



PRACTICAL NURSING ASSISTANTS AND PNEUMONIA PREVENTION ASSOCIATED WITH MECHANICAL VENTILATION IN ICU

PRÁTICAS ASSISTENCIAIS DE ENFERMAGEM E PREVENÇÃO DA PNEUMONIA ASSOCIADA À VENTILAÇÃO MECÂNICA EM UTI

PRÁCTICAS ASISTENCIALES DE ENFERMERÍA Y PREVENCIÓN DE LA NEUMONÍA ASOCIADA A LA VENTILACIÓN MECÁNICA EN UTI

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ABSTRACT

Objective: to assess the knowledge of nurses in pneumonia prevention practices associated with mechanical ventilation in patients hospitalized in intensive care unit. **Method:** exploratory, descriptive study of qualitative approach, developed with 19 nurses in an ICU, guided with a semi-structured interview, after approval of the research project by the Ethics Committee in Research, CAAE 26654314.3.0000.5175. **Results:** the level of knowledge that nurses have about the care practices involving pneumonia associated with mechanical ventilation was satisfactory showing no difficulty to answer. It was identified the importance of the nurses' role to care practices in the care of critically ill patients and the importance of recognizing the clinical findings to establish a diagnosis. **Conclusion:** the results provide subsidies for a reflection on the role of nurses in intensive care healthcare practices in the prevention of pneumonia in patients who are undergoing mechanical ventilation. **Descriptors:** Intensive Care; Nursing; Pneumonia; Health Care.

RESUMO

Objetivo: avaliar o conhecimento dos enfermeiros no que se refere às práticas de prevenção da pneumonia associada à ventilação mecânica em pacientes hospitalizados em unidade de terapia intensiva. **Método:** estudo exploratório-descritivo, de abordagem qualitativa, desenvolvido com 19 enfermeiros de uma UTI, com um roteiro de entrevista semiestruturado, após a aprovação do projeto de pesquisa pelo Comitê de Ética em Pesquisa, CAAE 26654314.3.0000.5175. **Resultados:** o nível de conhecimento que os enfermeiros tinham acerca das práticas assistenciais envolvendo a pneumonia associada à ventilação mecânica foi satisfatório, não demonstrando dificuldades em responder o que lhes era questionado. Identificou-se a importância do papel do enfermeiro em face às práticas assistenciais no cuidado ao paciente crítico e a importância do reconhecimento dos achados clínicos no estabelecimento de um diagnóstico. **Conclusão:** os resultados constituem subsídios para uma reflexão acerca do papel do enfermeiro intensivista no atendimento às práticas assistenciais na prevenção da pneumonia em pacientes que são submetidos à Ventilação Mecânica. **Descritores:** Terapia Intensiva; Enfermagem; Pneumonia; Assistência à Saúde.

RESUMEN

Objetivo: evaluar el conocimiento de los enfermeros en lo que se refiere a las prácticas de prevención de la neumonía asociada a la ventilación mecánica en pacientes hospitalizados en unidad de terapia intensiva. **Método:** estudio exploratorio-descriptivo de enfoque cualitativo, desarrollado con 19 enfermeros de una UTI, con una guía de entrevista semi-estructurado, después de la aprobación del proyecto de investigación por el Comité de Ética en Investigación, CAAE 26654314.3.0000.5175. **Resultados:** el nivel de conocimiento que los enfermeros tenían acerca de las prácticas asistenciales envolvendo la neumonía asociada a la ventilación mecánica fue satisfactorio no demostrando dificultades en responder lo que les era cuestionado. Se identificó la importancia del papel del enfermero frente a las prácticas asistenciales en el cuidado al paciente crítico y la importancia del reconocimiento de los hallados clínicos en el establecimiento de un diagnóstico. **Conclusión:** los resultados son subsidios para una reflexión acerca del papel del enfermero intensivista en la atención a las prácticas asistenciales en la prevención de la neumonía en pacientes que son sometidos a la Ventilación Mecánica. **Descritores:** Terapia Intensiva; Enfermería; Neumonía; Asistencia a la Salud.

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INTRODUCTION

The use of invasive ventilation is an advance in the treatment of respiratory diseases. Despite saving many lives, this approach may also bring harm the patient if this management is not well executed. It can be said that pneumonia acquired in the hospital, especially in intensive care units (ICUs) is an aggravating factor of the mechanical ventilator use when the patient is intubated and need of such equipment to ventilate.

The implementation of ICUs began in the 1970s in Brazil, since with its emergence hospitals achieved great progress because before the serious patients were not treated in appropriate areas and material resources for quality care were scarce.¹

Professionals working in ICUs need scientific, specific and updated expertise to develop their technical skills in daily practice. Nowadays, health professionals working in the field of intensive care, must unceasingly collaborate directly and indirectly to the health of critically ill patients in accordance with the needs of each unit, seeking positively the ideal way to treat or control respiratory infections of patients admitted to ICUs. The team should be committed to a process of systematic training and continuing education in order to plan, regulate, disseminate results and positively criticize the hospital infection control programs that will result in economic impacts with reduced hospital costs.^{2,3}

The Mechanical Ventilation (MV) is a procedure used in an attempt to relieve the symptoms coming mainly from gas exchange disorders. When patients are subjected to this practice, the pulmonary defense mechanisms are altered by underlying disease or by the protective upper airway, bringing normal physiology of respiratory disorders, ranging from pulmonary hypersecretion to the increased frequency of breathing infections.⁴

The Pneumonia Associated to Mechanical Ventilator (PAVM) is the infection that occurs 48 hours after intubation, whose etiological agents were not incubated in the period of the patient's admission and 72 hours after extubation. Thus, it is the most important and common infection that affects mechanically ventilated critically ill patients in ICUs.⁵

The infection control has become a complex characteristic due to the existence of a variety of microorganisms, often multi-resistant, which require the use of broad-spectrum antibiotics. Thus, it is important to highlight that nurses must meet appropriate

technical and practices, such as proper use of personal protective equipment, so that there is control and prevention of hospital infections. However, it must be a plan, with the participation of multidisciplinary health teams and regulators that should apply and establish proposed decisions, in order to reduce costs for the institution as well as the patient's hospital stay, as well as increasing survival.⁶

A systematic assessment that involve educational strategies is extremely important for the quality of care provided to the patients of health services and they should be discussed between the active staff to be implemented. It also stresses that the hospital infection is a significant health risk to patients and shows that it is through critical and conscious actions that health care is improved.^{6,7}

This study shows to be relevant to the academia considering that the scientific nature of research carried out with sound and real bases, bring to students and professionals a chance to carry out their actions to understand how nurses must deal with the care practices in the prevention of PAVM, requiring that health professionals are trained to perform the best care in attendance. Based on the foregoing, this study aims to:

- Assess the knowledge of nurses in relation to pneumonia prevention practices associated with mechanical ventilation in patients hospitalized in intensive care unit.

METHOD

Exploratory and descriptive study with a qualitative approach, initially operationalized by a literature review.⁸ It was developed in the Regional Emergency and Trauma Hospital Dom Luiz Gonzaga Fernandes, located on 1045 Avenida Floriano Peixoto, in the neighborhood San José in Campina Grande/PB, aiming to get the knowledge of nurses of the Intensive Care Unit in the prevention of Pneumonia Associated to Mechanical Ventilator. The collection of empirical material was held from 24 to 27 March 2014.

The population was predominantly of nursing assistants working in Intensive Care Unit. The sector currently has twenty-five nurses in activity divided into services scales. Nineteen nurses were interviewed. The others refused to participate or were on holiday.

The inclusion criteria was: nurses of both genders, nurses who worked for more than five months in the scenario of the research institution, Nurses members of the Intensive Care Unit team (ICU) and nurses who had

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contact with at least one patient affected Pneumonia Associated to Mechanical Ventilator (PAVM). The exclusion criteria were: active professionals in the ICU who were not carriers of the undergraduate degree in nursing; nurses who were not on duty at the time of interview application and nurses on vacation.

To collect the empirical material a semi-structured interview was used. All recordings were transcribed in full and analyzed carefully. Then, the information about service of the objectives were organized and categorized, and later analyzed qualitatively based on the technical analysis of thematic content proposed by Bardin.⁹

This research began after consideration of the Ethics Committee in Research Higher Education and Development Center of Campina Grande (CESED/CG) under the Presentation Certificate to Ethics Assessment (CAAE) 26654314.3.0000.5175 and after acceptance of the participants by signing the Consent Form (TCLE).

RESULTS AND DISCUSSION

♦ Category 1: The nurses and their practice in ICU: recognizing and acting about the PAVM

To meet therapeutic objectives, nursing need working knowledge of the many therapies available for patients presenting respiratory problems. Therefore, nurses should keep updated so there is a better understanding regarding the treatment, enforcement procedures and identification of future complications.

The major challenge in the management of patients with PAVM is to establish early and precise etiological diagnosis, given that the clinical diagnosis, as shown in the literature, presents an important limitation. PAVM is one of the most feared adverse effects in the intensive care environment. Therefore, it is necessary to recognize the extent of the problems for better intervention. However, few studies evaluate the epidemiology of this disease in Brazil, proving this theme lack of consistent investigations.¹⁰

Research participants brought significant content when asked the following question: **“Based on your experiences, what are the clinical criteria you use to identify and determine a probable patient affected with pneumonia Associated with Mechanical Ventilation?”**

Some clinical criteria that we can observe is the high and persistent fever, secretion appearance and odor. Laboratory tests,

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through the high level of leukocytosis, also through x-ray. (N1)

One of the main signs that we know as infection, it would be persistent fever. (N7)

The PAVM diagnosis are a combination of clinical, radiological and laboratory findings. Microbiological data is also used as an attempt to discovery diagnosis and is considered a low specificity of clinical criteria alone.¹¹

In the following statements, it is remarkable the importance of nursing knowledge regarding the clinical criteria presented by the patients. However, it is necessary that nursing professionals are always alert to the monitoring and care on patient outcomes that is under their care.

The presence of fever, leukocytosis, and purulent secretion from the tracheal tube are criteria that you can identify in addition to the X-ray. (N10)

Hyper-secretive patient, usually this hypersecretion, purulent sputum associated primarily with fever, chills, symptoms of possible infection, especially these two. (N18)

It is found that the placement of professionals confirm directly with the literature findings, particularly in relation to the PAVM diagnosis. It is necessary that the patient has at least some of laboratory criteria: positive blood culture without another suspected infection focus or positive culture of pleural fluid or bronco alveolar lavage culture ≥ 104 UFC/mL or tracheal aspirate ≥ 106 UFC/mL, histopathologic examination with evidence of lung infection or urinary antigen or culture for *Legionella spp.* or other positive laboratory tests for respiratory pathogens (serology, direct testing and culture). In the absence of one of microbiological criteria, it is diagnosed with clinically definite PAVM. Clinical criteria are: radiological and microbiological tests evaluated separately and even the radiological findings, when absent, do not exclude the possibility of PAVM, just decrease its possibility.¹¹

In some statements is evident extensive knowledge and practical experience by these professionals. In this sense, it is identified that nurses are updated and trained with regard to the PAVM diagnostic criteria directing the possibilities of intervention as ensuring the statements below:

We do culture here. From the tracheal secretion culture we will see if the patient is affected and the need for tests. (N3)

We observe the secretion too, color and odor. It also has a part of the culture that generally we have seen, the fever is

persistent, these things, you know, this is it. (N8)

It is possible to identify by the speeches that nurses have a broad knowledge of the subject, but not always know in detail all the clinical criteria. The narratives show clearly how much they are objective when they speak about the subject. There is a low specificity criteria to make a diagnosis of PAVM in which the pathogenicity is very complex and linked to several factors. Also underscore that the clinical criteria are limited and insufficient to diagnose there, even with the results of chest radiography.¹²

It must be suspected that a patient was affected by PAVM if radiography show new, progressive or persistent infiltrates including other signs and symptoms such as temperature above 38°, leukocytes increases, purulent sputum or recent coughing.¹³

In the clinical diagnosis of PAVM observed through the testimonials that the nurse is one of the professionals who maintain a closer relationship with patients of great complexity, a characteristic that makes these subjects readily identify the symptoms manifested by them.

The clinical criteria is the temperature, the way in which it is ventilating, if ventilation is being impaired, secretion that is coming out of the tube, whether it is with purulent meaning it is already starting an infection. (N4)

Nursing should act together with the law of professional practice, especially with regard to their front allocations to the provision of care to critically ill patients. Therefore, it is necessary to know the health conditions of patients and propose the plan of care through the nursing diagnosis listing priority assistance to patients who need it most. It is noted that the nursing diagnosis is a critical piece to a specific care to critical patient not limited only to healthcare interventions.

PAVM has been increasingly common in these scenarios, increasing mortality and hospital costs. Pneumonia is the second leading nosocomial infection in ICUs and when associated with mechanical ventilation is an infection that affects most hospitalized patients, and its incidence can range 9 to 68% depending on the diagnostic method used and the studied population.¹²

Considering these concepts, when the following question was asked: **“In your view, what do you mean by Pneumonia Associated to Mechanical Ventilator?”**, nurses cited relevant technical and conceptual aspects as the following statements:

PAVM is the accumulation of secretion due to mechanical ventilation. The patient is often hyper-secretive, so it's good we have to be careful not to accumulate this secretion in the lung. (N13)

Respondents conceptualize PAVM considering the same assumptions and in accordance with the literature, some of which delimit its concept and other deepen it bringing a broader understanding of the subject. It is evident that the speeches are practically consensual, demonstrating familiarity and experience from nurses in front of the subject of this investigation.

The incidence of nosocomial pneumonia is ten times higher in patients using the mechanical ventilator. Furthermore, patients who are in ICUs are critically ill and have an increased risk of colonization of their airways.^{11,13} Thus, it is essential that nurses have knowledge and meet these features so they can dedicate to the care, acting assertively about the parameters and conditions presented by the patient. Thus, it is clear that the narratives of the professionals below corroborate these ideas:

It is pneumonia acquired after the patient has undergone to intubation, tracheostomy and placed a mechanical ventilation. (N5)

I understand that the pneumonia associated to mechanical ventilator is the wrong handling of the ventilator, then the patient is affected by this situation. (N4)

Finally, it is possible to identify through the speeches of the interviewed nurses, considering their performance in the intensive care unit, in the specific care to critical patients that they work precisely in promoting a style, as well as training and knowledge. In this case, assuming that the ICU is a place prepared to provide care to critically ill patients, and require high quality care, there is the need to analyze the assistance which are identified by the presented speeches. Clearly the team is found qualified because they search to aggregate and transmit knowledge, and operate even in the formation of holistic care to the sick individual.

• Category 2: Nursing actions and their practical applicability of PAVM in the ICU

To prevent PAVM, there are several strategies that can be implemented to prevent oropharyngeal colonization by pathogens. They are basic and essential steps in providing care to critically ill patients with the nursing staff, such as washing hands routinely, wearing gloves in tracheal aspiration, special care with oral hygiene and should be used antimicrobial solutions for cleaning mouth and special care for the

patients receiving enteral feeding raising the headboard from 30 to 45° to decrease the risk of aspiration.^{13,14,15} In this perspective the following question was asked: **“What are the preventive measures that you normally adopt to prevent Pneumonia Associated to Mechanical Ventilator?”**, the professionals interviewed revealed:

Keeping high position, suspending diet when vacuuming, suspending diet when the bed bath, aseptic technique suction and preventing as much the contamination. (N19)

The endotracheal suction was aseptically preventive measure against PAVM better known by respondents nurses. Strict oral hygiene was placed as a preventive measure by only four respondents, and the use of chlorhexidine appointed for only one of them. The use of sterile gloves only four respondents mentioned it as extremely important and just reinforces that should be replaced whenever the professional handling a patient and then another one. Hand washing and periodic exchange of ventilator and filter circuit were mentioned by only three and the body care procedures in the patient, only one nurse included it. The use of proper attire when handling patients, only two professionals reported it. Reducing the duration of mechanical ventilation, the concern with the position change and the warming of the patient after bath came in just one quote; when it was a procedure.

Maintaining high headboard is an important factor because the patient intubated presents aspiration risk, since these patients make use of nasogastric tube which enhances the reflux of food. Thus, it is necessary to elevate the head during feeding, aimed at reducing episodes of aspiration bronco,¹² so it is possible to identify by the statements that preventive measures especially for PAVM are essential and should be control strategies implemented focusing their actions on standardization and training conduits for assistance to patients at risk. For these considerations, it is understood that the prophylaxis of these infections is due in large part to the staff caring for the patient, especially nursing, which accounts for more prevention mechanisms in caring for patients admitted to ICUs. In this study, the preventive measures more known by intensive care nurses are described below:

A preventive measure we have adopted is to be trying, always make the aspiration of the patient. The use of sterile gloves when handling an aspiration is made without contaminating the probe and without contaminating the glove. (N14)

Another important measure that was very well placed by respondents nurses is hand washing, this should be a routine action of the whole team especially nursing, directly linked to the care of critically ill patients particularly in ICUs.

The hands are the main route of transmission of microorganisms for the assistance provided. This procedure should be part of all educational campaigns, since it strengthens the technical basis of the concepts. This measure aims to prevent and control infections related to Health Care (IRAs). Many studies recommend the use of liquid soap with antiseptics such as chlorhexidine in places where the presence of multidrug-resistant bacteria as a common practice to reduce cross transmission.^{16,17}

Hand washing is an infection control measure. It must take place before and after patient contact, before donning gloves and after removing them, between one patient and another, between one procedure and another, or on occasions where there is a transfer of pathogens to patients and environments, including procedures with the same patient and after contact with blood, body fluids, secretions, excretions and contaminated articles or equipments.¹⁸

From this perspective, the washing and hand hygiene were possible to identify in the statements of several interviewees as a preventive measure, as shown below:

Basic measures such as washing hands before contact before and after, change glove for each patient and exchange parts of the mechanical ventilator. (N8)

In the change of position, respiratory therapy, aspiration and handwashing. (N17)

It is highlighted in the above sections that nurses have the technical skills to provide a decent health care to the patient. Thus, it appears that the team is aware of the preventive measures in the care of critical patients undergoing mechanical ventilation. Another important preventive measure and cited by respondents was the decontamination of the oral cavity, and this care cited by only one professional regarding use of chlorhexidine as an important antimicrobial in removing micro-organisms colonizing the oral cavity.

The oral hygiene have been considered of great importance in the prevention of nosocomial infections, although there are no clear recommendations for how it should be performed and practiced in different ways in different services. The neglect of oral care becomes a risk factor for the development of nosocomial pneumonia. The monitoring and

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decontamination of the oral cavity by trained professionals such individuals appear to be a powerful tool to reduce pulmonary colonization by oral pathogens and, consequently, in reducing the incidence of nosocomial pneumonia.¹⁹

Chlorhexidine is an alternative in the prevention and treatment of oral diseases with minimal side effects, low local and systemic toxicity and no change of the local flora and used as a mouthwash for the reduction of dental plaque in critically ill patients. However, it is clear that the oral cavity play a key role in the colonization of the oropharynx with nosocomial pathogens and the lack of oral hygiene might compromise the oral immunity and/or loss of salivary function, and biofilm formation.²⁰

The speeches of nurses reveal that they are updated with regard to prevention. They listed briefly conducts in line with the actions recommended in the literature, reinforcing the competence of professionals for intensive care. The following statements ensure these ideas:

The sanitation of the oral cavity with chlorhexidine which is now recommended, but always aspiration. (N1)

Oral hygiene is an important factor, that is aseptically aspiration to the patient and oral hygiene for us from nursing is very important. (N7)

Another important measure to prevent PAVM is the exchange of ventilator circuits, noticing the absence of a default period setting routine replacement. The literature explains that for the exchange of circuits there is no exact time, but makes it clear that they must not be changed in less than 48 hours. Necessarily the circuits should only be changed if there is visible dirt or it is damaged.²⁰

The colonization of the ventilator circuit can contribute to the development of PAVM, and the daily changes of the ventilator circuit does not seem to collaborate to reduce its incidence. The breathing circuit should not be switched at intervals of less than 48 hours. There is currently no definition for exchanging time. However, it is recommended to every seven days exchange passive humidifiers and if they are with dirt or damaged, no needing programmed exchanges.¹⁶ The statements below confirm directly this understanding as nurses ensure:

It should be performed the exchange of filters and ventilator circuits sporadically. (N6)

In terms of prevention, we must switch the circuit every 72 hours. This is one of the basic measures. (N16)

The oropharyngeal colonization is an important precursor to pneumonia, and gastric colonization, reflux extraction and also increase the risk to the patient with MV. Therefore, tracheal suction is a technique that has been proposed as effective in reducing PAVM. This approach is justified by the secretions accumulated in the tube allowing the proliferation of bacteria that then pass into the lower airways causing this condition.¹

Tracheal suction is a nursing procedure which aims at removing the secretions and maintaining the airway of the patient permeable. This procedure must be performed following aseptic technique which requires a thorough training of the nursing team. Therefore, in practice it is noted that eager to relieve an hyper-secretive patient, some steps from the endotracheal aspiration technique are ignored, which can add more complications than those that are already inherent in the procedure such as: drop in blood oxygen saturation in patients requiring positive end expiratory pressure and high fraction of inspired oxygen, nosocomial pneumonia, increased intracranial pressure, atelectasis and hemodynamic instability.^{21,22}

In the case of tracheal aspiration, nurses report that this procedure should be performed aseptically according to literature findings. They reinforce although it would be essential for the realization of the aspiration, do it with the help of another professional to reduce the breaking risk of contamination and aseptic technique. This feature is clear in the speeches of most respondents.

The aspiration preferably should be continued, in the right time not only when the patient is hyper-secretive. (N13)

Aseptic techniques for tracheal aspiration and oral hygiene. I think those two are very important. (N18)

The decrease in ventilation time is also a strategy in reducing PAVM, because the patient that spends a lot of time in the ventilator dependency is vulnerable to infections because the constant manipulation of the system/circuit, in addition to greater exposure to pathogens.

A prolonged mechanical ventilation and length of stay in the ICU is also one of the criteria for the development of pneumonia. Studies show that other preventive strategy is to reduce the MV of the patient exposure time as an important care in the prevention of PAVM and when weaning from sedation is

properly conducted, there is also a significant improvement in patient outcomes.¹⁰

We try to see with the team the possibility to reduce the time the patient is intubated. If we cannot, we invest in decubitus changes, among others. (N9)

Avoiding too much to handle this patient in relation to disconnect the ventilator. I believe that performing aseptic technique is more important. (N10)

Keeping the patient in a semi-sitting position, that is, with an increase in the headboard 30 to 45°, has been shown associated with a reduced risk of pulmonary aspiration, minimizing the possibility of entry of secretions in the airways digestive tract. It is one of the simplest ways to prevent PAVM, for maintaining elevated head reducing the risk of aspiration of gastrointestinal or oropharyngeal content.¹⁷

It is worth remembering that the use of proper attire is a care directly related to preventing infection, but also becomes a protective mechanism for the professional who is manipulating the patient.

I always wear proper attire before making any procedure in the patient, even if it is not infected or has no other one infected. (N2)

From this perspective, the speeches show the important role of nurses about the prevention of nosocomial infections, particularly with regard to special care meeting the needs and weaknesses inherent in the critical patient, focusing on patients under mechanical ventilation. It is recommended that the entire team is always updated and there is fighting campaigns for disease prevention in ICUs. Therefore, there is the key based care is essential to quality care, and essential knowledge of the recommended care practices in service.

CONCLUSION

Patients undergoing mechanical ventilation require a careful assistance and a continuous monitoring with appropriate interventions in order to avoid future complications. The MV is a key feature of life support used in ICUs.

According to the testimonies, it was possible to know a little of the nursing professional experiences in ICUs, especially with regard to the care of critically ill patients. The care planning and the principles governing the care in the prevention and control of infection, still have challenges facing a careful evaluation of care related to the control of IH in these scenarios.

It is expected that this study will boost other studies involving the prevention of IH's,

with main focus on PAVM, reaffirming the importance of the nurse in the quality care and the development of practices that can minimize the incidence of in accordance with their interventions infections.

This study adds knowledge about the care of critically ill patients and emphasizes the importance of measures relating to associated complications, such as the risks to these patients. This research also involves a great importance to the academic community, especially because it reflects a collective discussion that puts the nurse in a position that requires attention, commitment and continuous dedication on the recognition and realization of preventive actions, being properly able to perform a truly differentiated and problem-solving assistance.

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