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The Role of Nurses to Optimizing the Mechanical Ventilation for Acute Respiratory Failure in the Intensive Care Unit (ICU) of Hospital

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ABSTRACT

Background: The largest component at every health care facility center is the Nurse. In hospitals, nurses are placed in various health care units or sections, one of which is the Intensive Care Unit (ICU). Generally, Nurses at ICU have greater duties, roles, and responsibilities than nurses in other service units. Every day, these nurses must deal with critical patients, especially patients with acute respiratory failure on ventilators whose lives are threatened and have a high risk of death. Therefore, ICU nurses are increasingly required to play an integrated and comprehensive role to optimize mechanical ventilation management so that critical patients (acute respiratory failure) can be saved. Objective: To examine the nurse's role of ICU and any supporting and inhibiting factors them to optimizing mechanical ventilation in patients with acute respiratory failure at the ICU. Method: A qualitative descriptive as type of this study, and use analytical, exploratory, phenomenological, and evaluative design. This research has been conducted in the ICU Room of Dr. Wahidin Sudirohusodo General Hospital of Makassar, Makassar City, South Sulawesi Province, Indonesia. The subjects are 21 nurses at ICU's room. The informants include: the doctor in charge of the ICU, the Head of the Nursing Section, nurses, patients and families. Observation, interviews, and documentation as methods are used to collecting any data need to analyses problem and objective this study. A qualitative used as analyses approach, Results: All nurses at ICU room of hospital have an urgent, important and strategic role to optimizing mechanical ventilation against patients with acute respiratory failure. The specifically roles that must be played them by stages, integrated and holistic include: observation (observer), monitoring (monitor), evaluation of monitoring results and data analysis, airway management, examination and assessment of patient conditions, nursing care and actions, communication and coordination, preparedness and collaboration, as well as prevention and management of complications. The supporting factors of the role of nurses at ICU include: the human resources (HR) competence of nurses, the increasing number of acute respiratory failure patients requiring care, policy support and mechanisms as guidelines, support from hospital management, infrastructure and facilities and equipment, communication relationships and lines of coordination and collaboration, and the support of the patient's family. While the inhibiting factors include: patient factors, nurse negligence factors (in monitoring and managing ventilators, evaluating and analyzing data, managing patient breathing), quantity and quality of nurse HR factors, high nurse workload factors, limited time management factors in assessments, limited infrastructure and facilities and equipment factors. ineffective communication factors, conflict of interest factors, and poor role conflict management factors.
Keywords: Acute respiratory failure, ICU, Nurse, Role.

INTRODUCTION

Nurses are the largest component at every health care facility center unit. According to the Indonesian National Nurses Association (INNA), a nurse is someone who has the knowledge, skills, and authority to provide nursing care to others based on their knowledge and skills within the limits of their authority.1 Nurses are professional healthcare workers who have the duty, role, and responsibility to provide independent and collaborative care to patients. Nurses work in various healthcare facilities, including and especially in hospitals. One of the crucial service areas in hospitals that requires nurses is the Intensive Care Unit (ICU). Generally, an ICU is a medical facility equipped with trained personnel and advanced technology to provide intensive care to support the lives of critically ill patients.2 Beside there are amount medical/health personnel (nurses), the ICU's room also has various special facilities and equipment for critical patients who require immediate intervention, regular monitoring and coordinated management of organ system functions to overcome life-threatening or potentially life-threatening diseases that are reversible, 3 even the ICU is specifically designed to provide care services to critical patients with a multidisciplinary approach. 4

According to Musliha, the placement of nurses in the ICU's room is aimed at managing patients with life-threatening illnesses, trauma or complications,5 providing medical and specialized care to maintain the patient's life,4 as well as providing comprehensive care to patients with life-threatening conditions or organ system failures such as the lungs, heart and kidneys that require close supervision and special equipment.6 Patients treated in the ICU are those at high risk of death and therefore require intensive monitoring for a certain period. The care provided in the ICU is complex and integrated and is carried out together to improve the patient's condition, including airway and breathing support, cardiovascular support, hemodynamic monitoring, fluid management, principles of vasoactive drug use, CNS, renal support, gastrointestinal support, nutrition, infection control, and

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end-of-life care.4 One of the equipment commonly used for airway and breathing support in the ICU is a mechanical ventilator. 4,7 The ICU has standard equipment in the form of manual ventilation and airway support devices, suction devices, vascular access equipment, invasive and non-invasive monitoring equipment, defibrillators and pacemakers, patient temperature control devices, thoracic drainage equipment, infusion pumps and syringe pumps, portable equipment for transportation, special beds, lights for procedures and one of them is mechanical ventilation to assist breathing efforts through an Endotracheal Tube (ETT) or tracheostomy.5

One of the clinical indications for installing a mechanical ventilation device according to Musliha is respiratory failure, especially acute respiratory failure.5, 8 Acute respiratory failure is often referred to as acute respiratory distress syndrome (ARDS), namely the inability of the respiratory system to maintain normal blood oxygenation (PaO2), carbon dioxide elimination (PaCO2) and adequate pH caused by problems with diffusion or perfusion ventilation. ARDS is total lung damage due to various etiologies such as sepsis, viral or bacterial pneumonia, aspiration of gastric contents, chest trauma, prolonged shock, burns, fat embolism, drowning, massive blood transfusion, cardiopulmonary bypass, O2 poisoning, acute pancreatitis hemorrhage, inhalation of toxic gases, and consumption of certain drugs. The main signs and symptoms in ARDS cases include increased respiratory rate, dyspnea, additional breath sounds on auscultation, decreased consciousness, tachycardia, cyanosis, hypoxemia, chest retraction, restlessness, respiratory acidosis and metabolic acidosis which will ultimately occur as a result of the failure of compensatory mechanisms.9

To observe be continue, existence nurses at ICU have differ from nurses in general because they have greater duties, specific roles, and responsibilities than nurses in other service units. Every day, ICU's nurses must deal with critical patients, especially those with acute respiratory failure on ventilators whose lives are threatened and have a high risk of death. Therefore, ICU nurses are increasingly required to play an integrated and comprehensive role to optimize mechanical ventilation management so that patients can be saved. According to the Ministry of Health, ICU nurses have several primary duties and roles, including: regularly monitoring ventilator parameters, maintaining the airway, performing maintenance and examinations, and communicating and coordinating.10 It's the problematic phenomenon that acute respiratory failure are still remains one of the twenty leading causes of highest death globally in intensive care units, with a mortality rate of 35%-46% depending on the severity of ARDS symptoms. Mortality due to ARDS increases with age, with a mortality rate of 24% in those aged 15-19 years and 60% in those over 80 years. ARDS is a medical emergency triggered by various acute processes directly or indirectly related to lung damage. ARDS is an acute lung disease that requires Intensive Care Unit (ICU) care and has a high mortality rate of up to 60%. Therefore, ARDS is a life-threatening inflammatory lung disease.11

The American European Consensus on ARDS at 2010 found an incidence of 12.6-28.0 cases per 100,000 population per year, with approximately 40% reported cases of acute respiratory failure, including deaths. Studies in Germany and Sweden reported 77.6-88.6 cases per 100,000 population per year. The incidence of ARDS in the United States is 306 cases per 100,000 population per year. ARDS cases in Taiwan increase with age, with ages ranging from 75 to 84 years, increasing by 50% from 1997 to 2011. The prevalence of respiratory failure in Indonesia is not clearly recorded. The incidence of respiratory failure ranked tenth among causes of death in hospitals, at 5.1% in 2017 based on data on the ranking of ten non-communicable diseases (NCDs) in 2017.12 According to the WHO, the number of critically ill patients in the ICU increases annually, with 9.8-24.6% of critically ill patients admitted to the ICU per 100,000 population, and deaths from critical and chronic illnesses worldwide have increased by 1.1-7.4 million.13 There are approximately 4 million ICU admissions in the United States. 6 According to the SCCM, the average mortality rate for patients admitted to the adult ICU is 10-29%, depending on age and severity of illness. Over ten years in the next, the mortality rate for patients admitted to the ICU is higher than for patients of the same age who have never been admitted to the ICU. 14 Any patients in the ICU have critically ill with organ instability. Therefore, they require assistance with devices such as ventilators, IV drips installed and monitoring, and vasoactive drugs. Critically ill patients can experience rapid pathophysiological changes, which can increase the incidence of increased morbidity and mortality that can lead to death. 5 According to the Patient and Family Support Committee of the Society of Critical Care Medicine,15 patients in intensive care often have problems such as neurological disease, bleeding, hemodynamic and electrolyte fluid instability, shock, acute and chronic respiratory failure, kidney failure, chest pain, and sepsis. 16

At Dr. Wahidin Sudirohusodo General Hospital of Makassar that located in Makassar City, South Sulawesi Province, it is a class A hospital and national referral center in Eastern Indonesia, established in 1994. Its main vision is to become a leading Academic Health Center in Indonesia with a mission to provide quality health services, education, and research. This hospital provides a variety of medical services from general to sub-specialist, equipped with modern facilities and skilled staff, and has received accreditation from KARS (Hospital Accreditation Quality) and JCI (Joint Commission International). The management employs a number of medical personnel, namely 331 doctors (322 doctors in general medical services and 9 basic specialist doctors) and 2,024 nurses, including 51 nurses in the Pinang 1 treatment room, some of whom (21 nurses) are ICU nurses.

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Intensive Care Center services at the hospital is serves patients who require integrated intensive care services including: intensive care services in the pediatric field (Pediatric Intensive Care Unit (PICU), Neonatal Intensive Care Unit (NICU), Medical Intensive Care Unit (MICU), Surgical Intensive Care Unit (SICU), Intensive Coronary Care Unit (ICCU), and continuous renal replacement therapy services (Continues Renal Replacement Therapy (CRRT), and other cases that require intensive care. Patients at the Intensive Care Center are treated by specialist doctors and sub-specialists from various sections related to intensive therapy such as: anesthesia specialists, internal medicine specialists, surgical specialists, neurology specialists, pediatricians, heart specialists and others, and are served by nurses who are skilled and experienced in the field of Intensive Care and are headed by an Intensive Care consultant doctor who is responsible for overall services. In this regard, the hospital management provides 8 ICU units without ventilators, 43 beds for the class ICU with ventilator, 17 beds for NICU class with ventilator, 18 beds for PICU class with ventilator, and 3 beds for ICCU/ICVCU with ventilator.17

In relation to the need to optimize mechanical ventilation management in patients with acute respiratory failure at ICU, General Hospital management of Dr. Wahidin Sudirohusodo has established policies and mechanisms (systems and procedures) for nurses to carrying out their duties and roles, including: First, the role of monitoring and evaluation, with the main tasks including: (1) monitoring ventilator parameters, (2) monitoring patient conditions, (3) evaluating results. Second, nursing care and actions, with the main tasks including: (1) performing routine oral and tracheal care to prevent infection and maintain airway hygiene, (2) patient mobilization, (3) administering medication, (4) supporting patient breathing. Third, collaboration and communication, with the main tasks including: communicating and collaborating with the medical team.17 In short, ICU nurses play a role in closely monitoring ventilator parameters and patient conditions, providing basic care such as checking oxygen saturation and breath sounds, and carrying out nursing actions to prevent complications and support the healing process. Nurses are also responsible for collaborating with the medical team in adjusting ventilator settings to ensure optimal oxygen and carbon dioxide (CO2) exchange, reducing the workload of breathing, and maintaining stable lung function.

It’s the problem phenomenon, although supported by policies and mechanisms as guidelines, support from hospital management, support from hospital management, human resource (HR) competence, an increase in the number of acute respiratory failure patients requiring treatment, infrastructure and facilities and equipment, lines of communication and coordination and collaboration, and support from patient families, but nurses in the ICU’s room are still face various challenges that have the potential to hinder their role in optimizing the management of mechanical ventilation for acute respiratory failure in the ICU. The challenges of these problems include: motivation and negligence to carrying out ventilator monitoring and tasks management, negligence to evaluating and analyzing data, negligence to manage a patient respiratory, quantity and quality of nursing human resources, high workload, limited time management in assessments, limited and dysfunctional mechanical ventilation facilities and equipment, ineffective both communication-coordination and collaboration, even sometimes conflicts of interest, and lack skills to manage any role conflict. Based on all background description mentioned above, so this study is more increasingly important and strategic to be conduct, with the aim to analyzing the role of ICU’s nurses and also supporting and inhibiting factors to optimizing mechanical ventilation for acute respiratory failure at the ICU Room of Dr. Wahidin General Hospital, The results of this research are expected to provide practical and theoretical benefits and contributions, as well as solutions to overcome existing obstacles.

METHOD

This research is a qualitative type,18-19 with a descriptive phenomenological approach.20 Location at the ICU Room of Dr. Wahidin Sudirohusodo General Hospital, Makassar, and research have been conducted for two months (August-September, 2025). The subjects are twenty one nurses of ICU. The focus of this study is the role of nurses include: observation, monitoring, evaluation, maintaining the airway, examination, nursing care and actions, communication, coordination and collaboration. The informants include the doctor in charge of the ICU, the Head of the Nursing Section, Nurse, patients and their patient's family. This investigation is designed by analytical, exploratory, phenomenological, and evaluative. Observation, interviews, and documentation approaches are used to collect any data need it. Validity be done to check through editing, classifying, verifying, analyzing, and concluding. All data and information be processed them, and then they analyzed qualitatively in accordance with qualitative research procedures include reduction, abstraction, display, and deductive-inductive conclusion drawing.20-23. This study has obtained ethical approval from the Ethics Committee of Poltekkes Kemenkes Makassar (Approval No. 1 511/M/KEPK-PTKMS/VII/2025). The approval was granted following a review confirming the study’s compliance with established ethical principles, including respect for participant autonomy, confidentiality, and voluntary informed consent, in accordance with national and international research ethics guidelines. Throughout the research process, ethical considerations were strictly upheld: formal permissions were obtained from relevant authorities prior to data collection, appointments were scheduled with informants in

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advance, and the confidentiality of respondents' and informants' identities was maintained in accordance with their requests.

RESULT

The role of nurses to optimizing a mechanical ventilation management for acute respiratory failure in the Intensive Care Unit (ICU)

Based on this research results, can be obtained an overview about the role of ICU nurses to optimizing mechanical ventilation in acute respiratory failure in the Intensive Care Unit (ICU) of Dr. Wahidin Hospital, Makassar, as described below.

1. The Role of Nurses in Monitoring

Based on the research results, nurses at ICU's room of Dr. Wahidin General Hospital are carry out their role as monitors for patients with acute respiratory failure undergoing intensive care in the ICU. In carrying out this role, nurses be able perform several main and important tasks, including: monitoring ventilator parameters and patient conditions. First, nurses regularly monitor ventilator parameters such as Positive End-Expiratory Pressure (PEEP), Peak Inspiratory Pressure (PIP), and others. This is done deliberately with the intention and purpose to ensuring that the machine works according to instructions and also to ensure that the values of these parameters remain in accordance with the patient's needs and do not make an endanger for patient.

Second, Nurses is to monitor ventilator settings include mode, tidal volume, frequency, breaths, and airway pressure to ensure they are appropriate to the patient's needs, and interpret any alarms that arise. Third, Nurses to directly monitor the situation and conditions of oxygen using such as pressure, volume and percentage of oxygen as well as oxygen saturation given to the patient. Fourth, Nurses monitor the patient's condition by observing vital signs, measuring blood pressure, pulse, respiratory rate, and oxygen saturation regularly to assess the patient's response to therapy. Fifth, Nurses observe the patient's physical condition, by: conducting a thorough physical assessment, including listening to breath sounds, breathing rhythm, respiratory rate, assessing bilateral chest movement to ensure adequate gas exchange and no signs of disturbance, and observing other signs of breathing difficulty. Sixth, Nurses identify complications, by: paying attention to signs of complications such as barotrauma (lung injury due to high pressure), ventilator-associated pneumonia, or decreased cardiac output, which can be triggered by the use of high PEEP.

2. The role of nurses in evaluating monitoring results and data analyses

Based on the research findings at ICU of Dr. Wahidin General Hospital, nurses have been performing their role as evaluators: First, they are periodically review monitoring data. This is done intentionally with the aim to evaluating the effectiveness of ventilation therapy and making adjustments according to the doctor's instructions. Second, nurses to evaluate mechanical ventilation monitoring including vital signs, periodic physical assessments of patients, and analysis of data from ventilator monitors and supporting examination results to identify complications. Third, Nurses to conduct an evaluation and analysis, include: (1) to analyzing monitor data: monitoring and understanding ventilation parameters displayed on the ventilator monitor, such as pressure, volume, and respiratory rate, to ensure the effectiveness of therapy. (2) to integrating data from supporting examinations: coordinating and reviewing the results of other diagnostic examinations such as blood gas analysis, chest x-rays, or other laboratory results, to obtain a complete picture of the patient's condition. Fourth, Nurses to conduct a physiological assessment by monitoring vital signs such as blood pressure, heart rate, oxygen saturation, and respiratory rate periodically. Nurses must also be skilled to analyzing unstable hemodynamic conditions. Fifth, Nurses observe the patient's condition: assessing from head to toe (head-to-toe assessment) to identify changes or complications as early as possible.

3. The role of nurses in airway management

Based on the research results, nurses at ICU are carry out their role as patient airway managers, by carrying out several tasks including: First, to carrying out airway management such as regular mucus suction to keep the airway clean and patent, regular suction of airway secretions to prevent mucus buildup that can hinder breathing, and preventing aspiration by ensuring airway integrity is maintained to prevent fluid from entering the lungs. Second, to assess the patient's clinical and airway condition, such as by: to checking breath sounds to ensure adequate air movement on both sides of the lungs. Third, to ensuring the position of the endotracheal tube (ETT) or tracheostomy tube is always safe and properly installed it. Fourth, to checking and caring for the ETT cuff to prevent leaks or injury. Fifth, Maintenance of equipment and preparation for weaning from the ventilator, including (1) equipment maintenance, namely ensuring all tubes, connectors, and ventilator components are functioning properly and there are no leaks; (2) maintaining the patient's position properly to prevent compression on the tube and support drainage of secretions; (3) preventing infection: performing aseptic procedures during airway care and replacing the tracheostomy or endotracheal tube to prevent infection. Sixth, Nurses to ensure optimal gas exchange. Seventh, Nurses to preventing complications, and Eight, Nurses to continuous care according to procedures and patient conditions.

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4. The role of nurses in examining and assessing patient conditions

Based on the research results, nurses at ICU of hospital are carry out their role as examiners, include: First, to checking the visually patient's lung condition, such as the presence of additional breath sounds or wheezing. Second, by regularly, nurses to monitor any vital signs, lung function through ventilator data, and the patient's physical condition to adjust management. Third, to conducting a chest physiotherapy examination (e.g. chest physiotherapy) to help remove secretions. Fourth, to conducting an examination to ensure the endotracheal tube is not kinked or blocked. Fifth, to conducting ongoing assessments. Sixth, to taking a measure to prevent complications. Seventh, to conducting a comprehensive assessment of the patient's condition through (1) respiratory assessment: to assessing the patient's respiratory effort, breath sounds, and other signs of respiratory distress. (2) airway assessment: to ensuring a patent airway, performing suction as needed, and to checking the endotracheal or tracheostomy tube to prevent blockage. (3) to asses a neurological status: monitoring the patient's level of consciousness and neurological condition.

5. The role of nurses in the nursing care and actions

Based on the research results, nurses at ICU are carry out their roles in the nursing care and actions, by: (1) to performing oral care and tracheostomy or endotracheal tubes routinely to prevent infection and maintain airway hygiene; (2) to planning appropriate nursing actions based on evaluation, including incision wound care, complication prevention, and equipment maintenance; (3) to supporting the weaning process: identifying the patient's physical and mental readiness to be removed from the ventilator, monitoring during the weaning period, and providing support to the patient and family; (4) to do patient mobilization, namely: to helping patients in mobilization by regularly to prevent complications such as pneumonia, deep vein thrombosis, and circulatory disorders, (5) to providing a medication according to the treatment program to control pain, sedation, or bronchodilators as needed, (6) to supporting patient breathing, as like: to ensuring the patient's position is comfortable and balanced between oxygenation needs and lung function. (7) to be an advocate: ensure that patient rights and comfort are met by advocating for appropriate care and explaining the process to patients and families.

6. The role of nurses in communication and coordination

Based on the research results, nurses at ICU are to apply their role in communication and coordination by: First, to communicating and coordination with ICU's specialists, respiratory therapists and other medical/health team members to discuss and report the patient's status and condition, as well as aligning treatment plans and ventilation therapy strategies; Second, to communicating and coordination with respiratory therapists regarding suction schedules, ventilator adjustments, and evaluating patient readiness for extubating. Third, to perform a team coordination, include: working closely with other multidisciplinary teams such as specialist doctors, respiratory therapists, and nutritionists to ensure comprehensive care. Fourth, providing information about the patient's response to mechanical ventilation and the actions that have been taken; Fifth, communicating findings to doctors and planning further actions, including the process of weaning from the ventilator. Sixth, communicating with the medical team: reporting accurately and timely any changes in the patient's condition to doctors or other medical teams.

7. The Role of nurses in preparedness and collaboration

Based on the research results, ICU's nurses are carrying out their role in preparedness and collaboration by: First, to preparing for weaning: to monitoring the patient's readiness to be removed from the ventilator (weaning) and collaborating with the medical team to carry out the weaning procedure. Second, to providing intervention: to preparing appropriate interventions when complications such as bronchospasm, hypoxemia, or pneumothorax occur. Third, to collaborating or working together with the medical team to ensure all aspects of care are met, from basic care, medication, to ongoing monitoring. Fourth, to collaborating in decision making: actively participating in team discussions to determine ventilator setting adjustments, treatment plans, and indications for starting the weaning process.

8. The role of nurses in the prevention and management of complications

Based on the research results, ICU's nurses are conducting their role in preventing and managing complications by: First, to educating patient and family: to providing education, if possible, about the patients' condition, management, and steps to prevent complications such as ventilator-associated pneumonia (VAP). Second, to preventing VAP, by: to implementing strict hand hygiene, aseptic techniques during suctioning, and positioning the patient's head of the bed at a 30-45 degrees position, unless there are contraindications. Third, Sedation management, namely: providing a sedation break (sedation holiday) to assess the patient's readiness for extubating. Fourth, to apply a holistic and continuous nursing care, including early mobilization and optimal care to improve lung function and prevent complications.

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The Supporting and Inhibiting Factors of the Role of ICU's Nurses to Optimizing Mechanical Ventilation in Acute Respiratory Failure in the Intensive Care Unit (ICU)

Based on the research results, there are several the supporting and inhibiting factors for the role of ICU's nurses in optimizing mechanical ventilation in patients with acute respiratory failure in the Intensive Care Unit (ICU) of Dr. Wahidin Sudirohusodo General Hospital. Supporting factors include: First, the competence factor of human resources (HR) of ICU nurses. This is characterized by (1) a high level of undergraduate education in the field of health and nursing such as a bachelor's degree in nursing and a master's degree in nursing (Ners), (2) having knowledge and skills as well as experience in carrying out roles and tasks as patient condition observers, ventilator and oxygenation monitors, evaluators of monitoring results and data analysis, airway managers, examiners and assessors of patient conditions (researchers), care executors, communicators, coordinators, collaborators, and complication managers. Second, the support factor from hospital management. This is indicated by the existence of clear policies and mechanisms (systems and procedures) as guidelines for ICU nurses to carrying out their work duties and strategic roles to managing mechanical ventilation for patients with acute respiratory failure in the ICU. Third, the infrastructure factor, facilities and equipment. This is indicated by the availability of ICU treatment rooms, amount complete and well-functioning ventilators, including parameters such as PEEP (Positive End-Expiratory Pressure), PIP (Peak Inspiratory Pressure), tidal volume, and respiratory rate, and others. Fourth, the communication factor. This is indicated by good communication between fellow ICU nurses, the ICU medical team and other medical personnel so allowing them to make rapid and appropriate therapy adjustments according to changes in the patient's condition. Fifth, the patient's family support factor. In this case, the presence of the patient's family is very important in providing encouragement and motivation as well as social (emotional, spiritual) support to the patient to undergo the treatment process in the ICU. In addition, the patient's family also plays a role to provide an informational support for nurses by to reporting the patient's situation and condition, such as shortness of breath, anxiety, profuse sweating, and others.

The inhibiting factors include: First, patient factors, especially the condition of patients with acute respiratory failure which is often unstable and changes rapidly, and patient behavior that resists the ventilator machine as a result of monitoring and intervention that is not strict/constant/consistent from nurses. In addition, some patients also sometimes do not show good compliance with therapy. Second, the factor of negligence of nurses in to monitoring and managing the ventilator. This is indicated by the continued emergence of problems of mismatch (asynchrony) of ventilator parameter settings with patient needs, negligence to identifying the cause and making appropriate adjustments to ventilator parameters, the emergence of problems adjusting ventilator parameters (such as tidal volume, PEEP, and others). To setting too high pressure or volume on the ventilator can cause an injury risk and damage to the lungs due to the ventilator. In addition, sometimes there are problems when to manage a weaning from the ventilator as a result of negligence of nurses to monitoring the process of removing the patient from the breathing aid gradually or immediately so that the assessment of the patient's condition is inaccurate and the strategy adjustment is less appropriate.

Third, negligence factors in to evaluating and analyze data, where nurses sometimes neglect to monitor the patient's response against mechanical ventilation, including hemodynamic status and ventilator parameters, resulting in slow and inaccurate clinical decisions. Delays in responding to changes in the patient's condition can increase the risk of other complications such as ventilator-associated pneumonia (VAP) or atelectasis. Fourth, negligence in managing the patient's breathing. This is indicated by suboptimal/ineffective airway clearance and suctioning or coughing techniques, resulting in the patient's respiratory rate being inaccurate and the handling of eclampsia accumulating and interfering with the airway. In addition, nurses are sometimes negligent and lack discipline in maintaining optimal gas exchange, resulting in blood oxygen and CO2 levels not being maintained or not achieve the target. This is due to errors or mistakes in selecting the ventilation mode, inaccuracy in setting tidal volume, PEEP, and respiratory rate.

Fifth, the quality of nursing human resources. In this case, although nurses have a high nursing educational background, not all of them have better knowledge of respiratory physiology, and their skill levels are inadequate to conducting comprehensive assessments. The quality of human resources that is not entirely satisfactory/beneficial also often causes nurses to make mistakes in assessment and inefficient ventilator settings so that gas exchange is not optimal, and oxygenation is not achieved optimally and even carbon dioxide is not removed properly. Another problem is the lack of understanding, critical thinking skills, and experience among nurses in dealing with the complexity of ventilator parameters, especially in managing mechanical ventilation parameters such as tidal volume, respiratory rate, and PEEP pressure appropriately according to dynamic clinical conditions. The substandard quality of human resources also has implications for nurses' inability to carry out their role as evaluators, difficulties in deciding on weaning, and inaccurate assessments, which can lead to delays or even failure in the weaning process from the ventilator. Similarly, in carrying out the assessment process, nurses do not yet fully possess the ability to collect and analyze data.

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Sixth, the quantity factor of human resources, in this case the number of ICU staff/nurses is often not appropriate or less comparable with the number of critical patients who must be monitored and served at the same time. Seventh, the high workload factor of nurses, in this case the number of critical patients who require service and care often increases or is relatively large while the number of ICU staff/nurses available is relatively limited so that nurses often experience physical and mental fatigue facing heavy tasks and lack of focus to managing a mechanical ventilation. These situations and conditions often cause nurses to be panic and act hastily when carrying out nursing actions, thus potentially reducing the services quality. Eighth, time management in assessments. In this case, nurses have lack ability to manage their time, resulting in relatively limited and suboptimal use of time for assessment and synchronization activities. This situation and condition are closely related to the role conflict and other workloads nurses must shoulder them.

Ninth, the factor of limited infrastructure, facilities, and equipment. The number of critical patients often increases while the number of units and capacity of ICU rooms is limited, and also the number of mechanical ventilators is insufficient. In addition, existing ventilators given available are sometimes experience a problem and not optimally functioning it, sometimes even damaged but not replaced, thus hampering the duties of nurses to providing a nursing services and actions. Tenth, the factor of ineffective communication, sometimes miscommunication occurs between nurses and the team of doctors or other medical teams that cause services and therapy adjustments to be delayed and hampered and even prone to errors in patient care. Eleventh, the factor of conflict of interest: ICU nurses, doctors, or other medical teams sometimes experience disputes and conflicts (conflicts) regarding the implementation of policies and mechanisms (systems and procedures) for patient care. Twelfth, the factor of inadequate conflict management in resolving problems between patients/families and nurses.

DISCUSSION

The nurses' role to optimizing a mechanical ventilation for acute respiratory failure in the Intensive Care Unit (ICU)

The findings of this research shown that ICU's nurses at Dr. Wahidin Sudirohusodo General Hospital have eight urgent, important and strategic roles that need to be implemented in stages, integrated and holistically to optimizing a mechanical ventilation for patients with acute respiratory failure in the ICU room. The eight roles are 1) Monitoring, 2) Evaluation of monitoring results and data, 3) Airway management, 4) Examination and assessment of patient conditions, 5) Nursing care and actions, 6) Communication and coordination, 7) Preparedness and collaboration, and 8) Prevention and management of complications. In other words, ICU's nurses have roles as Observers, Monitors, Evaluators, Airway Managers, Examiners and assessors of patient conditions (Researchers/ Investigators), Care Executors, Communicators, Coordinators, Collaborators and Complication Managers. This is in accordance with Article 29 paragraph 1 of Law Number 38 of 2014 that in carrying out Nursing Practice, Nurses have the following duties: a. nursing care providers, b. counselors and counselors for clients, c. nursing service managers, d. nursing researchers, e. task implementers based on delegation of authority, and f. task implementers in certain limited circumstances. Tasks can be carried out both individually or together (group). The implementation of nursing tasks must be responsibly and accountably done them. 24 Likewise, Article 30 of Law Number 38 of 2014 on the authority of nurses as providers of nursing care in the field of individual health efforts includes: a. conducting holistic nursing assessments; b. determining nursing diagnoses; c. planning nursing actions; d. implementing nursing actions; e. evaluating the results of nursing actions; f. making referrals; g. providing action in emergency situations according to competence; h. providing nursing consultations and collaborating with doctors; i. conducting health education and counseling; and j. administering medication to clients according to medical personnel prescriptions or over-the-counter drugs and limited over-the-counter drugs.24

The findings results are in accordance with those stated by Sagurawati about the main roles and duties of nurses, include: 1) Caregivers: to provide a directly care to patients, starting from routine examinations to performing medical procedures such as installing IVs and changing bandages; 2) Patient condition monitors: monitor vital signs and patient health conditions continuously; 3) Educators: provide education and counseling to patients and families regarding health conditions, self-care methods, medication use, and disease prevention; 4) Advocates: protect patient safety and ensure their needs are met; 5) Coordinators: communicate and coordinate with doctors, midwives, pharmacists, and other health workers to ensure effective care; 6) Emotional supporters: provide psychological and emotional support to patients and their families; 7) Researchers: participate in research to advance nursing science and practice. Nurses have a very important role in every Health Service System, especially in the scope of Health Service Facilities, nurses are the spearhead in providing health services to patients (clients). Similarly, Nopriyanti stated that the role of nurses is: nursing care providers, 2. making clinical decisions, client protectors and advocates, case managers, rehabilitators, comfort providers, communicators, counselors, collaborators, educators, consultants, and innovators. 25

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The findings of this study are consistent with research by Canderwall *et al.*, 26 and Suzanne *et al.*, 27 in France, that the primary role of nurses during weaning is to observe the initial discharge period based on the patient's condition or to recommend initiating a weaning program. The most frequently used weaning procedure is the abrupt weaning procedure for all types of non-invasive ventilation. The nurse's primary role is to observe the ability of weaning based on the patient's physical and psychological condition such as respiratory function, feelings of discomfort, the patient's ability and willingness to wean (extubation), and reactions to the treatment given. And according to research by Hirzallah et al., in Portugal, there are differences in the duration of mechanical ventilation use (days), duration of weaning, ICU LOS, and Hospital LOS in the group of nurses who initiated mechanical ventilation weaning. 28 The patient is the most influential factor in the success of mechanical ventilation weaning. 29

The findings of this study are in accordance with the research of Caderwal *et al*, that critical nurses have a key role in prioritizing weaning and initiating the progress of the care process, because optimal nursing care must be provided to patients to minimize complications. 26,30 Critical nurses who initiate weaning programs have been shown to reduce the duration of mechanical ventilation use, reduce the length of stay in the ICU, and reduce the length of hospital stay. 28, 30,31 Similarly, research by Meilando *et al*, that critical nurses have a very large role in the process of weaning mechanical ventilation starting from initiating the process of weaning mechanical ventilation by carrying out interdisciplinary collaboration especially with doctors, patient and family preparation (patient-centered care) to observing the period of removal from mechanical ventilation. The main role of nurses during weaning is to observe the initial removal period based on the patient's condition or recommend initiating a weaning program because the patient is the most influential factor in the success of weaning mechanical ventilation. 32

A study by Ghanbari *et al*, in Iran found that evaluating patient readiness for weaning based on a nurse-led weaning protocol resulted in shorter duration of MV compared to typical methods in ICU patients. In fact, ICU nurses are responsible for promoting care. Therefore, optimal nursing care should be provided to patients to minimize complications. 30 Similarly, a study by Yeung et al. in the UK found that the use of NIV in weaning from mechanical ventilation, compared with ongoing invasive ventilation, can reduce in-hospital mortality, the incidence of VAP, and length of ICU stay, especially in patients with COPD. Based on this, extubation to NIV may be a reasonable clinical strategy in patients who fail SBT, especially in patients with COPD. 33 Therefore, based on their research in Sweden, Cederwall *et al*, suggested the need for ICU nurses to implement person-centered care strategies for patients with long weaning periods, starting with minimizing daily sedation to establish communication and directly capturing what the patient feels and wants through voice or non-verbal language. The next step is to involve the patient and family in planning the weaning process, facilitating the patient's active participation in decision-making during the weaning process to optimize weaning outcomes. 26

The role of ICU's nurses in to optimizing a mechanical ventilation for patients with acute respiratory failure at ICU is in accordance with the role concept put forward by Horton & Hunt, namely "person's task or duty in undertaking" or someone who carries out their duties or obligations,34 or a set of behavioral standards that are expected to be possessed in relation to their status and position in society. 35,36 In this case, ICU nurses as the front line in nursing care services in the ICU are expected to have and carry out their roles as observers, monitors, evaluators, airway managers, examiners and assessors of patient conditions (researchers), care executors, communicators, coordinators, collaborators and complication managers. The role of ICU nurses as put forward by Soekanto37 and Johnson & Johnson38 includes the dynamic aspects of their position or status as health workers who fulfill their rights and obligations in optimizing mechanical ventilation in patients with acute respiratory failure in the ICU.

The existence of nurses at ICU has a different role from nurses in general in other service units in the Hospital. This is in accordance with what was stated by Gibson & Donelly that a role is someone who must relate to different systems, usually organizations.39 Similarly, Wolfman's opinion that a role is a part played by nurses in every situation and a way of behaving to align themselves with the situation faced.40 The role of ICU nurses as stated by Ahmadi represents a complex of expectations regarding how they should behave and act in certain situations facing critical patients (acute respiratory failure) based on their status and function as implementers of nursing care.41 According to Widodo, the complex expectations of the role of nurses are to carry out actions both individually and in groups in carrying out their main and principal tasks,42,43 including the role of nurses carrying out their main tasks in the Hospital ICU Room where the tasks carried out are expected to have an influence on the existence of the Hospital ICU Room. This is in line with the opinion of Lantaeda *et al*, regarding the expected influence of a role,44 including the role of ICU nurses to apply their rights and obligations base on their status or position as observers, monitors, evaluators, airway managers, examiners and assessors of patient conditions (researchers), care executors, communicators, coordinators, collaborators and complication managers.

Ralph Linton stated that there is no role without position, or conversely, there is no position without role. Role determines what is done for society and what can be expected from society.45,46 This means that the

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involvement of nurses in carrying out their roles as observers, monitors, evaluators, airway managers, examiners and assessors of patient conditions (researchers), care executors, communicators, coordinators, collaborators and complication managers greatly determines their success or failure in optimizing mechanical ventilation in patients with acute respiratory failure in the Hospital ICU and in meeting the expectations of patients, families, medical/medical teams, hospital management and the nurses themselves. Therefore, according to Soekanto & Sulistyowati, the role inherent in ICU nurses must be distinguished from the position and function of general nurses, so they must be able to adapt to their specific position and function as ICU nurses.47 In this regard, according to Soekanto, special norms are needed to regulate roles,37 including the role of ICU nurses. And these norms have been established by the management of Dr. Wahidin Hospital.

The role of nurses to optimizing a mechanical ventilation for patients with acute respiratory failure in the ICU Room of Dr. Wahidin Sudirohusodo General Hospital as stated by Scott can be seen from five important aspects 48, namely: First, impersonal nature, in this case the expectations of the role of nurses are determined by the position of the ICU nurse role itself; Second, related to work behavior (task behavior), in this case the desired behavior of ICU nurses in carrying out work tasks ranging from monitoring, evaluation of monitoring results and data, airway management, examination and assessment of patient conditions, nursing care and actions, communication and coordination, preparedness and collaboration, to preventive measures and management of complications in order to optimize mechanical ventilation in patients with acute respiratory failure in the ICU's room. Third, role clarity and role ambiguity, in this case ICU's nurses are faced with clear roles and ambiguous or confusing roles. Fourth, a role that are capable to producing several major behavioral changes if learned quickly, in this case through their roles, nurses can learn to optimize mechanical ventilation to solve a acute respiratory failure of critical patients in the ICU. Fifth, role variation, in this case nurses can carry out more than one role or even a number of roles such as the role of observer, monitor, evaluator, airway manager, examiner and assessor of patient conditions (researcher), care executor, communicator, coordinator, collaborator and role as complication manager.

The role of the nurse at ICU, as stated by Scott, consists of three components48, include: First, Role Conception, in this case nurses have a trust or belief over what to do them for patients with acute respiratory failure in certain situations. Second, Role Expectations, in this case the patient and family have an expectation toward nurse to realize an appropriate actions. Third, Role Implementation, where the actual behavior of the nurse on their position as observer, monitor, evaluator, airway manager, examiner and assessor of patient conditions (researcher), care executor, communicator, coordinator, collaborator and complication manager. If these three role components are in harmony, the interaction between the nurse and the patient will be harmonious and continuous and will avoid conflict. The role of nurses to optimizing a mechanical ventilation for patients with acute respiratory failure in the ICU' room of hospital, as stated by Santosa *et al*., includes five dimensions,49 include: First, Role as a policy, in this case the role of ICU nurses becomes an appropriate and good policy to be implemented. Second, Role as a strategy, in this case the role nurses as a strategy to gain a support from colleagues, the medical team, patients, and the patient's family. Third, Role as a communication tool, in this case the role of nurses can be utilized as an instrument or tool to obtain an input to perform any information in a responsive and responsible decision-making process. Fourth, Role as a dispute resolution tool, in this case the role of nurses is utilized as a way to reduce or mitigate conflict through efforts to achieve consensus from existing opinions such as colleagues, the medical team, patients, and the patient's family. Fifth, Role as therapy, in this case the nurse's role is carried out as an effort to overcome the patient's psychological problems. The findings in accordance with those proposed by Hendropuspio 50 and Narwoko 51 who classify two types of roles, namely: expected roles and actual roles. The first role (the expected role) is seen as the ideal way to carry out the role of ICU's nurses according to the assessment of the community, especially patients and their families. While the second role (the role carried out/adapted) to determines any method or way chosen by nurses to apply their role in optimizing mechanical ventilation for patients with acute respiratory failure in the ICU of hospital. Type of this role provides an opportunity, freedom or flexibility for nurses to adjust their nursing actions to the specific situations and conditions faced by critical patients.

This findings are in accordance with what was stated by Soekanto that the role occurs when there is an opportunity and action given.52 In this context, ICU's nurses can be said to carry out and not actualize their roles if there are or not real actions applied them in the activities of monitoring tasks, evaluation of monitoring results and data analysis, airway management, examination and assessment of patient conditions, nursing care and actions, communication and coordination, preparedness and collaboration, as well as prevention and management of complications. Based on this, Soekanto further classifies three types of roles, include: active roles, participatory roles, and passive roles. Nurse is said to play an active role if they are able to implemented the tasks that instructed by the ICU's doctor in charge or the Head of the Hospital Nursing Section in accordance with her position, title, authority, and function. Nurse is said to play a participatory role if they are involved to helping and give a contribution to the optimization of mechanical ventilation management for patients with acute respiratory failure.

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Nurse is said to play a passive role if they do not intentionally involve herself in certain nursing care activities because they want to give other nurses or other medical team members the opportunity to participate and avoids a conflict of interest.

The Supporting and Inhibiting Factors for the Role of ICU's Nurses to Optimizing a Mechanical Ventilation for Acute Respiratory Failure in the Intensive Care Unit (ICU)

The findings of this research results shown: First, the supporting factors for the role of ICU's nurses include: (1) The competence factor of human resources (HR) nurses, (2) The increasing number of patients with acute respiratory failure requiring treatment, (3) The supporting factors of policies and mechanisms as guidelines, (4) Support from hospital management, (5) The infrastructure factor as well as facilities and equipment, (6) The communication relationship factor and the line of coordination and collaboration, and (7) The patient's family support factor. While the inhibiting factors include: (1) Patient factors, (2) The negligence factor of nurses in monitoring and managing ventilators, (3) The negligence factor in evaluating and analyzing data, (4) The negligence factor of nurses in managing patient breathing, (5) The quality factor of nurse HR, (6) The quantity factor of nurse HR, (7) The high workload factor of nurses, (8) The limited time management factor in assessments, (9) The limited infrastructure factor as well as facilities and equipment. (10) The ineffective communication factor, (11) The conflict-of-interest factor, and (12) The inadequate management factor of role conflict.

This findings are in accordance with the research of Cecep *et al*, who found that the experience of ICU's nurses to processing the ventilator weaning is good, that includes nurses' knowledge, skills, motivation, and inhibiting factors in the length of the ventilator weaning process, losses from failure in the ventilator weaning process, nurses' psychology in the ventilator weaning process.53 Likewise, Subhani's research on nursing enforcement problems that arise in patients managed with respiratory failure and installed a mechanical ventilation SIMV mode, namely the problem of ventilator weaning disorders, risk fodisuse syndrome and spiritual distress, so that the ventilator weaning actions given affect the weaning and extubation processes in patients. Therefore, the role of nurses in the ICU is increasingly important in mechanical ventilator weaning as a process of removing ventilator assistance that is carried out gradually or directly.54 Therefore, Kusnanto and Burhanudin's research emphasizes it's importance of health workers, especially in the ICU, carrying out routine respiratory care including maintaining oral hygiene with antiseptics, to conducting a regular training for ICU's staff on the importance of VAP prevention and early detection of infection, and to conducting regular monitoring on mechanical ventilator users and to evaluating the effectiveness of protocols for continuous improvement.55 In addition, Oktaria *et al*, assesses the need for strict monitoring by nurses of patients experiencing electrolyte disorders and imbalances and their factors.56

The findings are in accordance with the role theory proposed by Merton that individuals will experience role conflict when there are two or more pressures that occur simultaneously directed at a person, so that if the individual complies with one of them, it will be difficult or impossible to comply with the other. In this case, high workloads often cause nurses to experience role conflict.57 The limited number of ICU nurses and disproportionate to the number of patients, often causes a nurse to have to carry out several work tasks and creates a heavy workload for nurses. In addition, nurses are also sometimes faced with professional roles in the hospital and roles in the family environment. As a result, nurses are vulnerable to experiencing internal conflict, lack of focus in carrying out their work tasks, and can even experience fatigue and stress.

To closer look it, the finding shown amount the role phenomena and factors that support and hinder the role of ICU nurses in optimizing mechanical ventilation for patients with acute respiratory failure in the ICU. This can be examined through several role components.57,46 First, Acted Role, which is the actual way ICU nurses perform a role. Second, Prescribed Role, which is the way patients and their families expect ICU nurses to perform each specific role. Third, Role Conflict, which is a condition experienced by ICU nurses who occupy one or more statuses that demand conflicting expectations and role goals. Fourth, Role Distance, which is the ICU nurse's emotional role execution, which leads to role imbalance. Fifth, Role Failure, which is the failure of a nurse to perform a specific role in managing mechanical ventilation for patients with acute respiratory failure. Sixth, Role Model, namely an ICU nurse whose behavior can be emulated, imitated, or followed. Seventh, Role Set (series or scope of roles), namely the relationship of communication, coordination, cooperation, collaboration between an ICU nurse with other nurses or with doctors, medical team members, patients, and the patient's family when carrying out their role. Eighth, Role Strain, namely a condition that arises when an ICU nurse experiences difficulty in fulfilling the expectations or goals of the role being carried out due to inconsistencies that conflict with each other.

The role of ICU's nurses to optimizing a mechanical ventilation for patients with acute respiratory failure in the ICU's room of hospital can be too examined into two assumptions of the critical approach to role theory (Adisa et al., namely the structural and interactional approaches.58 First, if based on the structural approach, so the role of nurses can mean a set of internal and external expectations that can guide into their own assessments

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and the assessments of the ICU's Doctor in charge and the Head of the Hospital Nursing Section as well as the assessment of patients and patients' families regarding the suitability and inconsistency of the roles carried out with expectations. Second, the interactional approach, it's means the role of ICU's nurses as a comprehensive pattern of behavior and attitudes related to a particular identity or entity carried out by individuals nurse in different.

The overall description shows the findings of research on the role of ICU's nurses to optimizing the mechanical ventilation for patients with acute respiratory failure in the ICU's room of Dr. Wahidin Sudirohusodo General Hospital along with the supporting and inhibiting factors, all of which provide an overview of the importance of improving the professionalism of ICU's nurses to carrying out their various strategic roles. It's problem until now, studies on this matter are still very relative lacking and limited. Therefore, with the results of this study, it is hoped that they can serve as a reference to encouraging further studies. And methods and strategies to maximize the role of ICU nurses in optimizing mechanical ventilation in patients with acute respiratory failure in the ICU's room are more important. The recommendations of this study results provide theoretical and practical contributions. First, the theoretical contribution, especially strengthening the theories of the role of nurses in optimizing mechanical ventilation in patients with acute respiratory failure in the ICU's room. Second, the practical ones, especially encouraging ICU nurses as observers, monitors, evaluators, airway managers, examiners and assessors of patient conditions (researchers), care executors, communicators, coordinators, collaborators and complication managers.

CONCLUSION AND RECOMMEDATION

There are eight urgent, important, and strategic roles must be played in a gradual, integrated, and holistic manner by nurses to optimizing the mechanical ventilation for patients with acute respiratory failure in the ICU of Dr. Wahidin Sudirohusodo General Hospital. These eight roles are: monitoring, evaluation of monitoring results and data, airway management, examination and assessment of patient conditions, the nursing care and actions, communication and coordination, preparedness and collaboration, and prevention and management of complications. In other words, nurses at ICU have the roles as observer, monitor, evaluator, airway manager, researcher, care executor, communicator, coordinator, collaborator, and complication manager. The supporting factors for the role of nurses at ICU include: (1) Competence of human resources (HR) nurses, (2) Increasing number of patients with acute respiratory failure requiring care, (3) Support for policies and mechanisms as guidelines, (4) Support from hospital management, (5) Facilities and infrastructure, facilities and equipment, (6) Communication relationships and lines of coordination and collaboration, and (7) Support patient families. Meanwhile, the inhibiting factors include: (1) Patient factors, (2) Nurses is negligence to monitoring and manage ventilators, (3) Negligence to evaluating and analyze any data, (4) Negligence factors for nurses in managing patient breathing, (5) Quality factors for nurse HR, (6) Quantity factors for nurse HR, (7) High workload factors for nurses, (8) Limited time management factors in assessments, (9) Limited infrastructure factors, facilities and equipment. (10) Ineffective communication factors, (11) Conflict of interest factors, and (12) Inadequate role conflict management factors.

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