TEXTO & CONTEXTO ENFERMAGEM
TEXT & CONTEXT NURSING TEXTO & CONTEXTO ENFERMERÍA

NURSING DIAGNOSIS/OUTCOMES AND INTERVENTIONS FOR CRITICALLY ILL PATIENTS AFFECTED BY COVID-19 AND SEPSIS

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ABSTRACT

Objective: to relate nursing diagnoses/outcomes and interventions for critically ill patients affected by COVID-19 and sepsis in the Intensive Care Unit, according to the International Classification for Nursing Practice (ICNP®). **Method:** a documentary study conducted in March and April 2020 from the ICNP® terminology subset for adult patients with sepsis. The documentary *corpus* was composed of the list of nursing diagnoses/outcomes and interventions based on Horta's Theory of Basic Human Needs; on the 7-Axis Model of the International Classification for Nursing Practice, version 2017; on the Pathophysiological model of sepsis; as well as relying on the authors' expertise in direct care for suspected or confirmed critically ill patients affected by COVID-19. **Outcomes:** a total of 58 nursing diagnoses/outcomes were identified that belong to the psychobiological needs of oxygenation (13-22.4%), vascular regulation (12-20.7%), neurological regulation (10-17.2%), hydration (08-13.8%), elimination (08-13.8%), immunological regulation (04-6.9%) and thermal regulation (03-5.2%), evidencing a total of 172 nursing interventions with a mean of 03 for each nursing diagnosis/outcome. **Conclusion:** data analysis provided greater knowledge about the disease and the nursing process in the ICU setting, serving as a guide for the professional practice for critically ill patients hospitalized with COVID-19 and sepsis.

DESCRIPTORS: Nursing. Coronavirus infections. Sepsis. Nursing processes. Critical care. Intensive care units.

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DIAGNÓSTICOS/RESULTADOS E INTERVENÇÕES DE ENFERMAGEM PARA PACIENTES GRAVES ACOMETIDOS POR COVID-19 E SEPSE

RESUMO

Objetivo: relacionar diagnósticos/resultados e intervenções de enfermagem para pacientes graves acometidos por COVID-19 e sepse na Unidade de Terapia Intensiva, segundo a Classificação Internacional para a Prática de Enfermagem (CIPE®).
Método: estudo documental realizado nos meses de março e abril de 2020 a partir do subconjunto terminológico da CIPE® para pacientes adultos com sepse. O *corpus* documental foi composto pela lista de diagnósticos/resultados e intervenções de enfermagem com base na Teoria das Necessidades Humanas Básicas de Horta; no Modelo de 7-Eixos da Classificação Internacional para a Prática de Enfermagem, versão 2017; no Modelo fisiopatológico da sepse; bem como contou com a expertise dos autores no cuidado direto a pacientes graves suspeitos ou confirmados de COVID-19.
Resultados: foram identificados 58 diagnósticos/resultados de enfermagem que pertencem às necessidades psicobiológicas de oxigenação (13-22,4%), regulação vascular (12-20,7%), regulação neurológica (10-17,2%), hidratação (08-13,8%), eliminação (08-13,8%), regulação imunológica (04-6,9%) e regulação térmica (03-5,2%), evidenciando um total de 172 intervenções de enfermagem com uma média de 03 para cada diagnóstico/resultado de enfermagem.
Conclusão: a análise dos dados oportunizou maior conhecimento sobre a doença e o processo de enfermagem no âmbito da UTI, servindo como um guia para a prática profissional ao paciente grave internado com COVID-19 e sepse.

DESCRITORES: Enfermagem. Infecções por coronavírus. Sepse. Processos de enfermagem. Cuidados críticos. Unidades de terapia intensiva.

DIAGNÓSTICOS/RESULTADOS E INTERVENCIONES DE ENFERMERÍA PARA PACIENTES GRAVES AFECTADOS POR COVID-19 Y POR SEPSIS

RESUMEN

Objetivo: relacionar diagnósticos/resultados e intervenciones de enfermería para pacientes graves afectados por COVID-19 y por sepsis en la Unidad de Cuidados Intensivos, de acuerdo con la Clasificación Internacional para la Práctica de Enfermería (CIPE®).
Método: estudio documental realizado en los meses de marzo y abril de 2020 a partir del subconjunto terminológico de la CIPE® para pacientes adultos con sepsis. El *corpus* documental estuvo compuesto por la lista de diagnósticos/resultados e intervenciones de enfermería sobre la base de la Teoría de las Necesidades Humanas Básicas de Horta; del Modelo de 7 ejes de la Clasificación Internacional para la Práctica de Enfermería, versión 2017; y del Modelo fisiopatológico de la sepsis; al igual que contó con los profundos conocimientos de los autores en el cuidado directo a pacientes graves con sospecha o confirmación de COVID-19.
Resultados: se identificaron 58 diagnósticos/resultados de enfermería que pertenecen a las necesidades psicobiológicas de oxigenación (13-22,4%), regulación vascular (12-20,7%), regulación neurológica (10-17,2%), hidratación (08-13,8%), eliminación (08-13,8%), regulación inmunológica (04-6,9%) y regulación térmica (03-5,2%), evidenciando un total de 172 intervenciones de enfermería con una media de 03 para cada diagnóstico/resultado de enfermería.
Conclusión: el análisis de los datos amplió el conocimiento sobre la enfermedad y el proceso de enfermería en el ámbito de la UCI, sirviendo así como guía para la práctica profesional ofrecida al paciente grave internado con COVID-19 y sepsis.

DESCRIPTORES: Enfermería. Infecciones por coronavirus. Sepsis. Procesos de enfermería. Cuidados críticos. Unidades de Cuidados Intensivos.

INTRODUCTION

Even before the infection by the new coronavirus (SARS-CoV-2) originated a pandemic that had a major impact on the health of the populations and on the economy worldwide, the first cases of this acute respiratory disease emerged in Wuhan, China, at the end of December 2019 (called COVID-19). From the new cases reported in several countries on the five continents, the World Health Organization (WHO) soon declared it as a public health emergency of global interest as it presents high and sustained transmissibility among individuals.[1–2]

In this context, the most common signs and symptoms attributed to the clinical syndrome consist of fever, myalgia or fatigue, dry cough and dyspnea, which can be accompanied by lymphopenia, abnormalities in blood clotting or bilateral pulmonary ground-glass opacities on chest computed tomography, responsible for a rapid increase in the number of hospitalizations in Intensive Care Units (ICUs) for the artificial support of the organic functions of those most critically ill patients with severe acute respiratory syndrome (SARS).[2–4]

It is worth highlighting that infected patients with typical symptoms of a flu syndrome can also develop a clinical condition of sepsis, which is known to be marked by a complicated pathophysiological web and defined by the presence of life-threatening organic dysfunction resulting from the organism's unregulated immune response to the infection. However, when there is a progression to septic shock, accentuated circulatory, cellular, and metabolic abnormalities reflect an inadequate use of oxygen by the cells, capable of substantially increasing mortality.[5–6]

As sepsis manifests itself in different severity spectra over time, the intensive care nurse is encouraged to plan, coordinate, and implement actions for a more careful assessment at the bedside in the sense of not only assisting suspected or confirmed cases of infection by the new coronavirus (SARS-CoV-2), but also of tracking infections related to health care and probable sepsis by early recognition of organic disorders (clinical or laboratory) or during clinical discussions with the multidisciplinary team on duty. Therefore, such efforts must provide an agile and adequate treatment based on the international guidelines of the Surviving Sepsis Campaign (SSC)[7–9] and on clinical nursing terminology.

Therefore, the International Classification for Nursing Practice (ICNP®) enhances clinical reasoning by means of standardized terminology that reliably represents the elements of the nursing practice, accurately and in a timely manner, supported by a multi-axial structure (7-Axis Model) that allows describing both the patient's phenomena for which the nurses are responsible and the specific nursing interventions with their respective outcomes.

For the International Council of Nurses (ICN), a nursing outcome is the measure or status of a nursing diagnosis at various points in time, after a nursing intervention,[10] thus translating changes in nursing diagnoses in response to the nursing interventions. For this reason, there is no specific classification for nursing outcomes in the ICNP®, and it is advised that any diagnosis at some point can also be an outcome, which led to the use, throughout the article, of the expression "nursing diagnoses/outcomes".

In order to contribute to the reflection on the complexity inherent to assisting Nursing in the ICU setting, and to stimulate practice by means of cognitive efforts and of the qualified application of the nursing process, the objective of this study is to relate nursing diagnoses/outcomes and interventions for critically ill patients with COVID-19 and sepsis in the Intensive Care Unit, according to the International Classification for Nursing Practice (ICNP®).

METHOD

A documentary study conducted in the months of March and April 2020 from the doctoral thesis[11] entitled "ICNP® terminology subset for critically ill patients with Sepsis", developed at the Adult ICU of the Lauro Wanderley University Hospital, belonging to the Federal University of Paraíba. The documentary *corpus* was composed of the list of nursing diagnoses/outcomes and interventions based on Horta's Basic Human Needs (BHN) Theory; on the 7-Axis Model of the International Classification for Nursing Practice, version 2017; on the Pathophysiological model of sepsis, which opportunely highlights immune dysfunction and bioenergetic insufficiency as important processes in the genesis of the disease; as well as relying on the authors' expertise in direct care for suspected or confirmed critically ill patients affected by COVID-19.

Therefore, when during their hospitalization, the patients present a dysregulated systemic response of the immune system to the new coronavirus (SARS-CoV-2) or to another infectious agent, the structuring mechanisms of the pathophysiological framework of sepsis generate states of tension, conscious or unconscious, which are preponderant in compromising human psychobiological needs for oxygenation, vascular regulation, neurological regulation, hydration, elimination, immune regulation, and thermal regulation, which will be presented in the present study.

Based on the identification of these most affected BHNs, the construction of the list with nursing diagnoses/outcomes and interventions was based on the authors' experience as intensive care nurses for the analysis of all the statements contained in the referred terminological subset, which allowed them to list those focused on the care of critically ill patients concomitantly affected by COVID-19 and sepsis and, thus, serve as a guide for the nurses in their intensive clinical practice.

RESULTS

Regarding the 58 nursing diagnoses/outcomes identified for the care of critically ill patients affected by COVID-19 and sepsis, distributed according to Horta's BHNs, 13 (22.4%) belong to the need for oxygenation, 12 (20.7%) to the need for vascular regulation, 10 (17.2%) to the need for neurological regulation, 08 (13.8%) to the need for hydration, 08 (13.8%) to the need for elimination, 04 (6.9%) to the need for immunological regulation, and 03 (5.2%) to the need for thermal regulation.

From then on, lists were built that provide clinical reasoning and enhance the nursing process with nursing diagnoses/outcomes (NDs/NOs) for intensive care, followed by the respective nursing interventions (NIs) prescribed for the care of the human needs affected or partially met by the patient in the face of the bioenergetic insufficiency (Charts 1-4) and immune dysfunction (Chart 5) developed, with a total of 172 NIs and a mean of 03 for each ND/NO.

Chart 1 – Nursing diagnoses/outcomes and interventions for critically ill patients with COVID-19 and sepsis according to the BHN for Oxygenation. João Pessoa, PB, Brazil, 2020.

BHN for Oxygenation	
Nursing diagnoses/outcomes	
Lactate clearance, effective	Airway cleaning, impaired
Lactate clearance, impaired	Risk of bronchoaspiration
Acid-base imbalance (specify)	Cough
Ventilatory weaning, impaired	Gas exchange, impaired
Dyspnea (specify grade)	Spontaneous ventilation, impaired
Acid-base balance, effective	Mechanical ventilation (specify ventilatory mode)
Hyperlactatemia	
Nursing interventions*	
- Open airways using the 2Vs-2Es technique with a bag-valve-mask-reservoir device, coupled to an HEPA (High Efficiency Particulate Air) filter or to an HMEF (Heat and Moisture Exchange Filter) for an exceptional need for manual ventilation.[12–13] - Adhere to the use of N95, PFF2 or equivalent masks; beanie; goggles and/or face shield; procedure gloves and waterproof apron for aerosol-generating procedures.[14] - Aspirate airway secretions with a closed suction system, when strictly necessary. - Watch for signs of immediate need for tracheal intubation: SpO_2 <93% with low-flow oxygen and/or respiratory rate >28 rpm or CO_2 retention ($PaCO_2$ >50 mmHg and/or pH <7.25). - Auscultate lung sounds and assess chest radiography. - Assist in the rapid sequence procedure of tracheal intubation and confirm position of the tracheal tube by continuous waveform capnography, when available.[12] - Assess skin color, temperature, and moisture. - Evaluate airway permeability and cough reflex. - Evaluate the characteristics of the respiratory secretions and record them in the medical record. - Evaluate ventilation mode and document parameters set on the mechanical ventilator in the medical record, in addition to variables such as driving pressure and plateau pressure. - Assess serial level and arterial lactate clearance, when initial lactate >2 mmol/L. - Assess response to the spontaneous breathing test (SBT). - Assess whether the patient's breaths are synchronous with the mechanical ventilator. - Calibrate the continuous oximetry of central or mixed venous oxygen saturation every 24 hours, when available. - Clamp the tracheal tube with forceps (e.g., Reynald forceps) and pause ventilation with a mechanical ventilator in standby mode for maneuvering and disconnecting the airways.[12,15] - Collect nasopharyngeal swab, sputum or endotracheal aspirate for laboratory exam. - Collect arterial and/or central venous blood for blood gas analysis. - Raise the head of the bed by 30-45°. - Stimulate early mobilization in bed.[15] - Avoid the administration of medications through nebulizations where there is no room with negative pressure. - Provide supplemental oxygen through a nasal cannula (up to 5 L/min) or non-rebreathing face mask with reservoir (up to 10 L/min) for a target SpO_2 ≥93%.[16–17] - Establish standard precautions for droplets, contact and/or aerosols, as well as install[18] an HEPA or HMEF filter in the vent port (breather) of chest drain bottles under water seal. - Inflate the cuff with air to a pressure 25-30 cmH_2O.[15] - Investigate mottle/livedo reticularis on the skin and stage using the *mottling score* tool. - Measure the patient's height to calculate the predicted tidal volume (≤6 mL/kg).[19] - Monitor the peripheral oxygen saturation by pulse oximetry and communicate when SpO_2 <93%. - Monitor central or mixed venous oxygen saturation. - Monitor CO_2 levels at the end of expiration ($EtCO_2$) by capnography. - Position the enteral tube at post-pyloric level and check abdominal radiography. - Prevent accidental extubation during decubitus changes, bed bath, change of artificial airway fixation, transport or mobilization for exams/procedures.	

Chart 1 – cont.

BHN for Oxygenation
Nursing interventions*
- Foresee and anticipate ventilatory weaning. - Promote oral hygiene with an aqueous solution of 0.12% or 0.2% chlorhexidine digluconate every 12 hours, with previous application of 0.5% to 1% hydrogen peroxide or 0.2% povidone in the oral structures through embryo with gauze or mouthwash.[20] - Provide adequate sedation, analgesia and/or neuromuscular block in invasive ventilatory support. - Perform patient pronation using the envelope maneuver and the three turning moments, with the participation of at least a physician, nurse, physiotherapist, and nursing technicians.[21] - Perform safe prone checklist by a bedside professional who is not involved in the maneuver.[21] - Perform scheduled extubation in agreement with the team and put a surgical mask on the patient.[22] - Change mechanical fan circuits for visible dirt, damage or ventilation >30 days. - Change the mechanical fan filter every 7 days for possible dirt, condensation or damage. - Verify cuff pressure 4 times a day and before oral hygiene.

*Nursing interventions that do not have superscript references were taken from Ramalho Neto JM. ICNP® terminology subset for critically ill patients with Sepsis [thesis]. João Pessoa (PB): Federal University of Paraíba; 2019.

Chart 2 – Nursing diagnoses/outcomes and interventions for critically ill patients with COVID-19 and sepsis according to the BHN for Vascular Regulation. João Pessoa, PB, Brazil, 2020.

BHN for Vascular Regulation	
Nursing diagnoses/outcomes	
Arrhythmia (specify)	Tissue hypoperfusion
Septic shock	Peripheral tissue perfusion, impaired
Cardiac output, impaired	Tissue perfusion, ineffective
Cardiac function, impaired	Arterial pressure, altered
Hyperglicemia	Risk of bleeding
Hypoglycemia	Risk of deep venous thrombosis
Nursing interventions*	
- Apply graduated compression socks or intermittent pneumatic compression devices to the legs.[15] - Assess the quality and strength of the peripheral pulses. - Evaluate hemodynamic profile during oxygenation support by veno-venous extracorporeal membrane (VV-ECMO).[15–16] - Evaluate central venous pressure, pulmonary artery occlusion pressure, cardiac output, and vascular resistance values. - Check the morphology and amplitude of the invasive pressure curves. - Strictly control intravenous therapy with liquids and/or electrolytes. - Monitor urine output continuously by calculating urine output in mL/kg/h. - Stimulate the beginning of the early enteral diet in the multi-professional rounds. - Ensure conservative volume resuscitation with intravenous crystalloid fluid prescribed by the physician. - Ensure ideal titration of vasopressor and/or inotropic doses to maintain MAP ≥65 mmHg, with infusion into the distal lumen exclusive of the central venous catheter. - Identify shockable or non-shockable rhythms of cardiorespiratory arrest and initiate care. - Install calibrated peripheral venous access or assist central venous access passage. Install catheter in the radial artery to monitor invasive arterial pressure (IAP).	

Chart 2 – Cont.

BHN for Vascular Regulation
Nursing interventions*
- Interrupt enteral nutrition in a patient with unstable hemodynamics and high doses of noradrenaline (>0.5 μg/kg/min) or vasopressin in any dose. - Investigate clots or residual blood in the catheter, air bubbles, leakage, failure to calibrate the monitor, moving objects in contact with the extensions or pressure transducer, if over-damping or under-damping in invasive pressure curves. - Investigate the presence of precordial pain. - Investigate signs and symptoms of deep vein thrombosis. - Investigate the use of medications with chronotropic, inotropic and/or dromotropic effects. - Keep the transduction equipment filled with saline solution pressurized at 300 mmHg. - Monitor the occurrence of cardiac arrhythmias and hemodynamic instability. - Monitor blood pressure, heart rate, pulse rate, frequency and depth of the breaths, body temperature with programming of adequate parameterization of alarms. - Monitor and evaluate hemodynamic response by means of dynamic variables (variation in pulse pressure, variation in systolic volume, change in systolic volume with passive elevation of the legs). - Monitor the CO_2 venoarterial gradient (ΔPCO_2), when necessary. - Monitor the QT interval in series electrocardiograms, when the patient is using hydroxychloroquine[23] or prokinetic agents. - Monitor capillary filling time. - Monitor signs of tolerance to enteral nutrition in a patient with unstable hemodynamics using noradrenaline (<0.5 μg/kg/min). - Monitor signs and symptoms of pulmonary congestion, systemic congestion or low cardiac output. - Monitor signs and symptoms of hyperglycemia (polyuria, polydipsia, polyphagia, weakness, ketone breath, Kussmaul's breath) or hypoglycemia (irritability, sweating, confusion, tremors, dizziness). - Level a three-way stopcock connected to the invasive pressure transducer with the patient's phlebostatic axis. - Observe pulse amplitude, peripheral perfusion, temperature and aspect of the limb with an intra-arterial catheter. - Observe the presence of bruises, petechiae, hematomas or signs of bleeding. - Obtain data on the initial and current ejection fraction in two-dimensional echocardiogram tests, when available. - Perform a standard 12-lead electrocardiogram (ECG). - Perform cardiopulmonary resuscitation maneuvers immediately in a patient in the prone position with an advanced airway, with hand positioning on the T7-T10 thoracic vertebrae, in the interscapular region.[13,24] - Perform Allen's test before cannulation of the radial artery or collection by puncture of arterial blood. - Perform capillary blood glucose test according to the institutional protocol and rotate puncture of the phalanges of the limbs. - Perform "zeroing" of the invasive pressure system every 2 hours, or when necessary, with a subsequent square wave test (flush test). - Change all the components of the invasive pressure system every 96 hours.

*Nursing interventions that do not have superscript references were taken from Ramalho Neto JM. ICNP® terminology subset for critically ill patients with Sepsis [thesis]. João Pessoa (PB): Federal University of Paraíba; 2019.

Chart 3 – Nursing diagnoses/outcomes and interventions for critically ill patients with COVID-19 and sepsis according to the BHN for Neurological Regulation. João Pessoa, PB, Brazil, 2020.

BHN for Neurological Regulation	
Nursing diagnoses/outcomes	
Aphasia, expressive	Disorientation
Agitation (specify RASS score)	Stupor
Cognition, impaired	Risk of *delirium*
Coma	Sedation (specify RASS score)
Delirium	Sleepiness
Nursing interventions*	
- Administer prescribed analgesic medication and evaluate response with the Numeric Pain Scale from 0 to 10, the Behavior Pain Scale (BPS) or the Critical Care Pain Observation Tool (CPOT). - Apply CAM-ICU every 12 hours or during changes in the Richmond Agitation-Sedation Score (RASS). - Assess cognitive function by applying the Mini Mental State Examination (MMSE). - Assess the need to apply chemical or mechanical containment in the bed. - Assess the patient's skin daily.[15] - Evaluate and calculate the Braden or Evaruci scale score.[25–26] - Assess the level of awareness using the Glasgow scale. - Assess the risk of falls and keep the bed protection rails elevated. - Assess pupil size, symmetry, and light accommodation. - Place a pneumatic mattress on the patient's bed, when available. - Determine the RASS score each shift. - Determine a target RASS score for the patient during the multi-professional rounds. - Implement eye care to prevent dry eye and corneal injury.[27] - Daily inform the patients about time (day, month, year, hour) and space (where they are). - Investigate the presence of precipitating factors of *delirium*. - Investigate hearing acuity and ability to communicate by means of gestures, head movements, writing support or drawings. - Investigate criteria for palliation together with the multi-professional team. - Limit noise in the ICU environment. - Monitor acute change in the patient's mental status in relation to baseline. - Monitor the sedation level using the RASS score. - Allow the patients to use their glasses or hearing aids, when possible. - Promote daily interruption of the sedation of eligible patients in the multi-professional rounds. - Promote the patient's sleep-wake cycle. - Provide emotional support. - Provide family approach with virtual visits by means of a tablet or robot, when available. - Make changes in body positioning when possible. - Use short, clear, and direct phrases in communication. - Use a communication tool (e.g.: ISBAR) in the moments of handover and multi-professional rounds.	

*Nursing interventions that do not have superscript references were taken from Ramalho Neto JM. ICNP® terminology subset for critically ill patients with Sepsis [thesis]. João Pessoa (PB): Federal University of Paraíba; 2019.

Chart 4 – Nursing diagnoses/outcomes and interventions for critically ill patients with COVID-19 and sepsis according to the BHNs for Hydration and Elimination. João Pessoa, PB, Brazil, 2020.

BHN for Hydration	BHN for Elimination
Nursing diagnoses/outcomes	
Electrolyte imbalance	Constipation
Liquid imbalance	Diarrhea
Dehydration (specify grade)	Urinary elimination, increased
Edema (specify location and grade)	Urinary elimination, reduced
Hypervolemia	Renal function, impaired
Hypovolemia	Urination, impaired
Fluid intake, impaired	Nausea
Process risk of the regulatory system, impaired (specify)	Vomits
Nursing interventions*	
- Auscultate hydro-air noises. - Assess the characteristics of the vomits in terms of volume, color and odor. - Assess the degree of peripheral edema using a scale of crosses from +1 to +4. - Evaluate hemodynamic profile during hemodialysis session and record final volume of the ultrafiltrate. - Examine rectal ampoule and palpate impacted mass (fecaloma). - Perform enema or intestinal irrigation, when appropriate. - Identify factors that cause or enhance nausea. - Investigate the presence of mucus or blood in the stools. - Investigate factors that contribute to constipation or diarrhea. - Investigate habits and pattern of intestinal elimination. - Investigate previous urological problems. - Wash the hands before and after handling the patient. - Maintain the patient's intimate hygiene. - Keep the headboard at a minimum of 10° during bed baths and sheet changes. - Keep upper and/or lower limbs elevated. - Monitor bladder elimination for urine frequency, volume, color and odor. - Monitor fluid loss due to bleeding, vomits, diarrhea, sweating and/or sialorrhea. - Monitor for the presence of dyspnea, fatigue or dizziness. - Monitor the intestinal eliminations for stool frequency, volume, consistency, color and odor. - Monitor the drainage rate of the gastric tube, intestinal fistula, episodes of vomits and/or diarrhea, recording volume and characteristics in the medical record. - Monitor the behavior of the professionals who provide patient care with hand hygiene. - Monitor fluid balance and the serum electrolyte levels.[15] - Monitor for signs of dehydration. - Monitor for signs of paralytic ileus (absent hydro-air sounds, nausea, vomits, abdominal distension). - Observe the type of diet offered. - Guide bed rest. - Position the patient's head laterally during an episode of vomits. - Promote an adequate supply of liquids. - Provide parrot bottle or trimmer. - Bathe in bed with warm water or at room temperature. - Perform relief or delay bladder catheterization as needed. - Perform bladder ultrasound and assess residual urinary volume, when available.	

*Nursing interventions that do not have superscript references were taken from Ramalho Neto JM. ICNP® terminology subset for critically ill patients with Sepsis [thesis]. João Pessoa (PB): Federal University of Paraíba; 2019.

Chart 5 – Nursing diagnoses/outcomes and interventions for critically ill patients with COVID-19 and sepsis according to the BHNs for Immune and Thermal Regulation. João Pessoa, PB, Brazil, 2020.

BHN for Immune Regulation	BHN for Thermal Regulation
Nursing diagnoses/outcomes	
Allergy	Fever
Organic dysfunction (specify)	Hyperthermia
Infection (specify focus)	Hypothermia
Sepsis	
Nursing interventions*	
- Administer prescribed antihistamine medication and assess clinical response. - Administer prescribed antipyretic medication and assess clinical response. - Apply physical means to control fever, when necessary. - Schedule and supervise the administration of broad-spectrum antimicrobials within the first hour of sepsis or septic shock recognition, after culture collection. - Heat the limbs with heating plates or orthopedic cotton. - Watch for signs of organic dysfunction: arterial hypotension; oliguria (≤0.5 mL/kg/h) or creatinine elevation (>2 mg/dL); PaO_2/FiO_2 ratio <300 mmHg or low oxygen saturation by pulse oximetry; thrombocytopenia; hyperlactatemia; change in the level of consciousness; agitation; *delirium*, and/or significant increase in bilirubins. - Evaluate laboratory tests: complete blood count, creatinine, bilirubins, transaminases, RT-PCR, serological test, coagulogram, D-dimer, arterial blood gases, and/or central venous blood gases.[8–9] - Evaluate the healing process and record the evolution of the wound in the medical record. - Calculate the Sequential Organ Failure Assessment (SOFA) score and evaluate its variation (ΔSOFA) every 24 hours. - Collect two samples of blood culture early and, when appropriate, from other relevant sites (urine, cerebrospinal fluid, wound, tracheal secretion or catheter tip). - Immediately report an adverse reaction episode to the intensive care physician. - Pre-screen for allergies or severe drug reactions. - Ensure safety in the medication chain: the right patient, the right medication, the right dose, the right time and interval between the doses, the right way, the right pharmaceutical form, the right record, and the correct orientation and evaluation of the response. - Implement preventive measures for bloodstream infection associated with a central venous catheter. - Implement preventive measures for pneumonia associated with mechanical ventilation. - Start a continuous intravenous insulin infusion protocol in the presence of two blood glucose levels >180 mg/dL and change solution every 12 hours. - Stop the drug infusion in the presence of adverse reactions, changing solutions and equipment in use. - Investigate infection focuses. - Keep warm using a blanket, thermal mattress or forced air devices (thermal blanket). - Monitor the permanence time of invasive devices. - Monitor clinical response to antimicrobials and assess resolution of infection. - Monitor for signs of bronchoaspiration. - Monitor signs and symptoms of infection. - Observe breathing for dyspnea, bronchospasm or stridor due to high obstruction. - Program adequate alarm parameterization. - Heal every 24 hours or whenever the dressing is dirty, loose and damp (blood, secretion, sweat). - Perform and (re)assess water balance periodically. - Remove the intravascular access considered as the source of the septic condition, after installing a new device. - Remove or change the site of the intra-arterial catheter in the face of signs of local infection, ischemia or necrosis. - Rescue results of cultures and assess sensitivity profile to antimicrobials.	

Chart 5 – Cont.

BHN for Immune Regulation	BHN for Thermal Regulation
Nursing interventions*	
- Respect the objection of the Jehovah's Witness patients or their legal guardians regarding the refusal of blood transfusion therapy according to the principles of the religion they profess. - Supervise state of hyperglycemia and hypernatremia in a patient with unstable hemodynamics and using intravenous hydrocortisone. - Use a sepsis screening tool daily (e.g., SOFA score or own institutional screening system). - Check vital signs every 15 minutes until the first hour in the event of an adverse reaction.	

*Nursing interventions that do not have superscript references were taken from Ramalho Neto JM. ICNP® terminology subset for critically ill patients with Sepsis [thesis]. João Pessoa (PB): Federal University of Paraíba; 2019.

DISCUSSION

Based on the premise that there is no pathognomonic pathophysiological aspect of septic conditions, many times in the clinical setting of the ICU it is difficult to determine whether a critically ill patient with respiratory symptoms has a viral or bacterial infection, or even a co-infection. Significant viral diseases (e.g., COVID-19) underdiagnosed in patients with suspected sepsis can lead to the hospital spread of respiratory infections, and to the unnecessary use of antibiotics, as well as to the underutilization of antivirals in the hospital setting.[28]

Nowadays, the tracking of infection and potential sepsis in the ICU are recommended for the early identification of organic dysfunctions in critically ill patients by assessing the extent and severity of dysfunctional organs with the aid of the SOFA score or, further, according to clinical criteria recommended by the Latin American Institute of Sepsis and which are aligned with the SSC, such as: arterial hypotension; oliguria or elevated creatinine; reduced oxygenation index or low oxygen saturation by pulse oximetry; thrombocytopenia; hyperlactatemia; change in the level of consciousness; and significant increase in bilirubins. In addition, the opening of the sepsis protocol is opportune for COVID-19 suspected patients who have an associated flu syndrome (fever accompanied by cough, tonsillitis, runny nose, pharyngitis and/or dyspnea starting in the last 7 days) in the presence of any organic dysfunction.[5–6,29]

Among the mechanisms involved at the core of this pathophysiological process of sepsis, the following stand out: immune dysfunction and bioenergetic insufficiency, responsible for carrying pro- and anti-inflammatory cytokine activation; vasodilation and increased capillary permeability, with relative hypovolemia and arterial hypotension; considerable heterogeneity in the distribution of blood flow, with thrombosis in the microcirculation, changes in blood viscosity and loss of the normal rheological capacity of red blood cells that are more easily added to endothelial cells, leading to a reduction in tissue oxygen supply and consequent incompatibility in the global relationship between oxygen supply (DO_2) and consumption (VO_2), mitochondrial dysfunction with cytopathic hypoxia, increased anaerobic metabolism, and hyperlactatemia.[11,30] Thus, the care demands in cases of COVID-19 can represent only the tip of the iceberg in those patients who develop a concomitant septic condition in response to the viral impairment by SARS-CoV-2 or, also, due to an associated bacterial, fungal or parasitic infection.

In addition, in order to help such patients maintain their dynamic balance, prevent imbalance states or reverse imbalance in balance, the intensive care nurses develop differentiated competences to identify phenomena in which they need to intervene (such as daily sepsis screening, evaluation of lactate clearance, monitoring of organic dysfunctions, pronation, installation of an arterial line,

ultrasound examination), considering that the entire pathological process of COVID-19 and sepsis primarily compromises the psychobiological needs of oxygenation, vascular regulation, neurological regulation, and hydration and elimination by bioenergetic insufficiency, in addition to the needs for immune and thermal regulation at the time of the installed immune dysfunction,[11] adopted as central axes in the line of reasoning of the present study.

Regarding the prone maneuver, a protocol must be used based on the resources available and on the training level of the team, paying attention to potential complications, such as pressure injuries to the face, chest and knee; accidental extubation; loss of intravascular devices, drains, and probes; facial, limb, and thorax edema; transient hemodynamic instability; brachial plexus injury; and surgical wound dehiscence, among others caused by ventral decubitus for 12 to 16 hours.[9,21]

Thus, it is perceived that the nursing phenomena aimed at the BHN for Oxygenation are highlighted in view of the large number of human needs affected or partially met, which ratify the prevalence of typical symptoms of the flu syndrome that, associated with the sepsis condition, give rise to specific care actions given the following diagnostic concepts[11] (Chart 1): Lactate clearance, effective; Lactate clearance, impaired; Acid-base imbalance (specify); Ventilated weaning, impaired; Dyspnea (specify grade); Acid-base balance, effective; Hyperlactatemia; Airway cleaning, impaired; Risk of bronchoaspiration; Cough; Gas exchange, impaired; Spontaneous ventilation, impaired; Mechanical ventilation (specify ventilation mode).

Although in the context of intensive care the assessment of macro-circulation parameters predominates, the imbalance between DO_2 and VO_2 can be generated by a reduction in oxygen supply, even in conditions of normalization of the macro-hemodynamics, as a consequence of the changes in micro-circulation; or caused by a reduction in oxygen consumption due to primary alterations in the mitochondrial function, suggesting that bioenergetic failure plays a central role in multiple organ dysfunction and in increasing mortality.[11]

In the meantime, the main variables of tissue perfusion monitored in the ICU comprise lactate and venous oxygen saturation (SvO_2 and $SvcO_2$). However, the assessment of peripheral perfusion at the bedside (capillary filling time, temperature gradient, and skin mottling) is an alternative to measuring perfusion non-invasively, based on the fact that, during a shock situation, even in occult shock, there is a deviation of the blood flow to the noble organs (heart, brain, and kidneys) through sympathetic activation and peripheral vasoconstriction, the skin and muscles being the first to feel these changes and the last to normalize perfusion after volume replacement.[11,30–31]

It should be noted that the Process risk of the regulatory system, impaired (specify) ND/NO,[11] belonging to the BHN for Hydration (Chart 4), concerns the risks inherent to the imbalance in the volume of body fluids, entry and exit of water and electrolytes, control of heat production and loss through physiological mechanisms, which concentrates in this single statement a total of 09 NDs/NOs inherent to the risks of fluid imbalance; electrolyte imbalance; dehydration; hypovolemia; hypervolemia; acid-base imbalance; hypoglycemia; hyperglycemia; and impaired thermoregulation.

Although these nursing practices vary widely around the world, it is imperative to highlight that the competences closely linked to intensivist nurses in combating the COVID-19 pandemic converge to similarities linked to the exhaustive search for knowledge and skills in order to integrate techniques that pervade scientific principles to the technological apparatus of the ICU where they operate. In view of the exorbitant number of infections by the new coronavirus (SARS-CoV-2) with overcrowding of critically ill inpatients and increasing scarcity of beds, refining the emotional balance has also become a matter of survival common to all so as to be able to assist adequately; make assertive decision-making; and discern the ideal types of Personal Protective Equipment (PPE), with adequate procedures to put the equipment on, and safe procedures to take it off, so as not to contaminate oneself and the other.

From the perspective of sepsis, nurses also initiate a package of measures that comprise lactate dosage; culture collection; venous access; preparation and optimized administration of broad spectrum antimicrobials; volume replacement and evaluation of static or dynamic hemodynamic variables; vasopressor and/or inotropic therapy; installation of intra-arterial catheter and monitoring of the invasive pressure; identification and control of the infectious focus; administration of blood components and alert for transfusion reactions; ventilatory support; glycemic control; early nutrition; reassessment of the volemic and perfusion status; and monitoring of lactate clearance; among other adjuvant measures.[8,32–35]

In view of this, it is expected that the present study can contribute to the improvement of the skills of the intensive care nurses when caring for the patient with COVID-19 and sepsis, boosting their work process as they identify human needs and nursing phenomena to enhance the prognosis of these critically ill patients in the ICU. Finally, due to the fact that the world is dealing with a new and threatening disease, it is indispensable that, in future research studies, outcome indicators are used that can evidence the association between the nursing diagnoses, the nursing care actions, and the outcomes presented by these patients.

Some limitations of the study are directly related to the still incipient clinical experience of the health professionals worldwide regarding the care of patients with COVID-19. However, the use of the ICNP® terminology favored the specification of nursing diagnoses/outcomes and interventions, especially developed by intensive care professionals who work directly in the care of this clientele at the bedside in Brazilian ICUs.

CONCLUSION

It is hoped that this study can contribute to a reflection on the inherent complexity of care, associated with the implementation of the nursing process for critically ill patients admitted to the ICU with COVID-19 and sepsis. The results evidenced constitute a guide for the professional practice that, from inherent critical-reflective thoughts, leads its agents to effective, efficient, safe and patient-centered decision-making, being extremely important to monitor the quality of this care provided for the advancement of the knowledge of the profession and for the development the theory that supports it.

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NOTES

ORIGIN OF THE ARTICLE

Extracted from the thesis entitled “ICNP® terminology subset for critically ill patients with Sepsis”, presented in 2019 to the Graduate Program in Nursing of the Federal University of Paraíba; as well as from recent literature on the COVID-19 disease.

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