UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
FACULDADE DE MEDICINA
PROGRAMA DE PÓS-GRADUAÇÃO EM MEDICINA: CIÊNCIAS MÉDICAS

PROTOCOLO DE DESMAME EM PACIENTES TRAQUEOSTOMIZADOS: UM ESTUDO ANTES E DEPOIS

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PROTOCOLO DE DESMAME EM PACIENTES TRAQUEOSTOMIZADOS: UM ESTUDO ANTES E DEPOIS

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“*Estamos na situação uma criancinha que entra em uma imensa biblioteca, repleta de livros em muitas línguas. A criança sabe que alguém deve ter escrito aqueles livros, mas não sabe como. Não compreende as línguas em que foram escritos. Tem uma pálida suspeita de que a disposição dos livros obedece a uma ordem misteriosa, mas não sabe qual ela é”.*

(Albert Einstein)

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RESUMO

Introdução: A traqueostomia está entre os procedimentos mais comuns utilizados em pacientes com necessidade de suporte ventilatório prolongado em Unidades de Terapia Intensiva. Protocolos específicos para essa população são escassos. **Objetivo:** Avaliar se pacientes traqueostomizados e dependentes de ventilação mecânica apresentam maior sucesso no desmame quando comparados a pacientes não submetidos a um protocolo. **Metodologia**: O estudo retrospectivo do tipo quase experimento, através da análise do banco de dados entre os anos de 2014- 2015 (pacientes desmamados de forma subjetiva) 2016 implantação do protocolo, 2017-2018 (desmame com protocolo). **Resultados:** O estudo foi realizado com 114 pacientes(63 na fase 1 e 51 na fase 2), sendo gênero feminino 24(38%) e 29(57%), masculino 39(62%), 22(43%); internação clínicos 49(78%), 36(71%); cirúrgicos 14(22%), 15(29%); comorbidades zero 19(30%), 6(12%), uma 26(41%), 15(29%), duas ou mais 18(29%), 30 (59%); dias de VM pré (17 vs 14, p= 0,003); dias de desmame (12 vs 8, p=0,04), dias de internação no CTI(45 vs 37, p= 0,03), probabilidade de óbito APACHE II e Saps-3 (32,4+-18,1 vs 54,9+-25,9, p<0,001), sepse 17(27%), 28(55%) e óbito 19(30%), 14(28%). A análise mostra 62% dos pacientes submetidos ao protocolo de desmame foram libertados da ventilação mecânica nos primeiros 6dias, comparados a 18,2% dos pacientes não submetidos ao protocolo. Assim, em 15 dias (p<0,001), HR=2,15 (IC 95%: 1,02 – 4,53; p=0,044), sendo ajustado para idade, sexo, número de comorbidades, sepse, número de dias de VM pré-TQT, motivos clínico pulmonar e cirúrgico neurológico e probabilidade de óbito. **Conclusão:** O protocolo de desmame mostra-se eficaz para pacientes traqueostomizados nos primeiros dias de ventilação pós procedimento, apresentando duas vezes mais chance de serem desmamados do suporte ventilatório invasivo.

Palavras-chave: Traqueostomia, ventilação mecânica, cuidados críticos, desmame do respirador, sepse, protocolos clínicos

ABSTRACT

Introduction: The tracheostomy is between the most commonly used with patients in need of prolonged ventilatory support in intensive care unity. Specific protocols for this population are scarce. **Objective:** To evaluate if trancheostomized patients and mechanical ventilatory dependents present greater successes in weaning when compared to non-submitted to a protocol. **Methodology:** The retrospective quasi-experimental study, through of database analysis between the years 2014-2015 (weaned patients in subjective form) 2016 protocol deployment, 2017-2018 (weaning with protocol). **Results:** The study was conducted with 114 patients (63 in stage 1 and 51 in stage 2), 24 females (38%) and 29 (57%), males 39(62%), 22(43%); clinical hospitalization 49(78%), 36(71%); surgical 14(22%), 15(29%); zero comorbidities 19(30%), 6(12%), one 26(41%), 15(29%), two or more 18(29%), 30 (59%); MV days pre (17 vs 14 p=0,003); weaning days (12 vs 8, p=0,04), ICU hospitalized days(45 vs 37, p= 0,03), death probability APACHE II and Saps-3 (32,4+-18,1 vs 54,9+-25,9,p<0,001), sepsis 17(27%), 28(55%) and death 19(30%), 14(28%). The analysis shows 62% of the submitted to weaning protocol patients were released from mechanical ventilation in the first six days, compared to 18,2% of the non-submitted patients. Therefore, in 15 days (p<0,001), HR=2,15 (IC 95%: 1,02 – 4,53; p=0,044), adjusted by age, genre, comorbities number, sepsis, number of days of MV pre tracheostomy, pulmonary clinical reasons and neurological surgery and death probability. **Conclusion:** The weaning protocol reveals itself effective to tracheostomized patients in the first days of ventilation after procedure, presenting twice more chances of being weaned of invasive ventilatory support.

Keywords: Traqueostomy, mechanical ventilation, critical cares, respirator weaning, sepsis, clinical protocol

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LISTA DE ABREVIATURAS E SIGLAS

TQT: Traqueostomia

VM: Ventilação Mecânica

VMP: Ventilação Mecânica Prolongada

UTI : Unidade de Terapia Intensiva

ICU: *Intensive Care Units*

MV: *Mechanical Ventilation*

ARI: *Accute Respiratory Insufficiency*

PVS: Ventilação por pressão de suporte

PEEPi: Pressão positiva expiratória final intrínseca

ACCP: *American College of Chest Physicians*

SCCM: *Society of Critical Care Medicine*

TRE: Teste de Respiração Espontânea

SUMÁRIO

1. INTRODUÇÃO

Retirar o paciente da ventilação mecânica pode ser mais difícil que mantê-lo. O processo de retirada do suporte ventilatório, ocupa ao redor de 40% do tempo total de ventilação mecânica (Goldwasser et al, 2007). Outros autores descrevem o desmame como a "área da penumbra da terapia intensiva" e que, mesmo em mãos especializadas, pode ser considerada uma mistura de arte e ciência (Ely et al,1996).

A traqueostomia (TQT) é frequentemente realizada após 14 a 21 dias de ventilação mecânica, é derivada dos termos gregos *trachea arteria* (artéria dura) e *tomia* (incisão). Esse recurso é utilizado para facilitar a entrada e/ou saída de ar dos pulmões quando existe alguma obstrução no trajeto natural e consiste em um procedimento cirúrgico de abertura artificial da traqueia para permitir a respiração podendo facilitar o desmame (SINGH, 2017).

2. REVISÃO DA LITERATURA

2.1 Estratégias de busca de informações

Para a elaboração do estudo, foi realizado um levantamento bibliográfico de artigos científicos nas bases de dados Pubmed/Medline e Lilacs, com os seguintes termos: ventilação mecânica e desmame, traqueostomia e desmame, ventilação mecânica prolongada. As combinações encontram-se na Figura 1.

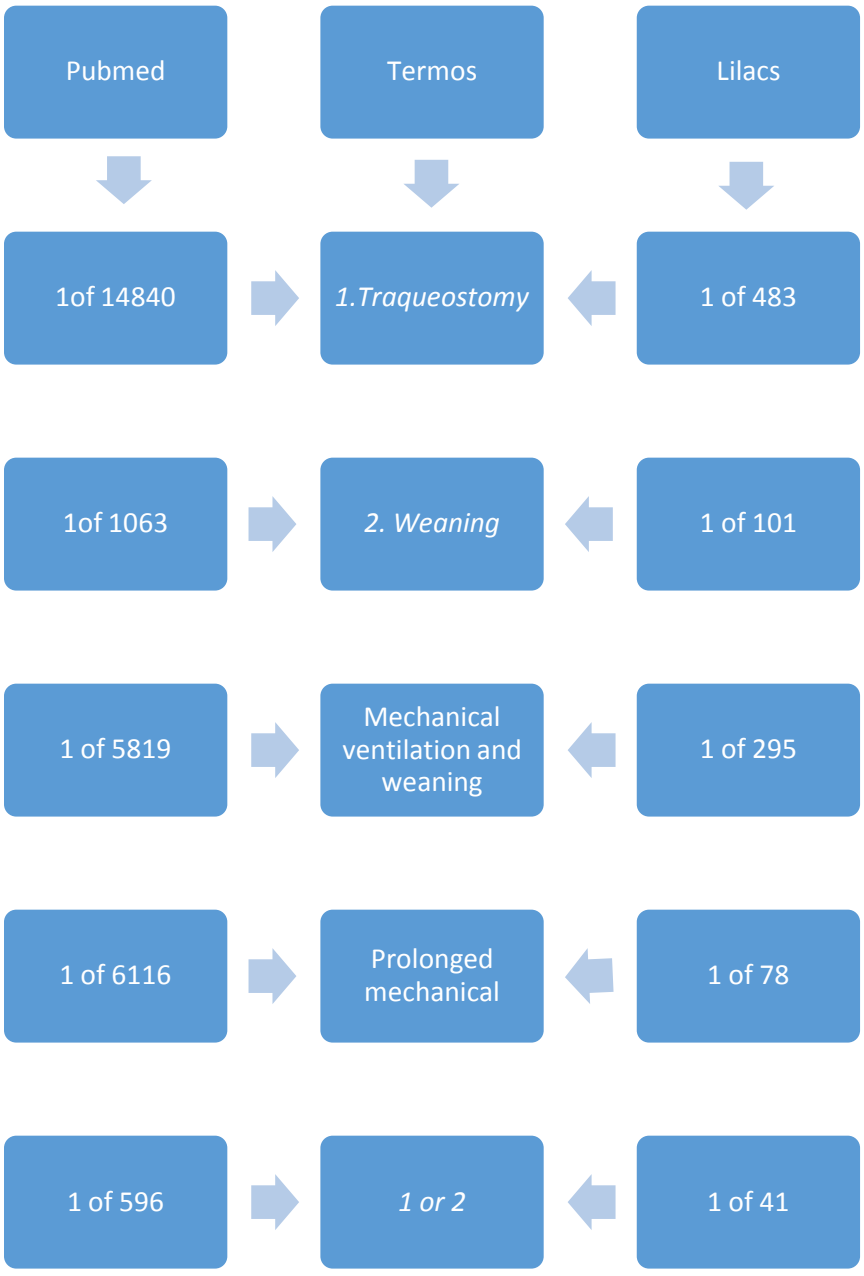

Figura 1. Estratégia de busca de referências
Fonte: Elaborado pela Autora (2019)

2.2 Unidades de Terapia Intensiva

Uma Unidade de Tratamento Intensivo(UTI) é uma área especificamente dotada de pessoal e equipada, separada e independente de um hospital dedicado ao gerenciamento e monitoramento de pacientes com condições de risco de vida (BOLELA,CARVALHO, 2006)

Os tratamentos realizados em terapia intensiva incluem monitoramento invasivo de parâmetros fisiológicos, terapia de substituição renal, suporte cardiovascular e suporte ventilatório invasivo e não invasivo. Esses tratamentos, embora potencialmente salvadores de vidas, podem sobrecarregar significativamente um paciente. No Reino Unido, a taxa de mortalidade para pacientes cuja internação envolve internação na UTI é de cerca de 20%, e 10% daqueles que sobrevivem à UTI morrem antes de deixar o hospital(BASSAFORD, 2019).

Os avanços tecnológicos e organizacionais das UTIs permitiram que, atualmente, um número maior de pacientes sobreviva a um insulto agudo. Esse fato gera um aumento considerável de doentes criticamente crônicos, com dependência prolongada da VM e de outros cuidados de UTI (LOSS et al, 2015; PEREIRA et al, 2019).

Os pacientes em terapia intensiva podem apresentar instabilidade grave de um ou mais sistemas fisiológicos principais ou podem apresentar alto risco de instabilidade de um destes sistemas. O conhecimento sobre o perfil dos pacientes de terapia intensiva é importante, no intuito de oferecer dados consistentes que permitam um planejamento adequado da assistência à saúde, direcionando as intervenções, dando atenção aos efeitos da terapia, ao prognóstico e aos fatores de risco (FAVARIN e CAMPONOGARA, 2012).

O termo sepse se origina de uma palavra grega antiga *sepse* , que significa “decadência da matéria orgânica”, e era conhecida por ser usada em um papiro egípcio por volta de 1600 aC . A definição moderna de sepse foi criada em 1991 por uma conferência de consenso do American College of Chest Physicians (ACCP) e da Society of Critical Care Medicine (SCCM), para que os clínicos pudessem aplicar uma estrutura padrão com diretrizes diagnósticas precisas para seguir tendências epidemiológicas e determinar a eficácia dos tratamentos para sepse (HO et al, 2019).

2.3 Ventilação Mecânica

A Ventilação Mecânica é aplicada em várias situações clínicas em que o paciente desenvolve insuficiência respiratória, sendo, dessa forma, incapaz de manter valores adequados de O_2 e CO_2 sanguíneos, determinando um gradiente alvéolo-arterial de O_2 [$(PA\text{-}a)O_2$] e outros indicadores da eficiência das trocas gasosas alterados (CARVALHO et al, 2007).

O número de pacientes que necessitam de ventilação mecânica prolongada(VMP) está crescendo globalmente e prevê-se um aumento paralelo ao aumento da necessidade de ventilação mecânica nas UTIs, particularmente em idosos e com condições comórbidas. De fato, essas tendências atraíram a atenção da saúde planejadores de assistência médica, uma vez que pacientes submetidos a VMP geralmente requerem recursos de assistência médica e, portanto, aumento de gastos (ZILBERBERG et al, 2008). No estudo de Hill, por exemplo, pacientes em VMP apresentaram taxas mais altas de readmissão hospitalar, readmissão na UTI e custos totais de assistência médica, além de taxas mais altas de morbidade em um estudo prospectivo recente no Canadá. A análise dos dados da amostra nacional de pacientes internados nos Estados Unidos revelou uma tendência crescente para a necessidade de cuidados paliativos em pacientes recebendo VMP (HILL et al, 2017).

Portanto, a duração da ventilação mecânica parece ser um indicador aceitável de complicações significativas de saúde, bem como de custos com assistência médica. Dessa forma, é necessário prever o tempo de ventilação mecânica, com várias equações propostas e abordagens metodológicas para esse fim na literatura. Além disso, prever a ventilação mecânica pode ser uma justificativa robusta para a melhoria da qualidade em uma determinada UTI (ESTENSSORO et al, 2005)(GHAURI et al, 2019).

Um estudo de coorte multicêntrico e retrospectivo de pacientes sob VM identificou que pacientes com necessidade de ventilação mecânica prolongada (suporte com VM $\geq$ 21 dias) possuem um risco maior de complicações durante a permanência na UTI, taxas mais elevadas de mortalidade durante a permanência na UTI e no hospital, e custos maiores relativos à doença (LOSS et al, 2015).

Então, retirar o paciente da ventilação mecânica talvez seja muito mais difícil que mantê-lo. Considera-se ventilação mecânica prolongada a dependência da assistência ventilatória, invasiva ou não-invasiva, por mais de 6 h por dia por tempo superior a três semanas, apesar de programas de reabilitação, correção de distúrbios funcionais e utilização de novas técnicas de ventilação (III Consenso Brasileiro de Ventilação Mecânica).

2.4 Traqueostomia

Em pacientes que necessitam de longos períodos de VM, o imobilismo e a fraqueza musculares esquelética são as mais comuns e importantes complicações encontradas nas UTIs como os pacientes (MENDES et al., 2013). Isso se agrava quando nos deparamos com doentes críticos crônicos em função das características de fraqueza profunda atribuída à miopatia, neuropatia e alterações da composição corporal, maior vulnerabilidade a infecção, estado de coma ou delírio e deficiências nutricionais, assim como sintomas de dor, depressão e ansiedade (IBRAHIM et al., 2012).

A traqueostomia é um procedimento comumente realizado em pacientes críticos, indicações são claras, incluindo ventilação mecânica prolongada, necessidade de proteção das vias aéreas, dificuldade de desmame da ventilação mecânica, Escore de coma de Glasgow persistente <8, polineuropatia e obstrução das vias aéreas superiores (ZAPATA et al., 2019) .

A traqueostomia é considerada uma alternativa na promoção e na facilitação do desmame ventilatório e, por isso, está entre os procedimentos cirúrgicos mais comumente realizados em pacientes críticos nas UTIs que necessitam de suporte ventilatório prolongado. Importante considerar que a indicação de TQT não se limita ao paciente crítico. Nas Unidades de Terapia Intensiva, a TQT É também realizada em momentos de urgência para acesso respiratório de vias aéreas difíceis(MACLNTYRE et al, 2005). É um procedimento comum em pacientes exigindo ventilação mecânica prolongada e proteção das vias aéreas na unidade de terapia intensiva (SINGH et al, 2017).

Teoricamente, a traqueostomia pode reduzir as cargas resistivas inspiratórias e expiratórias, porque, em comparação com os tubos endotraqueais, as cânulas têm diâmetros internos maiores e são menos suscetíveis à deformação e obstrução termolábil devido a secreções. A traqueostomia também pode melhorar o fluxo expiratório, minimizando a pressão expiratória final intrínseca positiva (PEEPi) (METHA etal, 2015).

Alguns estudos divergem sobre o tempo para a realização da TQT. Segundo Cheung e Napolitano (2014) é considerada precoce quando executada de 3 a 10 dias de ventilação mecânica, enquanto a tardia, é variável e definida a qualquer tempo após o período precoce, entre 7 a 14, 14 a 28 ou maior que 28 dias depois do início da

ventilação mecânica. A traqueostomia precoce é aquela realizada em 7 dias ou menos após a intubação traqueal(LIN et al, 2015).

Fisiologicamente, a traqueostomia proporciona uma redução do espaço morto anatômico, da resistência das vias aéreas e do trabalho respiratório; garante ainda um melhor acesso à via aérea, no que diz respeito à remoção de secreções (Ibrahim et al, 2012; MacIntyre, 2005). A traqueostomia proporciona também maior mobilidade e conforto aos pacientes, além de oferecer a possibilidade de comunicação mais efetiva, alimentação, mobilização para fora do leito e alta da UTI com maior segurança (NELSON et al, 2010).

2.5 Desmame Ventilatório

O desmame do paciente é o processo de transição da ventilação mecânica para a espontânea (Oliveira, 2006). Pode ocorrer de três tipos: simples é o sucesso no primeiro teste de respiração espontânea (TRE), difícil é quando ocorre pelo menos uma falha no TRE e de 3 a 7 dias para sair da VM e assim o desmame prolongado ocorre quando pelo menos 3 falhas no TRE ou mais de 7 dias em VM após o primeiro TER (WHITE, 2012).

Cerca de 60% a 70% dos pacientes podem ser extubados após um breve teste em ventilação espontânea. A dificuldade no desmame reside em cerca de 5% a 30% dos pacientes, que não conseguem ser retirados do ventilador em uma primeira ou segunda tentativa (GOLDWASER, 2000).

O teste de respiração espontânea em pacientes traqueostomizados é uma técnica simples, estando entre as mais eficazes para o desmame. É realizado permitindo-se que o paciente ventile espontaneamente através da traqueostomia, conectado a uma peça em forma de “T”, com uma fonte enriquecida de oxigênio, ou recebendo pressão positiva contínua em vias aéreas (CPAP) com PEEP de 5 cm H2O, ou com ventilação com pressão de suporte (PSV) com PS de até 7 cm H2O. Durante o teste, o paciente deve permanecer estável, sem alterações de freqüência cardíaca, freqüência respiratória, pressão arterial e queda de saturação. Passando no teste, o paciente deve ser avaliado, e apresentando condições de ser desmamado da ventilação mecânica, inicia-se o desmame com tubo T (MENDES et al., 2013).

Na prática, ainda há escassez na utilização de protocolos padronizados de desmame em pacientes traqueostomizados e avaliação de seus desfechos (NELSON, 2010).

A falta de um protocolo muitas vezes pode levar a complicações da retirada da assistência ventilatória e da prótese, com necessidade de retornar o suporte. Isso ocorre devido à falta de critérios para retirada da Ventilação Mecânica e até mesmo para retirada da TQT. Através de um protocolo os profissionais poderão ter mais tranquilidade em realizar o procedimento, sendo baseado em fundamentos e referências (MENDES, 2015).

3. MARCO CONCEITUAL

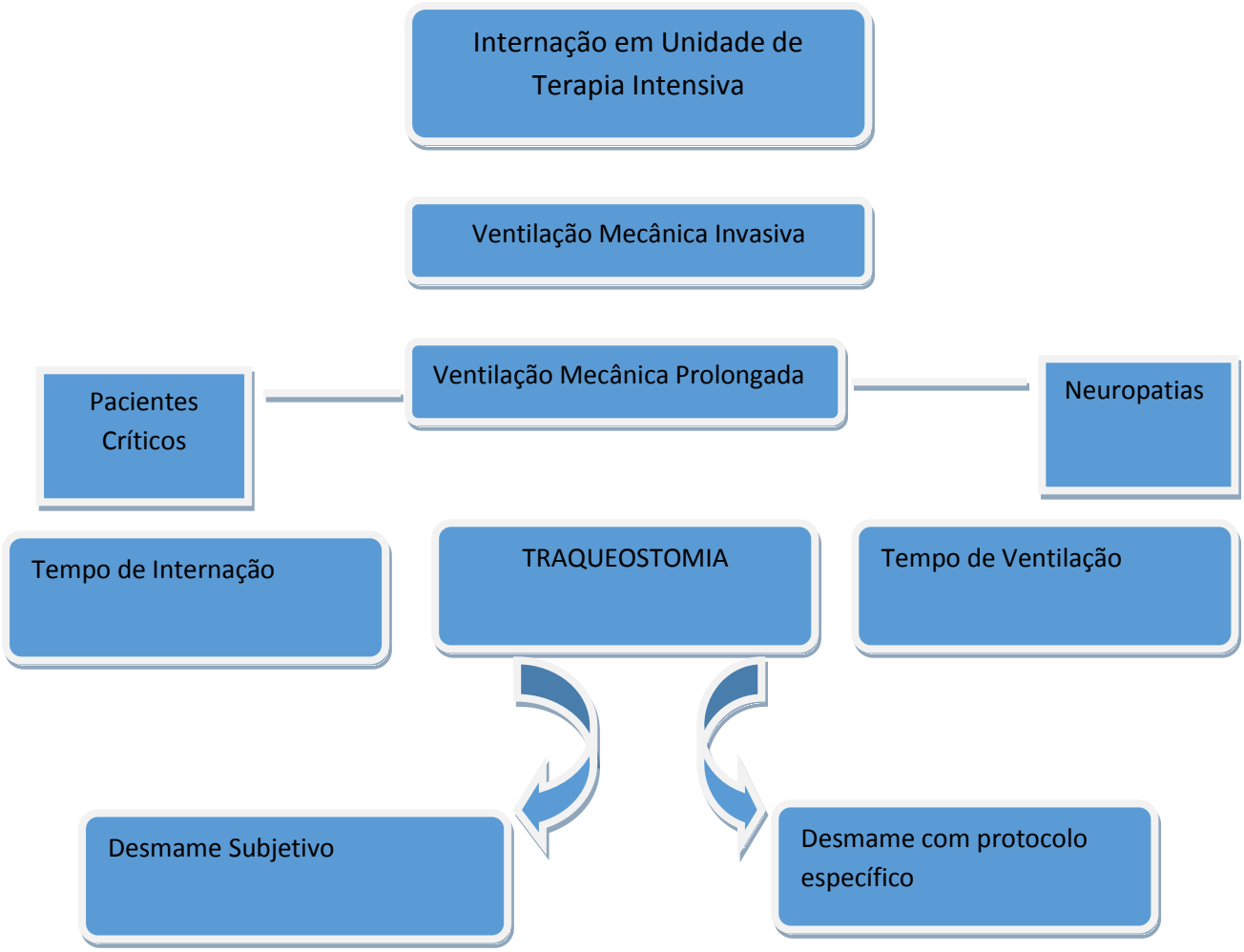

Figura 2. Marco conceitual do Protocolo de Desmame em Pacientes Traqueostomizados.

4. JUSTIFICATIVA

Observa-se um aumento de pacientes com necessidade de suporte ventilatório invasivo nas unidades de terapia intensiva. O aumento na idade populacional e a gravidade das doenças podem estar relacionadas com a grande demanda dos leitos das UTIs. Contudo, tempo de ventilação mecânica invasiva e as falhas de desmame podem dificultar ainda mais a alta do paciente da UTI. A traqueostomia é um procedimento simples e muito utilizado nesses centros. A partir disso, verifica-se a importância de estabelecer critérios para desmame do suporte ventilatório. Existem poucos estudos que estabeleçam critérios de desmames de pacientes submetidos a traqueostomia, sendo a decisão a respeito ainda baseada em avaliações subjetivas.

Identifica-se a necessidade de implementação de um protocolo de desmame em pacientes traqueostomizados, verificando a sua efetividade em relação ao tempo destes pacientes em ventilação mecânica.

5. OBJETIVOS

Apresentam-se a seguir, os objetivos propostos no estudo:

5.1 Objetivo Geral

Avaliar se pacientes traqueostomizados e dependentes de ventilação mecânica apresentam maior sucesso no sucesso do desmame quando comparados a pacientes não submetidos a um protocolo.

5.2 Objetivos Específicos

Verificar o perfil dos pacientes traqueostomizados traqueostomizados submetidos a um protocolo de desmame com pacientes desmamados de forma subjetiva.

Identificar dias de internação em terapia intensiva de pacientes traqueostomizados submetidos a um protocolo de desmame com pacientes desmamados de forma subjetiva.

Identificar dias livres de ventilação mecânica em terapia intensiva de pacientes traqueostomizados submetidos a um protocolo de desmame com pacientes desmamados de forma subjetiva.

Relacionar comorbidades e sepse em pacientes traqueostomizados submetidos a um protocolo de desmame com pacientes desmamados de forma subjetiva.

6. HIPÓTESES

- Após período de ventilação prolongada, pacientes traqueostomizados conseguem ter um tempo mais curto de internação em unidade de terapia intensiva.
- Pacientes traqueostomizados evoluem no desmame ventilatório com um protocolo específico.
- Com um protocolo específico de desmame ventilatório, conseguimos diminuir os dias de internação em unidade de terapia intensiva.

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Weaning protocol with tracheostomized patients: a before and after study

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ABSTRACT

Introduction: The tracheostomy is between the most commonly used with patients in need of prolonged ventilatory support in intensive care unity. Specific protocols for this population are scarce. The purpose of this study was to evaluate if trancheostomized patients and mechanical ventilatory dependents present greater successes in weaning when compared to non-submitted to a protocol. Methodology: The retrospective quasi-experimental study, through of database analysis between the years 2014-2015 (weaned patients in subjective form) 2016 protocol deployment, 2017-2018 (weaning with protocol). Results: The study was conducted with 114 patients (63 in stage 1 and 51 in stage 2), 24 females (38%) and 29 (57%), males 39(62%), 22(43%); clinical hospitalization 49(78%), 36(71%); surgical 14(22%), 15(29%); zero comorbidities 19(30%), 6(12%), one 26(41%), 15(29%), two or more 18(29%), 30 (59%); MV days pre (17 vs 14 p=0,003); weaning days (12 vs 8, p=0,04), ICU hospitalized days(45 vs 37, p= 0,03), death probability APACHE II and Saps-3 (32,4+-18,1 vs 54,9+-25,9,p<0,001), sepsis 17(27%), 28(55%) and death 19(30%), 14(28%). The analysis shows 62% of the submitted to weaning protocol patients were released from mechanical ventilation in the first six days, compared to 18,2% of the non-submitted patients. Therefore, in 15 days (p<0,001), HR=2,15 (IC 95%: 1,02 – 4,53; p=0,044), adjusted by age, genre, comorbities number, sepsis, number of days of MV pre tracheostomy, pulmonary clinical reasons and neurological surgery and death probability. Conclusion: The weaning protocol reveals itself effective to tracheostomized patients in the first days of ventilation after procedure, presenting twice more chances of being weaned of invasive ventilatory support.

Keywords: Traqueostomy, mechanical ventilation, critical cares, respirator weaning, sepsis, clinical protocol

Introduction

The need for mechanical ventilation (MV) is an important mark of patients whose stayed for a long time in Intensive Care Unities (ICU)(1,2,7,21). Those chronic patients or long-days mechanical ventilation dependents have raised significantly in last years, because the improvement of caring in ICU and reduction of mortality rates in acute stage.

The tracheostomy is intended when the same patients need more time of mechanical ventilation, with the objective of reduce laryngeal injuries due to prolonged tracheal intubation, greater breathing confort, less need for sedation and facilitation of respiratory secretion removal (3,4,6). About, 10% of the patients whose need mechanical ventilation are tracheostomized with the objective to facilitate the prolonged mechanical ventilation weaning support. The definitions of the starting time were quite variable, between 21 days to 3 days. The tracheostomy in 10 days was well investigated until 15 randomized clinical trials, and most of these studies had early traqueostomy in 7 days(4,5). The weaning in tracheostomized patients and the decannulation moment of them still need greater understanding and few authors describe specific skills to reach these goals(3). Therby, the purpose of this study was evaluate if tracheostomized patients and mechanical ventilation dependents present greater success in weaning when compared to protocol non-submitted patients.

Patients and Methods

Study design

The retrospective quasi-experimental study performed after the Ethics and Research Clinic Hospital of Porto Alegre Comitee and Moinho dos Ventos Hospital (number CAAE 17976619.7.0000.5327) approvals. The study was conducted in the Intesive Care Unity from Moinho dos Ventos Hospital, Porto Alegre, Rio Grande do Sul, Brazil, through database analysis routinely collected in that unity.

Population under study

The study were shared in two moments. The first (pre-protocol weaning stage) were analyzed all the tracheostomized patients in the years 2014 and 2015. The weaning protocol in tracheostomy was setted up in the unity during whole 2016 (training stage). In that period, the data wasn't collected. In the study second stage were analysed the tracheostomized patients in the years 2017 and 2018, therefore, submitted to tracheostomy weaning protocol.

Exclusion and inclusion standards

Were included patients with ventilatory drive, which had started the weaning until 24 hours after the tracheostomy, in mechanic ventilation with adjusted parameters in support pression, with PEEP less or equals to 10cmh20, FiO2 less or equals to 40% and excluded patients previously tracheostomized, in palliative care, no ventilator weaning perspectives, neuromuscular degenerative disease.

Tracheostomy weaning protocol description

The tracheostomy weaning protocol application (Picture 1) is routine in the unity, performed by physioterapists after discuss with the medical and support team, obeying the inclusion standards. All stages are advanced if the patient remains stable, without respiratory distress signs and vital signs alteration.

If the patient doesn't tolerate certain stage (day), must return to MV and try the same stage next day. If the patient doesn't tolerate, for two days in a row, certain stage, must return to MV and the next day restart the protocol since first stage. Therefore, success in the protocol 48 hours without ventilator support after the last stage.

Statistical Analysis

The quantitative variables were described for average and standard deviation or median and interquartile amplitude. The categorical variables were described for absolute and relative frequencies.

To compare averages, the t-student test was applied. In asymmetry case, the Mann-Whitney test was applied. The proportions comparison, the qui square test from Pearson or Fisher exact test were applied. To estimulate the probability free from MV, the Kaplan-Meier method was applied and the curves were compared in the log-rank test. To control the confusing factors, the Cox proportional hazards was used. The standard to variable input in the multivariate model was that the same displays a $p<0,20$ value in the bivariate analysis.

The significance level adopted was 5% (p<0,05) and the analysis were performed in the SPSS program version 21.0.

Results

During the period of the study, were analyzed 114 tracheostomized patients, between 2014 and 2018(63 on stage 1 and 51 on stage 2). The chart presents the basic features of the sample studied in this population with age (72,5 +-15,7 vs 66,1+-19,3; p=0,05); female 24(38%) and 29(57%), male 39(62%), 22(43%); clinical admission 49(78%), 36(71%); surgical 14(22%), 15(29%); comorbities zero 19(30%), 6(12%), one 26(41%), 15(29%), two or more 18(29%), 30 (59%); days of MV pre (17 vs 14, p= 0,003); weaning days (12 vs 8, p=0,04), days of hospitalization in ICU(45 vs 37, p= 0,03), death proabiblity APACHE II e Saps-3 (32,4+-18,1 vs 54,9+-25,9, p<0,001), sepsis 17(27%), 28(55%), p=0,005 and death 19(30%), 14(28%), p=0,91.

There was a significant raise of the comorbities number in patient who were in protocol when compared to the period before the protocol, being that diseases were significantly different between the period were: SAH (51%1 vs 2,7%; p<0,001), HF (31,4% vs 1,6%; p<0,001) and cirrhosis (0% vs 9,5%: p=0,032).

Measured only less than 15 days (p<0,001), HR=2,15 (IC 95%: 1,02 – 4,53; p=0,044), adjusted for age, genre, number of comorbities, sepsis, number of days of MV pre tracheostomy pulmonary, clinical reasons and neurological surgery and death probability.

Discussion

Tracheostomized patients submitted to a specific weaning protocol of mechanic ventilation presentes twice more chances to be weaned of invasive ventilatory support.

Estimate that the proportion of the intensive medicine has presented a constantly growing in last decades, supported by the main technologic advance performed in medical and scientific areas, it is known about the support role provided by mechanic ventilation for life maintenance.

For the patients who remain dependent of ventilator, the tracheostomy can favor the transition of acute caring for the rehab environment and allow support respiratory care until a possible recover (10,18,22,23). Thefore, an increasing number of patients who have prolonged mechanic ventilation need, improving to tracheostomy and raising the prolonged hospitalization time. Approximately a quarter of the patients with prolonged mechanical ventilation present generalized and persistent muscle weakness, and recent estimate indicate that 1 million of individuals can develop neuromyopathy for critical disease each year (5,18). This attitude raises the consequences of weaning failure because of ineffective cough and retention of secretion.

Studies observed a raising of tracheostomy use in whole population of general intensive care, e many patients having hospital discharge depending of ventilation (19,20,21). The tracheostomy use diversifies between the countries. France, Greece, Italy and Belgium had a significant percentage of users in tracheostomy with ventilation. Another countries with users comparatively greater with neuromuscular disease. About 50% of the dutch neuromuscular patients had a tracheostomy, in comparison with 35% percent in Denmark and just 18% in Sweden(19).

In our sample 62% of the patients submitted to weaning protocol were released from mechanical ventilation in the first 6 days, compared to 18,2% of non-submitted to a protocol patients. Therefore, in 15 days (p<0,001), HR=2,15 (IC 95%: 1,02 – 4,53; p=0,044), adjusted by age, genre, comorbities number, sepsis, number of days of MV pre tracheostomy, pulmonary clinical reasons and neurological surgery and death probability. As well, it was presented less hospitalized days before with average of 45 and after 37 days. This result was found in the same group with greater severe and incidence of sepsis. The days of pre tracheostomy ventilation decreased observing a small decline but perhaps significant for the weaning success, suggesting that the tracheostomies now are putted on after a similar duration of mechanic ventilation in comparison with that conditions in general intensive care (14,22,25).

The weaning protocols became popular since the publication of guidelines for task force about the discontinuation of ventilator in 2001(8). Many studied report that weaning protocol reduced the ventilation total duration, weaning duration and the ICU staying time without affect the mortality or adverse events (9,12,15). However, these outcomes weren't confirmed in the tracheostomized population yet.

In tracheostomized for accute respiratory insufficiency, many patients could eventually be released from invasive MV after the successful treatment, some of them still require prolonged weaning(23) and continuum use of non-invasive ventilation, presenting that remain dependent of invasive ventilation is associated to a high risk of extremely bad quality of life (23,24).

Because of the lack of ventilatory weaning protocols to critical patients, according to a recent definition of consensus in critical diseased, resulted in a two factors combination: received treatment in ICU for at least 8 days or at least one in each five eligible conditions (prolonged MV> 96 H; tracheostomy; sepsis or other severe

infections; severe wounds and/or multiple organ failure; ischemic stroke, brain hemorrhage or traumatic brain injury), prolonged MV and tracheostomy were the two reliable indicators that occur in patients with accute respiratory insufficiency(ARI)(7).

In a study of 123 (38%) patients 12 were successful in weaning and 47 weren't, but at least one opportunity of weaning (2). About curiosities and what we should know about tracheostomies, were found in tracheostomies performed in low extubation complication rates patients, when the ventilator weaning time between 14, 28 days or a month after performed when there are rare clinical indications (9). A multidisciplinary evaluation, considering the life expectancy of the patient, life quality and future interaction with their families and caregivers after ICU and hospital discharge. The mechanical ventilation support treating in intensive care unities for 909 adults in United Kingdom, the early tracheostomy in 4 days after hospitalized in intensive care wasn't associated with a improvement of mortality in 30 days or other important secondary results (11).

In many observational studies of cohort examinated the questions of an ideal moment of tracheostomy, retrospective study of 531 subjects in mechanical ventilation ICU medical / surgical mixed determined that the time before tracheostomy correlated with less time in mechanical ventilation and less time in ICU and hospitalization, but wasn't associated to hospital death (13). The progressive increase of spontaneous breathing time, alternated with ventilator support sufficient to reduce the breathing work of the patient below the fatigue threshold, promote an endurance improvement of breathing muscles, allowing more training, which provides greater spontaneous breathing time (16,20).

The literature has shown, recently, that systematic identification protocols of interruption conditions of mechanic ventilation can reduce significantly its duration

(17). Weaning specific protocols in the intensive care unities can reduce the hospital internment time. The removal in short periods of the day of the mechanical ventilation mainly in the first weaning days after tracheostomy, can be great predictors to avoid muscle fatigue, improve mobility, reduce the hospitalization time and mechanical ventilation for this profile of critical patient dependents of prolonged mechanic ventilation periods.

Unprecedented study with the weaning protocol use to trancheostomized patients, those considered severe, in a population of 114 patients there was a significant increase of sepsis in patients which entered in the protocol when compared to the period before the protocol, patients remain with less ventilation days.

The applied protocol in a growing population, presents great impact inside the intesive care unity to reduce the hospitalization days and make the diseased be weaned in the first 15 days of ventilation after trancheostomy.

Conclusion

The weaning protocol is effective for tracheostomyzed patients in the firt days of post-procedure ventilation, twice as likely to be weaned from invasive ventilatory support.

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Date		**Ayre (5l/min)**		**Failure Reasons**
	1st Day	**1h morning/ 1h afternoon /1h evening**		
	2nd Day	**3hs morning / 3hs afternoon**		
	3rd Day	**6hs morning/6hs afternoon**		
	4th Day	**12hs day**		
	5th Day	**24hs**		
	6th Day	**48hs**		

Picture 1. Tracheostomy Weaning Protocol

Source: Prepared by the author

Chart 1 Basal characteristics tracheostomized patients

Variables	**Before** **(n=63)**	After (n=51)	**P**
Age (years-old) – average ± DP	72,5 ± 15,7	66,1 ± 19,3	0,055
Genre – n(%)			0,070
Female	24 (38,1)	29 (56,9)	
Male	39 (61,9)	22 (43,1)	
Hospitalization reason – n(%)			0,509
Clinical	49 (77,8)	36 (70,6)	
Surgical	14 (22,2)	15 (29,4)	
Clinical Reasons – n(%)			
Neurologicals	10 (15,9)	12 (23,5)	0,429
Pulmonaries	29 (46,0)	14 (27,5)	0,066
Cardiovasculars	7 (11,1)	4 (7,8)	0,752
Kidneys	1 (1,6)	0 (0,0)	1,000
Metabolics	9 (14,3)	7 (13,7)	1,000
Surgical Reasons – n(%)			
Cardiovasculars	3 (4,8)	2 (3,9)	1,000
Neurologicals	2 (3,2)	11 (21,6)	0,006
Trauma	4 (6,3)	3 (5,9)	1,000
Abdominal	5 (7,9)	2 (3,9)	0,457
Numbers of comorbity – n(%)			0,003
Zero	19 (30,2)	6 (11,8)	
One	26 (41,3)	15 (29,4)	
Two or more	18 (28,6)	30 (58,8)	
MV days pre-Tracheostomy – median (P25-P75)	17 (15-27)	14 (10-21)	0,003
Weaning days – median (P25-P75)	12 (9-14)	8 (6-14)	0,044
Hospitalized in ICU days – median (P25-P75)	45 (38-56)	37 (23-53)	0,031
Death probability* - average ± DP	32,4 ± 18,1	54,9 ± 25,9	<0,001
Sepsis – n(%)	17 (27,0)	28 (54,9)	0,005
Death – n(%)	19 (30,2)	14 (27,5)	0,913

* By APACHE or SAPS

9. CONSIDERAÇÕES FINAIS

A realização de pesquisas relacionadas a protocolos específicos para pacientes críticos apresenta algumas limitações de avaliação e falta de publicações sobre. O presente estudo proporcionou informações importantes sobre a eficácia de um desmame específico do protocolo nos primeiros dias após procedimento, contribuindo para diminuir os dias de ventilação mecânica e o tempo de internação em terapia intensiva.

São necessários mais estudos multicêntricos com um número maior de pacientes, avaliando decanulação e funcionalidade dessa população.

O presente estudo, apesar da escassez de publicações sobre protocolos em traqueostomizados, apresenta resultados importantes para desmamar o paciente antes da ventilação e diminuir o tempo de internação.

10. PERSPECTIVAS FUTURAS

A partir dos resultados obtidos nesse estudo que verificou a importância de um protocolo de desmame ventilatório específico para pacientes traqueostomizados, observa-se interesse em:

- Investigar a condição funcional de pacientes desmamados da ventilação mecânica através do protocolo de desmame;
- Execução de um estudo multicêntrico.

11. ANEXOS

11.1 STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation
Title and abstract Pag:28	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/rationale Pag: 30	2	Explain the scientific background and rationale for the investigation being reported
Objectives Pag:28	3	State specific objectives, including any prespecified hypotheses
Methods		
Study design Pag:31	4	Present key elements of study design early in the paper
Setting Pag:31	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants Pag:31	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case
Variables Pag:31-32	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable

Data sources/ measurement Pag:31	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias
Study size	10	Explain how the study size was arrived at
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods Pag:31	12	(*a*) Describe all statistical methods, including those used to control for confounding
		(*b*) Describe any methods used to examine subgroups and interactions
		(*c*) Explain how missing data were addressed
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy
		(*e*) Describe any sensitivity analyses

Continued on next page

Results		
Participants Pag:33	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed
		(b) Give reasons for non-participation at each stage
		(c) Consider use of a flow diagram
Descriptive data Pag:31-32	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders
		(b) Indicate number of participants with missing data for each variable of interest
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time
		Case-control study—Report numbers in each exposure category, or summary measures of exposure
		Cross-sectional study—Report numbers of outcome events or summary measures
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included
		(*b*) Report category boundaries when continuous variables were categorized
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
Discussion		
Key results Pag:34	18	Summarise key results with reference to study objectives
Limitations Pag:36	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation Pag:34-36	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	21	Discuss the generalisability (external validity) of the study results

Pag:36-37

Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

11.2 Normas para Publicação

Author Guidelines

RESPIRATORY CARE welcomes original manuscripts related to the science of respiratory care. The Journal is published in both print and electronic formats.

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GUIDELINES FOR AUTHORS

GENERAL GUIDELINES

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Manuscripts must conform to the International Committee for Medical Journal Editors' (ICMJE) Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals and to these instructions.
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- Give consent to submission and publication of the work
- Have participated in the research and in the shaping of the manuscript
- Have read and approved the manuscript
- Be able to publicly discuss and defend the manuscript's content

Authorship is not based on obtaining funding, offering advice, or similar. Persons who contribute such may be mentioned in the Acknowledgments. Authors must take responsibility for at least one component of the work, be able to identify who is responsible for each other component, and be confident in their co-authors' integrity.

The contributions of each author must be listed on the Title Page (literature search, data collection, study design, data analysis, manuscript preparation, manuscript review).

Any editorial contributions made by outside organizations, persons, funding bodies, or persons employed by funding sources must be acknowledged on the Title Page.

Duplicate Publication and Plagiarism

The manuscript must not have been previously published elsewhere and must not be currently under consideration for publication elsewhere, including online. If any part of the material (other than a brief abstract submitted to a national or international meeting) has been published or is currently under consideration for publication elsewhere, you must provide copies of all related material at the time of submission.

Conflict of Interest

The conflict of interest policy of Respiratory Care is consistent with that of JAMA,1 ICMJE,2 CSE,3 and WAME.4 Disclosures must be made at the time of

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The following examples are considered conflicts of interest and require disclosure:

- Being an employee of a company that designs, manufactures, or sells respiratory care equipment
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These examples are intended to illustrate the types of relationships that constitute conflicts of interest in the field of respiratory care, and are not meant to be all-inclusive.

The conflict of interest policy also applies to the Journal's Editors, Editorial Board members, and all manuscript reviewers.

Disclosure of relationships will not necessarily affect the decision to publish a manuscript. Having such relationships is not considered unethical. However, not disclosing such relationships is unethical.

1. Flanagin A, Fontanarosa PB, DeAngelis CD. Update on JAMA's conflict of interest policy. JAMA 2006;296(2):220-221. doi: 10.1001/jama.296.2.220
2. International Committee of Medical Journal editors. Recommendations for the conduct, reporting, editing, and publication of scholarly work in medical journals. Updated December 2014. Accessed January 27, 2015
3. Council of Science Editors. Editorial policy statements approved by the CSE Board of Directors. http://www.councilscienceeditors.org/i4a/pages/index.cfm?pageid=3332 A ccessed January 27, 2015
4. World Association of Medical Editors. Recommendations on publication ethics policies for medical journals. http://www.wame.org/about/recommendations-on-publication-ethics-policie Accessed January 27, 2015

Industry Relationships

Respiratory Care requires authors to indicate the role of funding organizations or sponsors in the design of the study, data collection, data analysis, and interpretation of the data. Authors must also disclose the role of funding organizations in the preparation,

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Individuals who provided paid contributions to the paper (including writers, statisticians, epidemiologists, and any others involved with data management and analyses) may meet the criteria for authorship. If they do not, they should be listed in the Acknowledgment section.

Respiratory Care will not consider submissions that are ghost written by industry employees or hired writers. Nor will the Journal consider submissions of industry-sponsored studies in which the data were collected and analyzed solely by employees of the company. Such studies are considered only if there is independent analysis of the methods and data by someone at an academic institution, who has research and publishing experience (eg, medical school, academic medical center, or government research institute).

For additional information related to relationships between authors and industry, refer to: Fontanarosa PB, Flanagin A, DeAngelis CD. Reporting conflicts of interest, financial aspects of research, and role of sponsors in funded studies. JAMA 2005;294(1):110-111 doi: 10.1001/jama.294.1.110.

Registration of Clinical Studies

Respiratory Care will only consider clinical trials that are registered, as appropriate, at ClinicalTrials.gov or equivalent.

Ethics of Investigation

All studies that include human subjects must indicate in the Methods section that approval was received from the appropriate local institutional review board (IRB) or Ethics Committee. This requirement applies to retrospective studies, prospective studies, quality improvement projects, and surveys. Human research subjects may be hospital patients, healthy volunteers, clinicians, or students. It is important to note that the IRB, not the investigator, determines whether a study is exempt from full review.

Authors must comply with the Health Insurance Portability and Accountability Act (HIPAA) . This applies to any information (eg, text, photo, or radiograph) that could potentially identify a patient or subject. Authors must provide written consent from the individual, next of kin, or guardian.

All studies involving animals must indicate in the Methods section that approval was received from the local IACUC (Institutional Animal Care and Use Committee) or that the research was conducted in accordance with a national guideline (eg, Public Health Service Policy on Humane Care and Use of Laboratory Animals).

MANUSCRIPT TYPES

Original Research

Original research is a report of an original investigation. It must include: Title Page, Structured Abstract, Key Words, Introduction, Methods, Results, Discussion, Conclusions, References, and Quick Look. It may also include Tables, Figures, and Acknowledgments. Supplementary Material, such as a survey instrument or details related to the methods, may be provided for online publication only. Authors of randomized clinical trials must follow the CONSORT guidelines. One of the figures must be a CONSORT flow diagram.

Quality Improvement Projects

A well-done quality improvement project might be suitable for publication as original research. This type of research is commonly performed in the healthcare setting to understand and improve practice. Several considerations are important for a quality improvement project to be suitable for publication. It must have generalizable interest among the readers of the Journal and it must follow the scientific method. This means that the study must have an identified question or hypothesis, approval from the Institutional Review Committee, and statistical analysis of the data is necessary. Quality improvement projects are submitted in the category "Original Research."

Reviews

Narrative Reviews

A narrative review is a comprehensive review of the literature that does not follow the rigor of a systematic review. It must include: Title Page, Outline, Unstructured Narrative Abstract, Key Words, Introduction, Review of the Literature, Summary, and References. The review of literature is typically divided into headings and sub-heading specific to the subject matter. The Outline consists of the headings and subheading of the paper. The review may also include Tables, Figures, Acknowledgments, and Supplementary Material for online publication only. Narrative reviews are usually written by persons with established expertise in the subject area.

A newer form of review is the scoping review. This has aspects of both narrative and systematic reviews. A scoping review will typically include a detailed search for relevant studies, and will include reports of various evidence levels (eg, randomized clinical studies, observational studies, bench studies, case series). In a scoping review, there is no critique of the individual studies included. The span of a scoping review tends to be much broader than systematic reviews. A scoping review is submitted in the category "Narrative Review."

Systematic Reviews

Because of their methodological rigor, systematic reviews have become the standard for synthesizing evidence in health care. A systematic review organizes relevant evidence that fits pre-specified eligibility criteria to answer a specific research question. It uses explicit, systematic methods to minimize bias in the identification, selection, synthesis, and summary of studies. Some, but not all, systematic reviews contain a meta-analysis. A meta-analysis uses statistical techniques to combine and summarize the results of multiple studies. The systematic review must follow the PRISMA guidelines. A systematic review must include: Structured Abstract, Key Words, Introduction, Methods, Results, Discussion, Conclusions, and References. It may also include Tables, Figures, Acknowledgments, and Supplementary Material for online publication only. One of the Figures must be a PRISMA flow diagram. Other figures might be the results of a meta-analysis (forest plots). Systematic reviews are generally written by persons with established expertise in the subject area.

Editorial

An invited manuscript related to another paper published in the same issue. Must include: Title Page, Text, and References. May also include Tables and Figures.

Correspondence

A brief communication responding to previously published material in Respiratory Care. Must include: Title Page, Text, and References. May include Tables and Figures. Correspondence is published online only.

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For each author include:

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Indicate the specific contributions of each author to the paper:

- Literature search
- Data collection
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- Review of manuscript

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- Name and location of the institution where the study was performed
- Name, date, and location of any meeting or forum where research data were previously presented, and who presented
- Sources of financial support
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Identify corresponding author and provide contact information

Abstract

A structured abstract for an original research study and a systematic review includes these sections: Background, Methods, Results, and Conclusions. Abstracts must not contain any facts or conclusions that do not also appear in the text.

An unstructured Abstract for a Narrative Review is written as a paragraph of fewer than 300 words that provides a general overview of the paper.

Include the Abstract in the main manuscript text file.

Key Words

List 6–10 key words or phrases that reflect the content of your manuscript. Key words may be selected from the Medical Subject Headings (MeSH terms) used by MEDLINE.

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Double-space all text (including Tables and References). Number the pages. Center and bold 1st level headings; flush-left and bold 2nd level headings; indent and bold 3rd level headings.

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EndNote contains the style for Respiratory Care: http://endnote.com/downloads/style/respiratory-care
Journal Article
Article. List the first 6 authors, then "et al". Exception – in a paper with 7 total authors, list all 7:
Wallet F, Delannoy B, Haquin A, Debord S, Leray V, Bourdin G, et al. Evaluation of recruited lung volume at inspiratory plateau pressure with PEEP using bedside digital chest x-ray in patients with acute lung injury/ARDS. Respir Care 2013;58(3):416-423.

Corporate authors:
Chang SY, Dabbagh O, Gajic O, Patrawalla A, Elie MC, Talmor DS, et al; on behalf of the United States Critical Illness and Injury Trials Group: Lung Injury Prevention Study Investigators (USCIITG-LIPS). Contemporary ventilator management in patients with and at risk of ALI/ARDS. Respir Care 2013;58(4):578-588.

Article in a supplement:
del Giudice MM, Leonardi S, Ciprandi G, Galdo F, Gubitosi A, La Rosa M, et al. Probiotics in childhood: allergic illness and respiratory infections. J Clin Gastroenterol 2012;46(Suppl):S69-S72.
Corrected article:
Mireles-Cabodevila E, Hatipoğlu U, Chatburn RL. A rational framework for selecting modes of ventilation. Respir Care 2013;58(2):348-366. Erratum in: Respir Care 2013;58(4):e51.
Articles e-published online ahead of print:
Nozoe M, Mase K, Murakami S, Okada M, Ogino T, Matsushita K, et al. The relationship between spontaneous expiratory flow-volume curve configuration and airflow obstruction in elderly COPD patients. Respir Care 2013 [Epub ahead of print] doi: 10.4187/respcare.02296
Abstract. Citing abstracts is highly discouraged. Those more than 3 years old should not be used:

Blakeman TC, Rodriquez D, Branson RD. Evaluation of five chemical oxygen generators (abstract). Respir Care 2012;57(10):1751.

Editorial:
Rouby JJ, Arbelot C, Brisson H, Lu Q, Bouhemad B. Measurement of alveolar recruitment at the bedside: the beginning of a new era in respiratory monitoring? (editorial). Respir Care 2013;58(3):539-542.

Editorial, no author given:
Asthma: not just for kids (editorial). Johns Hopkins Med Lett Health After 50 2012;24(8):6.

Letter:
Haynes JM. Expiratory reserve volume maneuver may be the preferred method for some patients during spirometry testing (letter). Respir Care 2013;58(2):e14-e15. author response: e15.

Books

Book. Corresponding pages should be cited whenever reference is made to specific statements or content:
Wilkins RL, Stoller JK, Kacmarek RM. Egan's fundamentals of respiratory care, 9th edition. St Louis: Mosby|Elsevier; 2009:400-404, 917.

Corporate authors:
Panel on Understanding Cross-National Health Differences Among High-Income Countries; Committee on Population Division of Behavioral and Social Sciences and Education; Board on Population Health and Public Health Practice; National Research Council; Institute of Medicine of the National Academies. U.S. health in international perspective: shorter lives, poorer health. Washington, DC: National Academies Press; 2013.

Chapter:
Heffner JE. Chronic obstructive pulmonary disease. In: Hess DR, MacIntyre NR, Mishoe SC, Galvin WF, Adams AB. Respiratory care principles and practice, 2nd edition. Sudbury, MA: Jones & Bartlett; 2012:735-764.

Online Material
Static material must be listed in the References and include the digital object identifier (DOI). Use a DOI for content published online only. Because these items are static, there is no need to include an access date:
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Write 2–4 declarative sentences summarizing current understanding of the topic being studied. Think of it as defining the state of the art or establishing equipoise.

DO – State the current evidence on the subject

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Example Quick Look
Current knowledge
The endotracheal tube cuff allows positive pressure ventilation and protects the airway from aspiration. Standard cuff pressures of 20–30 cm H2O are typically used to prevent leakage of fluid around the cuff and to prevent mucosal injury. In recent years, laboratory evaluations of cuffs in glass models have demonstrated reduced fluid leakage, but clinical studies have not confirmed these findings in vitro.

What this paper contributes to our knowledge
In a realistic viscoelastic model of the trachea, endotracheal tube cuffs of different designs provided an adequate seal at a pressure of 12 cm H2O. With increased PEEP,

higher cuff pressures were required. Tubes with a subglottic suction channel performed best in the lateral position.

Figures
Use of Figures is encouraged. Include only Figures that clarify and augment the text. All Figures must be called-out in the text. Number consecutively as Figure 1, Figure 2, etc.

The first Figure in the report of a clinical trial must be a flow diagram showing phases of the trial (ie, enrollment, subject allocation, follow-up, and analysis). See CONSORT. Each Figure must be uploaded to Manuscript Central as a separate image file, NOT embedded in the text.

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Every Figure must have a legend explaining every component of the Figure. The legend should be self-sufficient and allow the reader to understand the figure without referring to the text.

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Write equations as normal text. Do not use the equation function in Microsoft Word or other mathematics software.

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For original research papers, the Editor recommends working with a biostatistician to assure appropriate analysis. The Editor may request a letter from your biostatistician assuring that the analysis is correct.

In the Methods section, identify the statistical tests used to analyze the data. Indicate the *P*-value that was taken to indicate significance. State whether tests were one-tailed or two-tailed; justify the use of one-tailed tests. Identify post-hoc analyses. Cite references to support your choice of tests and identify any statistical analysis software used. Indicate how the power analysis was conducted to determine appropriate sample size.
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Always report the units of measurement according to current scientific usage. Standard units of measurement and scientific terms may be abbreviated without explanation (eg, L/min, mm Hg, pH, O_2). The Journal uses most values in Systeme Internationale (SI)

units. For blood gas values, we prefer mm Hg to kPa. For airway pressure, we prefer cm H_2O rather than millibars.

Pulmonary Terms and Symbols

Use the Preferred Pulmonary Terms and Symbols (Appendix 1). Use abbreviations sparingly. Do NOT invent new abbreviations for terms with long-held standard abbreviations. Use an abbreviation only if the term occurs 4 or more times in the manuscript.

The following commonly used abbreviations do not need to be defined: ARDS, CI, COPD, CPAP, DNA, FDA, FEV_1, F_{IO2}, FVC, ICU, P_{aO2}, P_{aCO2}, P_{O2}, P_{CO2}, PEEP, SD, S_{pO2}. We also do not define units (eg, mL, cm, µm, µL).

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Use generic names instead of trade (proprietary) names for both drugs and equipment.

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