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Responding to the COVID-19 Epidemic

Holistic care for patients with severe coronavirus disease 2019: An expert consensus☆

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ABSTRACT

Objective: To standardize the holistic care for patients with severe coronavirus disease 2019 (COVID-19) in China.
Methods: The consensus was preliminarily formed by combining relevant literature findings and frontline medical working experiences, and it was eventually confirmed by five rounds of online discussions and expert consultations.
Results: This consensus included nursing assessment, nursing priorities, nursing goals, and thirteen key points of nursing procedures such as oxygen therapy and respiratory nursing, etc.
Conclusion: This scientific and practical consensus guideline can provide clinical guidance on the holistic nursing care of patients with severe COVID-19.

What is known?

- The condition of patients with COVID-19 who need intensive care changes rapidly. These patients may lose their lives because infections often affect multiple system organs and lead to multiple organs dysfunction syndrome.

What is new?

- More than twenty nursing experts in China discussed together and finally confirmed a consensus on holistic nursing care of patients with severe COVID-19, which included nursing assessment, nursing priorities, nursing goals, and thirteen key points of nursing such as oxygen therapy and respiratory nursing, etc.

1. Introduction

At the end of 2019, an outbreak of coronavirus disease 2019 (COVID-19) was reported in Wuhan, China. As the epidemic continued to spread, it was listed by the World Health Organization (WHO) as a Public Health Emergency of International Concern [1], and China initiated a first-level response [2]. Due to the disease's high infectivity and pathogenicity and the high mortality rate of severely affected patients [3,4], nursing care of critically ill patients with COVID-19 is extremely difficult and requires high standards. Thus, The Chinese Government has proposed establishing a holistic nursing system for severe and critical patients to provide patient-centered care following modern nursing concepts, and utilizing nursing procedures as a fundamental framework and guide for clinical nursing care and nursing management. To standardize and guide holistic care of patients with COVID-19 in severe and critical condition and to effectively preserve their physical and mental

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health, an expert consensus panel on Holistic Care of COVID-19 Patients in Severe and Critical Condition (hereafter "Consensus") was jointly developed, led by the Chinese Nursing Association, and involving the Nursing Department of Tongji Hospital Affiliated with Tongji Medical College of Huazhong University of Science and Technology, the Nursing Department of the Peking Union Medical College Hospital of the Chinese Academy of Medical Sciences, and nursing experts dispatched by the Intensive Care Professional Committee of the Chinese Nursing Association to assist Wuhan.

2. Development of the consensus

2.1. Target groups and protection levels

The Consensus applies to patients whose clinical condition is classified as either severe or critical according to the *Diagnosis and Treatment Protocol for Novel Coronavirus Pneumonia(Trial version 6)* [5]. When providing care to these patients, nurses should strictly implement personal protection measures. Level II protection should be adopted when working in isolation wards, and Level III protection measures should be adopted when performing procedures that may produce aerosols (e.g., sputum aspiration, tracheal intubation, noninvasive ventilation, tracheotomy, cardiopulmonary resuscitation, etc.).

2.2. Establishment of the consensus

The Consensus was established jointly by 22 nursing experts, one medical expert, and one hospital infection control expert from different departments of 20 hospitals across China.

A draft of the consensus was developed after analysis, summary, and consolidation of information from a comprehensive review, which included the diagnosis and treatment protocols, management consensus, and related literature of COVID-19, as well as effective nursing measures and experiences gained by the experts during frontline care of patients in severe and critical condition.

Several revisions were made throughout five rounds of online discussion and expert consultations; a final version of the Consensus was then developed and reviewed by the medical expert and hospital infection control expert.

3. Contents of the consensus

3.1. Key points in the assessment

3.1.1. Medical history assessment

Assess the patient's history of living in the epidemic area, past medical history, treatment history, epidemiological history, and comorbidities, etc.

3.1.2. Physical assessment

(1) Vital signs: Assess the patient's body temperature; blood pressure; pulse; blood oxygen saturation; breathing rate, rhythm, and depth; etc. [6].
(2) Symptoms and signs: Assess the patient's level of consciousness, muscle pain, fatigue, cough, sputum, chest tightness, shortness of breath, diarrhea, etc.
(3) Skin and mucosa: Assess the patient's skin color and elasticity, peripheral extremity circulation, presence of bleeding, etc.
(4) Nutritional status: Assess the patient's food intake, presence of dehydration, etc.

3.1.3. Psychological assessment

Assess the patient's emotional response to the disease, cognitive changes, and compliance with protective measures.

3.1.4. Environmental assessment

Assess whether environmental risks of cross-infection exist, and ensure adequate bed spacing and the negative pressure ward, protective measures for high-risk operations, and adequate personal protective measures for both patients and medical staff.

3.2. Health problems

3.2.1. Priority health problems

(1) Impaired gas exchange – related to increased airway resistance and decreased lung compliance.
(2) Hyperthermia – related to viral lung infection.
(3) Activity intolerance – related to impaired lung function and imbalanced oxygen supply and consumption.
(4) Potential complications – deep vein thrombosis, hyperglycemia, acute respiratory distress syndrome, septic shock, metabolic acidosis, coagulopathy, multiple organs dysfunction syndrome, stress ulcers, etc. [7].
(5) Anxiety/fear – related to isolation and concerns over the disease's prognosis.

3.2.2. Other health problems

(1) Ineffective airway clearance – related to excessive mucus and ineffective cough.
(2) Diarrhea – related to intestinal dysfunction due to COVID-19 infection.
(3) Impaired comfort – related to illness-related symptoms, such as chest tightness, gasping breaths and fatigue.
(4) Imbalanced nutrition: less than body requirements – related to fever, diarrhea, reduced intake, etc.
(5) Risk for impaired skin integrity – related to fever, humidity, poor peripheral circulation, and forced position.
(6) Knowledge deficit – patients may have insufficient knowledge related to isolation concept, personal protection and COVID-19.

3.3. Nursing goals

(1) Alleviating dyspnea and hypoxemia.
(2) Ensuring effective coughing, breathing gradually becoming stable and lung sounds clear.
(3) Controlling body temperature effectively.
(4) Relieving diarrhea.
(5) Reducing the chance of developing pressure injury during hospitalization.
(6) Detecting and handling complications effectively.
(7) Ensuring patients have a stable emotion and gaining effective cooperation from patients when implementing therapeutic nursing interventions and rehabilitation programs.
(8) Ensuring a gradual return to a normal diet and maintaining the desired body weight at a standard level.
(9) Maintaining patient comfort during hospitalization and satisfying their needs timely.
(10) Improving patients' activity endurance.
(11) Ensuring high compliance with isolation and effective self-protection among patients.

3.4. Nursing interventions

3.4.1. Providing optimal oxygen therapy and respiratory care

(1) Promptly evaluate whether patients' respiratory distress and/or hypoxemia are relieved and provide patients with individualized respiratory support per medical orders based on their condition and tolerance [8].
(2) Patients receiving nasal cannula or high flow nasal cannula (HFNC) oxygen therapy can wear a surgical or face mask to reduce the spread of viral aerosols [9]. Oxygen supply cannot be interrupted arbitrarily during HFNC oxygen therapy [10]. Employ lung-protective approaches during invasive mechanical ventilation, and apply a small tidal volume (4–8 ml/kg of ideal weight) and low inspiratory pressure (plateau pressure < 30 cmH_2O [1 cmH_2O = 0.098 kPa]) during the procedure to reduce ventilator-induced lung injury [5].
(3) During oxygen administration, closely monitor patients' consciousness, heart rate, breathing characteristics (rhythm, rate, frequency, depth, synchronization of spontaneous breathing and ventilator), improvement of cyanosis, and oxygen therapy complications. Carefully monitor blood oxygen saturation or arterial blood gas analysis results [11] and promptly adjust oxygen flow rate, oxygen supply mode, and ventilator parameters accordingly, as per medical orders.
(4) Ventilator and catheter care: (i) Passively humidify invasive ventilators using a heat-moisture-exchanger (HME) with a bacterial filter to reduce condensation in the circuit [12].(ii) Use of disposable ventilator circuits and exhalation valves is recommended, and installation of virus filters at both the inhalation and exhalation ends of the ventilator. Replace these filters only upon contamination or mechanical failure, as opposed to on a routine basis [12]. (iii) Do not disconnect the ventilator. If the ventilator must be disconnected, for reasons such as replacing the sealed sputum-aspirating tube, it must first be set to standby mode. (iv) Use 75% alcohol to wipe and disinfect the surface of the ventilator on a daily basis. Treat disposable catheters as infectious medical waste, and send reusable catheters to the disinfection center for sterilization after immersion for 30 min in 1,000–2,000 mg/L of chlorine-containing disinfectant.
(5) Prone ventilation: Implementation of prone ventilation for more than 12 hours per day can be considered when the PaO_2/FiO_2 ratio is continuously lower than 150 mmHg (1 mmHg = 0.133 kPa) [8]. (i) Prior to implementing prone ventilation, oropharyngeal and endotracheal secretions should be removed first to ensure an unobstructed artificial airway. (ii) Jejunal tube feeding is recommended for patients undergoing prone ventilation. If gastric tube feeding is employed, aspirate the patient's stomach contents before prone ventilation. When the patient is in the prone position, perform feeding in small amounts. (iii) Regularly evaluate and change the patient's prone position from side to side to avoid applying continuous pressure to the same area. Decompression dressings can be applied to pressured areas and the patient's apophysis area to reduce potential pressure injuries.
(6) Prevention of ventilator-associated pneumonia (VAP): Keep the head of the bed elevated by 30–45° [13]. Routinely monitor and maintain the cuff pressure of the endotracheal tube at 25–30 cmH_2O. Promptly clear secretions accumulated under the glottis [14].

3.4.2. Maintaining a clear airway

(1) Cough and expectoration: Teach patients the correct methods of deep breathing and effective coughing based on their condition. In particular, a sealed plastic bag should be used when patients expectorate to prevent the sputum from spreading the virus.
(2) Atomization inhalation: Administration of drugs via an atomization inhaler may produce aerosols and pollute indoor air. Therefore, the atomization inhalation should be avoided. If unavoidable, a quantitative inhalation device combined with an aerochamber is preferred.
(3) Sputum removal: Use a closed endotracheal suctioning system to aspirate secretions in the airway, and perform the procedure only when necessary.

3.4.3. Fever nursing

(1) Patients with fever should be provided with antipyretic treatment as per medical orders and nursing assessment findings.
(2) Following antipyretic treatment, closely monitor patients' body temperature, sweating, and electrolyte changes. Dry patients' sweat and change clothes and bedsheets upon heavy sweating. Use gentle actions when replacing clothes and bedding. Treat contaminated clothes and sheets as infectious fabrics and place them into orange waste bags [15].
(3) Encourage patients who are capable of independent oral food intake to drink more water, and report to the doctor for timely fluid supplements if necessary.

3.4.4. Special care

3.4.4.1. Nursing care for patients with blood purification treatment

(1) Central venous catheterization should be performed by two nurses, strictly implementing maximum aseptic barrier techniques and protective measures [16].

(2) Prior to treatment, monitor patients' vital signs, biochemical indicators, and coagulation functions, and evaluate the patency of vascular access.

(3) Choose the most appropriate anticoagulation approach, treatment mode, and treatment dose as per medical advice.

(4) During treatment, closely monitor patients' vital signs, coagulation functions, electrolyte changes, treatment effects, and so on. Promptly identify and deal with treatment-related complications such as hypotension, electrolyte disturbance, and thrombocytopenia [17].

(5) Treatment devices should be used exclusively for the same disease. After treatment, wipe and disinfect the instrument with a disinfectant containing 1,000–2,000 mg/L of chlorine, and discard waste liquid bags and filters in double-layer yellow medical waste bags.

3.4.4.2. Nursing care for patients with convalescent plasma therapy

(1) Prior to transfusion of convalescent plasma, ensure that patients sign an informed consent form and administer antiallergic drugs as per medical orders.

(2) Strictly follow aseptic operation procedures and blood transfusion technical specifications.

(3) During treatment, particularly within the first 15–20 min of the transfusion, closely monitor patients' vital signs, consciousness, and skin changes. Transfuse convalescent plasma slowly within 1–4 hours [17].

(4) After treatment is completed, discard blood bags in double-layer yellow medical waste bags instead of recycling them. Keep careful records to ensure that donor and recipient information is traceable [17].

(5) Closely monitor patients' conditions after treatment to evaluate the effectiveness of the intervention.

3.4.4.3. Nursing care for patients with extracorporeal membrane oxygenation. Venous-venous extracorporeal membrane oxygenation is the preferred method of respiratory support for patients with severe COVID-19 [8].

(1) Place the catheter carefully to avoid pulling, shifting, bending, leaking, or dropping. Check catheter connections regularly to ensure tightness.
(2) Closely observe patients' consciousness, pupils, breathing, blood pressure, body temperature, blood oxygen saturation, central venous pressure, mean arterial pressure, and other vital signs, and monitor arterial blood gas analysis results, coagulation functions, and so on [18].
(3) Device monitoring during extracorporeal membrane oxygenation: (i) Closely monitor the speed of both the centrifugal pump head and the blood flow. (ii) Monitor the inlet and outlet pressure of the oxygenator to identify any obstruction in the device, thereby preventing bending and poor perfusion. (iii) Set the airflow rate and oxygen concentration into the oxygenator based on the incoming blood flow. (iv) Closely monitor and adjust the temperature of the blood warmer[19]. (v) Prevent and detect complications promptly.

3.4.5. Observation and nursing for drug administration

(1) Administer drugs according to medical orders, and strictly follow the check system.
(2) Pharmacy Intravenous Admixture Services (PIVAS) is recommended to ensure accurate dosage and reduce unnecessary exposure.
(3) Pay attention to drug contraindications. Do not use antiviral drugs such as lopinavir and ritonavir in combination with drugs such as alfuzosin [8]. When traditional Chinese medicine injection is used in conjunction, flush the catheter with normal saline. Separate administration of intestinal microecological regulators by 2 hours from administration of antibiotics.
(4) Closely monitor adverse drug reactions. When administering antiviral and antibacterial drugs, regularly monitor patients' gastrointestinal responses and liver and kidney functions. When administering glucocorticoids, provide calcium and vitamin D supplements and regularly monitor patients' blood calcium concentration [20].
(5) Traditional Chinese medicine injections should go through infusion sets with a precision filter. Perform the first 30 min of the injection via slow-drip infusion. Do not prescribe traditional Chinese medicine to pregnant women, children, and people with drug allergies.
(6) One dose of Chinese herbal medicine is allowed per day, delivered separately in 2–4 instances by either warm oral intake or nasal feeding. During drug administration, a light diet is recommended; a cold and greasy diet should be avoided[21].
(7) Administer intestinal microecological regulators with warm water not exceeding 40 °C. Patients should be helped or instructed when taking the medication.
(8) Observe the therapeutic effect of administered drugs by closely monitoring patients' body temperature, blood oxygen saturation, and improvement of uncomfortable symptoms.

3.4.6. Management of catheters

(1) Assess the necessity of catheter retention daily.
(2) Ensure that all catheters are unobstructed, tightly connected, and fixed firmly to avoid shifting and dropping.
(3) Closely monitor the color, property, and quantity of the drainage fluid.
(4) Strictly follow operation and disinfection regulations to avoid secondary infections.
(5) Use disposable drainage bags and bottles. Strictly implement personal protection measures, operate gentlely, and follow standard operations during catheter replacement to avoid contamination.
(6) Discard contaminated drainage bags and bottles in double-layer yellow medical waste bags and dispose of them in accordance with relevant regulations.

3.4.7. Observation of patients' conditions

(1) Closely monitor changes in patients' vital signs and consciousness, especially breathing frequency, rhythm, pattern, and depth.
(2) Observe the therapeutic effect of oxygen therapy and dynamically adjust the mode and oxygen flow rate based on patients' degree of dyspnea, blood oxygen saturation, and blood gas analysis results.
(3) Perform hemodynamic monitoring to detect arrhythmia and heart failure [5].
(4) Observe associated symptoms such as general muscle pain, fatigue, cough, and chest tightness.
(5) Record patients' intake and output amounts within 24 hours to maintain water, electrolyte, and acid-base balances.
(6) Strengthen monitoring of infection indicators and collect blood, sputum, urine, stool, and other specimens promptly and correctly.
(7) Strengthen monitoring and nursing care of basic diseases, such as hypertension, diabetes, coronary heart disease, and so on.
(8) Seek to prevent and promptly identify complications. In particular, be vigilant of disease exacerbation when patients develop symptoms such as persistent high fever, respiratory failure, shock, or multiple organs failure [22].

3.4.8. Diet and nutrition

3.4.8.1. For patients with oral food intake

(1) Ensure patients' oxygen supply is not interrupted when eating or drinking.

(2) Patients should have small frequent meals, with a diet predominantly composed of eggs, beancurd, dairy products, fruit juice, vegetable juice, rice paste, and so on.

(3) If nutritional demands are not met, enteral nutrition can be administered orally.

3.4.8.2. Enteral nutrition support

(1) Enteral nutrition can be prescribed if patients are normally unable to eat or cannot orally intake at least 60% of their energy consumption for 3–5 consecutive days[23].

(2) Monitor nutrition indicators, including albumin, transferrin, and preprotein counts. Record the type, concentration, and quantity of enteral nutrition supplements [24].

(3) During enteral nutrition infusion, elevate the head of bed at an angle $\geq 30°$ to prevent accidental aspiration.

(4) Observe the development of gastrointestinal symptoms such as diarrhea, nausea, or vomiting.

(5) A permissive low-calorie program that can satisfy 60%–80% of nutritional intake is recommended during the early stage. Once the condition is alleviated, energy and nutrients can be gradually increased to the full amount.

3.4.8.3. Parenteral nutrition support

(1) Parenteral nutrition is required for patients with severe gastrointestinal dysfunction.

(2) Closely monitor any development of metabolic disorders and complications.

3.4.9. Basic nursing

3.4.9.1. Patient placement. Single rooms are recommended. However, if single rooms are not available, bed spacing should be at least 1 meter. A negative pressure ward is recommended, allowing at least 12 air exchanges per hour. For non-negative pressure wards, airflow rate must remain at least 160 L/s during natural air ventilation [25].

3.4.9.2. Oral care

(1) Patients who can do self-care for themselves should be encouraged to perform oral care themselves.

(2) Patients who cannot care for themselves should be assisted by nurses to perform oral care 2 or 3 times per day.

(3) Be vigilant of the potential splash of secretions when performing oral care for patients. Nurses should wear Level III personal protection equipment if necessary.

3.4.9.3. Skin care

(1) Closely monitor facial skin for any pressure injury during oxygen therapy.

(2) Observe patients' overall skin condition and instruct them to either change position regularly or use protective products to prevent skin damage.

3.4.9.4. Elimination care

(1) Prevent constipation. During and after defecation, carefully increase patients' oxygen concentration to prevent hypoxia.

(2) Prevent diarrhea. If patients develop diarrhea, administer drugs as per medical orders and be vigilant to prevent incontinence dermatitis.

(3) Bedpans should be used exclusively for each patient. After use, immerse the bedpan in a disinfectant solution containing 5,000 mg/L of effective chlorine and subsequently clean it for future use.

(4) If the medical institution is equipped with a sewage treatment system, excreta can be discharged directly into the sewage tank. If not, excreta must be disinfected in accordance with the *Regulation of Disinfection Technique in Healthcare Settings* [26].

3.4.10. Psychological nursing

(1) Orient patients to the ward environment and isolation regulations upon admission.
(2) Regularly assess patients' psychological condition and consult with the psychiatry department if necessary.
(3) During bedside operations, provide patients with appropriate emotional support through gestures such as eye contact, touch, nods, handshakes, and thumbs-up gestures, thereby helping them to build confidence in their ability to overcome the disease [27].
(4) Help to communicate information to external relatives, provide patients with continuous information support, and encourage them to actively collaborate in their treatment.

3.4.11. Respiratory rehabilitation

(1) Principle: Collaborate with the clinical medical team to assess the feasibility of commencing respiratory rehabilitation programs for patients. Respiratory rehabilitation activities should not reduce the patient's blood oxygen saturation and blood pressure [28].
(2) Instructional methods: Videos, brochures, etc.
(3) Rehabilitation contents: Routine changes in body posturing (e.g., semi-recumbent position, lateral position, prone position, etc.) to reduce the work of breathing muscles and save strength; respiratory control techniques (e.g., abdominal breathing and pursed-lip breathing) to expand the lower chest and relieve breathing difficulties; effective sputum excretion techniques (e.g., postural drainage and effective coughing) to promote sputum excretion and maintain an unobstructed airway.

3.4.12. Rest and activities

(1) To ensure adequate sleep, instruct patients to rest in bed. Those with sleep disorders should be managed by drugs as per medical orders.
(2) Patients who can get out of the bed should follow the "Three Steps to Get Up" guideline (lie in the bed for 30 sec before getting up, drop both legs for 30 sec before standing up, and stand for 30 sec before walking). Instruct patients to perform activities such as sitting, standing, and stepping along the bedside once they are out of bed [29].
(3) Prevent patients from falling out of bed. Instruct patients to perform muscle training such as clenching their fists, raising their arms, ankle pumping, heel slipping, lifting their legs, and contracting quadriceps and gluteal muscles, according to their tolerance levels. Compression stockings can be utilized to prevent the formation of deep vein thrombosis in lower limbs.
(4) Avoid excessive activities to reduce patients' blood oxygen saturation and blood pressure.

3.4.13. Discharge instructions

(1) Instruct patients to perform respiratory rehabilitation activities according to their rehabilitation program.
(2) Ensure timely transmission of patients' medical information and instruct them to go to the designated place for centralized isolation of 14 days [30].
(3) Inform patients to make appointments for follow-up visit in the second and fourth week after discharge and carefully perform follow-up and review.
(4) Instruct patients to work and rest regularly and ensure they maintain adequate sleep, a balanced diet, and a calm emotional state.
(5) Instruct patients to perform hand hygiene and mask-wearing, maintain distance from family members, have separate meals, and avoid sharing personal items such as tableware and washing articles during home isolation [31].

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Ethical consideration

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Declaration of competing interest

None.

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重型危重型新型冠状病毒肺炎患者整体护理专家共识

华中科技大学同济医学院附属同济医院护理部,中国医学科学院北京协和医院护理部,
中华护理学会重症护理专业委员会(执笔:汪晖,曾铁英,吴欣娟,孙红)

【摘要】目的 规范重型、危重型新型冠状病毒肺炎患者整体护理。**方法** 查阅国内外新型冠状病毒肺炎相关文献,结合防疫一线护理专家的工作经验,形成初版《重型危重型新型冠状病毒肺炎患者整体护理专家共识》(以下简称《共识》),通过5轮线上会议和专家咨询,进行整理和修改,形成终版《共识》。**结果** 《共识》包括评估要点、护理问题、护理目标以及氧疗与呼吸支持、保持呼吸道通畅等13项护理措施。**结论** 《共识》具有一定的科学性和实用性,可为重型、危重型新型冠状病毒肺炎患者的整体护理提供临床指导。

【关键词】 新型冠状病毒肺炎;整体护理;重症护理;专家共识

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突发的新型冠状病毒肺炎疫情的护理人力及物力应急管理

刘于,汪晖,陈军华,章晓云,乐霄,柯键,王冰花,彭超华

【摘要】目的 介绍大型综合医院在面对新型冠状病毒肺炎疫情时的护理人力及物力应急管理。**方法** 武汉市某三级甲等医院护理部充分发挥职能,从建立可持续支援的三级梯队、合理动态调配人力、统筹安排岗前培训、监督重点工作环节、制定正向激励措施、合理使用及调配医疗物资等方面入手进行应急管理。**结果** 应急管理有效提高了护理团队的战斗力,对高效落实防治新型冠状病毒肺炎的特殊任务起到了积极作用。**结论** 本研究提出的应对新型冠状病毒肺炎疫情的人力及物力应急管理有效,但仍存在对突发事件的预测能力和战略准备意识不足、医疗应急物资储备制度不完善、专业化应急护理队伍缺乏的问题,因此,今后医院需建立高效快速的应急管理体系,重视护理应急预案的演练,以期更好应对突发公共卫生事件。

【关键词】 新型冠状病毒肺炎;疾病暴发流行;综合医院;卫生人力;医院设备和供应;护士;人员管理

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