



# Nursing Care in a Child with Coronavirus Disease 2019: A Case Study

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## Abstract

**Introduction:** Children are sensitive at any age to coronavirus disease 2019 (COVID-19) and are at risk of being infected. The prevalence of this disease in children under ten years of age is reported to be 1%. The most common clinical manifestation of COVID-19 in children is acute respiratory distress syndrome (ARDS). Nursing management is an important part of the treatment in children with ARDS. Owing to the emergence of COVID-19 and less focus on studies in pediatrics, the present study reports a case of COVID-19 in an 8-year-old child and its caring issues.

**Case Presentation:** This report describes an 8-year-old boy who was referred to Tabriz Children's Hospital with respiratory symptoms such as fever, cough, and dyspnea. He was admitted to the pediatric intensive care unit. Diagnosis of COVID-19 was made based on the PCR test on the second day of hospitalization. In chest X-ray imaging, in the left lung, consolidation, and glass-opacity was observed.

**Conclusions:** Caring for a child with COVID-19 was a new experience for PICU nurses. The most important caring issues of a child with COVID-19 were continuous monitoring of respiratory status, paying more attention to family informational and emotional support owing to visitation bans, transmission of infection, and the difficulty of caring activities due to the limitations of the use of personal protective equipment.

**Keywords:** COVID-19, Coronavirus, Child, Nursing, Care

## 1. Introduction

According to the global statistics for the Coronavirus until April 29th, 2020, the number of infected people and deaths was 3,148,417 and 218,368, respectively. This number was 92,584 for COVID-19-infected cases and 5,877 for deaths in Iran (1). Children are sensitive at any age and are at risk of being infected. Although the severity of clinical manifestation in children is less than adults, young children, especially infants, are more vulnerable to the disease (2). According to the Wu study (2020), in China, the rate of infection in children less than 10 years was reported to be 1% (486 cases) (3). In another study, among 2,143 suspected children with COVID-19, about 731 (34.1%) of them were laboratory-confirmed cases (2). Clinical signs and symptoms are usually initiated a few days after the person becomes infected, but in some people, the symptoms may appear with a delay. According to previous studies, the most common symptoms are fever, dry cough, dyspnea, fatigue, and muscle pain, but other symptoms such as headache, diarrhea, and runny nose may also be seen (4, 5). A study in China found that most of the children hospi-

talized with acute respiratory distress syndrome had coronavirus (6). Another study of Norwegian children found that 10% of hospitalized children with respiratory tract infections had coronavirus (7). The severity of COVID-19 in children is classified based on the clinical features, laboratory findings, and chest X-ray imaging into five categories: asymptomatic, mild, moderate, severe, and critical infections (8).

Nursing management is an important part of the treatment in children with acute respiratory syndromes. Owing to the emergence of COVID-19 and less focus on studies in pediatrics, the present study reports a case of COVID-19 in an 8-year-old child and its caring issues.

## 2. Case Presentation

An 8-year-old boy, with a normal developmental process and without a history of chronic disease, had fever (38°C - 39°C) and dry coughs for five days with symptoms that gradually worsened. Dyspnea was also added to the child's symptoms. Upon the admission, he had a

decrease in arterial oxygen saturation (SaO<sub>2</sub>) and respiratory distress (tachypnea, nasal flaring, and retraction). After chest X-ray imaging and initial tests (ABGs, CBC, etc.), he was admitted to the pediatric intensive care unit (PICU) on 18.3.2020 and was intubated with the suspicion of COVID-19. His medications included intravenous immunoglobulin (IVIG), keletra (tablet) (lopinavir/ritonavir), hydroxychloroquine (tablet), ribavirin (capsule), and azithromycin (Syrup).

In the initial assessment of vital signs, body temperature was 38°C, blood pressure 120/80 mmHg, heart rate 133 bit/min, and SaO<sub>2</sub> were 35%. In the physical examination, in addition to cough and dyspnea, auscultation of the respiratory system showed a bilateral crackle with decreased pulmonary vocalizations on the left side. No abnormalities were found on examination of other organs. The parents had a history of respiratory disease (cough and fever) in the past weeks, which received outpatient treatment. Diagnosis of COVID-19 was made based on the PCR test, by sampling tracheal secretions on the second day of hospitalization. In chest X-ray imaging, consolidation and ground glass-opacity were observed in the left lung.

### 3. Discussion

Nursing care for children with COVID-19 is comprised of supportive and symptomatic care based on the conditions of the patient. COVID-19 is a novel disease, and limited studies have been conducted on children. So the present study reports nursing care of COVID-19 in an 8-year-old child.

The COVID-19 care program was designed and adjusted based on the child's conditions. This caring program is designed according to NANDA nursing diagnosis (9) and the nursing process steps (10). The child was admitted to the PICU for 14 days. In the first seven days, the mechanical ventilation mood was pressure-regulated volume control (PRVC). In the early days of hospitalization, despite the connection to the ventilator machine, SaO<sub>2</sub> decreased by up to 63%. From the sixth day, SaO<sub>2</sub> did not fall below 90%. On the eighth day, the mechanical ventilation mood was changed to synchronized intermittent mandatory ventilation (SIMV). Following physiological parameters stability since day 12th, he was weaned from a mechanical ventilator. The setup of mechanical ventilation and vital signs of the child by days of hospitalization in PICU are shown in Table 1. The child had spontaneous breathing and received oxygen with free flow through the mask (Figure 1). The SaO<sub>2</sub> was above 96%. On the 15th day, he was transferred to the infectious unit, and the next day, he was discharged.

#### 3.1. Nursing Care

In the early days of hospitalization, following the child's respiratory system assessment nursing, the diagnosis of "Impaired gas exchange related to increased pulmonary secretions, receiving sedative drugs, and immobility as evidenced by crackle and decrease in SaO<sub>2</sub>" was made for the patient. The goal of the care plan was to clear the airways, to hear the normal sound of breathing, and to maintain saturation in the normal range (90% - 95%). For this purpose, chest physiotherapy, changing the position every four hours, and suctioning of tracheal tube, mouth, and nose secretions with black 10 Fr suction catheter and vacuum pressure between 80 to 100 mmHg. The number, color, and type of secretions were recorded in the nursing flowchart after each suction. Secretion was serous and adhesive.

"Risk of ineffective breathing pattern related to the displacement of tracheal tube" is the potential diagnosis during the intubation days. The goal of the care plan was to prevent the displacement of the tracheal tube and maintain an effective breathing pattern. In this regard, the child was placed in the supine position with the semi-recumbent position (30°-45°). Also, respiratory parameters and signs and symptoms of respiratory distress were monitored continuously. Verification of endotracheal tube position was done through auscultation of the lungs, observation of bilateral chest rise, fogging of the tube, and pulse oximetry results. The ventilation setting and intravenous infusion of sedative drugs were checked according to the physician's order. To increase patients' tolerance of the endotracheal tube, reduce anxiety, and reduce patient-ventilator dyssynchrony, the level of consciousness was regularly assessed and documented for providing adequate sedation. During the examination, there was no problem in the respiratory pattern related to the displacement of the tracheal tube.

Following the improvement of the clinical condition, the child was weaned from mechanical ventilation and received oxygen with free flow through the mask in the amount of 7 L/min on the 12th day. From the 13th day, the child was conscious, and he did not need to receive auxiliary oxygen.

In the first six days of hospitalization, the child's axillary temperature was between 36.8°C and 39.5°C. Based on this finding, the actual diagnosis of "hyperthermia related to COVID-19 as evidenced by fever" was proposed. The nursing intervention was performed to maintain the body temperature in the normal range in each shift. Axillary temperature was assessed every two hours, and reported any temperatures greater than 38°C to the doctor. Room temperature was adjusted and monitored. To decrease warmth and increase evaporative cooling, excessive clothing and

**Table 1.** Setup of Mechanical Ventilation and Vital Signs of the Child by Days of the Hospitalization at PICU

Day	T, °C		PR, min		BP, mmHg		RR, min		SaO <sub>2</sub> %		Mood	FiO <sub>2</sub>	Ventilation				
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max			peep	RR	TV	PC	PS
1	36.7	37.5	113	147	95/55	113/65	42	43	70	95	PRVC	100	7	35	200	-	-
2	38	39.5	130	161	81/40	123/75	30	44	63	92	PRVC	100	5	25	150	-	-
3	37.2	38.5	102	133	85/39	115/64	25	36	77	93	PRVC	100	6	25	150	-	-
4	36.8	37.7	89	126	90/60	109/50	25	36	90	96	PRVC	100	6-8	25	150	-	-
5	36.8	37.2	72	96	90/60	100/60	25	35	86	96	PRVC	100	8	25	160	-	-
6	36.5	38.8	85	143	92/57	113/68	30	40	90	93	PRVC	90	8-10	30	160	-	-
7	36	36.7	78	83	89/58	122/72	25	30	91	96	PRVC	90	10-8	30	200	-	-
8	36.5	36.7	73	82	85/40	106/60	25	40	90	94	PSIMV	90	6	25	-	20	12
9	36	36.8	73	99	94/53	122/72	25	33	95	99	PSIMV	80	5	25	-	18	12
10	36.2	36.8	82	100	88/48	107/67	15	30	95	98	PSIMV	60	5	15	-	15	12
11	36.4	36.7	89	104	89/57	100/51	15	29	95	100	PSIMV	50	5	15	-	15	10
12	36.5	36.7	85	115	85/30	93/57	26	37	96	100	Extubation	O <sub>2</sub> therapy with mask 7 l/min					
13	36.5	37	104	113	90/60	110/70	26	30	94	100	Extubation	O <sub>2</sub> therapy with mask 6 l/min					
14	36.5	37	98	111	85/48	102/72	24	26	97	98	Extubation	Without O <sub>2</sub> therapy					

covers were eliminated. The fluid intake and output were checked and recorded every hour. Following an increase in temperature above 38°C, paracetamol diluted in 0.9% sodium chloride was administered intravenously. The outcome of the evaluation showed that the interventions decreased the child's body temperature below 38°C. After the seventh day, the child's body temperature was in the normal range without any intervention.

In addition to the nursing diagnosis for the patient, there was a potential diagnosis for the caregivers as "risk of infection related to the spread of coronavirus". Therefore, safety and protective interventions were planned to prevent the spread of the infection. In this regard, the child was isolated immediately in a single isolation room. In each shift, one nurse and one nursing aid took care of the child, and they used personal protective equipment (gown, gloves, N95 mask, and eye protection) (Figure 1). All surfaces and equipment of the isolation room were disinfected daily, and the wastes from the isolation room were disposed of separately from other wastes.

### 3.2. Caring for Family

The crisis of hospitalization and COVID-19 diagnosis affected the parents, and their emotional needs were increased when the child was admitted to the PICU and the isolation room. In this regard, informational and emotional support was provided by giving information about the reason for isolation and the risks to themselves if isolation procedures were not followed. During the days that the parents were not allowed to visit, they were informed daily about the disease, treatments, and plan of care. Parents' reactions to illness in their child depend on a variety

of factors. When parents first visited their child in the PICU, they prepared regarding self-protection, the equipment of the ward, and the child's appearance. The child's nurse accompanied parents to the bedside and facilitated communication with them by allowing them to ask questions.

### 3.3. Conclusions

Clinical manifestations of COVID-19 in children are often mild, and the rate of hospitalization is low. This case was selected to report for the following reasons, firstly because he had severe clinical manifestations that led to his hospitalization in the PICU, and secondly, he showed the caring needs of children with COVID-19 and their families. Although caring for a child with COVID-19 was a new experience for PICU nurses, there was not a significant difference in terms of nursing care and diagnosis with other respiratory diseases in children. The most important caring issues of a child with COVID-19 were continuous monitoring of respiratory status, paying more attention to family's informational and emotional support due to visitation bans, transmission of infection, and the difficulty of caring activities due to the limitations of the use of personal protective equipment.

### Supplementary Material

Supplementary material(s) is available [here](#) [To read supplementary materials, please refer to the journal website and open PDF/HTML].



**Figure 1.** The Child and PICU nurses on the 15th day when he was transferred to the Infectious Unit

## Footnotes

**Authors' Contribution:** Data collection: NM and MRF. Drafting the manuscript: MRF, MJ, NM, and JM. All authors read and approved the final manuscript.

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**Ethical Approval:** This study was confirmed by the Ethics Committee of the Tabriz University of Medical Sciences with the code of IR.TBZMED.REC.1399.494.

**Informed Consent:** Parents of the child were informed with detailed information about the study and were assured all of the information would be kept confidential. Verbal and written consent was obtained from them.

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