**Research Article**

# Infection Prevention and Control in Prenatal Care Providers Caring for Pregnant Women with Covid-19 Under Mechanical Ventilation in Tabriz Hospitals in The Second Quarter Of 2020

Fatemeh Mallah[1], Abbasali Dorosti[2], Khadijeh Eslamnezhad[3*]

1. Associate Professor of Obstetrics and Gynecology, Medical Faculty, Tabriz University of Medical Sciences,Tabriz, Iran.
2. Associated Professor of Anesthesiology, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran
3. Obstetrics & Gynecology, Faculty of Medicine, Sarab University of Medical Sciences, Sarab, Iran.

**Corresponding Author: Khadijeh Eslamnezhad**. Obstetrics & Gynecology, Faculty of Medicine, Sarab University of Medical Sciences, Sarab, Iran. Email: ostad_tbzmed@yahoo.com, ORCID: https://orcid.org/0000-0004-2152-2296.

**Abstract**

**Introduction:** Preventive measures in providing care for patients with COVID-19 under mechanical ventilation protects healthcare workers (HCWs) against infection. With no data on the compliance of HCWs with preventive measures, this study aimed to examine infection prevention and control in prenatal care providers caring for pregnant women with COVID-19 under mechanical ventilation in Tabriz hospitals in the second quarter of 2020.

**Methods**: This cross-sectional descriptive study was conducted on 60(available sampling) nurses working in COVID-19 ICUs of Imam Reza, Alzahra and Taleghani hospitals in Tabriz in the second quarter of 2020. Instruments to measure preventive measures were prepared by the research team, and the author completed them along with nurses caring for pregnant women with COVID-19 under mechanical ventilation. Data were entered in SPSS 21 and were compared using logistic regression and chi-square tests. P-value was considered to be less than 0.05.

**Results**: Total score of compliance with preventive measures was 3.45±018 (medium); the analysis of logistic regression between demographic variables and compliance with preventive measures indicated a significant statistical difference between marital status (OR=1.2 and CI=0.8-2.0), underlying diseases (OR=1.9 and CI=1.5-2.2), and work history (OR=1.6 and CI=1.4-2.3).

**Conclusion**: In this study, contact precautions in caring for pregnant women with COVID-19 under mechanical ventilation were medium which could have a significant effect on COVID-19 infection among the staff.

**Keywords**: COVID-19, Mechanical Ventilation, Contact Precautions, Intensive Care, Pregnancy

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## Introduction

The first known case of COVID-19 was identified in Wuhan, China in late 2019. The disease spread worldwide in less than two months and given its global prevalence, WHO declared it as the COVID-19 pandemic. It was initially considered as a respiratory disease and later as the data grew, cardiovascular, gastrointestinal and nervous complications



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were also reported in patients with COVID-19 (1, 2).

Invasive measures are taken in some patients with severe COVID-19 when they fail to respond to non-invasive therapies such as oxygen therapy (3). Endotracheal intubation is in the first place among these invasive measures. According to the available guidelines, the endotracheal tube could be used for maximum 4 weeks and a tracheostomy is considered if the patient still needs machine-assisted ventilation (4, 5).

In machine-assisted ventilation, oxygen uptake increases during ventilation and patient care becomes more critical. Therefore, it is necessary to follow standard guidelines more seriously when caring for these patients (6, 7). Contact precautions are among these guidelines; they are defined as measures taken to reduce the risk of cross-infection from staff and equipment to patients when caring for patients with endotracheal tube. In addition to these advantages, the risk of cross-infection from patient to staff decreases. As the aim of contact precautions is to prevent cross-infection, they are also referred to as preventive measures (8).

Preventive measures are mandatory for all patients; however, they should be taken more carefully in patients with infectious respiratory problems (9). COVID-19 caused by the recently discovered novel coronavirus is among the diseases that require careful prevent measures to reduce the risk of cross-infection from patients to the medical staff. In COVID-19, medical procedures (suction of mucus from the back of the throat and contact with patients' secretions) in patients with endotracheal tube could increase the risk of cross-infection in HCWs due to the production of aerosols. Therefore, preventive measures are of critical importance in these patients in order to reduce the risk of cross-infection (10). If infected with COVID-19, pregnant women are at a higher risk of pulmonary and respiratory harms compared with others and the chance of intubation and mechanical ventilation is higher among them. Therefore, the use of intubation and mechanical ventilation is more prevalent in pregnant women. As caring for patients with COVID-19 under mechanical ventilation is associated with a higher risk of disease transmission and with insufficient data on the compliance with these measures among the medical staff caring for patients with COVID-19, On the other hand, if preventive precautions are not well followed by nurses caring for pregnant women, it may worsen their condition and spread the disease from other people to these women, who are more susceptible to the virus than others. And ultimately make the condition of pregnant women much worse; this study aimed to examine infection prevention and control in HCWs caring for pregnant women with COVID-19 under mechanical ventilation admitted in Tabriz hospitals in the second quarter of 2020.

**Methods**

This descriptive-analytic study was conducted with the participation of nurses working in COVID-19 ICU who cared for pregnant women with COVID-19 in the second quarter of 2020 in Imam Reza, Alzahra and Taleghani hospitals affiliated to Tabriz University of Medical Sciences. Based on similar studies on compliance with preventive emasures and considering compliance level of 0.75 and 0.12 study accuracy, sample size was estimated 50 using the formula. Given the 20% chance of loss, the final sample size was increased to 60 participants. Accessible purposive sampling was used in this study and participants were selected based on inclusion and exclusion criteria. Inclusion criteria were: minimum work experience of 1 year, working in ICU for at least 6 months, minimum working shift of three days a week caring for pregnant women with COVID-19, not having COVID-19, holding an undergraduate degree, and consenting to participate int he study. Exclusion criteria were: being moved to other



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wards, having underlying diseases which results in not working with COVID patients, working in other wards in addition to the ICU, work experience of over 20 years and taking preventive measures courses in the past three months.

The instrument used in this study consisted of two parts. The first part included demographic data such as age, marital status, number of children, history of underlying diseases, and work experience. The second part included the guidelines developed by the research team in collaboration with faculty members who had experience of developing instruments(Based on the use of scientific articles). This instrument was developed for research purposes and included questions such as observing hand hygiene, putting on and taking off gloves, putting on and taking off coveralls, correct suctioning and safe injection. There were four questions for each item with a total number of 20 items. Each item was carefully monitored by the observer; it was ticked "yes" (score of 1) in case of correct performance, "no" (score -1) was checked in case of failure to take the measure, and "no item" (score 0) was considered for absent measures. The score range varied between 4 and -4 and the final score was between 20 and -20. A score between -20 and -12 was at very weak level, a score between -12 and -4 was at weak level, a score between -4 and +4 was at medium level, a score between 4 and 12 was at good level, and a score between 12 and 20 was at the very good level.

After checking with the ward supervisor and wearing protective equipment, the researcher visited the ward. The researcher closely observed the nurses and they knew about the presence of the researcher. As the nursing interventions were carried out, their scores were recorded in the instrument. When finishing a procedure and starting another one, the researcher observed the nurses performance and monitored another participant. First, all participants of each ward were monitored and then, the researcher moved to the next ward.

1) Obtaining the code of ethics from the Ethics Committee of Tabriz University of Medical Sciences (IR.TBZMED.REC.1398.1306); 2) Checking with Alzahra and Taleghani hospital authorities; and 3) Obtaining informed written consent from all participants.

The data recorded for each participant were delivered to the statistical consultant (not included in the research team) and they were analyzed in SPSS 21. Frequency and percentage were used to represent data and logistic regression and chi-square tests ($P<0.05$) were used to analyze data.

**Results**

The age means ± standard deviation of participants was 39.45±04.29 and the majority of participants were between 40 and 50 years old (n=18, 30%). In addition, 26 participants (43.33%) had a work experience of 5 to 10 years. Of the total, 39 participants (65%) were married and 53.33% (n=32) had children. The detailed demographic information of the participants is shown in table 1.

The study of observing hand hygiene, putting on and taking off gloves and coveralls, correct suctioning and safe injection indicated that failure in complying with measures was more in women than in men. The frequency of noncompliance with preventive measures was higher among participants between 30 and 40 years old. Noncompliance with preventive measures was higher in participants with a work experience of 5 to 10 years. In addition, the best performance was seen in safe injection item and the worst in wearing and taking off coveralls item (Table 2).

Total score of compliance with preventive measures was 3.45±18.0 (medium). The study of logistic regression between demographic variables and compliance with preventive measures indicated a significant difference between marital status (OR=1.2 and CI=0.8-2.0), underlying diseases (OR=1.9 and



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CI=1.5-2.2), and work history (OR=1.6 and CI=1.4-2.3).

**Table 1: The demographic information of the participants**

| Variable | | % | N |
|---|---|---|---|
| Age | 20-30 | 26.66 % | 16 |
| | 30-40 | 26.66 % | 16 |
| | 40-50 | 30.0 % | 18 |
| | >50 | 16.66% | 10 |
| Years of service | <5 | 16.66% | 10 |
| | 5-10 | 43.33% | 26 |
| | 10-15 | 26.66 % | 16 |
| | 15-20 | 13.33 % | 8 |
| marital status | Married | 65 | 39 |
| | Single | 35 | 21 |
| Children | Yes | 53.33 % | 32 |
| | No | 46.67 % | 28 |
| disease | Yes | 23.33 % | 14 |
| | No | 76.67 % | 46 |

**Table 2: Correlation of noncompliance with preventive measures and demographic data in participants of the study**

| Variable | | Hand hygiene | | Wear and remove gloves | | Wearing and taking off the cover | | The correct principles of suctioning | | Safe injection | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Age | 20-30 | N=7 | P= 0.047 | N=8 | P= 0.048 | N=14 | P= 0.045 | N=8 | P= 0.043 | N=5 | P= 0.027 |
| | 30-40 | N=12 | | N=10 | | N=9 | | N=3 | | N=0 | |
| | 40-50 | N=5 | | N=10 | | N=8 | | N=4 | | N=1 | |
| | >50 | N=2 | | N=2 | | N=0 | | N=0 | | N=0 | |
| Years of service | <5 | N=7 | P= 0.01 | N=11 | P= 0.025 | N=11 | P= 0.009 | N=5 | P= 0.048 | N=3 | P= 0.015 |
| | 5-10 | N=8 | | N=5 | | N=10 | | N=5 | | N=1 | |
| | 10-15 | N=5 | | N=3 | | N=5 | | N=1 | | N=0 | |
| | 15-20 | N=0 | | N=0 | | N=1 | | N=1 | | N=0 | |
| marital status | Married | N=13 | P= 0.038 | N=10 | P= 0.088 | N=9 | P= 0.055 | N=5 | P= 0.112 | N=3 | P= 0.036 |
| | Single | N=5 | | N=8 | | N=11 | | N=5 | | N=7 | |
| Children | Yes | N=5 | P= 0.043 | N=4 | P= 0.026 | N=3 | P= 0.033 | N=5 | P= 0.033 | N=6 | P= 0.019 |
| | No | N=8 | | N=7 | | N=3 | | N=8 | | N=9 | |
| disease | Yes | N=3 | P= 0.011 | N=6 | P= 0.015 | N=6 | P= 0.005 | N=5 | P= 0.009 | N=6 | P= 0.013 |
| | No | N=14 | | N=11 | | N=21 | | N=16 | | N=14 | |

## Discussion

This study aimed to examine infection prevention and control in prenatal care providers caring for pregnant women with COVID-19 under mechanical ventilation in Tabriz hospitals in the second quarter of 2020. The results indicate that compliance with preventive measures was at medium level which can be dangerous. Results of similar studies on compliance with preventive measures in infectious diseases showed that HCWs caring for patients with infectious diseases take preventive measures to a great degree. Thus, the results of this study was not congruent with previous studies (11, 12). It appears that lack of preparedness for the crisis, high workload, lack of sufficient experience in dealing with contagious diseases, and the stress resulting from this situation are involved in poor compliance with preventive measures. Accurate information about the causes requires further research.



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In this study, the item related to gloves and coveralls correct wearing and taking off obtained the lowest score. This indicates that the staff lacks sufficient information on the correct use of coveralls and gloves and therefore, their score was low. Results of similar studies showed that when individuals confront a crisis for the first time, they need relevant training and in case of failure in receiving the required information, they fail to perform correctly (12, 13). In this regard, the results of this study were not congruent with those of similar studies. In this study, the ICU staff had received no training which could be the cause of their failure.

The item of observing hand hygiene and correct suctioning had a medium score; this indicates that participants in this study have background knowledge on these items. However, due to the increased workload and lack of equipment, failing to use this background knowledge and other factors that require more investigation led to a lower score in these items. The authors believe that the ICU staff should update their information and be assessed in terms of factors affecting standard care to improve their performance. Accordingly, the results of this study were in line with the results of similar studies (9, 14).

Finally, safe injection item had the highest score in this study; in other words, the participants were placed at a good level in safe injection. Injection is one of the common responsibilities of nurses and repeated practice has resulted in their permanent learning. In this regard, the results of this study were in line with the results of similar studies (15).

Some of the limitations of this study were lack of knowledge on receiving online training, lack of monitoring the recommendations among staff, and lack of information on the level of nurses' knowledge in caring for pregnant women with COVID-19. It is suggested to address these limitations in future studies and to provide appropriate training programs on contact precautions and their effectiveness; Lack of information about the care of other patients, lack of information about the type of drugs received by patients, lack of evaluation of the course of the disease in pregnant women, lack of evaluation of patients' safety were other limitations of this study.

**Conclusion**

In this study, contact precautions in caring for pregnant women with COVID-19 under mechanical ventilation were at medium level which could have a significant effect on COVID-19 infection among the HCWs.

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