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Nursing Care of the Intubated Patient - A Review of the Literature

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Abstract

BACKGROUND: Nursing care of the mechanically ventilated patient is specific, individualised care and requires a great deal of knowledge and expertise on the part of the nurse, who must use professional judgement to make nursing diagnoses that describe actual and potential health complications and conditions related to the patient's health.

AIM: The purpose of this thesis is to study endotracheal intubation and mechanical ventilation and the most common complications that arise during their performance. The aim is to present the role of the nurse in assisting the performance of endotracheal intubation and the nursing care of the intubated patient.

METHODS: The literature review was conducted in the international databases Cochraine Library, Pub Med, Cinahl, Google Scholar and Cobbis. The inclusion criteria for the search were original and peer-reviewed scientific articles published between 2020 and 2024 and available in full text. 10 articles were included in the analysis. The literature review process is presented using the PRISMA diagram, where we used 3 databases

RESULTS: Ten studies were included in the analysis and are detailed in the table below. Based on the thematic analysis, we identified four content categories: ventilator-associated pneumonia, pressure injury, individual patient plan and staff education.

CONCLUSION: The care of the mechanically ventilated patient must be individualised and thus tailored to each individual, and healthcare staff must have a great deal of knowledge and experience in order to provide quality care. Compared to abroad, we need to focus more on educating staff on the new guidelines and on the care of the mechanically ventilated patient.

Introduction

Invasive mechanical ventilation (MV) is an intervention often used in acutely ill patients who need ventilatory support or airway protection. The ventilator allows gas exchange to be maintained while other treatments are given to improve clinical status (2).

Mechanical ventilation (MV) is one of the most common interventions performed in intensive care units (ICUs) worldwide, with a forecast to increase over the next decade, and is one of the main reasons why patients need treatment in ICUs. Invasive mechanical ventilation is the mechanical insufflation of air through an interface. The interface can be an endotracheal tube or a tracheostomy cannula. It is indicated in acute respiratory failure, heart failure, sepsis and in cases where patients are unable to protect their airways, such as drug overdose, slow reversal of anaesthetic agents and neuromuscular disorders (10).

1.1 Mechanical ventilation

MV is divided into invasive ventilation, where an artificial airway is established (tube, cannula), and non-invasive mechanical ventilation without an artificial airway (mask, helmet). The primary goal of both is to allow satisfactory respiratory function (Metersky and Kalil, 2018) (22).

The need for invasive mechanical ventilation is one of the most common reasons for admission to an intensive care unit (22).

To understand invasive mechanical ventilation, it is essential to understand some basic terms that the ICU nurse also needs to know.

Ventilation: in other words, the process of moving air in and out of the lungs. Its most important effect is to remove carbon dioxide (CO_2) from the body and increase the oxygen content of the blood. Ventilation in the clinical setting is measured as minute ventilation and is calculated as respiratory rate times tidal volume (Vt). In a mechanically ventilated patient,

the CO2 content of the blood can be varied by changing tidal volume or respiratory rate.

Oxygenation: means providing the lungs with a greater supply of oxygen and thus increasing the oxygen content of the bloodstream. In a mechanically ventilated patient, this can be achieved by increasing the fraction of inspired oxygen (FiO2) or the positive end-expiratory pressure (PEEP).

PEEP: The positive pressure remaining in the airways at the end of the respiratory cycle (end expiratory pressure) is greater than atmospheric pressure in mechanically ventilated patients.

Tidal volume: the amount of air that moves in and out of the lungs during each respiratory cycle.

FiO2: The percentage of oxygen in the air mixture delivered to the patient via the ventilator.

Flow: The rate in litres per minute at which the fan takes in breaths.

Mechanical ventilation is a life-saving treatment that reduces the patient's work of breathing and eliminates acute respiratory acidosis and hypoxaemia. The doctor orders MV and is responsible for the mechanical ventilation settings (Jansson et al., 2018) (14).

1.2 Indications for mechanical ventilation

The most common indication for intubation and mechanical ventilation is acute respiratory failure, either hypoxic or hypercapnic. Other important indications include a reduced level of consciousness with inability to protect the airway, respiratory distress in which non-invasive positive pressure ventilation has failed, extensive haemoptysis, severe angioedema or any case of airway compromise such as airway burns, cardiac arrest and shock. Common elective indications for mechanical ventilation include surgical procedures and neuromuscular disorders (Carpio and Mora, 2023) (3).

1.3 Contraindications

There are no direct contraindications to MV as it is a life-saving measure in a critically ill patient, so all patients should be offered the option to use it if necessary. The only absolute contraindication to MV is if it conflicts with the patient's wish for artificial life support. A relative contraindication is if non-invasive ventilation is available and its use is expected to eliminate the need for mechanical ventilation. This should be started first as it has fewer complications than invasive MV (Carpio and Mora, 2023) (3).

1.4 Methods of artificial ventilation

Certain steps should be taken to start MV. The correct placement of the endotracheal tube should be checked. Adequate cardiovascular support with fluids or vasopressors, indicated on a patient-by-patient basis, should be provided. Appropriate sedation and analgesia should be provided. Endotracheal tube/in or tracheal cannula is painful and uncomfortable, and if the patient is restless or resistant to the tube (foreign body) or ventilation, control of the various parameters of ventilation and oxygenation will be much more difficult (Carpio and Mora, 2023) (3).

The modes of mechanical ventilation and the type of inspiration tell us who is doing the work of breathing (or simply who is breathing) - the ventilator, the patient or both. The mode can be:

- Controlled (ventilator does all the work, breaths are mandated). In this case, the patient is completely dependent on the mechanical ventilator (Kodila, 2008) (17).
- assisted (the patient simply initiates inspiration, the ventilator does the rest);
- spontaneous (the patient initiates, performs and completes the breath);
- mixed (alternating controlled, assisted and spontaneous breaths) (Kurnik and Knafelj, 2018) (19).

CPAP ("Continuous positive airway pressure") is a type of positive airway pressure used to provide a set airway pressure that is maintained throughout the breathing cycle, both during inspiration and expiration. The use of CPAP maintains PEEP, can reduce atelectasis, increase alveolar surface area and thereby improve oxygenation (26). The nurse should be familiar with standard modes of artificial ventilation when providing nursing care to a patient on artificial ventilation.

This article is about the presentation of the care of the ventilated patient, but the topic is quite broad, so the most essential activities that nurses working in the EICU need to pay attention to will be mentioned.

1.5 The endotracheal tube and the role of the nurse

The insertion of an endotracheal tube is a short procedure that requires thorough and systematic preparation, both mental preparation of the healthcare staff and the patient, and preparation of the equipment (29). The equipment needed for endotracheal intubation includes a hand-held breathing balloon with a face mask for preoxygenation; a tube of the

appropriate size and half a digit larger and smaller; a guide for the tube; a laryngoscope with a spoon of the appropriate size and spoons of other sizes; a Magill forceps; lidocaine in gel or spray; adhesive tape; oropharyngeal tube of appropriate size or tube fixator; 10 to 20 ml syringe for filling the laryngeal sac; stethoscope; aspirator and ventilator and capnography attachment; medications as ordered by the doctor; monitor to monitor vital signs and iv canal if not already in place (29).

1.5.1 The role of the nurse in the intubation procedure:

The nurse plays a key role in the intubation process. The procedure we perform is as follows:

- First, we prepare the patient, the monitoring equipment, the necessary medications ordered by the doctor for the anaesthetic induction, and the intubation equipment, which we also check perfectly (laryngoscope light working, laryngeal tube seal);
- remove the denture and aspirate the secretions;
- for preoxygenation, the patient is fitted with an OHIO mask with a flow rate of 15 l/min;
- followed by the administration of medicines as ordered by your doctor;
- while the doctor always laryngoscopes with his left hand, the nurse places the tube with the inserted guide in his right hand;
- After the endotracheal tube has been successfully inserted, the nurse pulls out the guide and fills the sealing bag, and the doctor checks the position of the tube;
- once the endotracheal tube is in the correct position, fix it properly and document its depth and tube size;
- the patient is put on a ventilator and vital signs are monitored (Kupnik, 2008; Prosen and Zadel, 2013) (30).

1.6 Nursing care of a patient on mechanical ventilation

Virginia Henderson's theory is based on basic human needs, which are defined by 14 activities. The ventilator-dependent patient needs help with breathing, eating, sleeping and resting, moving and positioning, elimination, dressing and personal hygiene, maintaining body temperature and other activities. When we see a patient who needs MV, it is important to treat them holistically and make an individualised care plan. Observation and ongoing evaluation of the success of nursing interventions is very important, as changes in the patient's condition can be rapid. If a change occurs, the care plan should be modified accordingly to achieve the goals set or to improve the patient's condition as soon as possible. If the patient's goals have not been achieved, we need to analyse our work and identify the reasons why the care has not been successful (3).

The final assignment is about the presentation of the nursing care of the ventilated patient, but the topic is quite broad, so the most essential activities of life that nurses working in the EICU need to pay attention to will be mentioned.

All patients on mechanical ventilation are monitored in the EIT. Mechanically ventilated patients are also connected to a monitor that monitors heart rate, respiratory rate, blood pressure and blood oxygen saturation. Other diagnostic tests such as chest X-rays and blood draws for gas analysis are also performed. How long a patient is on mechanical ventilation depends on a number of factors such as general strength, the condition of the lungs before being put on a ventilator and the involvement of other organs (34).

Nurses perform most of the procedures associated with mechanical ventilation and therefore need to have adequate knowledge of its performance. They are also expected to have skills including assisting with endotracheal intubation, non-invasive ventilation, discontinuation of sedation, prevention of aspiration, performance of aspiration through subglottic devices and endotracheal tube, and control of endotracheal tube lobe distention and correct patient positioning, up to extubation (16).

We have divided them into complications resulting from inadequate care, which can be eliminated with a good care plan and monitoring of the activities carried out. It is extremely important to follow infection prevention measures for patients on mechanical ventilation (21).

Oral hygiene is a very important part of the overall care of critically ill patients, as good oral hygiene can prevent or reduce the risk of developing VAP, thereby improving the outcome of treatment and reducing complication rates. Oral hygiene care includes mouth rinsing, antiseptic gel for gums and teeth, a soft foam sponge or toothbrush to clean the mouth and teeth, and devices such as an aspiration tube to remove excess fluid, toothpaste or other dirt (35).

For intubated patients in the EICU, a closed system is used for aspiration, which allows the procedure to be performed more quickly as the aspiration catheter is already placed on the tube. Aspiration can be performed with or without clean gloves. Also, mechanical ventilation and oxygenation are not interrupted, and the risk of infection with the patient's secretions is reduced (12).

Ivanuša and Železnik (2008) (12) list the specific features of closed aspiration and the appropriate measures:

- in the case of a patient who coughs during the insertion of the aspiration catheter, aspirate the coughed secretions first and continue aspiration once the patient is calm and rested;
- if no secretion can be obtained through the closed system, a standard catheter can be used;
- Place the aspiration system between the tube and the mechanical ventilation machine;
- During aspiration, the patient is supplied with 100% O2 and the tracheal pressure is set at 120 to 150mm Hg.

Infection prevention is the daily work of nurses, VAP or otherwise. Their job is to create and ensure a safe environment and take responsibility for patient care (25). From the moment of patient admission until discharge, their task is to systematically follow the nursing process, which includes assessment, planning, implementation and evaluation. Their role is to identify patients at high risk of infection and to inform the physician about the patient's responses to treatment, improvement or deterioration (Osti et al., 2017) (25).

Hospital pressure injuries, including those associated with respiratory devices, are a significant source of morbidity in critically ill patients (23). These injuries range from decubital pressure injuries to those resulting from lying in the correct position and personal protective equipment (28). Pressure injuries are mainly due to the pressure of body weight on bony prominences. Device-related pressure ulcers (DRPUs) can be caused by a foreign body coming into contact with the skin, the pressure of which deforms the skin and soft tissues (9). It also states that although the most common sites for DRPU are the face, ears, lower legs and heels, any site where the device comes in close contact with the skin can be at risk.

Devices and equipment that cause pressure damage include:

- respiratory equipment (oxygen masks, CPAP and BIPAP masks, endotracheal tube holder, nasal catheters);
- faecal and urinary aids (stoma liners, urinary catheters, bedpans);
- arterial and venous catheters and associated lines, dialysis catheters, thoracic drains;
- support and immobilisation devices (neck braces, external fixators, other immobilisation braces and casts);
- feeding devices (nasogastric probe, percutaneous endoscopic gastrostomy);
- patient transfer aids (transfer boards, belts, wheelchairs);
- patient monitoring devices (pulse oximeter, blood pressure cuffs, ECG and EEG electrodes, intracranial pressure tubes and cannulas, temperature and movement sensors, etc.);
- various devices and objects (e.g. identification bracelets, patient fixation belts, medical staff equipment) that accidentally end up in the patient's bed (9).

Nurses are the backbone of every EIT and are in constant direct contact with patients, more than other staff. They therefore play a key role in the care of the intubated patient and are responsible for implementing most interventions to prevent VAP. It is the latter that influence the care of critically ill patients and health outcomes (13).

VAP is the most common infection, occurring in intubated patients within 48 hours or longer, with no previous signs of (25) VAP results in delayed extubation, prolonged hospital stay, increased mortality and morbidity, increased use of healthcare resources and higher hospital care costs (Ricard et al., 2012). Given these consequences, the prevention of VAP has become a priority objective of health care delivery in the EIT, and the prevalence rate of VAP an indicator of safety and quality of care in the EIT (25).

It is an infection that is associated with an increase in EIT days, morbidity and mortality. Most prevention measures and strategies are part of routine nursing care. The nurse has various key roles such as providing direct nursing care, leadership, education, coordination and evaluation of interventions to prevent VAP. Lack of knowledge about infection prevention and appropriate nursing care among nurses becomes a barrier to adherence to evidence-based guidelines for VAP prevention (25).

The restrictions related to compliance with the VAP guidelines are as follows (Al-Sayaghi, 2021) (1):

- hand washing/disinfecting before and after each patient approach;
- wearing protective gloves whenever approaching a patient;
- use of a closed aspiration system;
- use of sterile gloves for open aspiration;
- regular oral care at least once a shift using chlorhexidine solution;
- use and proper replacement of heat and moisture exchangers;
- replacing the fan hose only when it is visibly dirty or not working properly;
- checking the position of the endotracheal tube at least once per shift and maintaining the pressure in the endotracheal tube;
- aspiration of secretions through the lumen in subglottic devices and the tube;

- Ensuring that regular respiratory physiotherapy is planned;
- daily discontinuation of sedation and assessment of readiness for extubation, with spontaneous breathing attempts;
- keeping the patient in a semi-sitting position;
- use of kinetic beds.

2 PURPOSE AND RESEARCH QUESTION

The aim of this thesis is to review endotracheal intubation and mechanical ventilation, and the most common complications that arise during their performance. The aim is to present the role of the nurse in assisting the performance of endotracheal intubation and the nursing care of the intubated patient.

The objectives of the final thesis are:

- to introduce endotracheal intubation and mechanical ventilation,
- to present the role of the nurse in assisting the performance of endotracheal intubation.

The research question we have tried to answer in this thesis is: "What is the role of the nurse in the intubated patient?".

3 WORKING METHODS AND MATERIALS

3.1 Literature review methods

The thesis is based on a systematic literature review. We reviewed scientific and professional articles on the topic of mechanical ventilation and the role of the nurse.

Table 1: Search strategy for Cochrane Library, Pub Med and Cinahl, dated 20.4.2024

Strategy	Databases		
	Cochrane Library	Pub Med	Cinahl
#1	Endotracheal intubation (n = 10.042)	Endotracheal intubation (n = 238)	Endotracheal intubation (n = 2.275)
#2	Respiratory care (n = 35.939)	Respiratory care (n = 3.540)	Respiratory care (n = 12.956)
#3	Intubated patient (n = 2015)	Intubated patient (n = 454)	Intubated patient (n = 1.130)
#4	nursing (n = 51.838)	Nursing (n = 4.364)	Nursing (n =100.180
#5	Nursing care (n = 28.931)	Nursing care (n = 4359)	Nursing care (n = 51.705)
#6	Mechanical ventilation (n = 15.231)	Mechanical ventilation (n = 983)	Mechanical ventilation (n = 7.912)
#7	#1 AND #2 AND #3 (n= 196)	#1 AND #2 AND #3 (n = 81)	#1 AND #2 AND #3 (n = 196)
#8	#7 AND #5 (n = 45)	#7 AND #5 (n = 4)	#7 AND #5 (n = 3)
#9	#3 AND #6 (n = 627)	#3 AND #6 (n = 133)	#3 AND #6 (n = 297)
#10	#9 AND #4 (n = 87)	#9 AND #4 (n = 6)	#9 AND #4 (n = 19)
#11	#10 AND #2 (n = 66)	#10 AND #2 (n =5)	#10 AND #2 (n = 8)

The literature search was conducted in April 2024 in the Cochraine Library, Pub Med, Cinahl, Google Scholar and COBISS databases, using the keywords: 'endotracheal intubation', 'airway care', 'respiratory tract care', 'nurse'."Based on the keywords and using Boolean AND, OR and NOT operators, we logically combined the search strings in the different databases. We also used the MeSh tool. The search strategies for the Cochrane Library, Pub Med and Cinahl are shown in Table 1.

To narrow down the hits, we also set inclusion and exclusion criteria, which are shown in Table 2.

Table 1: Inclusion and exclusion criteria in the search for relevant literature

Criterion	Inclusion criteria	Exclusion criteria
Keywords	Endotracheal intubation, airway care, nurse, nursing, intubated patient, mechanical ventilation	Other
Place of hearing	Health environment	Home environment
Age	Adults 18+	Under 18 years
Publication type	Scientific and professional articles; conference papers; bachelor's, master's and doctoral theses	Textbooks and arbitrary articles
Time period	2020 - April 2024	2019 and older
Language	English, Slovenian	Other languages
Access	Full texts	Only a summary is available

3.2 Results of the screening

Figure 1 shows the PRISMA diagram showing the identification of sources according to the selected databases, as of 20.4.2024. The diagram shows the overview and the inclusion of sources according to the inclusion and exclusion criteria.

In total, 18,104 hits were identified in the databases, and 9 hits were identified using other methods. The number of hits selected for full-text review and possible inclusion in the results was 42. In the final literature review, we included 10 studies related to the topic.

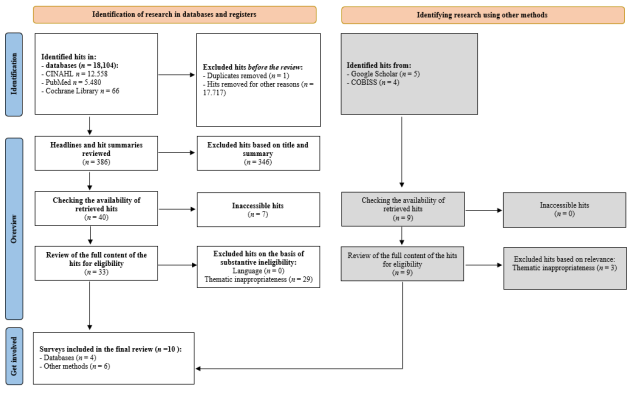

Figure 1: PRISMA diagram

4 RESULTS

Table 2: Example of a source review analysis table

Authors, year	Methodology	The purpose of	Sample	Findings/Results
Santos et al, (2020)	Descriptive / descriptive qualitative research First a literature review, then group discussions	Identify care that has been designed as good nursing practice for patients on invasive mechanical ventilation in the context of hospital emergency care.	16 nurses from the emergency department of a hospital in the south of Brazil took part.	Nurses cited 13 measures related to endotracheal tube, ventilator, bronchial aspiration prevention, infection control, and sedation, analgesia/sleep and alertness/pain management as good practice for patients on invasive mechanical ventilation.
Pinto et al, (2020)	A systematic literature review Qualitative and quantitative evidence included Metasynthesis process carried out.	A systematic review was carried out to explore gaps in existing nurse practices on potential complications in order to propose comprehensive guidelines for safe practice.	The metasynthesis included 30 studies, 6 of which provided relevant information for quantitative analysis.	Analysis of the studies showed that only 36% of nurses assessed patients before aspiration and had knowledge of the size of the aspiration catheter, and only 46% were aware of the appropriate aspiration pressure to use for endotracheal aspiration. Adherence to hand washing before aspiration was found in only 62% of nurses. It was found that despite awareness of potential complications, recommended practice guidelines were not followed.
Horseradish (2023)	A systematic literature review Descriptive / descriptive method A thematic analysis has been carried out	To investigate interventions to prevent wounds and ulcers in the oral cavity of the intubated patient.	9 sources were included in the survey	The results showed that the knowledge of care providers should be upgraded and that an individual plan should be developed for each patient.
Cederwall et al., (2023)	National cross-sectional survey Questionnaire	To find out the care practices and protocols used in Swedish ICUs for patients requiring mechanical ventilation for more than 7 days.	Swedish adult intensive care units were involved (n = 77). The respondents included 40 nurse managers, 36 ICU nurses and 1 unregistered nurse. The questionnaire consisted of 46 questions in seven domains: ventilator weaning, mobilisation, communication, nutrition, symptom assessment, psychosocial support and organisational characteristics.	The findings were that an individualised approach to ventilator weaning prevailed, decided by doctors and nurses in collaboration, although weaning protocols were available in some ICUs. Most units favoured early mobilisation, although only a few units used protocols. Nutritional protocols were widely accepted, with only a few units having a dedicated dietician.
Ogrin (2023)	Descriptive quantitative research Survey conducted	To establish the opinion of healthcare providers on knowledge and experience in the prevention of mechanical ventilation-associated pneumonia, and the importance of implementing nursing activities and measures to prevent pneumonia in patients on mechanical ventilation in the EIT.	103 EIT nursing staff participated.	The opinions of healthcare providers differed with regard to the length of service in the EIT. There was a difference in the statement "Airway aspiration via a tube - open system" according to the working time of the care providers, those with shorter working time rated the latter activity with higher importance ($p=0.013$) than those care providers with longer working time. Some of the indicators, such as "Tongue heavily coated" ($p=0.002$), "Tracheal constriction" ($p=0.028$) and "Blocked endotracheal tube/cannula" ($p<0.001$) was again more frequently rated as a significant complication by nursing staff with shorter working hours compared to those with longer working hours.
Cooper et al., (2021)	Descriptive survey, cross-sectional survey	The aim is to explore nurses' practice in the mobility of patients with oral intubation and mechanical ventilation and to identify patient-, nurse- and care environment-related barriers specific to this population.	The study involved 105 patients and 48 ICU nurses.	Patients were ready to start moving on average 34.8 hours after endotracheal intubation. Two-thirds of nurses reported that they never or rarely got these patients out of bed. Common patient-related barriers were non-cooperation (21.9%) and active medical problems (15%), even in patients who met the criteria for mobility. Nurse-related barriers were concerns about patient safety, especially falls (14.3% of patients) and injuries (9.5%). The care environment presented very few barriers, with nurses rarely mentioning that mobility was hindered by lack of assistance (13.3% of patients) or lack of physician ordering (5.7%).
Moser et al., (2022)	A systematic review and meta-analysis.	The aim is to determine the incidence of endotracheal tube-related pressure injuries in critically ill patients and to evaluate the effectiveness of interventions designed to prevent injuries.	Twelve studies were included (5 randomised clinical trials, 3 quasi-experimental and 4 observational). A total of 9611 adults and 152 children participated in these studies.	The incidence of pressure injury was 4.2% for endotracheal tubes. The meta-analysis showed that endotracheal tube stabilisation was the most effective intervention in preventing pressure injury.
Lopes Mota et al, (2023)	Descriptive qualitative research. Semi-structured interviews and thematic analysis of the results.	To describe the perceptions of healthcare technicians regarding the effectiveness of mechanical ventilation-associated pneumonia preventive measures in intensive care units.	40 medical technicians from the Adult Intensive Care Unit in Porto Alegre.	Four categories were identified: the role of the healthcare technician in preventing ventilator-associated pneumonia; measures to prevent pneumonia; disadvantages of implementing measures to prevent pneumonia; and further education on pneumonia. Participants are familiar with preventive measures, recognise their importance and implement them directly and indirectly.

Firer (2023)	A systematic literature review Empirical quantitative research	The aim is to determine the nutritional status of mechanically ventilated patients in the intensive care unit and to find the causes of interrupted feeding.	50 patients were enrolled in the study between July and December 2022.	In the ICU, more than half of the patients received between 95 and 100% of the prescribed food, slightly fewer received between 85 and 95%, and some patients received less than 85% of the prescribed food. Imaging tests were the most common cause of reduced dietary intake.
Jurkovič (2023)	Descriptive quantitative research	The aim is to determine the level of awareness of registered nurses in the management of patients with pneumonia due to mechanical ventilation in the surgical and internal intensive care units of Murska Sobota General Hospital.	24 registered nurses or health professionals from both the surgical and the internal medicine intensive care units of Murska Sobota General Hospital were involved.	Graduate nurses/healthcare professionals in the surgical and internal medicine ICUs do not observe differences by department in the implementation of interventions to prevent pneumonia in the intubated patient. In both units, they feel that they have sufficient knowledge and that they can use nursing interventions to prevent pneumonia due to mechanical ventilation.

5 DISCUSSION

The final thesis examined endotracheal intubation, mechanical ventilation and the role of the nurse in their performance. It sought to answer the research question "What is the role of the nurse in the intubated patient?"

The nurse plays many roles in endotracheal intubation. The nurses working in the EIT are responsible for providing safe, evidence-based care. Most inappropriate nursing care may be due to a lack of awareness and knowledge of current evidence-based practices (32).

To optimise the quality of care, nursing practice must be based on scientific knowledge and standardised evidence-based practices (32). At the same time, the patient as an individual being must be taken into account and therefore nurses' knowledge must be upgraded and an individual plan must be developed for each patient (11). Cederwall et al. (2014) (3) state that nurses in the EIT play a key role in a well-functioning interprofessional team, as they manage the interaction in the latter, and set priorities and manage processes such as ventilator weaning (Cederwall et al., 2014) (3). Patient involvement can be a challenge in the EIT department, but patient-centred care - that is, care with collaborative and active patient involvement in decision-making - can have a positive impact on the success of ventilator weaning (5). Results from a national cross-sectional study conducted in Sweden showed that an individualised approach to ventilator weaning was the predominant approach, decided by doctors and nurses in collaboration, despite the availability of weaning protocols in some EIT units (6).

Nurses from the EIT and EIN of three general hospitals in Slovenia rated their familiarity with the latest guidelines for the prevention of VAP in patients on mechanical ventilation as lower, as did attendance at seminars on the topic (24). In contrast, Jurkovič (2023) (15) states that they should have sufficient knowledge to prevent VAP.

Al-Sayaghi (2021) (1) describes a number of guidelines relating to adherence and the limitations associated with the implementation of interventions derived from the VAP prevention guidelines. In doing so, she highlights the lack of nurse staffing as a major barrier, as well as inadequate hospital cost containment policies to adequately implement procedures.

While the study by Santos et al., (2020) (33) showed that nurses reported measures related to endotracheal tube, ventilator, aspiration prevention, infection control, sedation and vigilance as good practice for patients on invasive mechanical ventilation, the study by Pinto et al..., (2020) (26) showed that only 36% of nurses had knowledge of the appropriate size of aspiration catheter before aspiration, and only 46% had knowledge of the appropriate aspiration pressure. Similarly, Pinto et al, (2020) (26) found that despite awareness of potential complications, nurses do not follow recommended practice guidelines.

Cooper et al. (2021) (7) state that two-thirds of nurses report that they rarely or never get patients out of bed immediately after extubation (mean 3.48 hours). The perceived barriers are related to nurses' performance in patient safety, particularly falls and injuries.

The results of a systematic review of the literature and a meta-analysis by Moser et al. (2022) (23) showed that the incidence of pressure injury in endotracheal tubes was 4.2%. Stabilization of the endotracheal tube was therefore the most effective intervention in preventing pressure injury. Therefore, the correct placement of tubal immobilisers and ventilator tubes is of paramount importance to prevent the occurrence of these injuries.

In addition to ventilation systems, other life support systems are also found in the patient lying in the ICU. There is a high likelihood of PZP due to enteral feeding and pressure of the probe on the mucosa. As Firer (2023) (8) states, the nurses' role is to continuously monitor feeding, check the patient's position and the status of the probe. This includes checking the inflation of the endotracheal tube, as this reduces the risk of aspiration. Other tasks include recognising complications of enteral feeding, ensuring that blood sugar levels are within normal limits, maintaining fluid balance and informing the doctor of abnormalities.

Nurses work directly in patient care and carry out various interventions such as administering medication, positioning the patient, personal hygiene, dressing and more. To provide safe and quality care,

their work requires knowledge and a range of skills (20) .

6 CONCLUSION

The nursing care of a patient on mechanical ventilation is specific. It requires a great deal of expertise from nurses, who are usually the first to recognise changes in the patient's condition. The mechanically ventilated patient presents many challenges. Most patients in the ICU are on mechanical ventilation during their stay and are completely dependent on the nursing staff. It is here that the role of the nurses is crucial, as they implement the appropriate airway care measures. They are responsible for personal hygiene procedures, proper oral care, aspiration, proper patient positioning and prevention of pressure injuries. Compared to abroad , more attention should be paid in Slovenia to educating staff on the new guidelines on the care of the mechanically ventilated patient. It should be remembered that patient care is individual and thus tailored to each individual, and therefore healthcare staff need to have a great deal of knowledge and experience to be able to provide quality care . Working in intensive care units is demanding and medical staff are expected to have a great deal of empathy as well as knowledge. The care of the ventilated patient can be improved by using indicators to measure the quality of care and by using the available evidence-based protocols/guidelines, in conjunction with systematic and comprehensive assessment, and by encouraging staff to offer the best possible practice in the care of the ventilated patient.

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