EVIDENCE SEARCH REPORT

RESEARCH QUESTION: In similar jurisdictions experiencing the COVID-19 pandemic, what is the proportion of patients receiving non-invasive ventilation versus those receiving intermittent mandatory ventilation?

UNIQUE IDENTIFIER: EOC052102-01 ESR

RESOURCES USED:
- MEDLINE (Ovid, PubMed, PMC, LitCovid)
- Embase (Ovid)
- CINAHL (Ebsco)
- Cochrane Library
- Cochrane CENTRAL
- ClinicalTrials.gov
- MedrXiv
- WHO Global Research on Coronavirus Disease
- Europe Pubmed Central
- NICE, NHS (UK)
- DynaMed
- UpToDate
- Google, Google Scholar
- Health Canada (including PHAC)
- Provincial Health authorities
- CDC, FDA, Whitehouse.gov (USA)
- CDC COVID-19 Research Articles
- ECRI
- WHO website

LIMITS/EXCLUSIONS/INCLUSIONS: English

DATE: May 21, 2020

LIBRARIAN: Lukas Miller & Michelle Dalidowicz

REFERENCE INTERVIEW COMPLETED: None conducted

REQUESTOR: Dr. John Froh

TEAM: EOC

SEARCH ALERTS CREATED: No (to be discussed)


LIBRARIAN NOTES/COMMENTS

Note: limitations of time prevented a reference interview from taking place for this search. /LM
I could find no sources of Canadian hospital/healthcare data (federal or provincial) to directly answer the question, in published sources and unpublished (grey-literature) sources. A data table from PHAC was found (containing preliminary data), though it lacks the specificity of treatment methods.
I checked numerous data surveillance/tracking dashboards (John's Hopkins, provincial trackers, newmedia orgs), but none found report on treatments/interventions, typically only the number of cases, tests, fatalities, and clearances.

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This information is provided as a service by the Saskatchewan Health Authority and University of Saskatchewan Libraries. Professional librarians conduct searches of the literature. Results are subject to the limitations of the databases and the specificity, breadth and appropriateness of the search parameters presented by the requester. The Libraries do not represent in any matter that retrieved citations are complete, accurate or otherwise to be relied upon. The search results are only valid as of the date and time at which the search is conducted. The Libraries do not accept responsibility for any loss or damage arising from the use of, or reliance on, search results.
The National Post reported on difficulties we are finding ourselves in when it comes to data:

Given a lack of local primary data, I opted to include reports/studies from a broader, international base. One study from China had a very similar question, but it took place in 2005 with regard to the SARS outbreak. (In the reference list below.)

I found that this sort of data is buried in tables of larger epidemiological studies (e.g. NEJM, JAMA). As more get published there will be more data to assess and work with. (That said, I can’t guess how long until we see Canadian figures...)

Many papers raise the issue of AGMP and risk of transmission surrounding ventilation. These results were unavoidable in my search, and I did my best to exclude those findings that focused on preventative measures.

Grey literature was very limited, aside from the Statistics Canada/PHAC table mentioned I could find no reports, policies, or other unpublished/informal literature to address the question posed.

Thank you and please let me know if you have questions or concerns.

Sincerely,
Lukas Miller

SEARCH RESULTS

To obtain the full-text articles or to request offsite access, email library@saskhealthauthority.ca.

SUMMARIES, GUIDELINES & OTHER RESOURCES

Government Data / Statistics

- Statistics Canada. Table 13-10-0766-01 Detailed confirmed cases of coronavirus disease (COVID-19) (Preliminary data), Public Health Agency of Canada
  https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1310076601
  - Columns for hospitalizations and admission to ICU.

  - "Of the 36 cases in the ICU, 4 (11.1%) received high-flow oxygen therapy, 15 (41.7%) received noninvasive ventilation, and 17 (47.2%) received invasive ventilation (4 were switched to extracorporeal membrane oxygenation). As of February 3, 47 patients (34.1%) were discharged and 6 died (overall mortality, 4.3%), but the remaining patients are still hospitalized. Among those discharged alive (n = 47), the median hospital stay was 10 days (IQR, 7.0-14.0)."

  - Provides clinical characteristics of a large Chinese population
    - oxygen therapy was administered in 41.3% and mechanical ventilation in 6.1%; higher percentages of patients with severe disease received these therapies (Table 3). Mechanical ventilation was initiated in more patients with severe disease than in those with nonsevere disease (noninvasive ventilation, 32.4% vs. 0%; invasive ventilation, 14.5% vs. 0%).

From table 3 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7092819/table/t3/)

<table>
<thead>
<tr>
<th>Variable</th>
<th>All patients (N=1099)</th>
<th>Nonsevere (N=926)</th>
<th>Severe (N=173)</th>
<th>Presence of Composite Primary End Point N=67</th>
<th>Presence of Composite Primary End Point N=1032</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen therapy</td>
<td>454 (41.3)</td>
<td>331 (35.7)</td>
<td>123 (71.1)</td>
<td>59 (88.1)</td>
<td>395 (38.3)</td>
</tr>
<tr>
<td>Mech vent</td>
<td>62 (6.1)</td>
<td>0</td>
<td>67 (38.7)</td>
<td>40 (59.7)</td>
<td>27 (2.6)</td>
</tr>
<tr>
<td></td>
<td>Invasive</td>
<td>Noninvasive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>------------</td>
<td>------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 (2.3)</td>
<td>0</td>
<td>25 (14.5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 (37.3)</td>
<td>29 (43.3)</td>
<td>27 (2.6)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- See full table for recovery/discharge data, complications, etc.


- Provides clinical characteristics for 486 cases in the Chicago area
- During the hospitalization, 138 (28.4%) patients were intubated; 78 (56.5%) were eventually extubated; 21 (15.2%) died; and 39 (28.3%) remained intubated at a mean ± SD follow-up of 19.6 ± 6.7 days.


- "The Large observational study to UNderstand the Global impact of Severe Acute respiratory Failure (LUNG SAFE) study, a large multicenter study, demonstrated that there is no significant difference in intensive care unit (ICU) and hospital mortality rates of patients with ARDS receiving NIV or mechanical ventilation, when ARDS severity, demographic characteristics, and associated comorbidities of both treatment groups were matched."

- Link to the LUNG SAFE study cited: [https://pubmed.ncbi.nlm.nih.gov/27753501/]


- "With the use of PPE on the ICU, use of NIV during the severe acute respiratory syndrome epidemic was not associated with an increased risk of transmission of the virus to health-care workers; endotracheal intubation was associated with an increased risk of aerosolisation and infection of health-care workers. The notion that early intubation avoids use of CPAP or NIV, therefore decreasing risk of viral transmission with the use of PPE, is debatable."

- "In patients with Middle East respiratory syndrome and acute hypoxaemic respiratory failure, NIV failure was high and was not associated with improved outcomes."

- "the clinical severity and mortality from Middle East respiratory syndrome was markedly greater than from severe acute respiratory syndrome or COVID-19"


- Small sample of Italian population (n=250) conducted using the prone positioning intervention, outside ICU.


- Very general study, but was cited recently with regard to COVID-19.


ARTICLES FROM THE LIBRARY DATABASES


ABSTRACT: Patients with severe and critical COVID-19 will develop into acute respiratory distress syndrome in a short time. Noninvasive or invasive positive pressure ventilation will be important means for those patients, which will help to improve the
clinical cure rate and reduce the mortality. Effective airway management has a great significance to improve respiratory support, reduce complications, and promote rehabilitation.

URL: https://www.ncbi.nlm.nih.gov/pubmed/32100976
DOI: 10.3760/cma.j.issn.1673-0860.2020.04.001


ABSTRACT: With the expanding use of molecular assays, viral pathogens are increasingly recognized among critically ill adult patients with community-acquired severe respiratory illness; studies have detected respiratory viral infections (RVIs) in 17-53% of such patients. In addition, novel pathogens including zoonotic coronaviruses like the agents causing Severe Acute Respiratory Syndrome (SARS), Middle East Respiratory Syndrome (MERS) and the 2019 novel coronavirus (2019 nCoV) are still being identified. Patients with severe RVIs requiring ICU care present typically with hypoxemic respiratory failure. Oseltamivir is the most widely used neuraminidase inhibitor for treatment of influenza; data suggest that early use is associated with reduced mortality in critically ill patients with influenza. At present, there are no antiviral therapies of proven efficacy for other severe RVIs. Several adjunctive pharmacologic interventions have been studied for their immunomodulatory effects, including macrolides, corticosteroids, cyclooxygenase-2 inhibitors, sirolimus, statins, anti-influenza immune plasma, and vitamin C, but none is recommended at present in severe RVIs. Evidence-based supportive care is the mainstay for management of severe respiratory viral infection. Non-invasive ventilation in patients with severe RVI causing acute hypoxemic respiratory failure and pneumonia is associated with a high likelihood of transition to invasive ventilation. Limited existing knowledge highlights the need for data regarding supportive care and adjunctive pharmacologic therapy that is specific for critically ill patients with severe RVI. There is a need for more pragmatic and efficient designs to test different therapeutics both individually and in combination.

URL: https://www.ncbi.nlm.nih.gov/pubmed/32040667
DOI: 10.1007/s00134-020-05943-5


URL: https://doi.org/10.1016/S2213-2600(20)30181-8
DOI: 10.1016/S2213-2600(20)30181-8


URL: https://www.ncbi.nlm.nih.gov/pubmed/32273336
DOI: 10.1136/thoraxjnl-2020-214913


URL: https://www.ncbi.nlm.nih.gov/pubmed/32273335
DOI: 10.1136/thoraxjnl-2020-214890


ABSTRACT: Coronavirus disease 2019 (COVID-19) is a respiratory tract infection caused by a newly emergent coronavirus, that was first recognized in Wuhan, China, in December 2019. Currently, the World Health Organization (WHO) has defined the infection as a global pandemic and there is a health and social emergency for the management of this new infection. While most people with COVID-19 develop only mild or uncomplicated illness, approximately 14% develop severe disease that requires hospitalization and oxygen support, and 5% require admission to an intensive care unit. In severe cases, COVID-19 can be complicated by the acute respiratory distress syndrome (ARDS), sepsis and septic shock, and multiorgan failure. This consensus document has been prepared on evidence-informed guidelines developed by a multidisciplinary panel of health care providers from four Spanish scientific societies (Spanish Society of Intensive Care Medicine [SEMICYUC], Spanish Society of Pulmonologists [SEPAR], Spanish Society of Emergency [SEMES], Spanish Society of Anesthesiology, Reanimation, and Pain
[SEDAR]) with experience in the clinical management of patients with COVID-19 and other viral infections, including SARS, as well as sepsis and ARDS. The document provides clinical recommendations for the noninvasive respiratory support (noninvasive ventilation, high flow oxygen therapy with nasal cannula) in any patient with suspected or confirmed presentation of COVID-19 with acute respiratory failure. This consensus guidance should serve as a foundation for optimized supportive care to ensure the best possible chance for survival and to allow for reliable comparison of investigational therapeutic interventions as part of randomized controlled trials. Copyright © 2020 Elsevier Espana, S.L.U. y SEMICYUC

URL: http://www.doyma.es/medintensiva/
DOI: http://dx.doi.org/10.1016/j.medin.2020.03.005


ABSTRACT: Severe acute respiratory infection (SARI) diseases (such as SARS, MERS, pH1N1) can rapidly progress to acute respiratory failure with high lethality. The outbreak of a novel coronavirus infection can lead to 15%-30% patients developing into acute respiratory distress syndrome (ARDS). Respiratory support is the most important therapy for SARI patients with respiratory failure. However, respiratory support is a high skilled technology, which means inappropriate application may bring related complications and cross infection of SARI pathogens among medical staff and non-medical personnel in hospital. Therefore, it is meaningful to established a standardized indication of respiratory support and to prevent related nosocomial transmission in SARI patients.

URL: https://www.ncbi.nlm.nih.gov/pubmed/32164086
DOI: 10.3760/cma.j.issn.1001-0939.2020.03.010


ABSTRACT: Here we report an investigation to adapt existing non-invasive ventilators (NIV) capable of delivering CPAP for use with oxygen to deliver enriched ventilation of 40%+ FiO2. Our intention is to maximise use of existing resources available to HCPs, as NIV and sleep apnoea (CPAP) machines are widely available, to deliver therapeutic benefit and potentially avoid the need for positive pressure ventilation during the COVID-19 pandemic. Competing Interest StatementThe authors have declared no competing interest. Funding StatementThe research is supported by the National Institute for Health Research (NIHR) infrastructure at Leeds. The views expressed are those of the authors and not necessarily those of the NHS, the NIHR or the Department of Health and Social Care. The authors would like to thank the NIHR MedTech and In Vitro diagnostics Co-operatives (MICs). Author DeclarationsAll relevant ethical guidelines have been followed; any necessary IRB and/or ethics committee approvals have been obtained and details of the IRB/oversight body are included in the manuscript. Yes

All necessary patient/participant consent has been obtained and the appropriate institutional forms have been archived. Yes

I understand that all clinical trials and any other prospective interventional studies must be registered with an ICMJE-approved registry, such as ClinicalTrials.gov. I confirm that any such study reported in the manuscript has been registered and the trial registration ID is provided (note: if posting a prospective study registered retrospectively, please provide a statement in the trial ID field explaining why the study was not registered in advance). Yes I have followed all appropriate research reporting guidelines and uploaded the relevant EQUATOR Network research reporting checklist(s) and other pertinent material as supplementary files, if applicable. Yes

Further data is available from the research team on request.

URL: http://medrxiv.org/content/early/2020/04/11/2020.04.06.20055665.abstract
DOI: 10.1101/2020.04.06.20055665


URL: https://clinicaltrials.gov/ct2/show/NCT04363463


ABSTRACT: Acute respiratory failure due to acute hypoxemia is the major manifestation in severe coronavirus disease 2019 (COVID-19) induced by severe acute respiratory syndrome coronavirus 2 infection. Rational and effective respiratory support is crucial in the management of COVID-19 patients. High-flow nasal cannula (HFNC) has been utilized widely due to its superiority over other non-invasive respiratory support techniques. To avoid HFNC failure and intubation delay, the key issues are proper patients, timely application and improving compliance. It should be noted that elder patients are vulnerable for
failed HFNC. We applied HFNC for oxygen therapy in severe and critical COVID-19 patients and summarized the following experiences. Firstly, to select the proper size of nasal catheter, to locate it at suitable place, and to confirm the nose and the upper respiratory airway unobstructed. Secondly, an initial flow of 60 L/min and 37 should be given immediately for patients with obvious respiratory distress or weak cough ability; otherwise, low-level support should be given first and the level gradually increased. Thirdly, to avoid hypoxia or hypoxemia, the treatment goal of HFNC should be maintained the oxygen saturation (SpO2) above 95% for patients without chronic pulmonary disease. Finally, patients should wear a surgical mask during HFNC treatment to reduce the risk of virus transmission through droplets or aerosols.

URL: https://www.ncbi.nlm.nih.gov/pubmed/32268019

ABSTRACT: A 37-year-old female presents with cough, fever, dyspnea, and myalgias for five days after recent contact with a family member with confirmed COVID-19. Her vital signs include T 38.3°C, HR 108, BP 118/70 mm Hg, RR 26 breaths per minute, and oxygen saturation 67% on roomair. She is not in respiratory distress currently and is protecting her airway. Her chest x-ray reveals bilateral airspace opacities. You plan to immediately intervene and address her hypoxia. (https://www.cambridge.org/core/article/just-the-facts-what-are-the-roles-of-oxygen-escalation-and-noninvasive-ventilation-in-covid19/99819E3278364C3EE16ED304C415DFF7)
DOI: 10.1017/cem.2020.396

ABSTRACT: The recent ongoing outbreak of severe pneumonia associated with a novel coronavirus (SARS-CoV-2), currently of unknown origin, creates a world emergency that has put global public health institutions on high alert. At present there is limited clinical information of the SARS-CoV-2 and there is no specific treatment recommended, although technical guidelines and suggestions have been developed and will continue to be updated as additional information becomes available. Preventive treatment has an important role to control and avoid the spread of severe respiratory disease, but often is difficult to obtain and sometimes cannot be effective to reduce the risk of deterioration of the underlining lung pathology. In order to define an effective and safe treatment for SARS-CoV-2-associated disease, we provide considerations on the actual treatments, on how to avoid complications and the undesirable side effects related to them and to select and apply earlier the most appropriate treatment. Approaching to treat severe respiratory disease in infants and children, the risks related to the development of atelectasis starting invasive or non-invasive ventilation support and the risk of oxygen toxicity must be taken into serious consideration. For an appropriate and effective approach to treat severe pediatric respiratory diseases, two main different strategies can be proposed according to the stage and severity of the patient conditions: patient in the initial phase and with non-severe lung pathology and patient with severe initial respiratory impairment and/or with delay in arrival to observation. The final outcome is strictly connected with the ability to apply an appropriate treatment early and to reduce all the complications that can arise during the intensive care admission.
URL: https://www.ncbi.nlm.nih.gov/pubmed/32204751

ABSTRACT: Except for pregnant women, the management of critically ill patients with COVID-19 during the pandemic includes the standard procedures that are used for any patient that requires to be attended to at the intensive care unit, as well as limited administration of crystalloid solutions, orotracheal intubation, invasive mechanical ventilation in the event of patient clinical deterioration, and muscle relaxants continuous infusion only if necessary. Non-invasive mechanical ventilation and high-flow oxygen therapy are not recommended due to the generation of aerosol (associated with risk of viral spread among health personnel), and neither is extracorporeal membrane oxygenation or the use of steroids. So far, there is no specific antiviral treatment for patients with COVID-19, and neither are there results of controlled trials supporting the use of any.

URL: https://pubmed.ncbi.nlm.nih.gov/32129582
DOI: 10.3760/cma.j.issn.0578-1426.2020.0006

ABSTRACT: BACKGROUND: The coronavirus disease 2019 (COVID-19) pandemic has become an immense public health burden, first in China and subsequently worldwide. Developing effective control measures for COVID-19, especially measures that can halt the worsening of severe cases to a critical status is of urgent importance. CASE SUMMARY: A 52-year-old woman presented with a high fever (38.8 degrees C), chills, dizziness, and weakness. Epidemiologically, she had not been to Wuhan where COVID-19 emerged and did not have a family history of a disease cluster. A blood test yielded a white blood cell count of 4.41 x 10^9/L (60.6 +/- 2.67% neutrophils and 30.4 +/- 1.34% lymphocytes). Chest imaging revealed bilateral ground-glass lung changes. Based on a positive nasopharyngeal swab nucleic acid test result and clinical characteristics, the patient was diagnosed with COVID-19. Following treatment with early non-invasive ventilation and a bundle pharmacotherapy, she recovered with a good outcome. CONCLUSION: Early non-invasive ventilation with a bundle pharmacotherapy may be an effective treatment regimen for the broader population of patients with COVID-19.

URL: https://www.ncbi.nlm.nih.gov/pubmed/32420305
DOI: 10.12998/wjcc.v8i9.1705

ABSTRACT: With the rapid pandemic spread of the novel coronavirus (SARS-CoV2), Emergency Departments of affected countries are facing an increasing number of patients presenting with hypoxic respiratory failure due to coronavirus disease 2019 (COVID-19). Providing mechanical support and endotracheal intubation can be challenging due to a number of patients larger than usual, often exceeding available resources. Considering the lack of recommendations available, we developed a flowchart to standardize the first approach to patients presenting to the Emergency Department with hypoxic respiratory failure due to COVID-19.

URL: http://link.springer.com/10.1007/s11739-020-02370-8
DOI: 10.1007/s11739-020-02370-8

ABSTRACT: As a response to the epidemic, the local government had appointed several designated hospitals for patients with SARS-CoV-2 infection. Despite a common coping strategy for mass casualty (earthquake and blast injury) in China, SARI epidemic has proposed a new challenge for healthcare workers, especially intensivists. About 15–20% of suspected and confirmed patients with SARS-CoV-2 infection in fever clinics developed severe hypoxemia (since the second week of disease course), and required some form of ventilatory support such as high-flow nasal cannula, and non-invasive and invasive mechanical ventilation. In addition, other complications might occur, including, but not limited to, shock, acute kidney injury, gastrointestinal bleeding, and rhabdomyolysis. No antiviral agents have been proven to be effective against the coronavirus. Therefore, management of critically ill patients with SARS-CoV-2 infection still remains supportive rather than definitive, indicating remarkable workload for intensive care physicians and nurses. This surge of critically ill patients in designated hospitals as well as fever clinics represents urgent demands for intensive care with regards to space, supplies, and staff (Table 1) [5,6,7,8]. Response to these demands requires cooperation between the medical rescue team, infection control specialists, local health authorities, and center for disease control and prevention [9].

URL: https://doi.org/10.1007/s00134-020-05966-y
DOI: 10.1007/s00134-020-05966-y

ABSTRACT: Since the beginning of March 2020, the coronavirus disease 2019 (COVID-19) pandemic has caused more than 13,000 deaths in Europe, almost 54% of which has occurred in Italy. The Italian healthcare system is experiencing a stressful burden, especially in terms of intensive care assistance. In fact, the main clinical manifestation of COVID-19 patients is represented by an acute hypoxic respiratory failure secondary to bilateral pulmonary infiltrates, that in many cases, results in an acute respiratory distress syndrome and requires an invasive ventilator support. A precocious respiratory support with non-invasive ventilation or high flow oxygen should be avoided to limit the droplets' air-dispersion and the healthcare workers' contamination. The application of a continuous positive airway pressure (CPAP) by means of a helmet can represent an effective alternative to recruit diseased alveolar units and improve hypoxemia. It can also limit the room contamination, improve comfort for the patients, and allow for better clinical assistance with long-term tolerability. However, the initiation of a CPAP is not free from pitfalls. It requires a careful titration and monitoring to avoid a delayed intubation. Here, we discuss the
rationale and some important considerations about timing, criteria, and monitoring requirements for patients with COVID-19 respiratory failure requiring a CPAP treatment. Copyright © 2020 by the authors. Licensee MDPI, Basel, Switzerland.

URL: https://www.mdpi.com/2077-0383/9/4/1191/pdf
DOI: http://dx.doi.org/10.3390/jcm9041191

URL: https://www.ncbi.nlm.nih.gov/pubmed/32326959
DOI: 10.1186/s13054-020-02892-9

ABSTRACT: Acute hypoxemic respiratory failure (ARF) is characterized by both lower arterial oxygen and carbon dioxide tensions in the blood. First line treatment for ARF includes oxygen therapy, intially administered non invasively using nasal prongs, high flow nasal cannulae or masks. Invasive mechanical ventilation (IMV) is usually reserved for patients who are unable to maintain their airway, those with worsening hypoxemia, or those who develop respiratory muscle fatigue and consequent hypercapnia. Inhaled nitric oxide (iNO) gas is known to improve oxygenation in patients with ARF by manipulating ventilation-perfusion matching. Addition of iNO may potentially alleviate the need for IMV in selected patients. This article demonstrates the feasibility of this technique based on our experience of patients with hypoxemic ARF. This technique may also be considered for patients with hypoxic ARF in setting of COVID-19. Competing Interest Statement: The authors have declared no competing interest. Funding Statement: None relevant. Author Declarations: All relevant ethical guidelines have been followed; any necessary IRB and/or ethics committee approvals have been obtained and details of the IRB/oversight body are included in the manuscript. Yes
All necessary patient/participant consent has been obtained and the appropriate institutional forms have been archived.
Yes
I understand that all clinical trials and any other prospective interventional studies must be registered with an ICMJE-approved registry, such as ClinicalTrials.gov. I confirm that any such study reported in the manuscript has been registered and the trial registration ID is provided (note: if posting a prospective study registered retrospectively, please provide a statement in the trial ID field explaining why the study was not registered in advance). Yes I have followed all appropriate research reporting guidelines and uploaded the relevant EQAR NETWORK research reporting checklist(s) and other pertinent material as supplementary files, if applicable. Yes
No external datasets provided.
URL: http://medrxiv.org/content/early/2020/05/20/202005.17.20082123.abstract
DOI: 10.1101/2020.05.17.20082123

22. Sleep Disorder Group of Chinese Thoracic S, Group of Sleep Disordered Breathing tCoRDoCAoME. [Expert consensus on sleep study and non-invasive positive airway pressure therapy during the epidemic of coronavirus disease 2019]. Zhonghua Jie He He Hu Xi Za Zhi. 2020;43(0):E043. DOI: 10.3760/cma.j.cn112147-20200309-00283
ABSTRACT: Coronavirus disease 2019 (COVID-19) is mainly transmitted through respiratory droplets, close unprotected contact, and intense aerosols-generating procedures. Sleep study and non-invasive positive airway pressure (NIPAP) therapy can increase the risk of exposure and transmission of new coronaviruses to medical staff and patients. China's national epidemic control has entered a critical stage of overall prevention and control together with the restoration of normal medical care delivery. Based on the characteristics of sleep-disordered breathing, this consensus elaborates on the recommendations from the following four aspects that include patient and medical staff education, optimization of diagnostic and treatment protocols, sterilization of medical devices and the environment, and control of hospital-acquired infection. It is emphasized that the indications for sleep study and NIPAP should be strictly defined according to the local epidemic situation. Portable home sleep study and auto-titration positive airway pressure is recommended. The applications of disposable nasal pressure transducer for sleep study and disposable or personal masks and ventilator tubing for NIPAP are strongly suggested. Moreover, it is necessary to standardize the procedure of NIPAP, to separate the functional divisions in sleep lab, to comply with the protection regulations for medical personnel, and to strengthen the cleaning and disinfection management.
URL: https://www.ncbi.nlm.nih.gov/pubmed/32295323
DOI: 10.3760/cma.j.cn112147-20200309-00283

ABSTRACT: The 2019-novel coronavirus predominantly affects the respiratory system with manifestations ranging from upper respiratory symptoms to full blown acute respiratory distress syndrome (ARDS). It is important to recognize the risk factors, categorize severity and provide early treatment. Use of high flow devices and non-invasive ventilation has been discouraged
due to high chances of aerosol generation. Early intubation and mechanical ventilation are essential to prevent complications and worsening, especially in resource-limited settings with very few centers having expertise to manage critical cases. Hydrophobic viral filter in the ventilator circuit minimizes chances of transmission of virus. Strategies to manage ARDS in COVID-19 include low tidal volume ventilation with liberal sedation-analgesia. At the same time, prevention of transmission of the virus to healthcare workers is extremely important in the intensive care setting dealing with severe cases and requiring procedures generating aerosol. We, herein, provide guidance on non-invasive respiratory support, intubation and management of ARDS in a child with COVID-19.

URL: https://www.ncbi.nlm.nih.gov/pubmed/32238613


ABSTRACT: Emergency departments are facing an unprecedented challenge in dealing with patients who have coronavirus disease 2019 (COVID-19). The massive number of cases evolving to respiratory failure are leading to a rapid depletion of medical resources such as respiratory support equipment, which is more critical in low- and middle-income countries. In this context, any therapeutic and oxygen support strategy that conserves medical resources should be welcomed. Prone positioning is a well-known ventilatory support strategy to improve oxygenation levels. Self-proning can be used in the management of selected patients with COVID-19 pneumonia. Here, we describe our experience with two COVID-19-positive patients who were admitted with respiratory failure. The patients were successfully managed with self-proning and noninvasive oxygenation without the need for intubation.

URL: http://www.sciencedirect.com/science/article/pii/S2213007120302409

DOI: https://doi.org/10.1016/j.rmcr.2020.101096


ABSTRACT: BACKGROUND: The outbreak of a novel coronavirus (2019-nCoV)-infected pneumonia (NCIP) is currently ongoing in China. Most of the critically ill patients received high-flow nasal cannula (HFNC) oxygen therapy. However, the experience of HFNC in this population is lacking. METHODS: We retrospectively screened 318 confirmed patients with NCIP in two hospitals of Chongqing, China, from January 1st to March 4th, 2020. Among them, 27 (8.4%) patients experienced severe acute respiratory failure including 17 patients (63%) treated with HFNC as first-line therapy, 9 patients (33%) treated with noninvasive ventilation (NIV) and one patient (4%) treated with invasive ventilation. HFNC failure was defined by the need of NIV or intubation as rescue therapy. RESULTS: Of the 17 HFNC patients, 7 (41%) experienced HFNC failure. The HFNC failure rate was 0% (0/6) in patients with PaO2/FiO2 > 200 mm Hg vs. 63% (7/11) in those with PaO2/FiO2 < = 200 mm Hg (p = 0.04). Compared with baseline data, the respiratory rate significantly decreased after 1-2 h of HFNC in successful group [median 26 (IQR: 25-29) vs. 23 (22-25), p = 0.03]. However, it did not in the unsuccessful group. After initiation of NIV as rescue therapy among the 7 patients with HFNC failure, PaO2/FiO2 significantly improved after 1-2 h of NIV [median 172 (150-208) mmHg vs. 114 (IQR: 79-130) under HFNC, p = 0.04]. However, two out of seven (29%) patients with NIV as rescue therapy ultimately received intubation. Among the 27 patients with severe acute respiratory failure, four patients were eventually intubated (15%). CONCLUSIONS: Our study indicated that HFNC was the most common ventilation support for patients with NCIP. Patients with lower PaO2/FiO2 were more likely to experience HFNC failure.

URL: https://www.ncbi.nlm.nih.gov/pubmed/32326285

DOI: 10.1186/s13613-020-00653-z

26. Wilcox SR. Management of respiratory failure due to covid-19. BMJ. 2020;369:m1786. DOI: 10.1136/bmj.m1786

URL: https://www.ncbi.nlm.nih.gov/pubmed/32366375

DOI: 10.1136/bmj.m1786


ABSTRACT: BACKGROUND AND AIM: The war against Covid-19 is far from won. This narrative review attempts to describe some problems with the management of Covid-19 induced acute respiratory failure (ARF) by pulmonologists. METHODS: We searched the following databases: MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials and reviewed the references of retrieved articles for additional studies. The search was limited to the terms: Covid-19 AND: acute respiratory distress syndrome (ARDS), SARS, MERS, non invasive ventilation (NIV), high flow nasal cannula (HFNC), pronation (PP), health
care workers (HCW). RESULTS: Protection of Health care workers should be paramount, so full Personal Protective Equipment and Negative pressure rooms are warranted. HFNC alone or with PP could be offered for mild cases (PaO2/FiO2 between 200-300); NIV alone or with PP could work in moderate cases (PaO2/FiO2 between 100-200). Rotation and coupled (HFNC/NIV) strategy can be beneficial. A window of opportunity of 1-2 hours is advised. If PaO2/FiO2 significantly increases, Respiratory Rate decreases with a relatively low Exhaled Tidal Volume, the non-invasive strategy could be working and intubation delayed. CONCLUSION: Although there is a role for non-invasive respiratory therapies in the context of COVID-19 ARF, more research is still needed to define the balance of benefits and risks to patients and HCW. Indirectly, non invasive respiratory therapies may be of particular benefit in reducing the risks to healthcare workers by obviating the need for intubation, a potentially highly infectious procedure.

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ABSTRACT: A COVID-19 outbreak started in Wuhan, China, last December and now has become a global pandemic. The clinical information in caring of critically ill patients with COVID-19 needs to be shared timely, especially under the situations that there is still a largely ongoing spread of COVID-19 in many countries. A multicenter prospective observational study investigated all the COVID-19 patients received in 19 ICUs of 16 hospitals in Wuhan, China, over 24 h between 8 AM February 2h and 8 AM February 27, 2020. The demographic information, clinical characteristics, vital signs, complications, laboratory values, and clinical managements of the patients were studied. A total of 226 patients were included. Their median (interquartile range, IQR) age was 64 (57–70) years, and 139 (61.5%) patients were male. The duration from the date of ICU admission to the study date was 11 (5–17) days, and the duration from onset of symptoms to the study date was 31 (24–36) days. Among all the patients, 155 (68.6%) had at least one coexisting disease, and their sequential organ failure assessment score was 4 (2–8). Organ function damages were found in most of the patients: ARDS in 161 (71.2%) patients, septic shock in 34 (15.0%) patients, acute kidney injury occurred in 57 (25.2%) patients, cardiac injury in 61 (27.0%) patients, and lymphocytopenia in 160 (70.8%) patients. Of all the studied patients, 85 (37.6%) received invasive mechanical ventilation, including 14 (6.2%) treated with extracorporeal membrane oxygenation (ECMO) at the same time, 20 (8.8%) received noninvasive mechanical ventilation, and 24 (10.6%) received continuous renal replacement therapy. By April 9, 2020, 87 (38.5%) patients were deceased and 15 (6.7%) were still in the hospital. Critically ill patients with COVID-19 are associated with a higher risk of severe complications and need to receive an intensive level of treatments. COVID-19 poses a great strain on critical care resources in hospitals. Chinese Clinical Trial Registry, ChiCTR2000030164. Registered on February 24, 2020, http://www.chictr.org.cn/edit.aspx?pid=49983&htm=4
URL: https://ccforum.biomedcentral.com/articles/10.1186/s13054-020-02939-x
DOI: 10.1186/s13054-020-02939-x

ABSTRACT: BACKGROUND: Noninvasive ventilation (NIV) has been used in patients with the Middle East respiratory syndrome (MERS) with acute hypoxemic respiratory failure, but the effectiveness of this approach has not been studied. METHODS: Patients with MERS from 14 Saudi Arabian centers were included in this analysis. Patients who were initially managed with NIV were compared to patients who were managed only with invasive mechanical ventilation (invasive MV). RESULTS: Of 302 MERS critically ill patients, NIV was used initially in 105 (35%) patients, whereas 197 (65%) patients were only managed with invasive MV. Patients who were managed with NIV initially had lower baseline SOFA score and less extensive infiltrates on chest radiograph compared with patients managed with invasive MV. The vast majority (92.4%) of patients who were managed initially with NIV required intubation and invasive mechanical ventilation, and were more likely to require inhaled nitric oxide compared to those who were managed initially with invasive MV. ICU and hospital length of stay were similar between NIV patients and invasive MV patients. The use of NIV was not independently associated with 90-day mortality (propensity score-adjusted odds ratio 0.61, 95% CI [0.23, 1.60] P = 0.27). CONCLUSIONS: In patients with MERS and acute hypoxemic respiratory failure, NIV failure was very high. The use of NIV was not associated with improved outcomes.
URL: https://www.ncbi.nlm.nih.gov/pubmed/30884185

ABSTRACT: Noninvasive positive-pressure ventilation (NPPV) to treat acute respiratory failure has expanded tremendously over the world in terms of the spectrum of diseases that can be successfully managed, the locations of its application and achievable goals. The turning point for the successful expansion of NPPV is its ability to achieve the same physiological effects as invasive mechanical ventilation with the avoidance of the life-threatening risks correlated with the use of an artificial airway. Cardiorespiratory arrest, extreme psychomotor agitation, severe haemodynamic instability, nonhypercapnic coma and multiple organ failure are absolute contraindications for NPPV. Moreover, pitfalls of NPPV reduce its rate of success; consistently, a clear plan of what to do in case of NPPV failure should be considered, especially for patients managed in unprotected setting. NPPV failure is likely to be reduced by the application of integrated therapeutic tools in selected patients handled by expert teams. In conclusion, NPPV has to be considered as a rational art AND not just as an application of science, which requires the ability of clinicians to both choose case-by-case the best “ingredients” for a “successful recipe” (i.e. patient selection, interface, ventilator, interface, etc.) and to avoid a delayed intubation if the ventilation attempt fails. Copyright ©ERS 2018.

URL: http://err.ersjournals.com/content/27/149/180029.full.pdf
DOI: http://dx.doi.org/10.1183/16000617.0029-2018


ABSTRACT: OBJECTIVES: To describe patient characteristics, clinical manifestations, disease course including viral replication patterns, and outcomes of critically ill patients with severe acute respiratory infection from the Middle East respiratory syndrome and to compare these features with patients with severe acute respiratory infection due to other etiologies. DESIGN: Retrospective cohort study. SETTING: Patients admitted to ICUs in 14 Saudi Arabian hospitals. PATIENTS: Critically ill patients with laboratory-confirmed Middle East respiratory syndrome severe acute respiratory infection (n = 330) admitted between September 2012 and October 2015 were compared to consecutive critically ill patients with community-acquired severe acute respiratory infection of non–Middle East respiratory syndrome etiology (non–Middle East respiratory syndrome severe acute respiratory infection) (n = 222). INTERVENTIONS: None. MEASUREMENTS AND MAIN RESULTS: Although Middle East respiratory syndrome severe acute respiratory infection patients were younger than those with non–Middle East respiratory syndrome severe acute respiratory infection (median [quartile 1, quartile 3] 58 yr [44, 69] vs 70 [52, 78]; p < 0.001), clinical presentations and comorbidities overlapped substantially. Patients with Middle East respiratory syndrome severe acute respiratory infection had more severe hypoxemic respiratory failure (PaO2/FIO2: 106 [66, 160] vs 176 [104, 252]; p < 0.001) and more frequent nonrespiratory organ failure (nonrespiratory Sequential Organ Failure Assessment score: 6 [4, 9] vs 5 [3, 7]; p = 0.002), thus required more frequently invasive mechanical ventilation (85.2% vs 73.0%; p < 0.001), oxygen rescue therapies (extracorporeal membrane oxygenation 5.8% vs 0.9%; p = 0.003), vasopressor support (79.4% vs 55.0%; p < 0.001), and renal replacement therapy (48.8% vs 22.1%; p < 0.001). After adjustment for potential confounding factors, Middle East respiratory syndrome was independently associated with death compared to non-Middle East respiratory syndrome severe acute respiratory infection (adjusted odds ratio, 5.87; 95% CI, 4.02-8.56; p < 0.001). CONCLUSIONS: Substantial overlap exists in the clinical presentation and comorbidities among patients with Middle East respiratory syndrome severe acute respiratory infection from other etiologies; therefore, a high index of suspicion combined with diagnostic testing is essential component of severe acute respiratory infection investigation for at-risk patients. The lack of distinguishing clinical features, the need to rely on real-time reverse transcription polymerase chain reaction from respiratory samples, variability in viral shedding duration, lack of effective therapy, and high mortality represent substantial clinical challenges and help guide ongoing clinical research efforts.

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DOI: 10.1097/CCM.0000000000002621


ABSTRACT: Purpose of Review: This article reviews the use of noninvasive ventilation (NIV) in patients with acute respiratory failure (ARF), with a critical review of the most recent literature in this setting. Recent Findings: The efficacy of NIV is variable depending on the cause of the episode of ARF. In community-acquired pneumonia, NIV is often associated with poor response, with better response in patients with preexisting cardiac or respiratory disease. In patients with pandemic influenza H1N1 and severe ARF, NIV has been associated with high failure rates but relatively favorable mortality. In acute respiratory distress syndrome, NIV should be used very cautiously and restricted to patients with mild-moderate acute respiratory distress
syndrome without shock or metabolic acidosis due to the high failure rate observed in several reports. Despite limited evidence, NIV may improve the outcomes of patients with chest trauma and severe ARF. In postoperative ARF, both continuous positive airway pressure and NIV are effective to improve clinical outcomes, particularly in those with abdominal, cardiac, and thoracic surgery. Summary: Although patients with severe hypoxemic ARF are, in general, less likely to be intubated when NIV is used, the efficacy is different among these heterogeneous populations. Therefore, NIV is not routinely recommended in all patients with severe hypoxemic ARF. Copyright © 2015 Wolters Kluwer Health, Inc.

URL: http://dx.doi.org/10.1097/MCC.0000000000000173

ABSTRACT: OBJECTIVE: To investigate the value of high flow nasal cannula (HFNC) in treating a patient with Middle East respiratory syndrome (MERS). METHODS: The effect of HFNC applied in the first imported MERS patient with complication of acute respiratory distress syndrome (ARDS) to China was observed. The patient was admitted to Department of Critical Care Medicine of Huizhou Municipal Central Hospital on May 28th, 2015, and the changes in various clinical parameters and their significance were analyzed. RESULTS: A 43-year old male was admitted to negative pressure isolation intensive care unit with the complaint of back ache for 7 days and fever for 2 days. Vital signs and saturation of pulse oximetry (SpO2) were monitored continuously. After admission, ribavirin was given orally for 12 days and alpha-interferon was administered once on the first day. However, after 2-week anti-virus therapy, the virus test was positive. Ceftriaxone was given on the 4th day, and it was changed to meropenem on the 3rd day for 2 weeks. Immune globulin was given on the 4th day and continued for 1 week. Thymosin-alpha1 was given on the 8th day and continued for 2 weeks. According to his past history, methimazole had been given continuously for hyperthyroidism and other symptomatic treatment. Oxygen inhalation (6 L/min) was given immediately after admission, but the condition of patient worsened with the following symptoms: frequent cough and obvious shortness of breath. Moreover pleural effusion gradually increased as shown by X-ray. SpO2 was maintained only at about 0.91. Oxygenation index (PaO2/FiO2) decreased to 144 mmHg (1 mmHg = 0.133 kPa), So oxygen inhalation via nasal cannula was changed to HFNC after 2 days. The parameters were set as follows: temperature 34 degrees C, flow rate 20 L/min, fraction of inspired oxygen (FiO2) 0.50. The flow was raised 5 L/min every 10 minutes, and was continued till the target value reached 60 L/min. FiO2 was modified according to SpO2 and PaO2/FiO2. FiO2 was set to 0.80 on the 5th day of admission. Shortness of breath of the patient was improved on the 7th day of admission after the application of HFNC. FiO2 was then decreased to 0.58 as PaO2/FiO2 rose. Then the flow was gradually decreased to 30 L/min. HFNC was reduced with continuous improvement in PaO2/FiO2. HFNC was changed to low flow oxygen inhalation nasal cannula (2-3 L/min) on the 20th day. Oxygen treatment was stopped on the 23rd day, and SpO2 was maintained at 0.98-1.00. Activities on bed were gradually increased. The patient was cured and discharged from hospital on June 26th. The patient showed good tolerance and high compliance during the treatment with HFNC. No nosocomial spread occurred during the treatment. CONCLUSIONS: HFNC could improve respiratory function of the patient with MERS obviously, and complication ARDS was prevented. HFNC might reduce nosocomial spread.

URL: https://www.ncbi.nlm.nih.gov/pubmed/27132449

ABSTRACT: The aim of this article was to review the role of noninvasive ventilation (NIV) in acute pulmonary infectious diseases, such as severe acute respiratory syndrome (SARS), H1N1 and tuberculosis, and to assess the risk of disease transmission with the use of NIV from patients to healthcare workers. We performed a clinical review by searching Medline and EMBASE. These databases were searched for articles on “clinical trials” and “randomised controlled trials”. The keywords selected were non-invasive ventilation pulmonary infections, influenza-A (H1N1), SARS and tuberculosis. These terms were cross-referenced with the following keywords: health care workers, airborne infections, complications, intensive care unit and pandemic. The members of the International NIV Network examined the major results regarding NIV applications and SARS, H1N1 and tuberculosis. Cross-referencing mechanical ventilation with SARS yielded 76 studies, of which 10 studies involved the use of NIV and five were ultimately selected for inclusion in this review. Cross-referencing with H1N1 yielded 275 studies, of which 27 involved NIV. Of these, 22 were selected for review. Cross-referencing with tuberculosis yielded 285 studies, of which 15 involved NIV and from these seven were selected. In total 34 studies were selected for this review. NIV, when applied early in selected patients with SARS, H1N1 and acute pulmonary tuberculosis infections, can reverse respiratory failure. There are only a few reports of infectious disease transmission among healthcare workers.

URL: https://www.ncbi.nlm.nih.gov/pubmed/25445941
DOI: 10.1183/09059180.0009413
Methods: Airflow was marked with intrapulmonary smoke for visualization. Therapy with inspiratory positive airway pressure an oronasal mask attached to a human acute respiratory syndrome and avian influenza after recent outbreaks. We studied exhaled air and particle dispersion through chest. 2006;130(3):730

Abstract: Background: Health dispersion. Chest. 2006;130(3):730-40. Hui DS, Hall SD, Chan MT, et al. Noninvasive positive airflow limitation. Non invasive ventilation was effective and safe during the Severe Acute Respiratory Syndrome in Asia. It is reasonable to recommend non-invasive ventilation in H1N1 pandemic. It may cause acute respiratory failure ranging from severe Acute Respiratory Distress Syndrome to exacerbations of acute respiratory failure and may be considered in the context of H1N1 pandemic. Although infection control issues have been arisen, non-invasive ventilation was effective and safe during the Severe Acute Respiratory Syndrome in Asia. It is reasonable to recommend non-invasive ventilation in H1N1-related exacerbations of chronic respiratory diseases, especially in negative-pressure wards. Treatment of early Acute Respiratory Distress Syndrome associated with H1N1 using non-invasive ventilation could be tried rapidly identifying those who fail without delaying endotracheal intubation. Considering the high demand for critical care beds during the pandemic, non-invasive ventilation may have a role in reducing the estimated load.

URL: https://www.ncbi.nlm.nih.gov/pubmed/22008399
DOI: 10.4187/respcare.01209


Abstract: Few studies have been performed on noninvasive ventilation (NIV) to treat hypoxic acute respiratory failure in patients with acute lung injury (ALI) or acute respiratory distress syndrome (ARDS). The outcomes of these studies, for whom endotracheal intubation is not mandatory, depend on the degree of hypoxia, the presence of comorbidities and complications, and their illness severity. The use of NIV as an alternative to invasive ventilation in severely hypoxic patients with ARDS (ie, P(aO2)/F(IO2) < 200) is not generally advisable and should be limited to hemodynamically stable patients who can be closely monitored in an intensive care unit by highly skilled staff. Early NIV application may be extremely helpful in immunocompromised patients with pulmonary infiltrates, in whom intubation dramatically increases the risk of infection, pneumonia, and death. The use of NIV in patients with severe acute respiratory syndrome and other airborne diseases has generated debate, despite encouraging clinical results, mainly because of safety issues. Overall, the high rate of NIV failure suggests a cautious approach to NIV use in patients with ALI/ARDS, including early initiation, intensive monitoring, and prompt intubation if signs of NIV failure emerge.

URL: https://www.ncbi.nlm.nih.gov/pubmed/22008399
DOI: 10.4187/respcare.01209


Abstract: In 2009, a novel H1N1 Influenza virus has emerged and on June 11 the World Health Organization declared it as pandemic. It may cause acute respiratory failure ranging from severe Acute Respiratory Distress Syndrome to exacerbations of airflow limitation. Non-invasive ventilation is now considered first-line intervention for different causes of acute respiratory failure and may be considered in the context of H1N1 pandemic. Although infection control issues have been arisen, non-invasive ventilation was effective and safe during the Severe Acute Respiratory Syndrome in Asia. It is reasonable to recommend non-invasive ventilation in H1N1-related exacerbations of chronic respiratory diseases, especially in negative-pressure wards. Treatment of early Acute Respiratory Distress Syndrome associated with H1N1 using non-invasive ventilation could be tried rapidly identifying those who fail without delaying endotracheal intubation. Considering the high demand for critical care beds during the pandemic, non-invasive ventilation may have a role in reducing the estimated load.

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DOI: 10.1016/s0873-2159(15)31253-8

URL: https://www.ncbi.nlm.nih.gov/pubmed/18941271


Abstract: Background: Health-care workers are concerned about the risk of acquiring contagious diseases such as severe acute respiratory syndrome and avian influenza after recent outbreaks. We studied exhaled air and particle dispersion through an oronasal mask attached to a human-patient simulator (HPS) during noninvasive positive-pressure ventilation (NPPV). Methods: Airflow was marked with intrapulmonary smoke for visualization. Therapy with inspiratory positive airway pressure

ABSTRACT: PURPOSE OF REVIEW: This review critically examines recent literature related to application of noninvasive ventilation in the acute setting. RECENT FINDINGS: Recent articles have strengthened the evidence supporting the use of noninvasive ventilation for patients with cardiogenic pulmonary edema and exacerbation of severe chronic pulmonary obstructive disease. In the former, however, it remains unclear whether noninvasive ventilation offers any significant advantages over continuous positive airway pressure. The rate of myocardial infarction seems to be no higher when patients with cardiogenic pulmonary edema are treated with noninvasive ventilation rather than continuous positive airway pressure, although caution is still advised in patients with acute coronary syndromes. Noninvasive ventilation also does not seem to increase the risk of dissemination of severe acute respiratory syndrome to health care workers as long as strict isolation procedures are used. Noninvasive ventilation facilitates weaning in patients with chronic obstructive pulmonary disease but should not be used routinely to treat extubation failure, and necessary intubation should not be delayed. Guidelines for the use of noninvasive ventilation can alter caregivers' behavior but have not been clearly shown to improve outcomes. Outcomes do seem to improve, however, as caregivers acquire experience with the technique. SUMMARY: The recent literature has refined some of the current indications for noninvasive ventilation in the acute-care setting, including chronic pulmonary obstructive disease and cardiogenic pulmonary edema. Guidelines for use are now being developed, and outcomes seem to be improving, partly as a consequence of greater caregiver experience and possibly related to technological advances.


ABSTRACT: The best treatment strategy for severe acute respiratory syndrome (SARS) is still unknown. Ribavirin and corticosteroids were used extensively during the SARS outbreak. Ribavirin has been criticized for its lack of efficacy. Corticosteroids are effective in lowering the fever and reversing changes in the chest radiograph but have the caveat of encouraging viral replication. The effectiveness of corticosteroids has only been suggested by uncontrolled observations, and the role of these agents in therapy remains to be established by randomized controlled studies. Both ribavirin and corticosteroids have very significant side effects. The lopinavir/ritonavir combination has been shown to reduce the intubation rate and the incidence of adverse clinical outcomes when used with ribavirin. When patients deteriorate clinically despite treatment with ribavirin and corticosteroids, rescue treatment with convalescent plasma and immunoglobulin may be beneficial. Noninvasive positive pressure ventilation is a sound treatment for SARS patients with respiratory failure if administered with due precaution in the correct environment. Interferons and other novel agents may hold promise as useful anti-SARS therapies in the future. The experience with traditional Chinese medicine is encouraging, and its use as an adjuvant should be further investigated.


ABSTRACT: PURPOSE OF REVIEW: This review critically examines recent literature related to applications of noninvasive ventilation in the acute setting. RECENT FINDINGS: Recent articles have strengthened the evidence supporting the use of noninvasive ventilation for patients with cardiogenic pulmonary edema and exacerbation of severe chronic pulmonary obstructive disease. In the former, however, it remains unclear whether noninvasive ventilation offers any significant advantages over continuous positive airway pressure. The rate of myocardial infarction seems to be no higher when patients with cardiogenic pulmonary edema are treated with noninvasive ventilation rather than continuous positive airway pressure, although caution is still advised in patients with acute coronary syndromes. Noninvasive ventilation also does not seem to increase the risk of dissemination of severe acute respiratory syndrome to health care workers as long as strict isolation procedures are used. Noninvasive ventilation facilitates weaning in patients with chronic obstructive pulmonary disease but should not be used routinely to treat extubation failure, and necessary intubation should not be delayed. Guidelines for the use of noninvasive ventilation can alter caregivers' behavior but have not been clearly shown to improve outcomes. Outcomes do seem to improve, however, as caregivers acquire experience with the technique. SUMMARY: The recent literature has refined some of the current indications for noninvasive ventilation in the acute-care setting, including chronic pulmonary obstructive disease and cardiogenic pulmonary edema. Guidelines for use are now being developed, and outcomes seem to be improving, partly as a consequence of greater caregiver experience and possibly related to technological advances.


ABSTRACT: BACKGROUND: Severe acute respiratory syndrome is frequently complicated by respiratory failure requiring ventilatory support. We aimed to compare the efficacy of non-invasive ventilation against invasive mechanical ventilation...
Endotracheal intubation was required in one third of the patients (9 of 27) who initially had a failure of NPPV therapy led to significant increases in PaO(2) and PaO(2)/FiO(2) and a decrease in respiratory rate (p < 0.01). In the remaining 27 patients, NPPV was initiated 1.2+/−1.6 days after ARF onset. Complications were few and reversible. There were no infections among the 105 health care workers caring for patients receiving NIPPV. CONCLUSIONS: NIPPV was effective in the treatment of acute respiratory failure in the presence of severe acute respiratory syndrome appeared to be associated with reduced intubation need and mortality.

URL: https://www.ncbi.nlm.nih.gov/pubmed/16157043


ABSTRACT: Inhalation of nitric oxide (NO) improved arterial oxygenation and enabled the reduction of inspired oxygen therapy and airway pressure support in patients with severe acute respiratory syndrome (SARS). In addition, chest radiography showed decreased spread or density of lung infiltrates, and the physiological effects remained after termination of inhaled NO therapy. These findings suggest not only a pulmonary vasodilator effect of inhaled NO, but also an effect on SARS.

URL: https://www.ncbi.nlm.nih.gov/pubmed/15546092

DOI: 10.1086/425357


ABSTRACT: OBJECTIVES: To study the effectiveness of noninvasive positive pressure ventilation (NIPPV) in the treatment of acute respiratory failure (ARF) in severe acute respiratory syndrome (SARS), and the associated infection risk. METHODS: All patients with the diagnosis of probable SARS admitted to a regional hospital in Hong Kong from March 9 to April 28, 2003, and who had SARS-related respiratory distress complications were recruited for NIPPV usage. The health status of all healthcare workers working in the NIPPV wards was closely monitored, and consent was obtained to check serum for coronavirus serology. Patient outcomes and the risk of SARS transmission to health-care workers were assessed. RESULTS: NIPPV was applied to 20 patients (11 male patients) with ARF secondary to SARS. Mean age was 51.4 years, and mean acute physiology and chronic health evaluation II score was 5.35. Coronavirus serology was positive in 95% (19 of 20 patients). NIPPV was started 9.6 days (mean) from symptom onset, and mean duration of NIPPV usage was 84.3 h. Endotracheal intubation was avoided in 14 patients (70%), in whom the length of ICU stay was shorter (3.1 days vs 21.3 days, p < 0.001) and the chest radiography score within 24 h of NIPPV was lower (15.1 vs 22.5, p = 0.005) compared to intubated patients. Intubation avoidance was predicted by a marked reduction in respiratory rate (9.2 breaths/min) and supplemental oxygen requirement (3.1 L/min) within 24 h of NIPPV. Complications were few and reversible. There were no infections among the 105 health-care workers caring for the patients receiving NIPPV. CONCLUSIONS: NIPPV was effective in the treatment of ARF in the patients with SARS studied, and its use was safe for health-care workers.

URL: https://www.ncbi.nlm.nih.gov/pubmed/15364765

DOI: 10.1086/425357


ABSTRACT: This study describes the blood gases features and short-term outcomes with noninvasive positive pressure ventilation (NPPV) treatment in the management of acute respiratory failure (ARF) during a severe acute respiratory syndrome (SARS) epidemic. Between April 22 and May 1, 2003, 120 patients meeting clinical criteria for SARS were admitted to a hospital for infectious diseases in Beijing, China. At 6 weeks after onset, 25% of patients (30/120) had experienced ARF. Of interest, 16 of these patients (53%) exhibited hypercapnia (PaCO(2) > 45 mm Hg), and 10 hypercapnic events occurred within 1 week of admission. The occurrence of hypercapnia or CO(2) retention and was accompanied by myalgias. NPPV was instituted in 28 patients; one was intolerant of NPPV. In the remaining 27 patients, NPPV was initiated 1.2+/−1.6 days after ARF onset. An hour of NPPV therapy led to significant increases in PaO(2) and PaO(2)/FiO(2) and a decrease in respiratory rate (p < 0.01). Endotracheal intubation was required in one third of the patients (9 of 27) who initially had a favorable response to NPPV.
Remarkable pulmonary barotrauma was noticed in 7 of all 120 patients (5.8%) and in 6 of those (22%) on NPPV. The overall fatality rate at 13 weeks was 6.7% (8/120); it was higher (26.7%) in those needing NPPV. No caregiver contracted SARS. We conclude that NPPV is a feasible and appropriate treatment for ARF occurring as a result of a SARS infection.

URL: https://www.ncbi.nlm.nih.gov/pubmed/15211394
DOI: 10.1007/s11325-004-0097-0


ABSTRACT: OBJECTIVE: To describe the blood gas features and short-term outcomes of noninvasive positive pressure ventilation (NIPPV) treatment for acute respiratory failure (ARF) in patients with severe acute respiratory syndrome (SARS) in this retrospective case series study sought. METHODS: Between April 22 and May 1, 2003, 120 clinically compatible SARS patients were admitted to a special hospital for infectious diseases in Beijing. All patients' records were reviewed. The outcome variables of NIPPV therapy were analyzed. RESULTS: At 6 weeks of SARS onset, 25% (30/120) patients had respiratory failure with ALI/ARDS. 16 (53%) had hypercapnia (PaCO(2) > 45 mm Hg) during the course of SARS. 28 of them received NPPV therapy. One was intolerable to NPPV treatment. In the remaining 27 patients, NPPV was initiated 1.2 +/- 1.6 (0 - 10) days after onset of respiratory failure. One hour of NIPPV therapy led to significant increases in PaO(2), SaO(2) and PaO(2)/FiO(2), and decrease in respiratory rate (all P < 0.01). 18 of the 27 patients were weaned successfully from NPPV. The mean duration of NPPV use was 10 +/- 6 (5 - 30) days. In addition to one patient who was intolerable to NIPPV treatment, intubation was required in other 9 patients who initially had a favorable response to NPPV. Remarkable pulmonary barotrauma was noted in 7 of the 120 (5.8%) patients with SARS, among which 1 developed 2 days after intubation, and 6 occurred while the patients were on NPPV, the incidence being 22% (6/27) in patients using NPPV. The fatality rate at 13 weeks of SARS onset was 6.7% (8/120) in the patient cohort, and 26.7% (8/30) in the ALI/ARDS patients. No SARS occurred in medical staff taking care of NPPV patients. CONCLUSIONS: Some of the SARS patients with ALI/ARDS could experience CO(2) retention, which might be related to the impairment of respiratory muscles. It is proved to be feasible and appropriate for NPPV treatment of respiratory failure in SARS patients who were at high risk of intubation related complications. As there was a high incidence of remarkable barotrauma, a careful lung protective strategy is necessary during the administration of NPPV as well as invasive mechanical ventilation.

URL: https://www.ncbi.nlm.nih.gov/pubmed/15498269


ABSTRACT: OBJECTIVE: To analyze the effects of noninvasive positive pressure ventilation (NIPPV) on oxygenation of severe acute respiratory syndrome (SARS) patients, and to discuss the timing point for mechanical ventilation. METHODS: Twenty-five SARS patients with respiratory dysfunction treated with NIPPV were studied retrospectively in order to evaluate the influences within 24 hours after initiation of ventilatory support on their physiological indices and oxygenation. Patients with SARS were divided into two groups: survivor group (n=13) and non-survivor group (n=12). We compared the acute physiology and chronic health evaluation (APACHEII) score, respiratory rate (RR), saturation of oxygen (SpO(2)) and modificative respiratory index (MRI) for the survivors and non-survivors before NIPPV and after NIPPV for twenty-four hours, respectively. RESULTS: Although NIPPV administered via full-face masks might be an effective treatment for rapidly improving vital signs and gas exchange and sense of dyspnea in both groups during the initial 24 hours of ventilatory support, the patients in non-survivor group had higher APACHEII score, respiratory rates and lower SpO(2), MRI than the patients in survivor group (P<0.05) at the same intervals after initiation of support. CONCLUSION: Noninvasive ventilation should be used as a substitutive tool for endotracheal intubation an alternative treatment for acute respiratory failure related to SARS. Therefore, we should make efforts to avoid missing the time point for NIPPV or intubation, and we should not be restricted to the available indications for NIPPV or IPPV.

URL: https://www.ncbi.nlm.nih.gov/pubmed/14552676


ABSTRACT: OBJECTIVE: To observe the application and the roles of non-invasive positive pressure ventilation (NIPPV) in the treatment of severe acute respiratory syndrome (SARS). METHODS: To analyze retrospectively the data of NIPPV in 105 SARS cases hospitalized from 8 Apr to 14 May, 2003. To generalize the indication, parameter adjustment, treatment effects, side effects and affection rate of the medical faculty. RESULTS: The total number of the patients was 105. Among them 24 patients accepted NIPPV, 5 patients died. The mortality was 4.7%, which was lower than the average rate of our country. The most common side effect was subcutaneous emphysema, of which the incidence rate was 16.7%. There was no SARS affected
among the medical faculty during the course of NIPPV. CONCLUSION: NIPPV is a safe and effective method for the treatment of the severe SARS. The proper application of NIPPV could decrease the chance of the invasive ventilation and decrease the affective rate of the medical faculty.

URL: https://www.ncbi.nlm.nih.gov/pubmed/12914215


ABSTRACT: In this retrospective study, clinical data including clinical manifestations, routine blood tests, chest radiographic imaging from 77 severe cases of SARS treated with integrated Chinese and Western medicine were collected and statistically analyzed. Twenty-nine (37.6%) patients were admitted to the intensive care unit, non-invasive ventilation was used in 40 (51.9%) cases, and invasive ventilatory procedure was performed in eight (10.3%) cases. Seventy (90.9%) patients were clinically cured and seven (9.0%) died. The duration of defervescence was 8.3 +/- 5.0 days after admission. In the early stage, normal leucocyte count was seen in 46 (75.4%) of the 61 patients tested, decreased leucocyte count in 13 (21.3%) and elevated leucocyte count in only two (3.2%) cases. A decreased lymphocyte count was also seen in 23 (37.7%) cases of the 61 patients tested on admission, and by day 14, the number of patients with decreased lymphocyte count (1.11 +/- 0.66 x 10(9)) increased to 32 (47.7%) in 67 cases examined. Neutral granulocyte count was normal or decreased in 58 (95.0%) patients on admission, but elevated from the 7th day onward and peaked on day 21 in 32 (65.3%) of the 49 cases tested. All of the blood abnormalities returned to normal in the convalescent stage. Twenty-nine (37.6%) of the 77 severe cases of SARS patients demonstrated an extensive lung involvement. In comparison with the non-severe SARS cases, this group of patients showed significantly more pneumonic air-space opacities and ground glass-like changes on the chest radiographs (p < 0.05, chi2 test). The role Chinese medicine played in the treatment of SARS was discussed.

URL: https://www.ncbi.nlm.nih.gov/pubmed/14992536
DOI: 10.1142/S0192415X03001521


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SEARCH STRATEGIES

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<th>Searches</th>
<th>Results</th>
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Other search terms used / Boolean structure

- (invasive AND non-invasive) AND ...
- (Invasive OR non-invasive) AND ....
- respiration OR ventilation OR artificial respiration OR artificial ventilation
- Endotracheal tubes OR cannulae OR nitrous oxide OR O2 OR NO2 OR NIV OR NIPPV OR NPPV OR CPAP OR BIPAP OR positive-pressure OR continuous-pressure OR positive-airway
- Acute respiratory syndromes, SARS
- Coronavirus, COVID-19, MERS, SARS, nCoV, middle east respiratory syndrome