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ORIGINAL ARTICLE

EVALUATION OF ASPIRATION TECHNIQUE ON THE PATIENT WITH MECHANICAL VENTILATION PERFORMED BY NURSING AVALIAÇÃO DA TÉCNICA DE ASPIRAÇÃO DE PACIENTE EM VENTILAÇÃO MECÂNICA REALIZADA PELA ENFERMAGEM EVALUACIÓN DE LA TÉCNICA DE ASPIRACIÓN DE PACIENTE EN VENTILACIÓN MECÁNICA REALIZADA POR LA ENFERMERÍA

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ABSTRACT

Objective: to identify the knowledge of nursing professionals about the technique of aspiration with patients in Mechanical Ventilation (MV) by an open system and to discuss the technique of endotracheal aspiration. **Method:** this is an observational, descriptive study with prospective data and a quantitative approach, performed at Luiz Gioseffi Jannuzzi School Hospital, with 15 nursing professionals. For the data collection, it opted for the technique of non-participant structured observation and a field diary. **Results:** 50 aspiration procedures were observed, of which 46% (n=23) in the daytime period and 54% (n=27) at night. All procedures were performed by the nursing technicians. The nurses were only in the organization, supervision, and control of the sector. **Conclusion:** it is imperative to elaborate a strategy of continuing education, as well as its adherence by the nursing professionals, to guide their performance according to the protocols that govern the practices of endotracheal aspiration, contributing to lower rates of development of Pneumonia Associated to Mechanics Ventilation (PAVM). **Descriptors:** Endotracheal Aspiration; Pneumonia; Nursing Care; Nursing.

RESUMO

Objetivo: identificar o conhecimento dos profissionais de enfermagem sobre a técnica de aspiração de pacientes em Ventilação Mecânica (VM) por sistema aberto e discutir a técnica da aspiração endotraqueal. **Método:** estudo observacional, descritivo, com dados prospectivos e abordagem quantitativa, realizado no Hospital Escola Luiz Gioseffi Jannuzzi, com 15 profissionais de enfermagem. Para a coleta de dados, optou-se pela técnica de observação estruturada não participante e um diário de campo. **Resultados:** foram observados 50 procedimentos de aspiração, sendo 46% (n= 23) no período diurno e 54% (n=27) no noturno. Todos os procedimentos foram realizados pelos técnicos de enfermagem. Os enfermeiros ficavam apenas na organização, supervisão e controle do Setor. **Conclusão:** é premente a elaboração de uma estratégia de educação continuada, bem como sua aderência pelos profissionais de enfermagem, para nortear sua atuação de acordo com os protocolos que regem as práticas de aspiração endotraqueal, contribuindo para menores índices de desenvolvimento da Pneumonia Associada à Ventilação Mecânica (PAVM). **Descritores:** Aspiração Endotraqueal; Pneumonia; Cuidados de Enfermagem; Enfermagem.

RESUMEN

Objetivo: identificar el conocimiento de los profesionales de enfermería sobre la técnica de aspiración de pacientes en Ventilación Mecánica (VM) por sistema abierto y discutir la técnica de la aspiración endotraqueal. **Método:** estudio observacional, descriptivo, con datos prospectivos y enfoque cuantitativo, realizado en el Hospital Escuela Luiz Gioseffi Jannuzzi, con 15 profesionales de enfermería. Para la recolección de datos, se optó por la técnica de observación estructurada no participante y un diario de campo. **Resultados:** fueron observados 50 procedimientos de aspiración, siendo 46% (n=23) en el período diurno y 54% (n=27) en el nocturno. Todos los procedimientos fueron realizados por los técnicos de enfermería. Los enfermeros solamente estaban en la organización, supervisión y control del sector. **Conclusión:** es premente la elaboración de una estrategia de educación continuada, así como su adherencia por los profesionales de enfermería, para guiar su actuación de acuerdo con los protocolos que dirigen las prácticas de aspiración endotraqueal, contribuyendo para menores índices de desarrollo de la Pneumonia Asociada a la Ventilación Mecánica (PAVM). **Descriptor:** Aspiración Endotraqueal; La Neumonía; Cuidado de Enfermera; Enfermería.

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INTRODUCTION

The maintenance of airway permeability has been the major challenge and the main objective in nursing care for intubated patients and artificial ventilation. This is because, in these patients, although the underlying pathology is not of pulmonary origin, the accumulation of secretions is inevitable, since endotracheal cannulation prevents OF being used THE superior airway defense mechanisms such as air filtration, humidification, and heating.¹

Nursing professionals who provide care to patients with Mechanical Ventilation (MV) need to be able to identify the, to interpret and intervene correctly health problems of these patients, as well as to have technical and interpersonal competence, for a reduction of complications, reduction of costs and improvement in assistance.²

Therefore, the objective of this study is the technique of aspiration of patients in mechanical ventilation developed by nursing professionals, since they are the ones who most act in this type of procedure, being necessary that they can perform the technique correctly.

MV is not a curative but preventive method, providing ventilatory support for patients with acute or chronic respiratory failure. It may be invasive or not, and in both cases, artificial ventilatory support is performed with positive airway pressure.

MV is invasive when an orotracheal tube or tracheostomy cannula is inserted into the trachea, through which the entire process is conducted. In the case of non-invasive MV, a mask that interfaces between the patient and the ventilatory support is used.³

The presence of the artificial tube (intubation cannula) prevents the patient from performing the normal airway cleaning mechanism when coughing. With this, the accumulation of secretions occurs, and it contributes to the evolution of pneumonia. It is worth noting that a cough is known as a natural reflex of the body to eliminate any lung irritation. Thus, aspiration of these secretions is necessary so that the risk of infections is reduced and the airway remains permeable, which allows better oxygenation.⁴

The tracheal aspiration is nothing more than the introduction into the airways of a probe that should be connected to an aspirator with suction pressure or negative pressure so that the secretions are removed. This aspiration should be performed when the patient has noise in the tracheal tube,

evidence of noise by secretion (during auscultation), visible secretion and reduction of percutaneous saturation.⁵

Although endotracheal aspiration is a necessary procedure, it is not free of risks, and may induce the patient to present complications such as increased blood pressure and intracranial pressure, hypoxemia, cardiac arrhythmias, cardiac and/or respiratory arrest, bronchospasm, atelectasis, nosocomial infections, vagal hyperstimulation, tracheobronchial tree damage, anxiety, bleeding, cardiovascular instability, neurological changes, or even death.⁶

The most common technique for endotracheal aspiration is the one performed by the open system, which requires the patient to be disconnected from the mechanical ventilator. The closed system does not require disconnection of the ventilator circuit and involves a multiple use trach-care surrounded by a transparent, flexible and sterile plastic cover to prevent contamination. This catheter is connected via a T-tube, located between the artificial airway and Y of the ventilator circuit. The acceptance of the trach care catheter is still controversial in hospital practice, considering some difficulties in its use and the cost.⁷

The endotracheal aspiration procedure should not be delegated to mid-level nursing teams.⁸ Being a complex and invasive procedure, a careful evaluation should be made, noting the real need for aspiration, since it can cause injuries in the state of the patient. For this, it is important that the nurse has knowledge based on scientific evidence related to endotracheal aspiration, as well as the field of aspiration.⁹ As the nursing team provides the greatest number of hours of patient care, professionals' knowledge of this team on the correct aspiration technique is fundamental for the prevention of infections.

When performing the technique, the professional must be correctly dressed in mask, goggles, disposable apron and sterile glove.¹⁰

This aspiration must be done aseptically and requires disconnection of the endotracheal tube from the mechanical ventilator, where a suction probe is introduced into the whole. The suction should not exceed 15 seconds.¹¹ It is imperative that the professional has not only the mastery of the technique but also the knowledge of the pathophysiology of the respiratory problem of the patient, since only then can the procedure

be applied safely, as little as possible in the evolution and success of treatment.¹²

The longer the patient remains intubated, the greater the number of aspirations.¹³ When the aspiration technique is not done correctly, there will be more risks for the development of infection. The required aseptic technique is sometimes neglected or lacking knowledge about its application.⁴

The study is justified by the fact that the practice of the incorrect artificial airway aspiration technique directly affects the health of the assisted patient.

The achievement of tracheal aspiration in an intubated patient under mechanical ventilation should be carried out by professionals who have adequate training for such procedure, but it is noticed that the level of knowledge of nursing professionals about the technique of endotracheal aspiration is still little discussed in the Intensive Care Units (ICU), despite its importance. When applied incorrectly, the technique can lead the patient to increase hospitalization time, increase hospital costs, and even it can cause the death of the infected patient.⁶

With this problematic presented, the following questions arise: what is the knowledge of the nursing team regarding aspiration in patients with mechanical ventilation in the Intensive Care Unit? What is the correct technique used for open endotracheal aspiration? Thus, this study aims to identify the knowledge of nursing professionals about the aspiration technique of patients in MV by an open system and discuss the good practices of this technique with nursing professionals.

METHOD

This is an observational, descriptive and cross-sectional study with a quantitative approach. The place of this study was a 142-bed middle school hospital located in the city of Valença, state of Rio de Janeiro, Brazil.

The research was carried out by three nurses and 12 nursing technicians,

representing the entire population of nursing professionals of the ICU, composed of six beds.

For the data collection, it was opted for the technique of non-participatory observation, following a structured script. The observation was guided by a protocol of aspiration care of the VAS that the researcher elaborated, where he based the foundations recommended by several authors, especially by the American Association for Respiratory Care (AARC).¹¹

Data collection was performed between September and October 2014, during day and night shifts. The data were arranged in an information bank, using Microsoft Office Excel software, version 2007, and analyzed by descriptive statistics, using the modalities of absolute and percentage distribution. The analysis was guided by the literature on the subject.

The research project was approved by the Research Ethics Committee of the Medicine School of Valença under the C.A.A.E. 34159714.3.0000.5246, and the participants signed the Free and Informed Consent Form.

RESULTS

In this study, 50 procedures were observed: 46% (n=23) in the daytime period and 54% (n=27) in the night period. It should be noted that all procedures were performed by nursing technicians. The nurses were only in the organization, supervision, and control of the sector.

It is noteworthy that 48 procedures performed by the technicians did not have the supervision of the nurse. It was observed that in none of the aspirations had a pulmonary auscultation as the initial evaluation for endotracheal aspiration.

Table 1. Evaluation of aspirations performed at the ICU. Valença (RJ), Brazil, 2014

Evaluation criteria	Yes		No	
	Abs.	(%)**	Abs.	(%)**
Washing hands before the procedure	15	30	35	70
Explaining the procedure to the patient	14	28	36	72
Stopping the diet	5	10	45	90
Using PPE	50	100	0	0
Folding FiO ₂ *** or regulating it to 100%	0	0	50	100
Using sterile glove for TOT aspiration****	50	100	0	0
Using adequate caliber catheter	50	100	0	0
Using sterile catheter	50	100	0	0
Following the sequence: mouth, nose, TOT****	0	0	50	100
Exchanging the tube after mouth and nose aspiration	0	0	50	100
Using sterile gauze to clean catheter secretions	7	14	43	86
Connecting VM to suction intervals	7	14	43	86
The aspiration time is at most 15s	0	0	50	100
Using saline solution to fluidize secretions	0	0	50	100
Using sterile ambu	50	100	0	0
Washing the system with ABD***** or SF***** after the end of aspiration	50	100	0	0
Properly protection of the tip of the system after aspiration	11	22	39	78
Returning the initial FiO ₂ ²	0	0	50	100
Washing hands after the procedure	26	52	24	48
Recording the characteristics of the secretion in the medical record	50	100	0	0

*Abs: Absolute number; **%: relative number (percentage); *** Inspired fraction of oxygen; **** Orotracheal tube; ***** Double distilled water; ***** saline.

DISCUSSION

Among the data, the nursing team had little adherence to handwashing, before and after the procedures performed on the patients, appearing before and after the procedures with 30% (15) and 52% (26) respectively. Hand washing is the most economical, practical and easy way to prevent nosocomial infections. Although known and discussed worldwide, research indicates the low adherence of health professionals to the practice of hand hygiene.¹⁴

The use of PPE was observed in 100% (50) of the procedures. The practice of using this equipment protects both the professional and the patient, as well as prevents cross-transmission between patients and professionals.¹⁰

The use of a sterile glove for aspiration of TOT, adequate gauge catheter, sterile catheter, use of sterile ambu and lavage of the system with ABD or SF after the end of aspiration was seen in 100% (50) of the aspirations.

The explanation of the procedure to the patient was observed in only 28% (14) of the cases, although it is one of the professional’s duties in performing procedures.

The interruption of the enteral diet was performed only in 10% (5) of the aspiration techniques observed. The practice of interrupting the diet during the procedure performed becomes important because of the risk of broncho aspiration, since the patient may have to vomit. However, it was a practice

that was also little noticed, with these patients being at greater risk of bronchoaspiration.¹⁵

It is worth emphasizing that 100% of professionals do not double the inspired fraction of oxygen (FiO₂) or regulate to 100% (50) and 78% (39) do not adequately protect the tip of the system after aspiration. Regarding the action of folding FiO₂ or regulating 100% (50) was not present in any of the procedures performed. However, it is important since what prevents hypoxemia is to hyper oxygenize the patient before the procedure¹⁶. The practice of connecting the mechanical ventilator to the aspiration intervals was also poorly observed, appearing in only 14% (7) of the observations. In any case, the time of 15 seconds was respected, and in all procedures, it was exceeded. The same professionals affirm that this erroneous practice can lead the patient to hypoxia and hemodynamic changes, because the air content of the lungs is reduced, since, along with the secretions, air is also aspirated.

Only 14% (7) of the professionals use sterile gauze to clean catheter secretions, and 64% do not correctly protect the tip of the system after aspiration.

In none of the situations, there was pulmonary auscultation as an evaluation for endotracheal aspiration. Pulmonary auscultation is an essential technique. Therefore, failure to perform auscultation will prevent the identification of adventitious noise, which is one of the indications for endotracheal aspiration.¹² They also affirm

that the appropriate caliber catheter contributes to the reduction of tracheal trauma that this patient may present due to the fact to be submitted to such procedure.

Regarding the literature, none of the professionals used 0.9% saline to humidify the secretions. Authors condemn this practice as it may have adverse effects of saturation and contribute to the risk of infection.¹³

All professionals do not follow the sequence of the technique: mouth, nose, and TOT. This is an important issue to be discussed.

The practice used by the professionals of this study is the aspiration tube order, mouth, and nose,⁸ which is justified by authors when they affirm that the same catheter of the sterile areas can be used for cleaning because they explain that oropharyngeal secretions are cleaned, and not sterile. However, the mouth and nose sequence, with a clean technique (procedure glove use), should come before TOT aspiration. After aspiration of the accumulated secretions above the cuff in subglobose, it is necessary to perform the exchange of the probe and the glove, which should be sterile, as well as its technique to aspirate with the TOT. This measure has been considered by the Centers for Disease Control and Prevention (CDC) as a non-pharmacological measure for the control of Pneumonia Associated to Mechanical Ventilation (PAVM).⁵ The authors explain that when a probe is introduced into the whole, swallowing reflex is encouraged. In the upper airways, the accumulation of secretions occurs in the upper part of the cuff. With this stimulated swallowing reflex, there may be a movement of the trachea, and this cuff can travel by allowing the secretions to slip into the bronchi, contributing to the development of PAVM. Other authors also corroborate this assertion by stating that subglottic aspirations reduce the risk of microaspirations and the risk of airway colonization and the risk of PAVM.

Regarding the importance of the record of the characteristics of the secretion, it is a way of collaborating with diagnoses and discoveries. Therefore, the annotation should contain type, color, and odor,⁶ practice performed by all professionals.

It is worth noting that it was also observed that the new nursing technician in the sector received training on the work developed in the ICU by another nursing technician, including how to aspire a patient in MV, and not by the nurse in the sector. Endotracheal aspiration is an invasive and complex procedure that requires an assessment of

whether there is a need for aspiration since it can cause harm to the patient.⁹ Therefore, the nurse must observe the changes in the patient's health status and interpret and intervene, using the Nursing Process.² According to Law 7.498, of June 25, 1986, which regulates the exercise of nursing, it is exclusive to the nursing professional nursing care of greater technical complexity and requiring scientifically based knowledge and ability to make immediate decisions.¹⁸ The patient's endotracheal aspiration technique can be inserted into the MV within the set of complex techniques in this context since the need for mechanical ventilatory support commonly occurs in critically ill patients due to cardiopulmonary dysfunctions,¹⁹ and these patients requires repeated aspiration to remove secretions. Thus, the complexity of this technique is justified. Despite this, with the help of the field diary, it was observed that it is a procedure performed most of the time by nursing technicians. This fact shows the distance of the nurse from the direct care to the patient, giving preference to the bureaucracy of the nursing service.

CONCLUSION

The nursing professionals of the studied ICU do not act within a nursing practice consistent with the technical and scientific knowledge of the correct practice of endotracheal aspiration. Of the 20 items traced in the observation of the standard procedure, only 25% of the procedures of the tracheal aspiration are done correctly. Such an index can be justified by the fact that 96% of the aspirations are performed by nursing technicians, without the supervision of the nurse. In this way, both professionals and patients are exposed to risks, being the professionals exposed to occupational accidents and patients being able to develop infections, sepsis, hypoxemia and hemodynamic instability, leading to damage to their health.

The study also showed relevant data for the Hospital Infection Control Sector (SCIH), aiming at the implementation of interventions to improve patient care and promoting the reduction of infection rates, since the professionals have not adopted the main measures to reduce hospital infections, such as hand hygiene and the use of PPE, which do not occur as they should. Thus, it is necessary to raise the awareness of professionals about the health care of the worker.

It was possible to perform the situational diagnosis of nursing practices, identifying the failures that occur in endotracheal aspiration,

as well as the procedures that are correctly performed by the professionals. It was observed the need for a greater presence of the nurse in these procedures, since he is the professional qualified for such, and the existence of a standard operating protocol on endotracheal aspiration is not enough. Therefore, it is necessary to intensify continuing education and, especially, the adherence of professionals involved in this practice, so that they actively participate in this program.

The findings bring to the discussion the "Good Practices" of Nursing in the technique of aspiration of patients with mechanical ventilation, so that a better scientific and technical knowledge on the subject is offered to the professionals of the area, contributing to the decrease of the Pneumonia associated with mechanical ventilation, since endotracheal aspiration is a practice often performed by the nursing professional. Thus, it aims at improving the quality of care provided to the patient.

We suggest the elaboration of a strategy of continuing education that guides the nurses' performance regarding the protocols of the endotracheal aspiration practices within a critical and reflexive perspective, as well as adherence, so that these professionals recognize the procedure as a competence and ability of their responsibility, contributing to lower rates of development of PAVM and providing better care to patients who need to undergo this type of procedure.

REFERENCES

- Costa D. Fisioterapia respiratória básica. São Paulo: Atheneu; 2004.
- Santos VFR, Figueiredo AEPL. Intervention and proposed activities for the nursing diagnosis: impaired spontaneous ventilation. Acta Paul Enferm [Internet]. 2010 [cited 2014 Sept 05];23(6):824-30. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0103-21002010000600017
- Introdução. J. bras. pneumol. [Internet]. 2007 July [cited 2014 Sept 05];33(suppl 2):51-3. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1806-37132007000800001&lng=en
- Martins JJ, Maestri E, Dogenski D, Nascimento ERP, Silva RM, Gama FO. How the icu nursing analyzes the need for secretion aspiration of the intratracheal tube. Cienc Cuid Saude [Internet] 2008 [cited 2014 Sept 07];7(4):517-22. Available from: <http://periodicos.uem.br/ojs/index.php/CienCuidSaude/article/view/6660/3918>
- Silva LD, Pereira SRM, Mesquita, AMF. Procedimentos de Enfermagem: Semiotécnica para o cuidado. Rio de Janeiro: Medsi; 2005.
- Frota OP, Loureira MDR, Ferreira AM. Open system endotracheal suctioning: ractices of intensive care nursing professionals. Esc Anna Nery [Internet] 2014 [cited 2014 Oct 07]. 18(2):296-02. Available from: http://www.scielo.br/scielo.php?pid=S1414-81452014000200296&script=sci_arttext
- Lopes FM, Lopez, MF. Impact of the open and closed tracheal suctioning system on the incidence of mechanical ventilationassociated pneumonia: literature review. Rev Bras Ter Intensiva [Internet] 2009 [cited 2014 Oct 09];21(1):80-8. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0103-507X2009000100012
- Potter P. Guia completo de procedimentos e competências de enfermagem. 8th ed. Rio de Janeiro: Elsevier; 2015.
- Favretto DO, Silveira RCCP, Canini SRMS, Garbin LM, Martins FTM, Dalri MCB. Endotracheal suction in intubated critically ill adult patients undergoing mechanical ventilation: a systematic review. Rev Latino-Am Enfermagem [Internet]. 2012 [cited 2014 June 24];20(5):997-07. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-11692012000500023&lng=en&nrm=iso
- Frota, OP, Ferreira AM, Loureiro MDR, Cheade MFM, Reis MG. Use of individual protection equipment by nursing professionals in endotracheal aspiration. Rev enferm UERJ [Internet]. 2012 [cited 2014 Oct 10];20(5):625-30. Available from: <http://www.e-publicacoes.uerj.br/index.php/enfermagemuerj/article/view/5939>
- American Association of Respiratory Care (AARC). Clinical practice guideline: endotracheal suctioning of mechanically ventilated patients with artificial airways. Respir Care [Internet]. 2010 [cited 2014 Aug 28];55(6):758-64. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/20507660>
- Sties SW, Leandro RC, Neto MLC. Health field professionals' profile related to suction procedure. Revista Digital Buenos Aires [Internet]. 2010 [cited 2014 Nov 14];15(143):[abOct 1p]. Available from: <http://www.efdeportes.com/efd143/procedimento-de-aspiracao-orotraqueal.htm>
- Ribeiro IFA, Almeida, LF, Loula, CMA. The influence of endotracheal aspiration for the occurrence of pneumonia in intubated

patients in intensive care unit of a public hospital in Feira de Santana-BA. *Revista dialogo & ciência*. 2012 [cited 2014 Mar 07];32(10):224-8.

14. Felix CCP, Miyadahira AMK. Miyadahira AMK. Evaluation of the handwashing technique held by students from the nursing graduation course. *Rev. Esc. Enferm USP* [Internet]. 2009 [cited 2014 Sept 12];43(1):139-45. Available from:

<http://www.scielo.br/pdf/reeusp/v43n1/18.pdf>

15. Furtado EZL, Santos AMR, Moura MEB, Avelino FVSD. Endotracheal aspiration: healthcare team practices in care for critical patients. *J Nurs UFPE on line* [Internet]. 2013 [cited 27 de Oct de 2014];7(12):6998-06. Available from:

http://www.revista.ufpe.br/revistaenfermage/index.php/revista/article/view/5434/pdf_4226

16. Águas ES, Cunha MF, Vitorino PVO. Evaluation of tracheobronchial aspiration in an intensive care unit of the city of Goiânia. *Revista Movimenta* [Internet]. 2011 [cited 2014 Oct 31];4(1):33-9. Available from:

<http://www.nee.ueg.br/seer/index.php/movimenta/article/viewFile/504/387>

17. Valente DJO, Valente JPO, Rebelo BSC, Santos JR. Pneumonia associada à ventilação mecânica (PAVM) da evidência à prática preventiva. *Revista Amato Luisitano* [Internet]. 2013 [cited 2014 Nov 09];32(supl):19-26. Available from:

http://www.ulscb.min-saude.pt/media/6670/suplemento_enfermage_m.pdf

18. Brasil. Lei n. 7.498, de 25 de junho de 1986. Dispõe sobre a Regulamentação do Exercício da Enfermagem e dá Ocras providências. *Diário Oficial da União* 26 jun 1986; Seção 1:9273.

19. Pedroso AIB, Bigolin M, Gonçalves MP, Werle RW. Effects of the skeletal muscle training with prolonged mechanical ventilation patients. *Cogitare Enferm*. [Internet]. 2010 [cited 2014 Nov 24];15(1):164-8. Available from:

<http://ojs.c3sl.ufpr.br/ojs/index.php/cogitare/article/view/17189/11324>

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