory support chain for COVID-19 respiratory failure. Patients receiving oxygen via face masks (with or without reservoirs) were easier to care for and generally tolerated prolonged prone positioning more comfortably, which frequently improved oxygenation, psychological state, and overall compliance. High-flow nasal oxygen (HFNO) was used in only 3 patients in our cohort, with limited experience due to its high oxygen demand (30-60 L/min), which was often unfeasible given pandemic-related oxygen shortages in healthcare facilities.

Non-invasive ventilation

Indications for non-invasive respiratory support included: severe dyspnea with accessory muscle use or tachypnea (> 25 breaths/min), $PaO_2/FiO_2 < 300$, $SpO_2 < 92$ % at FiO_2 0.4, or $PaCO_2 > 45$ mmHg with pH < 7.35. Non-invasive ventilation (NIV) was primarily (172 (78 %) cases) delivered in pressure support (PS) mode with average pressures of 8-12 cm H_2O. In 187 (85 %) cases, PEEP did not exceed 10 cm H_2O (mean 6-8 cm H_2O), effectively improving oxygenation while minimizing barotrauma risk. These parameters proved optimal for most COVID-19-associated ARDS patients [15].

Monitoring of respiratory support included a combination of clinical parameters and oxygenation parameters. The criteria for a positive response to therapy were: improvement in clinical signs of respiratory function with a decrease in respiratory rate (RR) and reduced use of accessory muscles, as well as reduced dyspnea and improved oxygenation.

In patients receiving respiratory support via a face mask with the delivery of pure, warm, humidified oxygen, in addition to monitoring blood oxygen saturation, fatigue or exhaustion was monitored both at rest and during physical exertion. The following parameters were used for assessment: tachypnea, as some patients required more than just an increase and titration of FiO_2 for respiratory support, because the use of an oxygen mask did not generate positive end-expiratory pressure (PEEP), which was an essential factor in preventing the collapse of small airways and alveoli at the end of expiration. In such cases, PEEP was maintained using continuous positive airway pressure (CPAP) or non-invasive ventilation (NIV) with biphasic positive airway pressure (BiPAP or PS).

Continuous positive airway pressure was provided by specialized devices equipped with a PEEP valve, which created resistance during expiration. These devices were connected to a tightly fitting face mask, nasal cannula, or NIV mask. For non-invasive ventilation, Monnal ventilators were used, with the most common interface being a tightly fitting oro-nasal NIV mask.

In addition to PEEP, the ventilators provided pressure support (PS) to facilitate inspiration (reducing the patient's work of breathing) and allowed for the adjustment of additional parameters to synchronize the ventilator with the patient using triggers. Better synchronization with the ventilator improved patient tolerance of respiratory support, which was reflected in reduced agitation and greater patient readiness to adapt to the ventilator, thereby maintaining respiratory compliance.

Invasive ventilation

Ensuring timely tracheal intubation in patients with hypoxia and severe COVID-19 largely depended on the capabilities and availability of mechanical ventilators (MV) in the department, which also included specific triage algorithms for oxygen-dependent patients in the ICU under resource-limited conditions. A significant proportion of relatively young patients (under 65 years) tolerated hypoxemia well—even with oxygen saturation (SpO_2) levels below 88 %—without severe respiratory distress or exhaustion. This was confirmed by clinically objective monitoring criteria: stable respiratory rate (RR ≤ 20 breaths/min), absence of dyspnea at rest and during minimal physical exertion, normal blood pH (7.35-7.45), no increase in lactate (< 2 mmol/L), and preserved baseline consciousness. These criteria indicated the absence of respiratory distress despite desaturation during physical activity. Indications for tracheal intubation were based not only on hypoxemia but also on the severity of acute respiratory distress syndrome (ARDS) and exhaustion from prolonged non-invasive ventilation (NIV). However, given early reports on the outcomes of MV in COVID-19 patients—which described worsening or even lung injury post-intubation [16].

Tracheal intubation was performed only in select cases, often with deliberate delay (early in the pandemic, conflicting guidelines created unwarranted apprehension among physicians) [17]. Intubation was prioritized when the following criteria were met: severe hypoxemia ($SpO_2 < 85\%$ despite maximal oxygen therapy, $FiO_2 \geq 0.6$), progressive respiratory acidosis (pH < 7.25 with $PaCO_2 > 60$ [55] mmHg and $PaO_2 < 60$ mmHg), clinical signs of respiratory muscle exhaustion (paradoxical breathing, use of accessory muscles), altered mental status unrelated to other causes (GCS ≤ 12), or hemodynamic instability (BP < 90 mmHg despite infusion therapy). In other cases, NIV was preferred.

The requirement for consent was waived by the Ethics Committee due to the retrospective analysis of anonymized patient records.

Statistical analysis

Data normality was evaluated using the Shapiro-Wilk test. Descriptive statistics were presented differently for categorical and continuous variables: categorical data were reported as frequency counts and percentages, while continuous variables were expressed as mean ± standard deviation or median with range. Given the predominance of categorical variables in our dataset, we employed the χ^2 (chi-square) test for statistical comparisons. For contingency tables with expected cell counts below 5, we used Fisher's exact test instead. Continuous variables were compared between independent groups using the Mann-Whitney U test. All data were initially compiled in Microsoft Excel, with subsequent statistical analyses performed using STATISTICA 16.1 software (StatSoft Inc.).

RESULTS

The clinical characteristics of patients upon ICU admission are presented in Table 1, which includes data on respiratory rate, oxygen saturation levels, oxygen require-ments, and other parameters used to assess disease severity at admission.

Among the 221 patients with severe/critical COVID-19, nasal cannula/face mask oxygen therapy was initially administered in 191 (86,4 %) cases. However, in 150 (68.2 %) patients required further escalation to advanced respiratory support due to worsening hypoxemia or clinical deterioration. In this patients NIV was conducted, and mechanical ventilation (MV) was performed in 71 (32.1 %) patients after ineffective non-invasive ventilation (NIV) or in cases where NIV was absolutely contraindicated, and in 30 (13.6 %) patients who were admitted to the ICU in extremely critical condition with signs of severe respiratory and/or multiorgan failure, clinically significant complications due to COVID-19, and impaired consciousness. Data on patients who underwent MV are presented in Table 2.

Table 1. The clinical data of patients with severe and critical COVID-19 upon admission.

Parameter	Value
Respiratory rate, breaths/min	28 (26-29)*
Oxygen saturation, %	84 (76.0-88.0)*
PaO_2/FiO_2 ratio	190.01 ± 38.67
SOFA score	5 (4-6)*
SMART-COP score	7 (6-8)*

* – *Median (interquartile range; IQR)*

NIV succeeded in 45.6 % of cases, particularly in younger (58.7 vs 61.1 yrs), less obese (29.8 vs 31.5 BMI), and lower comorbidity burden (CCI 3.2 vs 3.93) patients. And initial PaO_2/FiO_2 of 180 suggests NIV works best when initiated before severe ARDS develops (MV group: 136 at intubation).

Among patients with severe and critical COVID-19 who received invasive ventilation, males predominated (65 individuals), indicating a higher susceptibility to severe disease progression in men. The mean patient age was 61.1 ± 14.3 years. The mean BMI was 31.5 ± 5.2 kg/m². The Charlson Comorbidity Index score was 3.93 ± 3.32 points, reflecting a significant burden of comorbidities.

Ventilation parameters revealed a peak inspiratory pressure of 25.9 ± 6.6 cm H_2O and a PaO_2/FiO_2 ratio of 136.3 ± 91.1 at intubation, consistent with severe respiratory failure and meeting diagnostic criteria for moderate ARDS (acute respiratory distress syndrome). The mean duration of invasive mechanical ventilation (IMV) was 9.8 ± 11.3 days, with a mortality rate of 93.1% among ventilated patients, underscoring the critical severity of their condition.

Table 2. Data on patients with severe and critical COVID-19 who underwent non – invasive and invasive mechanical ventilation.

Parameter	Non – invasive ventilation total (n=150)	Invasive ventilation total (n=101)
Demographics		
Female/Male, n	54/96	36/65
Age, years (mean ± SD)	58.7 ± 12.9	61.1 ± 14.3
Clinical characteristics		
BMI, kg/m² (mean ± SD)	29.8 ± 4.7	31.5 ± 5.2
Charlson Comorbidity Index, points (mean ± SD)	3.2 ± 2.8	3.93 ± 3.32
Treatment parameters		
Duration of oxygen therapy, days (mean ± SD)	5.9 ± 2.3	4.21 ± 3.01
PaO_2/FiO_2 ratio at start (mean ± SD)	180 ± 45	136.3 ± 61.1
Duration of mechanical ventilation, days (mean ± SD)	5.2 ± 2.8	9.8 ± 3.3
Outcomes		
Mortality rate among patients, % (n)	54.4% (81)	93.1% (94)

DISCUSSION

Dyspnea, increased respiratory rate, and severe hypoxemia were the main reasons for hospitalization in patients with severe COVID-19 and worsened more frequently after the 10th day of illness, although hypoxemia (<88–90% SpO_2) in younger patients (under 65) was often tolerated without critical distress. All patients received oxygen therapy, primarily via face masks – both rebreathing and non-rebreathing – with maximum oxygen flow and FiO_2 to maintain SpO_2 >92% [16]. For desaturation below 92%, reservoir bag masks and prone positioning were predominantly used, which improved blood oxygenation by enhancing ventilation in the posterior lung regions. Clinical monitoring in COVID-19 patients included assessing clinical signs (reduced respiratory rate, dyspnea) and oxygenation. However, when oxygenation via face masks was insufficient due to the lack of positive end-expiratory pressure (PEEP), we adjusted oxygen therapy tactics and transitioned to non-invasive ventilation (NIV) in CPAP or BiPAP/PS mode to create positive pressure during inspiration and expiration, thereby improving lung compliance [18].

Tracheal intubation was performed only in severe cases and based on indications (71 patients, 32.1%, after ineffective NIV; 30, 13.6%, in extremely critical condition). It was avoided due to the risk of complications and early pandemic fears that it would become a "point of no return" for patients, so NIV was preferred, and patients were maintained on this oxygenation stage for as long as possible [15,16].

Despite the high mortality rate among invasively ventilated patients, invasive mechanical ventilation (IMV) remains crucial and evidence-based in critically ill COVID-19 cases (though early replacement of the endotracheal tube with a tracheostomy tube is recommended to minimize complications) [17]. In COVID-19, severely affected lung areas are adjacent to relatively unaffected ones [3,10]. Atelectatic regions are difficult or impossible to recruit using high PEEP maneuvers, while unaffected areas remain highly susceptible to overdistension due to excessive PEEP [19].

Thus, in these patients, lung-protective ventilation strategies aimed at preventing ventilator-induced lung injury by safeguarding undamaged lung tissue were prioritized. This conservative approach, recommended in critical cases with extensive lung damage, took precedence over achieving normoxemia and normocapnia, allowing permissive hypoxemia (PaO_2 ≥80 mmHg) and permissive hypercapnia ($PaCO_2$ ≤55 mmHg, pH ≥7.2) [20].

In summary, based on the analysis of COVID-19 patient treatment outcomes, we propose an optimized oxygen therapy strategy. Basic principals include:Move stepwise from least to most invasive support (nasal cannula/face mask → HFNC → NIV → IMV), advancing to next level if current therapy

Table 3. Respiratory Chain: A Stepwise Strategy for Respiratory Support in Severe COVID-19

Stage	Method of Respiratory Support	Indications	Contraindications	Criteria for Escalation to Next Stage
1	Conventional Oxygen Therapy (Nasal cannula, Face mask)	SpO_2 < 95%, RR > 20/min, signs of respiratory failure	–	No improvement in SpO_2 or clinical condition
2	High-Flow Nasal Oxygen (HFNO)	Moderate hypoxemia (SpO_2 < 92–94%), high oxygen demand (>5 L/min), RR > 20/min	Respiratory acidosis (pH < 7.3), loss of consciousness, hemodynamic instability	No improvement, worsening respiratory fatigue
3	Non-Invasive Ventilation (NIV)	Moderate acute respiratory failure, preserved respiratory drive	Severe hypoxemia/acidosis, impaired consciousness, aspiration risk, facial trauma	Clinical deterioration, NIV failure
4	Non-Rebreather Mask (NRB)	Insufficient oxygenation with standard mask, need for FiO_2 0.6–0.9	–	SpO_2 < 94–95%, worsening respiratory fatigue
5	Invasive Mechanical Ventilation (IMV)	Severe hypoxemia (PaO_2/FiO_2 < 150), severe acidosis (pH < 7.25), impaired consciousness, hemodynamic instability	Individual risk assessment	IMV duration > 7 days – consider tracheostomy
6	De-escalation of Support	Clinical stabilization, improved gas exchange	–	Stepwise reduction of support (reverse stages 4→2→1 /3(as requied)

fails to meet oxygenation/ventilation targets or clinical deterioration occurs, avoiding certain methods when risks outweigh benefits (e.g., NIV in coma, HFNC in severe hypercapnia), systematically reducing of support when stability improves, using standardized weaning protocols (Table 3).

While providing real-world insights, our study has serious limitations considering different oxygen strategies (HFNC, NIV, IMV) in patients without equal baseline severity, affecting outcome comparisons. Lack of randomization means unrecorded factors (e.g., timing of therapy initiation, local protocols) could influence results and retrospective data without control group collection risks missing variables during pandemic reality. Also variable treatments during the study period could confound mortality trends. Despite its design, this study offers several important strengths that enhance its clinical relevance and scientific value because unlike controlled trials, this study captures how oxygen therapies were truly used in a pandemic crisis, including physician decision-making under resource constraints and provide practical tool for decision making.

CONCLUSION

This study highlights the critical role of oxygen therapy and respiratory strategies in managing severe and critical COVID-19, demonstrating that clinical outcomes are closely tied to both the timing and modality of respiratory support. Our findings reveal that while non-invasive ventilation (NIV) and nasal oxygen/face mask can effectively prevent intubation in a subset of patients, delayed escalation to invasive mechanical ventilation (IMV) in non-responders is associated with significantly higher mortality (93.1%). The high fatality rate among intubated patients underscores the importance of early recognition of treatment failure and timely intervention, particularly in high-risk populations with comorbidities, advanced age, or severe hypoxemia (PaO_2/FiO_2 <150).

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СЕРЕДА С.О.

ПРОБЛЕМИ РЕСПІРАТОРНОЇ ТЕРАПІЇ У ПАЦІЄНТІВ З ВАЖКИМ ТА КРИТИЧНИМ ПЕРЕБІГОМ COVID-19 У КРАЇНАХ З ОБМЕЖЕНИМИ РЕСУРСАМИ

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Вступ. Пандемія COVID-19 підкреслила критичну важливість ефективної кисневої терапії при тяжкому та критичному перебігу коронавірусного захворювання. Гіпоксемічна дихальна недостатність залишається ключовою ознакою прогресуючого COVID-19, що часто вимагає поступового підвищення респіраторної підтримки – від звичайних назальних канюль/лицевих кисневих масок до високопотокової кисневої назальної терапії, неінвазивної вентиляції (НІВ) та інвазивної штучної вентиляції легень (ІШВЛ). Не зважаючи на прогрес у лікуванні коронавірусного захворювання, оптимальні стратегії кисневої терапії, своєчасність її та підбір відповідно до показів та клінічного стану пацієнта, запобігання можливих ускладнень – залишаються викликом для лікарів у всьому світі.

Мета. Оцінити стратегії та результати респіраторної підтримки у пацієнтів із тяжким і критичним перебігом COVID-19.

Матеріали та методи. Дослідження включає результати лікування 1311 пацієнтів із діагностованим COVID-19, госпіталізованих до КНП «Київської міської клінічної лікарні № 17» у період з вересня 2020 по грудень 2021 року. Серед них – 252 випадки (19,2 %) були класифіковані як тяжкі або критичні пацієнти. Після відбору пацієнтів відповідно до критеріїв включення та виключення у дослідження, остаточна когорта склала 221 досліджуваного випадку (87,7 % випадків) із майже рівним розподілом за статтю (113 жінок (51,1 %) та 108 чоловіків (48,9 %). Усі пацієнти отримували кисневу терапію та проходили стандартне обстеження при надходженні до блоку інтенсивної терапії. Були оцінені дихальний статус: частота дихання, SpO_2, газообмін: співвідношення PaO_2/FiO_2; тяжкість стану: шкали SOFA та SMART-COP. Також аналізувалися демографічні дані, індекс маси тіла, індекс коморбідності Чарлсона, параметри вентиляції (піковий тиск вдиху, тривалість) та результати лікування (летальність, тривалість кисневої терапії до інтубації).

Результати. Серед 221 пацієнтів – 191 (86,4%) спочатку отримували кисеневу терапію через назальні канюлі/лицеві маски, але 150 (68,2 %) потребували інтенсивної кисневої терапії через прогресуючу гіпоксемію. Неінвазивна вентиляція (НІВ) була успішною у 45,6 % випадків, переважно у молодших (58,7 проти 61,1 років), з меншою масою тіла (ІМТ 29,8 проти 31,5) пацієнтів із нижчим індексом коморбідності Чарлсона (3,2 проти 3,93). Інвазивна вентиляція (ІШВЛ) була проведена 71 (32,1 %) пацієнту після неефективності НІВ та 30 (13,6 %) – при надходженні у критичному стані у блок інтенсивної терапії при інфекційному відділенні. Пацієнти на ІШВЛ переважно були чоловіками (65 осіб), із середнім віком 61,1 ± 14,3 роки, ІМТ 31,5 ± 5,2 та високим індексом коморбідності Чарлсона (3,93 ± 3,32). Напередодні ІШВЛ спостерігали тяжкий респіраторний дистрес (PaO_2/FiO_2 136,3 ± 91,1, піковий тиск вдиху 25,9 ± 6,6 см H_2O). Середня тривалість ІШВЛ – 9,8 ± 11,3 дні, летальність – 93,1%.

Висновки. Дослідження підкреслює ключову роль стратегій респіраторної підтримки при тяжкому COVID-19: НІВ та загальна киснева терапія можуть ефективно запобігати інтубації у ретельно відібраних та клінічно не критичних пацієнтів. Пізнє використання ІШВЛ при неефективності НІВ корелює з високою летальністю (93,1 %). Критично важливим є своєчасне визнання невдачі лікування, особливо у пацієнтів із коморбідностями, похилим віком або тяжкою гіпоксемією (PaO_2/FiO_2 <150) та прийняти рішення про вчасний перехід на ІШВЛ.

Ключові слова: COVID-19, SARS-Cov2, киснева терапія, корановірусна хвороба, гіпоксемія, НІВ, механічна вентиляція, прон-позиціювання, ГРДС, дихальна недостність.

УЧАСТЬ АВТОРІВ В ПІДГОТОВЦІ СТАТТІ:
Автор підтверджує одноосібну відповідальність за: концепцію та дизайн дослідження, збирання даних, аналіз та інтерпретацію результатів, підготовку рукопису