REVIEW ARTICLE

Clinical nursing care guidance for management of patient with COVID-19

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Abstract

COVID-19 is a highly contagious disease, which has human-to-human transmission through droplet and contact. It is commonly manifested as fever, dry cough, myalgia, and dyspnoea; the severity of this disease may range from mild, severe to a critical-illness. Currently, there is no definitive treatment or vaccine for COVID-19. The only proven form of management is isolation and supportive care. Therefore, nurses have a pivotal role to play in its management. This evidence-based comprehensive literature review provides the role of nurses in the management of patients with COVID-19, which starts from the initial assessment and triaging, sample collection, care of patients with mild-to-moderate symptoms, care of the critically-ill patient, and care of the dead body.

Keywords: nursing management in COVID-19, SARS-CoV-2, nursing care of patient with COVID-19

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Introduction

Coronavirus disease (COVID-19) is an infectious illness caused by the novel coronavirus, named as severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), which is highly contagious and has rapidly spread globally. The outbreak of this disease occurred in Wuhan, China and was first reported to World Health Organization (WHO) on 31 December, 2019 and was declared a global pandemic on 11 March 2020.[1] Incubation period, symptomatology, severity profile, diagnostic methods and medical management of COVID-19 is briefed in Table-1. There is no specific anti-viral medication or vaccine that is currently available for the treatment or prevention of this disease. Therefore, isolation and supportive care are the key components of management with nurses playing a pivotal role in the patient care. This paper presents a comprehensive evidence-based clinical nursing care guidance for the management of the patient with COVID-19.

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Methods

Articles were extracted using MESH keywords like 'SARS-CoV-2', COVID-19, nursing care, nursing management, clinical management, infection control and prevention in COVID-19, etc. from PubMed, Embase and Google Scholar search engine between the period of the last quarter of 2019 and first quarter of 2020. In addition, gray literature was also reviewed to obtain epidemiological and management related data about this new disease.

Nursing Management Guidance

Patients with mild symptoms are hospitalised in a well ventilated isolation room preferably with negative pressure and managed with symptomatic and supportive interventions, which may include antipyretics (e.g. acetaminophen), external cooling, oxygen administration, nutritional supplementations, and antibacterial drugs administration (judicious use only in case of associated bacterial infection).[10] However, severe and critical cases may require ICU admission, high flow oxygen administration, mechanical ventilation, extracorporeal membrane oxygenation (ECMO), glucocorticoid therapy (controversial and not recommended in ARDS), and convalescent plasma administration.[6] There is no definitive treatment or vaccine for this disease; therefore, outcome of illness largely depends on quality of supportive care provided by the nurses for the recovery and prevention of iatrogenic complications. Nursing management has been discussed under five subsections in this article i) infection prevention and control practices, ii) role of nurses in initial assessment and triage iii) role of nurses in sample collection; iv) care of patient with mid-to-moderate symptoms iv) care of critically-ill patients and v) care of dead body.

Infection prevention and control practices

SARS-CoV-2 is highly contagious and found to be transmitted through respiratory droplets and contact routes. The virus-laden aerosol might travel up to 4-meter distance from infected patient (higher positivity in ICUs as compared to wards 66.7% vs. 8.3%), where highest

Table-1: Epidemiological profile, diagnosis and medical management of COVID-19.

Mode of transmission[2]

- Aerosolized droplets generated through coughing, sneezing or breathing
- Direct contact with patient and its body fluids including faeces
- Indirect contact with surfaces and fomites (virus can survive on surfaces for longer period: plastic/ stainless steel: 2-3 days; cardboard: 24 hours and copper: 4 hours)[3]
- Airborne transmission is suspected but not yet confirmed? (virus can survive in droplet particle in air up-to 3-hours[3] and was found upto 4-meter distance from patient[4])
- Faecal-oral route of transmission is also suspected? (SARS-CoV-2 is detected in faeces[5] but no reports on faecal?oral transmission is available till date.)

Incubation period:[6]

2 - 14 days (most cases occurring within 5-days of exposure)

Common symptoms:[6]

Fever (88%), dry cough (67%), fatigue (38%), myalgia (14.9%) and dyspnoea (18.7%); may also have headache, sore throat, rhinorrhoea and gastrointestinal symptoms.

Severity profile of disease:[6]

i) Mild to moderate (81%);
ii) Severe (dyspnoea, RR?30/minute. Blood oxygen saturation $\leq$93%, PaO2/FiO2 ratio<300, lung infiltrates >50% of lungs within 24 - 48 hours)-14% and
iii) Critical illness (respiratory failure, shock, multi-organ dysfunction syndrome)-5%

WHO estimated Global mortality rate- 3.4% [15% death in hospitalised patients][8]

Diagnosis[6]

i) Nasopharyngeal, oropharyngeal or sputum swabs or bronchoalveolar lavage, tracheal aspirate for rRT-PCR to detect RNA of coronavirus (nasopharyngeal swab is reliable only in first week of illness, later sputum or bronchoalveolar lavage, tracheal aspirate sample is more reliable)
ii) Chest X-ray has very little diagnostic value
iii) CT Scan: ground glass opacities, subpleural dominance, crazy paving and consolidation.
iv) Serology tests to identify IgM and IgG antibody to determine the percentage of infected population.(test is reliable only after 14 days of infection)

Medical Management[6]

There is no definitive treatment except isolation, symptomatic and supportive care. However, hydroxychloroquine is recently approved by FDA, USA[9] for use and certain antiviral drugs are under trial (e.g. Remdesivir, Favipiravir), which are promising with initial reports.

- Mild cases require symptomatic and supportive management:
  - Antipyretics (e.g. acetaminophen) for fever and myalgia
  - External cooling
  - Nutritional supplementation (e.g. protein and vitamin supplements)
  - Oxygen administration, if dyspnoea
- Critical cases require ICU admission and critical care:
  - Advanced airway and mechanical ventilation
  - High flow oxygen administration
  - Nasogastric/ parenteral nutrition
  - Shock management: fluids, vasopressors, antimicrobials (judicious use only) administration
  - Extracorporeal membrane oxygenation (ECMO)
  - Glucocorticoid therapy (use is controversial), and
  - Convalescent plasma administration
  - Anticoagulants (e.g. low molecular heparin) to prevent thrombosis.

rRT-PCR: real-time reverse transcription polymerase chain reaction; FDA: Food and Drug Administration.

concentration of aerosols was in patient room (44.4%), followed by air outlets (35.7%), doctors room (12.5%) and outside isolation room (0%).[4] Therefore, health care workers (HCWs) must strictly follow appropriate infection prevention and control (IPC) precautions. The essential IPC precautions recommended to be followed by HCWs while caring for patients infected with SARS-CoV-2 are listed below:[11,12]

- Provide patient with a triple layer surgical mask and ask them to follow coughing and sneezing etiquettes.

- Deploy minimum required HCWs, in the isolation room and practice bundling of nursing interventions to reduce the need of PPEs and risk of infections to HCWs.

- Disposal or dedicated equipment (e.g. stethoscopes, blood pressure cuffs and thermometers) should be used to prevent cross-infection) and disinfect with 70% alcohol in between use.

- Rational use of PPE- gloves, gown, eye protectives (goggles or eye shield), head cover, shoe covers and face mask preferably 95, respirators when exposed to aerosol generating procedures (e.g. nebulization, open suctioning, intubation, extubation, non-invasive mechanical ventilation etc.)

- Touching surfaces around patients must be minimised and practice meticulous hand hygiene with soap and water or alcohol based hand rub when hand not visibility soiled.

- Do not touch nose, eyes, mouth, face and maintain possibility 1-2 meter distance with others but new study found even virus might travel up to 4-meters.[4]

- Floors should be cleaned 4-hourly, by first mopping with 5% phenolic solution followed by 0.5% sodium hypochlorite solution (NaOCl).

- High touch surfaces such as doorknobs, bedrails, over-bed table, computer mouse, telephone, nursing trolley, nursing station, light switches, wall areas around the toilet etc. should be cleaned 4-hourly with 1% NaOCl solution.

- Metallic surfaces around patient should be cleaned with 70% alcohol and furniture, machines, instrument and surfaces in isolation room should be cleaned and disinfected with 1% NaOCl solution.

- Linen should be soaked in 0.05% NaOCl solution for 30 minutes before sending to laundry in a leak-proof plastic bag.

- Blood or body fluid spillage should be treated with 1% NaOCl solution for 30 minutes before wiping.

- Biomedical waste should be treated with 1-2% NaOCl solution and discarded in color-coded bins as per local or national BMW management policy.

Role of nurses in initial assessment and triage

Nurses are the frontline health care provides, who are involved in triage and sorting patients infected with SARS-CoV-2 based on the severity and history of the disease. They can use case definition, contact exposure definition[13] and the ABCDE history approach[14] given by WHO (Table-2).

Role of nurses in sample collection

Nasopharyngeal, oropharyngeal or sputum swab are collected to detect RNA of coronavirus through rRT-PCR. Safe, Accurate and Sufficient (SAS) approach should be used and following essential points should kept in mind while collection sample:[15]

- Trained person must collect sample using appropriate PPE, preferably use N95 mask or equivalent respirator because aerosol may be generated during procedure; if accidently patient coughs or sneezes.

- Keep COVID-19 sample collection kit ready i.e. Universal Transport Media (UTM) tube, flexible nasopharyngeal swab, ziplock, requisition form and an Ice pack.

- Do not induce the cough because it can generate aerosols and higher of risk of exposure to SARS-CoV infection.

- Follow steps for sample collection:

i) ask the patient to blow their nose, then check for obstruction and tilt head back to 70 degrees;

ii) insert the swab into nostril parallel to the palate and leave it for several seconds to absorb at the resistance; then slowly remove the swab while rotating; in case of oropharyngeal, take the specimen by swabbing the patient posterior pharynx and tonsillar area (ensure sufficient amount of sample is withdrawn);

iii) Place the swab into UTM tube then put into zip-lock along with the ice pack and label it;

iv) Store sample at 40 Celsius and transport to

Table-2: Initial assessment and case definition of patient with COVID-19.

ACDE approach of history taking[14]	Case definition[13]
Airway (A) - Ensure the patency of airway while talking to the patient? - Assess for dyspnea, abnormal breathing, sounds, cough and sputum expectoration. **Breathing (B)** - Assess for tachypnea (>20/ min), dyspnea, abnormal breathing, sounds, cough and sputum expectoration. - Measure oxygen saturation (SpO2>96%) **Circulation (C)** - Asses for cyanosis, capillary refill time (<2 sec) - Assess tachycardia (>100 beats/min) and BP - Assess for any signs of shock (hypotension, tachycardia etc.) **Disability (D)** - Assess the level of consciousness using AVPU, pupillary reflex - Previous history of any co-morbidity, drug intake history of fever, headache, coughing and malaise - Measure blood glucose level **Exposure (E)** Assessing for contact history as defined by WHO:[13] Exposures during 2 days before and the 14 days after the onset of symptoms: 1. Face-to-face contact with a probable or confirmed case within 1 meter and for more than 15 minutes; 2. Direct physical contact with a probable or confirmed case; 3. Direct care for a patient with probable or confirmed COVID-19 disease without using proper personal protective equipment1; OR 4. Other situations as indicated by local risk assessments.	**Confirmed case:** A person with laboratory confirmation of COVID-19 infection, irrespective of clinical signs and symptoms. **Probable case:** A. A suspect case for whom testing for the COVID-19 virus is inconclusive. a. Inconclusive being the result of the test reported by the laboratory. OR B. A suspect case for whom testing could not be performed for any reason. **Suspected case:** A. Patient with acute respiratory illness (fever and at least one sign/symptom of respiratory disease, e.g., cough, shortness of breath), AND a history of travel to or residence in a location reporting community transmission of COVID-19 disease during the 14 days prior to symptom onset. OR B. A patient with any acute respiratory illness AND having been in contact with a confirmed or probable COVID-19 case (see definition of contact) in the last 14 days prior to symptom onset; OR C. A patient with severe acute respiratory illness (fever and at least one sign/symptom of respiratory disease, e.g., cough, shortness of breath; AND requiring hospitalization) AND in the absence of an alternative diagnosis that fully explains the clinical presentation.

AVPU: alert, verbal, pain and unresponsive.

laboratory in closed circuit within zip lock bag with an ice pack.

Care of patient with mid-moderate symptom

All the symptomatic patients must be hospitalized, because mere isolation in home or community may expose family members and may easily lead to family clustering of infection.[4] Patients with mild-to-moderate symptoms should be admitted in isolated room, and managed with symptomatic and supportive care. Hydroxychloroquine has anti-inflammatory and immunomodulatory effects and found to be effective in management of COVID-19 when used in combination of Azithromycin.[16] Nurses have important role in care of patients with mild-moderate symptoms as detailed below:[6,10]

- Provide complete bed rest, promote sound sleep and regularly monitor vital signs, preferably through a remote monitoring system to reduce the risk of exposure and need of PPEs.

- Provide antipyretic drugs (e.g. acetaminophen) for management of fever and myalgia but NSAIDs should be avoided. Non-pharmacological interventions also may be used for fever like the optimum level of room temperature, light cotton clothing, external cooling interventions such as tepid sponging, use of a fan and cold sponging but remember to cool gradually to avoid shivering.

- Encourage patients to take a bath regularly with soap and water and maintain good personal hygiene.

- Provide plenty of fluids be, a nutritious high protein diet with vitamins. Some of the spices like haldi (Turmeric), Zeera (Cumin), Lahsun (Garlic), Guduchi (T. cordifolia or Giloy) are also believed to effective in recovery from viral infection due to their anti-inflammatory and immunity boosting effects.[17]

- Patients with respiratory difficulties may require Fowler's positon, pulse oximeter to monitor oxygen saturation and oxygen administration using nasal prongs or cannula to maintain SpO2 $\geq$ 90%.

- Collect blood samples and send them to the laboratory for prothrombin time, LDH (lactate dehydrogenase), D-dimer, ALT, C-reactive protein (CRP), and creatine kinase, which may be elevated in these patients.

- Hydroxychloroquine is known to cause AV blocks, cardiomyopathies and retail damage; therefore, nurses should closely monitor for these adverse effects.

Care of critically-ill patients

Critically-ill patients require intensive care unit admission and may need advanced airway and mechanical ventilation. They may be given extracorporeal membrane oxygenation (ECMO), glucocorticoid therapy (but its use is controversial), convalescent plasma administration, antiviral drugs e.g. remdesivir, favipiravir (these are under trial and found promising with initial reports) and antibacterial drugs to treat associated bacterial infections. Vasopressors and fluid may be administered for the treatment of shock and prophylactic and anticoagulants for prevention of thrombosis.[6] Therefore, critical care nursing protocols need to be followed along with specific precautions for infection prevention A summary of important critical care nursing interventions are briefed below:[18]

- Close monitoring of patency of airway, SpO2 $\geq$ 90%, vital signs, level of consciousness, acid-base balance, ECG, infection indicators, coagulation profile, renal and liver functions, signs of DVT and risk of pressure sores.

- Position patient in semi-fowler's position (30-45o head-end elevation) and change every two hourly to prevent pressure sores.

- Administer oxygen therapy to maintain SpO2 $\geq$ 90%; initially it may be provided through nasal prongs or cannula or mask. If this fails to maintain the desired SpO2, then high flow nasal oxygen (HFNO), non-invasive ventilation (NIV) or invasive mechanical ventilation should be implemented.

- Early initiation of nasogastric tube feeding (within 48-hours) or parenteral nutrition with diet rich in protein and vitamins.

- Assist in insertion of oropharyngeal airways and endotracheal intubation with aerosol and contact precautions. Endotracheal intubation is done after five-minutes pre-oxygenation via the continuous positive airway pressure (CPAP) method. and moisture exchanger (HME) filter is used between the mask and the circuit of ventilation balloon, which must be changed regularly (every 5-7 days) or whenever soiled.[19]

- Use closed endotracheal suctioning system with low suction pressure to prevent risk of aerosol exposure.

- Patient on mechanical ventilation requires use of separate ventilator circuit, implement Ventilator-Associated Pneumonia (VAP) prevention bundle, catheter-related urinary tract infections (CAUTI)

prevention bundle, catheter-related sepsis (CLEBSI), bundle, deep vein thrombosis (DVT) prevention interventions and regular check the readiness for weaning.

- Regularly provide oral care (every 6-hourly using 0.12% chlorhexidine), central line care (change dressing every 72-hours with transparent dressing), daily eye care, eye patching, urinary catheter care, back care, bed bath (with disposal wet sponges).

- Provide intermittent pneumatic compression and prophylactic anticoagulant for prevention of deep vein thrombosis and its complications.

- Intake and output must be maintained by nurses, where they may determine additional bolus fluid requirement of these patients (250-1000 ml in adults or 10-20 ml/kg in children) based on clinical response and improved perfusion target (MAP>65 mmHg).

Care of dead body

Perform proper hand hygiene and ensure the use of PPE (water-resistant apron, goggles, N95 mask, gloves) before attending a dead body. Remove all the tubes, drains, catheters and disinfect the puncture holes, wounds with 1% sodium hypochlorite (NaOCl) solution before closing them with impermeable material. Plug all the orifices such as nose, mouth, rectum, urethra, and vagina with NaOCl soaked cotton gauges. Embalming of the dead body should not be done and it should be placed in a leak-proof plastic zip closure body bag (150 micrometers thick) and disinfect outside surface of the bag with NaOCl solution; then either handover to family or send to a mortuary, where it will be stored at 40C. Electrical furnace (cremation) or deep burial (4-6 meter) with cementing is advised to avoid cross-infection. Finally, the isolation room, furniture, machines, and instrument should be cleaned and disinfected with NaOCl by submerging for a minimum of 30 minutes. Biomedical waste should be treated with 1-2% NaOCl solution and discarded in color-coded bins as per local or national BMW management policy.[20]

Conclusion

COVID-19 is a new disease caused by a SARS-CoV-2 infection. In the absence of any definitive treatment, nurses have a significant role to play in offering safe and quality supportive care and education. The key role of nurses for patients visiting health care facilities includes initial history collection, triaging, sample collection, drug administration for symptomatic management such as acetaminophen for fever and malaise, antibiotics for associated bacterial infection, oxygen administration to maintain Spo2>90%. Personal hygiene, plenty of fluids, a nutritious diet rich in proteins and vitamins and infection prevention and control measures are other key tasks nurses need carryout. However, critical-ill patients may require ICU admission, advanced airway, mechanical ventilation, intravenous fluid administration, vasopressors, nasogastric/ parenteral nutrition, where nurses need to provide effective monitoring and quality critical care nursing interventions. This is a new disease our guidance will continue to change as new information becomes available and this guidance will help nurses and health care providers to administer quality care for better outcomes of patients with COVID-19.

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