

Special Article

COVID - 19 and Nursing Interventions

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Abstract

Introduction: Coronaviruses belong to the family of Coronaviridae, which includes several types of viruses that are capable of contaminating and causing respiratory infections in mammals such as bats, camels, Asian masked civets, various species of birds and humans.

Aim: The aim of this retrospective study is to investigate the management of patients with COVID-19 requiring high quality nursing care in order to improve patient outcomes, along with high demands on workload and human resources.

Methodology: An extensive review of the relevant literature of the last 15 years was performed via electronic databases (Google Scholar, Pubmed, Medline, Scopus, the Hellenic Academic Libraries Association –HEAL link) and scientific journals (English and Greek) using specific key words.

Results: COVID-19 sometimes causes different symptomatology in patients, resulting in the need for an individualised patient care plan. Nurses as part of their continuing education for COVID-19 should be able, through knowledge of the pathophysiology and clinical manifestations of the disease, to diagnose active and potential problems in patients so that they can be resolved by implementing appropriate interventions.

Conclusions: The COVID-19 pandemic resulted in a major social and health crisis with a significant number of patients with severe disease requiring hospitalization, even in intensive care units, with no human and material resources readily available for their adequate and effective treatment and management.

key words: Covid - 19, coronavirus, pandemic, nursing interventions, nursing care

Introduction

Coronaviruses belong to the coronaviridae family, including several types of viruses that are infectious and cause respiratory infections in mammals, such as bats, camels, masked palm civets, in various avian species, and humans. The name of coronaviruses is derived from their distinctive morphology, whereby spikes with club-like bumps resembling a crown are superimposed on the polymorphic elytron with a diameter of 80-220 nm (Sharma et al., 2021; Lucchini et al., 2020).

It is an RNA virus whose genome consists of a long chain of RNA embedded as a helical ribonucleoprotein in the envelope. During RNA replication, seven positive-chain subgenomic mRNAs, each encoding a viral protein, are produced from intermediate negative chain forms complementary to the genome. (Sharma et al., 2021; Galanis et al., 2022)

Coronaviruses also affect humans with the infection caused by them sometimes showing a different degree of severity of symptoms, ranging from asymptomatic to symptomatic with the onset of fever, cough, respiratory distress and gastrointestinal disturbances. Especially in cases of elderly patients, those with underlying diseases, individuals who have not been vaccinated or have not received booster doses, or immunocompromised patients, coronavirus infection can cause severe pneumonia and even lead to death (Majumder et al., 2021; Hoogendoorn et al., 2021).

According to microbiology texts, coronavirus is reported to cause mild respiratory infections, with these infections remaining limited to the nasal fringing epithelium, trachea, and alveoli (Ochani et al., 2021). Managing of patients with COVID-19 requires skilled and evidence-based nursing care. Nurses are an integral part, or even the heart and backbone of the healthcare system. No health system can run effectively if the nursing service is understaffed and inadequate (Punjot, 2019).

The *aim* of this retrospective study is to investigate the management of patients with COVID-19 requiring high quality nursing care in order to improve patient outcomes, along with high demands on workload and human resources.

An extensive review of the relevant literature of the last 15 years was performed via electronic databases (Google Scholar, Pubmed, Medline, Scopus, the Hellenic Academic Libraries Association –HEAL link) and scientific journals (English and Greek) using the following key words: Covid - 19, coronavirus, pandemic, nursing interventions, nursing care

COVID-19 Chronology: The very first coronavirus was found in poultry in the 1930s, while the first coronaviruses causing infections in humans and being transmitted between humans were identified in the 1960s. The majority of these infections were considered mild, causing flu-like symptoms and symptoms similar to the common cold. Essentially, in terms of human contamination and subsequent infection, coronaviruses were until 2002 treated by the international medical community as simple, non-lethal viruses. (Ochani et al., 2021).

Since then, the general perception of the morbidity of coronaviruses in humans has changed dramatically, as 3 major epidemics with significant morbidity and mortality have been caused by different coronavirus species, all during the 21st century. In particular, the first major coronavirus epidemic was that of SARS-Cov causing Severe Acute Respiratory Syndrome (SARS), which was identified in China in November 2002 and caused 8096 infections in 26 countries, accompanied by a high mortality rate (10%). It was subsequently self-limited (WHO, SARS) (Sharma et al., 2021).

The second major coronavirus outbreak occurred about 10 years later, due to the Middle East Respiratory Syndrome Coronavirus (MERS-Cov), which emerged in April 2012 in Saudi Arabia, causing 2494 infections to date, accompanied by about 858 deaths. The disease was subsequently self-limited without being eradicated, but since 2017 there has been a significant decrease in the number of cases of the disease. Mortality from the disease is extremely high, reaching 37% to 80% in the Saudi Arabian region ((WHO, MERS) (Sharma et al 2021; Maykut et al, 2021)

The third major outbreak of coronavirus was the current pandemic of the new SARS-Cov-2, which causes COVID-19, and emerged in December 2019 in Wuhan, China, and from there it rapidly spread around the world, causing a series of health,

social and professional diversities and upheavals. COVID-19 appears to be characterized by higher morbidity and more deaths in absolute terms than all previous epidemics from coronavirus strains, having spread across the world (Sharma et al 2021; Tsang et al, 2021)

Infection with The New Coronavirus (COVID-19): As mentioned above, in December 2019, several cases of a new pneumonia were first reported in the city of Huwan, China, which had already spread to many parts of the world. On 30 January 2020, the World Health Organization (WHO) designated the SARS-Cov-2 epidemic as a global public health emergency. On 24 February of the same year, the WHO announced that SARS-Cov-2 has the potential and characteristics to spread globally causing a potential pandemic, and on 11 March 2020, the WHO officially designated COVID-19 as a pandemic (Sharma et al, 2021).

According to the WHO, by 19 May 2022, there were 520,912,257 registered cases of COVID-19 worldwide and the disease had caused over 6 million deaths (6,272,408) (<https://www.worldometers.info/coronavirus/>). The possibility of SARS-Cov-2 transmission to humans via an animal that has served as an intermediate host, such as bats, minks, skunks and pangolins, is currently considered strong (Xiao et al, 2020)

Beyond that, the main mode of transmission is person-to-person via droplets. Close contact with sick people and co-morbidity are factors that contribute to the rapid transmission of the disease, since, as mentioned above, the disease is transmitted by droplets. There is also a possibility of transmission, although less likely, through contaminated surfaces if hand hygiene measures are not observed. (Chen et al, 2020; Morley et al. 2020).

The main types of detection and identification of SARS-Cov-2 are: a) molecular analysis for the detection of virus RNA (PCR), b) rapid detection of virus antigen by immunochromatography (Rapid-test) and c) various methods for the detection of virus antibodies by immunoassays (Majumder et al, 2021).

The diagnosis of the disease is based on a positive result of virus detection tests, but this does not mean that a negative result guarantees the absence

of the disease. Patients with COVID-19 show lymphopenia, prolonged prothrombin time, elevated levels of lactate dehydrogenase, aspartate aminotransferase, creatine kinase, creatinine, C-reactive protein and procalcitonin. In addition, imaging findings consistent with bilateral pneumonia via chest radiography or CT scan can confirm the diagnosis and also determine the severity of the respiratory disease caused (Majumder et al, 2021).

The symptomatology of the disease ranges from complete absence of symptoms (asymptomatic disease) to severe disease leading to major multi-organ complications and even death. The most common symptoms include fatigue, malaise, fever, cough, sore throat, loss of taste and/or smell and gastrointestinal disturbances such as nausea, vomiting and diarrhea. In severe disease there is desaturation, which is accompanied by respiratory distress and dyspnea. (Ochani et al, 2021).

The therapeutic approach of COVID-19 depends on the severity of the disease and its symptomatology. Asymptomatic or presymptomatic disease does not require specific treatment, nor additional laboratory and imaging investigation. Emphasis should be placed on isolation of the case in order to limit the spread of the disease. No specific medication shall be administered and the patient shall continue to receive treatment for any underlying disease. In addition, temperature and oxygen saturation are monitored with an oximeter at least twice a day (Tsang et al, 2021).

In the case of mild and moderate disease, self-monitoring and confinement of the patient at home is required with the aim of symptomatic treatment and rest. Laboratory and imaging tests are not required. Good hydration and bed rest until the fever subsides are also recommended. It is obvious that treatment should be continued in the presence of underlying disease. If there are any other symptoms apart from fever, symptomatic treatment such as antiemetics, expectorants, antidiarrheal drugs are recommended. Antibiotics may be administered only on clinical, imaging or laboratory evidence of co-infection with bacterial pneumonia. Administration of dexamethasone or other corticosteroids is not recommended (Tsang et al, 2021).

In all cases of asymptomatic, mild or moderate disease, the therapeutic approach becomes more intensive in patients with risk factors for disease progression to severe COVID-19, such as patients with underlying diseases or immunosuppression. In these cases, close monitoring of patients and daily communication with attending physicians, monitoring of temperature and oxyhemoglobin saturation with an oximeter at least twice a day, and good hydration are essential. It is also recommended to take antipyretic drugs in case of fever, to continue treatment of the underlying disease, to administer other symptomatic drug therapy, to use antibiotic therapy on clinical and paraclinical evidence of bacterial lung infection (Tsang et al, 2021).

In case of moderate to severe disease, it is recommended to start, after consultation with the attending physician, early antiviral drug therapy. In the absence of rapid improvement of symptoms and general clinical picture, it is also suggested to transfer the patient to a hospital ICU with COVID-19 clinic. In these cases, it is possible that the patient may be admitted to the hospital for further monitoring and investigation of the disease, as well as initiation of intravenous medication to limit and effectively treat the disease. In some cases of patients with severe disease, if the disease worsens during hospitalization, further support and care in intensive care units (ICU) with mechanical ventilatory support and tracheal intubation is required (EODY 2022a).

Nursing Care Plan In COVID-19

COVID-19 sometimes causes different symptomatology in patients, resulting in the need for an individualised patient care plan. Nurses as part of their continuing education for COVID-19 should be able, through knowledge of the pathophysiology and clinical manifestations of the disease, to diagnose active and potential problems in patients so that they can be resolved by implementing appropriate interventions. (Sarma, 2021; Lake, 2020)

Possible nursing diagnoses for the patient with COVID-19 are the following:

- ✓ Gas exchange disorder
- ✓ Ineffective airway clearance
- ✓ Ineffective breathing

- ✓ Hyperthermia
- ✓ Sleep disturbance
- ✓ Activity intolerance

The inflammatory response to infection causes swelling of lung tissue and exudate formation resulting in airway narrowing and possibly obstruction of the bronchi and alveoli. Findings from the clinical examination of the patient that could support the above diagnosis are additional respiratory sounds such as crackles, rales and wheezes, dyspnea and tachypnea, cough and signs of hypoxia such as desaturation, cyanosis, restlessness, agitation or lethargy. The appropriate nursing interventions, among others, to be planned and then implemented are the following (LeMone et al, 2014):

- Assessment of the patient's respiratory function, including vital signs, lung sounds, oxyhemoglobin saturation and skin tone at least every four hours. Early detection of a respiratory dysfunction allows for early intervention to prevent tissue hypoxia and the development of complications.
- Ensuring conditions that allow adequate rest for the patient. Rest is expected to reduce the body's metabolic demands, fatigue and work of breathing, thus promoting a more efficient respiratory pattern for the patient.
- Reassuring support for patients during periods of respiratory distress. Respiratory distress and subsequent hypoxia increase patient anxiety, which in turn increases respiratory rate leading to tachypnoea and further deterioration of inefficient breathing.
- Use of oxygen therapy, based on a relevant medical directive. Supplementary oxygen administration will increase the partial pressure of oxygen in the arterial blood and treat the patient's hypoxia and sense of distress and anxiety. In this way the patient is expected to regain a more effective respiratory pattern.
- Taking the patient's temperature every 4 hours or more often and administering antipyretic drugs.
- Assessment of the patient's sleep using subjective and objective information and administration of antipyretic and analgesic drugs, because they increase comfort by reducing fever and relieving myalgias.

- Assessment of tolerance to fatigue by observing any increase in heart rate, respiratory rate, but also the occurrence of dyspnea, sweating or cyanosis. Findings like these are probably indicative of activity limitation or intolerance.
- Providing assistance to the patient to perform self-care activities. Providing assistance reduces energy requirements and thus may help to reduce patient fatigue and improve activity tolerance.
- Providing psychological support. A key element in this context is to reassure the patient that their strength and energy will return once the acute phase of the infection is over. It is very likely that the patient will be concerned that reduced tolerance to activity and fatigue are permanent future problems.

Prevention Of COVID-19: The most effective way of primary prevention of COVID-19 is: a) the implementation of infection control measures and b) vaccination. The implementation of prophylactic measures includes actions such as strict and meticulous hand hygiene with soap and water and/or the use of alcohol solutions, the use of high respiratory protection masks, especially indoors, but also outdoors where crowded conditions exist, avoiding confusion, good ventilation of indoor areas and keeping distances. In an inpatient setting, precautionary measures are more strict and management of cases or suspected cases of patients with COVID-19 disease is achieved through specific personal protection measures, including the use of personal protective equipment (Jho, 2016; Sharma et al 2021).

The most effective way of primary prevention of COVID-19 is: a) the use of infection control measures and b) vaccination. The application of precautionary measures includes actions such as strict and meticulous hand hygiene with soap and water and/or the use of alcohol solutions, the use of high respiratory protection masks, especially indoors, but also outdoors where there is a crowded environment, the avoidance of crowding, good indoor ventilation and keeping distances. In an inpatient setting, precautionary measures are more stringent and the management of cases or suspected cases of patients with COVID-19 disease is carried out by taking specific personal protection measures, including the use of personal protective equipment (Jho, 2016; Sharma et al, 2021).

Vaccination is a powerful preventive measure which is now available to us and is considered more effective than simply following precautionary measures. The combination of precautionary measures and vaccination is obviously the best way to prevent the disease, reducing the probability of becoming ill, but especially the probability of developing a severe disease that could lead to hospitalization, permanent complications of the disease and even death (Sharma et al 2021; Meo et al, 2021).

In December 2020, the European Medicines Agency has licensed 5 vaccines developed by BioNTech & Pfizer (December 2020), Moderna (January 2021), AstraZeneca (January 2021), Janssen Pharmaceutica NV (March 2021) and Novavax (December 2021). Existing evidence shows that these vaccines are extremely safe while offering efficacy of over 80% in the general population in terms of serious disease, hospitalization and death (European Vaccine Information Portal 2022). The scientific community is continuously working to produce and develop new vaccines that will be able to cover the population from variant strains of the virus and increase protection rates against both simple and severe disease (Meo et al., 2021; Raurell et al. 2020).

Conclusions: The COVID-19 pandemic resulted in a major social and health crisis with a significant number of patients with severe disease requiring hospitalization, even in intensive care units, with no human and material resources readily available for their adequate and effective treatment and management. At the heart of this epidemic are nurses, as they are the core of the health system and the key component in ensuring its proper functioning. The management of patients with COVID-19 requires a high level of nursing care in order to improve patient outcomes, along with high demands on workload and human resources.

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