



# Clinic Complications of dysphagia in patients admitted to an ICU

## Complicações Clínicas da disfagia em pacientes internados em uma UTI

## Las complicaciones clínicas de la disfagia en pacientes ingresados en una UCI

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### **Abstract**

**Introduction:** The Intensive Care Units (ICUs) are premises for the attention and care of medically compromised patients. Early speech-language therapy aims to quickly identify dysphagia, preventing clinical complications. Clinical evaluation at the bedside is a currently used form to identify. **Objective:** To relate the presence of dysphagia and clinical complications in adult patients with different underlying diseases hospitalized in an ICU. **Methods:** A retrospective, descriptive study conducted by analysis of speech-language therapy protocols of patients admitted to an ICU from July 2012 to April 2014. This study was approved by the Ethics Committee in Research of the participating institutions. **Results:** The sample included 110 patients, most sent with clinical pulmonary and / or neurological disorder, with mean age of 60.3 years. They found significant associations of dysphagia diagnosed with malnutrition ( $p = 0.020$ ) and a trend of association with patients undergoing tracheostomy ( $p = 0.058$ ). It was observed that the mechanical ventilation is superior four days, on average, in patients with dysphagia and that every day that a patient goes on mechanical ventilation increases by 10% the chance to present swallowing change. **Conclusion:** The clinical complications found in patients undergoing clinical assessment with dysphagia were malnutrition and age, whose dysphagia level varies and worsens with age. The speech

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### **Authors' contributions:**

All authors participated directly in the planning, elaboration, analysis and interpretation of the data, as well as made important intellectual contributions to the conception of the study. All authors read and approved the final version of the manuscript.

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therapy allows early diagnosis of dysphagia, reducing the length of hospital stay and providing better quality of life to the patient.

**Keywords:** Deglutition; Swallowing disorders; Intensive Care Unit; Critical Care; Tracheotomy; Intratracheal intubation.

## Resumo

**Introdução:** As Unidades de Terapia Intensiva (UTI) são locais destinados à atenção e cuidados de pacientes clinicamente comprometidos. A intervenção fonoaudiológica precoce visa identificar rapidamente a disfagia, prevenindo suas complicações clínicas. A avaliação clínica à beira do leito é atualmente a forma mais utilizada. **Objetivo:** relacionar a presença de disfagia e as complicações clínicas em pacientes adultos com diferentes doenças de base, internados em uma UTI. **Métodos:** Estudo retrospectivo, descritivo, realizado por análise de protocolos fonoaudiológicos dos pacientes atendidos em uma UTI, entre julho de 2012 e abril de 2014. Esta pesquisa foi aprovada pelos Comitês de Ética em Pesquisa das instituições participantes. **Resultados:** A amostra contou com 110 pacientes, a maioria encaminhada com quadro clínico de alteração pulmonar e/ou neurológica, com média de idade de 60,3 anos. Encontraram-se associações significativas da disfagia com o diagnóstico de desnutrição ( $p=0,020$ ) e uma tendência de associação com os pacientes submetidos à traqueostomia ( $p=0,058$ ). Observou-se que o tempo de ventilação mecânica é quatro dias superior, em mediana, nos pacientes com disfagia, e que a cada dia que um paciente passa em ventilação mecânica aumenta em 10% a chance de apresentar alteração de deglutição. **Conclusão:** As complicações clínicas encontradas nos pacientes submetidos à avaliação fonoaudiológica com diagnóstico de disfagia foram a desnutrição e a idade, visto que o grau de disfagia varia e se agrava com o avançar da idade. A atuação fonoaudiológica permite o diagnóstico precoce da disfagia, reduzindo o tempo de internação hospitalar e proporcionando melhor qualidade de vida.

**Palavras-chave:** Deglutição; Transtorno de deglutição; Unidade de Terapia Intensiva; Cuidados Críticos; Traqueostomia; Intubação Endotraqueal.

## Resumen

**Introducción:** Unidades de cuidados intensivos (UCI) son premisas para la atención y cuidado de los pacientes médicamente comprometidos. Terapia del habla temprana tiene como objetivo identificar rápidamente la disfagia, la prevención de complicaciones clínicas. La evaluación clínica a pie de cama es actualmente la forma más ampliamente utilizada. **Objetivo:** relacionar la presencia de disfagia y complicaciones clínicas en pacientes adultos hospitalizados en una UCI. **Metodos:** Estudio retrospectivo, descriptivo llevado a cabo mediante el análisis de protocolos de terapia del habla de los pacientes ingresados en una UCI de julio de 2012 hasta abril de 2014. Este estudio fue aprobado por el Comité de Ética en Investigación de las instituciones participantes. **Resultados:** La muestra incluyó a 110 pacientes, la mayoría enviados con clínica pulmonar y / o trastorno neurológico, con edad media de 60,3 años. Ellos encontraron asociaciones significativas de disfagia diagnosticados con desnutrición ( $p = 0,020$ ) y una tendencia a la asociación con los pacientes sometidos a traqueotomía ( $p = 0,058$ ). Se observó que la ventilación mecánica es superior a cuatro días, en promedio, en los pacientes con disfagia y que cada día que un paciente va en aumento de la ventilación mecánica en un 10% la posibilidad de presentar tragar cambio. **Conclusión:** Las complicaciones clínicas encontradas en pacientes con el diagnóstico disfagia eran la desnutrición y la edad. La terapia del habla permite el diagnóstico precoz de la disfagia, la reducción de la duración de la estancia hospitalaria y ofrece una mejor calidad de vida.

**Palabras clave:** Deglución; Trastornos de Deglución; Unidades de cuidados intensivos; Cuidados críticos; Traqueostomía; Intubación Intratraqueal

## Introduction

Intensive Care Units (ICUs) are places dedicated to the care of medically compromised patients, who require high-tech equipment and a qualified multidisciplinary team. Overall, these are debilitated patients, clinically unstable, immunocompromised, with low level of consciousness, malnourished, under the influence of medications and at risk of infection, thus requiring special care. In addition, they frequently present comorbidities such as chronic obstructive pulmonary disease (COPD), advanced age and neurodegenerative diseases<sup>1</sup>.

Swallowing is a complex activity of voluntary and involuntary actions and the timing between this function and respiration is essential to prevent pulmonary aspiration and to maintain adequate nutrition and hydration<sup>2</sup>.

During swallowing, in healthy individuals, the breathing phases are interrupted (apnea), and resumed after the pharyngeal phase, in the expiratory phase. Apnea is important to provide adequate protection of the airways during swallowing<sup>2,3</sup>. Opening the vocal folds after swallowing may allow food and saliva into the larynx, thus increasing the risk of aspiration<sup>2</sup>.

Dysphagia is characterized by a swallowing disorder that can affect any portion of the digestive tract, from mouth to stomach. It is due to neurological and/or structural causes and can have serious complications, such as malnutrition, dehydration, and aspiration pneumonia, which may lead to death<sup>4,5</sup>. This alteration can occur in any of the swallowing phases: oral, pharyngeal, and esophageal, in view of different clinical pictures. This is the disorder that most requires the presence of a speech-language pathologist in the ICU, considering the serious complications that may destabilize the patient's clinical status<sup>1,6</sup>.

ICU patients show a high risk of aspiration due to many factors, such as a lower level of consciousness (often caused by excessive analgesia or sedation), supine position, tracheostomy, prolonged use of nasogastric and/or endotracheal tubes, among others, in addition to an unstable clinical picture<sup>1,4,6,7</sup>. Lengthy hospitalization in an ICU contributes, along with the aforementioned aetiological factors, to hinder the swallowing dynamics<sup>4</sup>.

The number of beds occupied by critical patients admitted to these units is increasing. For this reason, it is necessary to characterize these patients

in order to better distribute human and material resources, aiming at the quality of care<sup>8</sup>.

The early involvement of a speech-language pathologist in ICUs aims at quickly identifying dysphagia, thus preventing its clinical complications, as well as participating in the diet-type decision. It also reduces costs and accelerates the discharge process<sup>1,6</sup>. Clinical speech-language assessment at the bedside is currently the most employed way of evaluating dysphagia, being many times the first choice, since it is non-invasive, quick and has a low-cost<sup>4</sup>.

Speech-language therapy works both to sustain life and the quality of life, since it allows an individual to resume oral feeding with safety<sup>1,6</sup>.

The present study has the goal of relating the presence of dysphagia and clinical complications in adult patients hospitalized in an ICU with several underlying diseases.

## Methods

This is a retrospective, descriptive study, carried out with the analysis of speech-language assessment protocols, from July 2012 to April 2014, in an ICU of a philanthropic hospital in the city of Porto Alegre.

The sample comprised 154 protocols, initially. Data were recorded in the Dysphagia Risk Protocol of the ICU, created by the residents of the Integrated Multiprofessional Residency in Health (Residência Multiprofissional Integrada em Saúde - REMIS), based on published studies<sup>9,10,11</sup>.

Medical request for speech-language evaluation was used as an inclusion criterion. Lack of completeness of the protocols at the time of analysis, either due to missing data, or because the evaluation was interrupted (due to change in the level of consciousness, clinical instability, ICU discharge and death), was used as an exclusion criterion. The sample initially comprised 154 protocols, from those, 44 were eliminated due to the exclusion criteria, thus leaving a final sample of 110 protocols.

The variables analyzed in the protocols were: age, sex, underlying pathology, occurrence of malnutrition and dehydration according to nutritional evaluation from the patient's chart; feeding route (nasogastric tube, nasogastric tube and/or oral), previous intubation, tracheostomy, screening of speech aspects, type and degree of dysphagia.

The speech-language protocol used defines the type and degree of dysphagia according to the classification proposed in the Dysphagia Risk Assessment Protocol (Protocolo de Avaliação do Risco para Disfagia - PARD)<sup>9</sup>, which classifies dysphagia as mild, mild-moderate, moderate, moderate-severe, and severe. For the statistical analysis, dysphagia was classified as absent or present, and characterized as mild, mild-moderate, moderate, moderate-severe and severe dysphagia.

This study was approved by the Research Ethics Committees of the participating institutions under protocols no. 706,298 and no. 760,622.

The sample was described by mean and standard deviation or median and interquartile range, in addition to the absolute and percentage frequencies of the categorical variables. Bivariate analyzes of the outcome for each variable of interest were performed through the t and Mann-Whitney tests, in addition to the Chi-square and Fisher exact tests, when necessary. Variables with p-value < 0.20 were selected to enter the multiple logistic regression model for the identification of risk factors for the diagnosis of dysphagia. The collected data were stored in an *Excell® electronic spreadsheet* and analyzed statistically with the software pack-

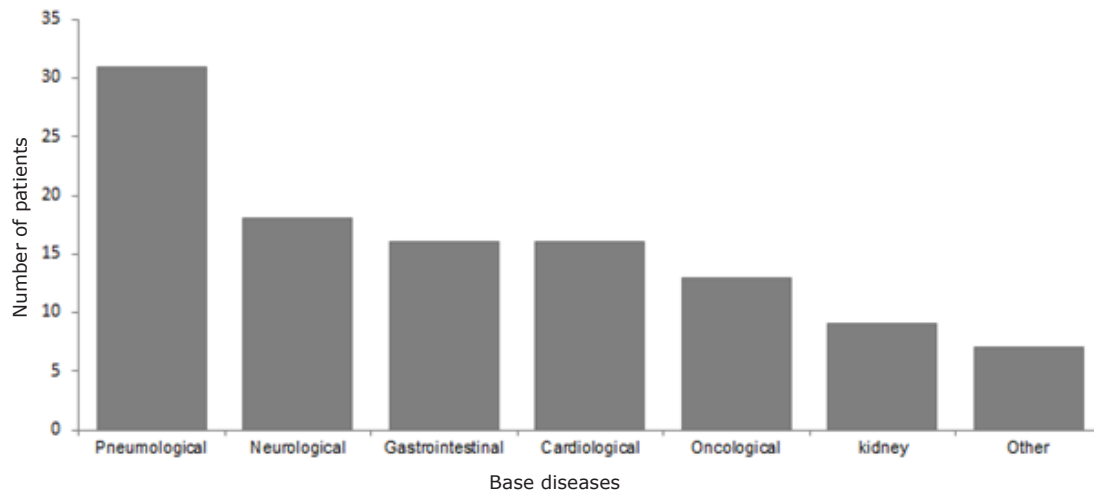
age *Statistical Product and Service Solutions®* (SPSS) version 22. A statistical significance of 5% ( $p < 0.05$ ) was adopted.

## Results

The sample comprised 110 patient protocols with mean age of 60.3 years and standard deviation (sd) of 16.6 years, of which 58 (52.7%) were male.

The underlying diseases presented by the patients, the ratios of which are shown in Figure 1, were grouped into six groups: respiratory diseases (respiratory insufficiencies, COPD and bronchopneumonia), neurological diseases (cerebrovascular accidents, traumatic brain injury, dementia and brain tumor), cardiovascular diseases (cardiopathies, congestive heart failure and acute myocardial infarction), gastrointestinal disorders (gastric hemorrhage, abdominal distension, fistulae and appendicitis), renal diseases, cancer, and others, such as orthopedic and traumatological surgeries.

It was observed that 31 (28.2%) patients referred to speech-language assessment presented pulmonary alterations, and 18 (16.4%) patients had neurological alterations.



**Figure 1.** Underlying diseases

Regarding the absence or presence of dysphagia and its classification, 36 (32.7%) patients presented normal/functional swallowing, 22 (20.0%) mild dysphagia, 15 (13.6%) mild-moderate dysphagia, 12 (10.9%) moderate dysphagia, 9 (8.2%) moderate-severe dysphagia and 16 (14.5%) severe dysphagia.

Most patients in the sample did not present clinical alterations of malnutrition (86.4%), dehydration (93.6%), language alteration (87.3%) and did not undergo tracheostomy (78.2%). On the other hand, the majority required orotracheal

intubation (87.3%) and the most used feeding route was the nasogastric tube (65.5%).

Results of the bivariate analysis showed dysphagia to be associated with malnutrition ( $p = 0.020$ ) with a tendency to be associated with tracheostomy patients ( $p = 0.058$ ). In addition, the median mechanical ventilation duration was four days longer in patients with dysphagia than in patients with normal/functional swallowing ( $p = 0.024$ ). The other variables analyzed did not show significant association. Table 1 summarizes the cross checks performed.

**Table 1.** Association between the presence of dysphagia and other variables - bivariate analysis

Variables	Total	Dysphagia		p-value
		Presence	Absence	
<b>Age, in years, m ± sd</b>	60.3 ± 16.6	61.4 ± 16.1	57.7 ± 17.4	0.258 <sup>#</sup>
<b>Sex, n (%)</b>				0.689
Female	52	34 (65.4)	18 (34.6)	
Male	58	40 (69.0)	18 (31.0)	
<b>Malnutrition, n (%)</b>				<b>0.020 *</b>
No	95	60 (63.2)	35 (36.8)	
Yes	15	14 (93.3)	1 (6.7)	
<b>Dehydration, n (%)</b>				0.423*
No	103	68 (66.0)	35 (34.0)	
Yes	7	6 (85.7)	1 (14.3)	
<b>Speech alteration, n (%)</b>				> 0.999*
No	96	64 (66.7)	32 (33.3)	
Yes	14	10 (71.4)	4 (28.6)	
<b>Intubation, n (%)</b>				> 0.999*
No	14	10 (71.4)	4 (28.6)	
Yes	96	64 (66.7)	32 (33.3)	
<b>Tracheostomy, n (%)</b>				0.058
No	86	64 (62.8)	32 (37.2)	
Yes	24	20 (83.3)	4 (16.7)	
<b>Length of mechanical ventilation, in days, med (25-75%)</b>	7.0 (4.0-13.0)	9.0 (4.0-14.5)	5.0 (2.0-9.3)	<b>0.024##</b>
<b>Feeding route, n (%)</b>				0.819
NG	9	5 (55.6)	4 (44.4)	
PO	13	8 (61.5)	5 (38.5)	
NE	72	50 (69.4)	22 (30.6)	
Other	16	11 (68.7)	5 (31.3)	

m: mean; sd: standard deviation; md: median; \* Fisher's Exact Test; # t Test; ## Mann-Whitney Test

The multiple analysis showed that every day a patient is on mechanical ventilation increases the chance of dysphagia by 10%. Other factors were

not significant in this analysis, according to the results shown in Table 2.

**Table 2.** Association between the speech-language diagnosis of dysphagia and other variables - multiple analysis

Variables	n	Percentage/md (25% -75%) in the presence of dysphagia	Multiple analysis		
			OR (IC95%)	p-value	
Malnutrition	No	95	63.2	1	0,09
	Yes	15	93.3	6.21 (0.75-51.19)	
Tracheostomy	No	86	62.8	1	0.824
	Yes	24	83.3	1.18 (0.27-5.26)	
Mechanic ventilation duration, in days	95	9.0 (4.0-14.5)	1.10 (1.01-1.19)	0.029	

## Discussion

From this study it was possible to delineate the main speech-language characteristics of the patients hospitalized in a general ICU. The most prevalent underlying diseases in the period were pneumological, followed by neurological diseases, accounting for almost half of the sample. COPD is the predominant pneumological disease, while cerebral vascular accident (CVA) is the predominant neurogenic disease.

COPD patients may be susceptible to alterations in the coordination of swallowing due to the functional impairment of ventilation<sup>2,3</sup>. In the course of the disease, periods of acute, clinical and functional worsening may occur, known as exacerbations episodes, leading to increased respiratory work and/or respiratory failure, often requiring ICU admission and ventilation support<sup>12</sup>. In a study with 35 patients aged 50-65 years, those with COPD had symptoms of dysphagia related to the pharyngeal and esophageal phases of swallowing, the airway protection mechanism, a history of pneumonia and to feeding symptoms, such as difficulty to eat solid foods<sup>2</sup>.

Regarding neurological diseases, a recent study indicates that 80.6% of the evaluated patients presented some alteration in swallowing<sup>13</sup>. Another study showed CVA to be the neurological disease that most causes alterations in swallowing<sup>14</sup>. Oropharyngeal dysphagia due to CVA, classified as

neurogenic, presents more alterations in the oral and pharyngeal phases of swallowing, thus related to the high degree of morbidity and mortality, as it frequently leads to clinical complications such as dehydration, malnutrition and risk of aspiration pneumonias<sup>15,16</sup>. Occurrence of oropharyngeal dysphagia in post-stroke patients who underwent speech-language assessment varies from 42 to 57%<sup>15</sup>.

Due to the clinical conditions associated with the underlying disease, patients often require an alternative feeding route for nutritional support, thus making it possible to offer food when the oral route is not indicated<sup>17</sup>. Difficulty of swallowing and a lower level of consciousness in patients with neurological and cardiovascular diseases are among the main justifications<sup>14</sup>.

A study pointed out that the alternative route most often used during hospitalization was the nasoenteral tube (NE)<sup>17</sup>, agreeing with this research. The use of an alternative feeding route may lead to dysphagia due to discomfort when swallowing, reduction in pharyngeal sensitivity, accumulation of secretions, among other aspects<sup>6</sup>.

Results show varying degrees of dysphagia, aggravated by old age. This information is in agreement with literature findings, which highlight the elderly population as being prone to dysphagia (prevalence of 23%)<sup>18</sup>. Aging provides a combination of factors that, when associated, modify and produce adaptations in swallowing<sup>19</sup>.

In the present study, we observed a significant association between dysphagia and malnutrition. Malnutrition is caused by an unbalanced diet, which lacks essential nutrients<sup>20</sup>, and mild dysphagia occurs when the disorder is present with slight oral alterations, together with adequate compensations, thus requiring only advice and/or small modifications of the diet<sup>11</sup>. Although malnutrition is recognized as a complication of dysphagia, there are few studies reporting this relationship<sup>21</sup>. It is worth noting that malnutrition associated with loss of strength and skeletal muscles can also lead to swallowing alterations.<sup>20,21</sup>

When it is related to the presence of dysphagia and malnutrition risk in hospitalized patients, dysphagic patients are at higher risk of malnutrition or are already malnourished<sup>22</sup>. Oropharyngeal dysphagia is a risk factor for malnutrition and respiratory tract infections, so its evaluation and treatment should be included in routine care for critically ill patients in order to avoid nutritional and respiratory complications<sup>6,19</sup>.

After extubation, patients are exposed to some risks of developing dysphagia, such as aspiration, following removal of the orotracheal tube, due to the residual effect of sedative drugs, presence of a nasointestinal tube, alterations of sensitivity of the upper airways, glottic injury, and laryngeal muscle alteration<sup>23-25</sup>.

Laryngeal lesion after orotracheal intubation (OTI) may be due to the traumatic placement of the orotracheal tube, the need for prolonged mechanical ventilation ( $\geq 48$  hours), agitation of the patient causing friction of the tube against the laryngeal mucosa or simply the presence of the tube<sup>26</sup>. The literature has frequently described swallowing alterations due to OTI, including altered laryngeal sensitivity and cough reflex<sup>13,23</sup>.

In the ICU, orotracheal intubation and mechanical ventilation (MV) are known risk factors for the development of dysphagia and aspiration pneumonia<sup>26,27</sup>. Corroborating this study, in which the majority of patients required orotracheal intubation (87.3%), other studies show that approximately 20% of the 50% of patients submitted to MV for more than seven days develop dysphagia<sup>28,29</sup>. Regarding OTI, a study showed significant association with the presence of dysphagia when intubation time is greater than six days<sup>23</sup>, contributing to this association, another study indicated 63% incidence of oropharyngeal dysphagia after OTI in the ICU<sup>4</sup>.

The increased MV time found in patients of this study, and the finding that each day in MV increases the chance of dysphagia by 10%, reveals the impact of MV on swallowing and reinforces the need of speech-language therapy for ICU patients.

Another risk factor found in critically ill patients is the use of tracheostomy. The findings of this study showed a tendency of association ( $p = 0.058$ ) between the presence of dysphagia and the use of tracheostomy.

Dysphagia can be observed due to the possibility of tracheostomy triggering modifications in both the respiratory function, influencing the mechanisms of protection of the airways and vocal production, as well as the swallowing function, compromising motor and sensory actions (laryngopharyngeal desensitisation, reduction of subglottic pressure and vocal fold closure time). Such modifications favor the appearance of late complications, including tracheal stenosis, bleeding, fistulas, infections, hemorrhages and bronchoaspiration<sup>30</sup>. In the literature we found data from occurrence of oral dysphagia in 11.1% of the cases, 22.2% of pharyngeal dysphagia and 44.4% of oropharyngeal dysphagia; 31.5% with clinical signs of laryngeal penetration and/or tracheal aspiration<sup>13</sup>. These data show its impact on swallowing<sup>30</sup>.

Evaluation data and speech-language intervention in an ICU make it possible to assess the possibility of oral feeding and/or a feeding route more adequate for the patient during hospitalization, as well as to select the consistencies of the diet, specify the risks and precautions during feeding, determine the candidates for therapeutic intervention and discuss the cases with the multi-professional team.

The earlier dysphagia is detected and suffers intervention, the lower the risks of worsening the patient's clinical condition and the greater the chances of a positive prognosis.

Interest in developing the present study arose from the recent insertion of speech-language professionals in the hospital environment, and more recently in ICUs, and from the need to define the clinical complications of critical patients with different underlying diseases, since this is a recent activity with few published data.

With this data, we expect to help the health professionals and managers to be aware of alterations of swallowing in critical patients, allowing for

a strategical planning aimed at a providing care that confers quality of life to these patients.

## Conclusion

The clinical aspects of patients undergoing speech-language assessment in this study include mostly neurological and/or pneumological impairments, the use of orotracheal intubation, mechanical ventilation, tracheostomy and nasointestinal tubes, and the presence of dysphagia.

The clinical complications found in patients undergoing speech-language assessment with diagnosis of dysphagia were malnutrition and age, since the degree of dysphagia varies with and is aggravated by old age.

The data found reinforce the need of having trained speech-language therapists in ICUs. These professionals are increasingly present in the hospital environment, in different specialized units, with varying degrees of complexity. In this context, the focus of speech-language therapy is to prevent, guide and rehabilitate swallowing alterations, reducing the length of hospitalization and providing better quality of life for the patient.

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