

# Weaning and Extubation Assisted With Conversational Hypnosis: A Systematic Review

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## Systematic Review

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# Abstract

**Background:** Patients admitted in intensive care units often receive mechanical ventilation. Prior to extubation, the weaning process could be a major cause of dyspnea and anxiety in awake intubated patients. Hypnotherapy is nowadays commonly used to manage anxiety and pain. Our hypothesis is that hypnosis would decrease stress during the weaning and extubation process.

**Methods:** This systematic review follows PRISMA Guidelines and was registered in PROSPERO (CRD42020171445). Web of Science, MEDLINE and Cochrane Central Register of Controlled Trials databases were searched between 02/23/20 and 03/11/20. We included all types of interventional trials assessing hypnotherapy for intubated patients whom were undergoing the weaning process or extubation. Two of the authors independently screened studies, extracted data and assessed risk of bias from identified trials.

**Results:** One study fulfilled our selection. This case series included 2 patients. Eleven sessions were completed. Hypnotherapy decreased anxiety during the weaning process from a median of 1 point (Interquartile Range: 1.0-2.5). Increase in oxygen saturation is also reported. There was no evidence of neither an anxiety reduction or an oxygen saturation improvement. This is due to the scarcity of publication and the methodological design of the one selected study.

**Conclusions:** We cannot conclude whether or not hypnosis could be recommended in the weaning process of intubated patients. Further studies are needed to assess hypnosis effects.

## Introduction

During intensive care unit (ICU) hospitalization, life-threatening situations frequently need the use of specific critical care devices (mechanical ventilation, hemodialysis, syringe pumps, extracorporeal membrane oxygenation etc.) and drugs (sedation, neuromuscular blocking agents etc.) improving survival but associated with post-ICU psychological issues. Studies point out that survivors tend to remember their hospital stay as a traumatic event filled with stressors such as pain, thirst and the inability to speak or move (1–3). Ventilatory support and the endotracheal tube were most often described as one of the most uncomfortable devices (1,2). The use of the latter furthermore usually leading to an unpleasant feeling of drowning: dyspnea (4).

The ventilatory support is eventually removed when the acute disorder is treated. Ventilatory weaning requires to decrease the ventilatory support received by the patient from the mechanical ventilator. During this weaning process patients' awakesness is essential, needing a reduction in sedation (5). However, this sedation decrease may lead to a discrepancy with the parallel increasing ventilatory effort and therefore dyspnea, anxiety and stress could result. In fact, previous publications reported an association between dyspnea, mechanical ventilation and the development of Post-Traumatic Stress Disorder (PTSD) symptoms (6).

Only few non pharmacological treatments are used to reduce stress factors in mechanically ventilated patients. In a Cochrane review, Bradt and Dileo suggested that music listening may improve anxiety in mechanically ventilated patients (7).

However, there is a growing interest for hypnotherapy in many health settings such as anaesthesia (8), chronic disorders (9) or during invasive procedures (10). Hypnotherapy is indeed commonly used to manage pain and anxiety or reduce the need of medication. Recently, Anlló *et al.* found that a 15 minutes hypnosis session reduced anxiety, dyspnea and respiratory rate in stable COPD patients (11). Finally, Rousseaux *et al.* published a protocol trial which aims to compare hypnosis alone or combined with virtual reality to improve anxiety, pain and fatigue in patients hospitalized in ICU departments after cardiac surgery (12).

To date, studies have seldom assessed the effect of hypnotherapy in critical care. For this reason, its role in mechanically ventilated patients still remains unclear.

The primary aim of this systematic review was to determine whether hypnotherapy during ventilatory weaning and extubation could improve dyspnea.

## Methods

The PRISMA guidelines were used to report this review (13). The present systematic review was registered in the International prospective register of systematic reviews (PROSPERO) under registration number CRD42020171445.

### *Search Strategy*

We searched for eligible studies until 11 March 2020 in the following databases: Web of Science, MEDLINE, Cochrane Central Register of Controlled Trials (See Appendix 1 for the search strategy). We searched on the OpenGrey database and also reviewed references lists of retrieved studies.

### *Eligibility Criteria*

We included all types of interventional trials. Only publications in English, French or Spanish were selected. Studies had to include participants whom were in Intensive Care Units (ICU), ventilated with an endotracheal tube, and whom were undergoing respiratory weaning or extubation. Only adults were selected.

We included trials evaluating hypnotherapy during mechanical ventilation weaning or extubating process. If the study included at least two groups, one of them would not have received hypnotherapy.

### *Outcome measures*

The primary outcome was self-reported dyspnea, without any restriction on the method of measurement.

Secondary outcomes were self-reported anxiety, stress and pain without any restriction on the method of measurement; and extubation success, defined as the proportion of patients free from invasive ventilatory support 48 hours after extubation.

### *Study Selection*

Two authors per trial (JW, AB) assessed the titles and abstracts from reference lists for possible inclusion. These review authors read the full text of articles to make the final decision for inclusion. Disagreements were resolved by discussion (JW, AB). When inclusion was still questionable even with the full text, another reviewer was contacted (CR) to determine whether the article met inclusion criteria. Duplicate publications of the same study were noted, but each trial was counted only once.

### *Data Extraction and Quality Assessments*

Two review authors per trial (JW, AB) extracted the characteristics for each trial. The results were compared, disagreements resolved by discussion (JW, AB, CR). We extracted information on the trial design, number included/analysed, participants' characteristics, country of study, method of assessment, inclusion/exclusion criteria, outcomes, follow-up times, adverse events, dropouts and withdrawals, intervention method and findings as they were reported in the paper.

Two review authors per trial (JW, AB) independently assessed risk of bias. For case report or case-series studies, the evaluation was based on the tool developed by Murad *et al.* for evaluating the methodological quality of this specific study design (14). For case-control or cohort studies, the Newcastle Ottawa Scale was used (15). For randomized and non-randomized controlled clinical trials (respectively RCT and CCT), the evaluation was based on the PEDro scale (16). A study was considered as "high quality" if all the items were present, except those who evaluated the patient and therapist's blinding (items 5 and 6). If any other item was not found in the publication, the study was considered as "low quality".

We used the tool developed by van Tulder *et al.* for evaluating the level of evidence (17) (Table 1).

Table 1. Level of Evidence

a.	Strong – consistent findings amongst multiple high quality RCTs.
b.	Moderate – consistent findings amongst multiple low quality RCTs and/or CCTs and/or one high quality RCT
c.	Limited – one low quality RCT and/or CCT
d.	Conflicting – inconsistent findings amongst multiple trials (RCT and/or CCTs)
e.	No evidence from trials – no RCTs or CCTs

Findings were considered as consistent if all studies had the same conclusions.

RCT - Randomized Controlled Trials

CCT - Nonrandomized Controlled Trials

To minimize the effect of publication bias, we searched the grey literature. To reduce the reporting bias, we consulted CT.gov looking for described protocols of the included studies.

## Results

### *Study Selection and study characteristics*

Thirteen potential studies were retrieved through the search strategies and other hand searched sources. After removing duplicates, we had 10 records. Of these 10 records we included 4 based on the informations in the title and/or abstract. Of those abstracts, we excluded 3 records after reading the full text. Characteristics of excluded studies are listed in Table 2. A flow chart summarizing the study selection process is shown in [Figure 1](#).

Table 2. Characteristics of excluded studies

Excluded study	Reasons of exclusion
<a href="#">Bowen DE. et al (18)</a>	<i>Patient included was tracheotomized</i>
<a href="#">LaRiccia P. et al. (19)</a>	<i>Patient included was tracheotomized</i>
<a href="#">Treggiari-Venzi M. et al (20)</a>	<i>Patient included was tracheotomized</i>

We included 1 study (21). The study's most important characteristics are summarized in table 3. This trial was in English and had been conducted in the United States. This trial was designed as a case report.

Table 3 - Most important characteristics of the included study	
<b>Methods</b>	<p>Study design: Case report</p> <p>N = (A/I) 2/2</p> <p>Country: United States</p>
<b>Participants</b>	<p>Inclusion criteria: two patients</p> <p>- Patient 1: a 60-years-old female with past diagnosis of COPD and amyotrophic lateral sclerosis, hospitalized for a right-sided acoustic neuroma. She was placed on ventilator support post-surgery.</p> <p>The patient was asked to consider the use of hypnotic relaxation to increase her weaning time after 22 days of mechanical ventilation. A written consent from the patient was obtained.</p> <p>- Patient 2: a 78-years-old man with past medical history of pulmonary tuberculosis, alcoholism, chronic cough, and COPD, intubated after being found unconscious.</p> <p>The patient agreed to try hypnosis relaxation 6 days after reintubation (attempted 11 days after the first intubation) and a written consent form was obtained from the patient and physician.</p> <p>Exclusion criteria: none</p>
<b>Intervention</b>	<p>Intervention: The preinduction procedure involved the education of the patient regarding the facts and myths of hypnosis. An eye-fixation method was used, trance state was tested by the procedure described by Friedlander and Sarbin (1938). This involves suggesting a series of motor exercises. The trance lasted approximately 20 minutes. Both patients were seated in a comfortable chair, ear oximetry was monitored before, during and after hypnosis.</p> <p>The first patient was unable to perform the eye closure and catalepsy test because of the paralysis of her right ocular muscles.</p> <p>Control: none</p>
<b>Outcomes</b>	<ul style="list-style-type: none"> <li>- Anxiety, with a 4-point scale (0-calm, 1-mild anxiety, 2-moderate anxiety, 3-severe-anxiety)</li> <li>- Oximetry</li> </ul> <p>Follow-up times: 8 days of hypnosis sessions and 5 days without hypnosis for the first patient. 3 days of hypnosis sessions and 9 days without hypnosis for the second patient.</p>

	<p>Reported findings:</p> <ul style="list-style-type: none"> <li>- Reduction of anxiety level (loss between 1 and 3 points after hypnosis session)</li> <li>- Increase in oxygen saturation after each session</li> <li>- No need for ventilatory support during the waking hours for the first patient</li> <li>- Successful extubation for the second patient.</li> </ul>
<b>Notes</b>	<p>Dropouts and withdrawals: none</p> <p>Adverse events: none</p>

### *Participants Characteristics*

The selected study involved 2 patients. Participants' ages varied from 60 to 78 years, respectively a female and a male. These patients had substantial co-morbidities like chronic obstructive pulmonary disease (COPD) and amyotrophic lateral sclerosis (ALS) for one of them and COPD, alcoholism and tuberculosis for the other one. The interventions began respectively on the 13th and 23rd day of mechanical ventilation support.

### *Risk of bias in included study*

In agreement with the tool developed by Murad *et al.* (14) only exposure, follow-up and reporting bias were potentially reduced. Concerning the other criterias identified, none of them were sufficiently described to be considered as fulfilled. Evaluation of each criteria is given in Table 4.

### *Intervention used in the trials*

Description of the hypnosis procedure followed in the one included trial is given in the Table 3.

Table 4 - Risk of bias of the included study

Risk of bias		
Bias	Authors' judgement	Support for judgement
Selection	No	Only two patients described, context described but peculiar patients.
Exposure	Yes	Time per session recorded, description of the intervention.
Outcome	No	Anxiety defined, measured and reported. Success of the weaning and measurement of oximetry are also reported but the presented graphic does not allow any accurate measure of the values.
Alternative causes	No	The weaning period before the intervention seems too short to clearly recognise the effect of hypnosis. For patient n°2, the intervention seems too close to the reintubation.
Challenge/rechallenge phenomenon	No	Hypnosis maintained during the entire process.
Dose-response effect	No	Same intensity of treatment.
Follow-up	Yes	Patients left the hospital 5 and 9 days after the last session without mechanical ventilation (during waking hours or at all).
Reporting	Yes	Intervention and results are clearly described.

### *Outcomes reported*

Outcomes measured in this trial were anxiety (4-point scale before and after each session) and oxygen saturation.

### *Effects of intervention on primary outcome*

Dyspnea was not reported.

### *Effects of intervention on secondary outcome*

Eleven sessions were described in Acosta's study. The median decrease in anxiety reported was 1 point (IQR: 1.0-2.5). Every session, anxiety declined by at least one point; the maximum decrease reported was 3 points. Stress and pain were not reported.

Only one of the two patients of this study was extubated on the third day of hypnotherapy. The second patient was able to breathe without the need for ventilatory support during the waking hours after 8 days of intervention. Nonetheless, this patient was discharged (transferred) from the hospital 5 days after the last hypnosis session.

### *Any other outcome reported by the trials*

The author reported an increase of oxygen saturation during and after the hypnosis session. No statistical analysis was performed and data in numeric form were not presented in the paper.

## Discussion

Data published about hypnotherapy during the weaning process for intubated patients are scarce. In fact, only one study fulfilled our selection. This case series included two patients with a variety of comorbidities. Results showed decrease in anxiety from at least one point per hypnosis session. Oxygen saturation may have been increased, but no exploitable data were provided to objectify it.

According to the van Tulder *et al.* tool (17), there is no evidence supporting the efficacy of hypnotherapy in the weaning process. This is due to the included study design (a case report). This highlights the need for further controlled studies.

A predefined protocol was recorded on PROSPERO in order to reduce the risk of bias in the review process. To minimize publication bias, we searched the gray literature and on clinical trial registration sites.

To our knowledge, there is to date no review investigating the same intervention or population of interest. However, 3 studies were excluded from this paper because hypnosis interventions were performed on tracheotomized patients (18–20) and hence not related to the extubation process. In two of these 3 cases series, reductions in anxiety were reported with hypnosis sessions. Nethertheless, anxiety assessment is not clearly described.

Even if those three studies' findings are consistent with Acosta's, designs used in all four studies make the data unusable for a proper statistical analysis.

Moreover, weaning tracheotomized patients and the extubation process are two specific non-transposable phenomenons, making the findings of those three previous studies unusable as well for our systematic review.

## Conclusion

Trials specific to hypnotherapy use in ventilatory weaning or extubation are rare. We found only one publication with a poor study design. Due to this publication scarcity, we cannot conclude whether or not hypnotherapy should be recommended.

Due to the absence of evidence in controlled trials, further studies are needed to determine the actual effect of hypnotherapy. These randomized controlled studies should investigate if hypnotherapy is feasible during the weaning process and the extubation and how it impacts self-reported dyspnea, anxiety and pain and weaning success.

# Declarations

## Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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This research did not receive any funding.

## Author Contributions

JW, CR, AB and FP conceived and planned the following research. JW, AB performed the literature search, study inclusion, data extraction and risk of bias assessment with support from CR for any disagreement. JW, CR, AB and FP wrote the manuscript, provided critical analysis of the manuscript redaction and final approval.

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## Figures

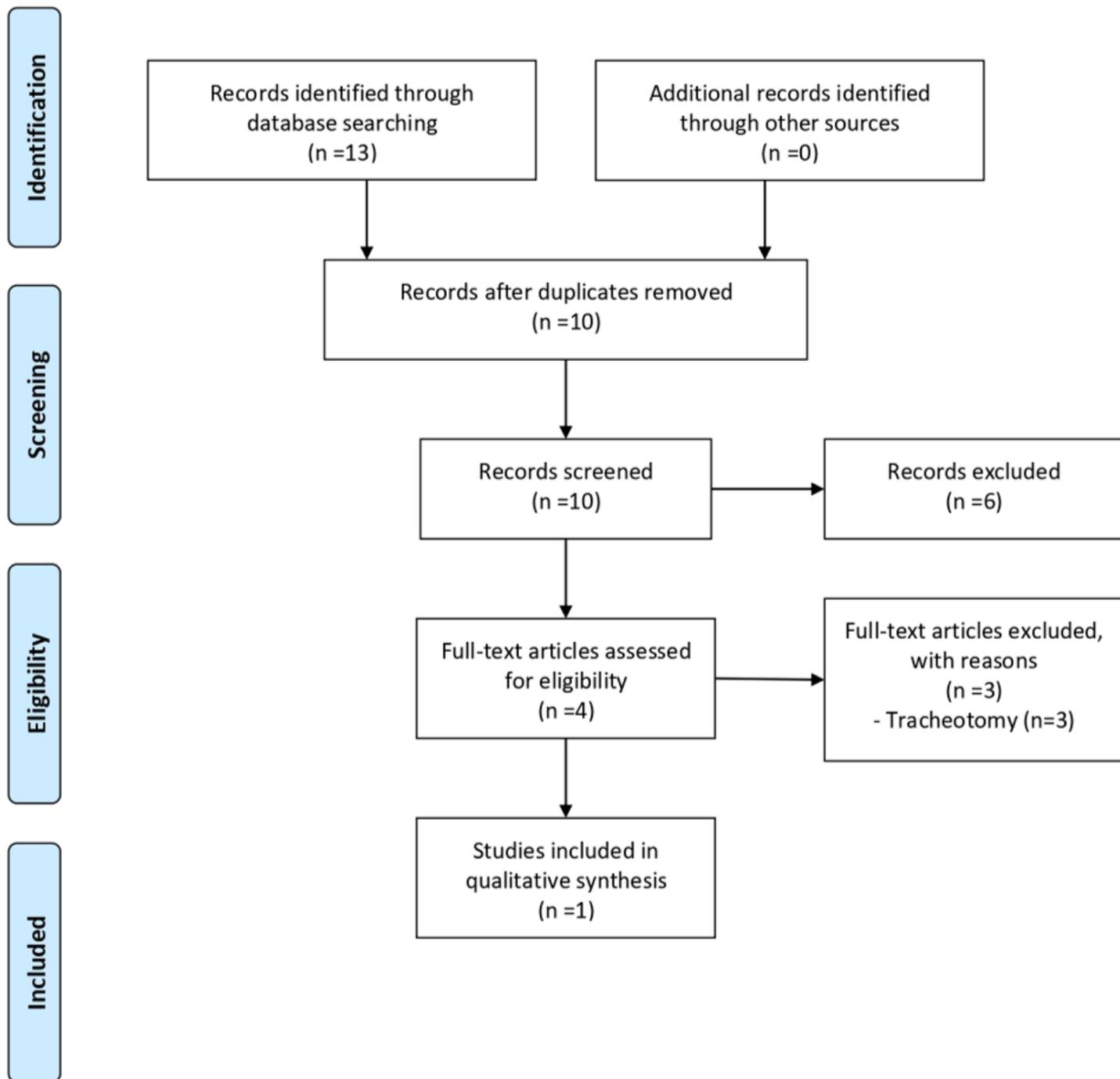


Figure 1

Flow chart of selection studies

## Supplementary Files

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- [Appendix1.docx](#)