

# PHYSICIAN DIRECTED PROTOCOL VERSUS PHYSIOTHERAPIST DIRECTED PROTOCOL FOR WEANING PATIENTS FROM MECHANICAL VENTILATION: A LITERATURE REVIEW

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## ABSTRACT

**Introduction:** Weaning is a process of reducing or removing ventilator support from mechanically ventilated patients. Weaning from mechanical ventilation can be defined as the process of abruptly or gradually withdrawing ventilator support. Over 90% of critically ill patients require mechanical ventilation and 40% of the time patient is receiving mechanical ventilation is spent in process of weaning from it. Successful weaning from ventilatory support is the ultimate goal for all those involved in the care of mechanically ventilated patients in intensive care units.

**Methods:** Thorough literature search was done through various databases and total of 25 articles were included for the review.

**Discussion:** The result of the study shows that the therapist directed protocol can effectively wean patients from mechanical ventilation when compared to physician directed protocol. The length of stay in ICU and the cost of hospitalization was also reduced following the implementation of therapist driven protocol. Therapist driven protocol is safe and can lead to extubation more rapidly than physician directed weaning.

Thus therapist driven protocol can safely and rapidly wean patients from mechanical ventilation. It will have effect on ICU length of days and also on hospitalization cost and therapist driven protocol reduces the both. So it is safe to wean the patients using therapist driven protocol.

**Conclusion:** Based on the literature search it is concluded that the therapist driven weaning protocols can effectively wean the patients from mechanical ventilation and also reduces length of stay and cost of hospitalization when compared to physician directed protocol. Still more research work is needed in this area. More number of randomized controlled trials should be done to prove the effectiveness of therapist driven protocols. Institution of therapist driven protocols can safely and effectively wean patients from mechanical ventilation and reduce length of stay in ICU and also reduces the cost.

**KEY WORDS:** Weaning, Mechanical ventilation, Ventilation, Therapist driven protocol.

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## INTRODUCTION

Weaning is defined as the process of reducing or removing ventilator support from mechanically ventilated patients [1].

Weaning from mechanical ventilation can be defined as the process of abruptly or gradually withdrawing ventilator support [2]. Over 90% of critically ill patients require mechanical

ventilation and 40% of the time patient is receiving mechanical ventilation is spent in process of weaning from it [3]. Successful weaning from ventilatory support is the ultimate goal for all those involved in the care of mechanically ventilated patients in intensive care units [4].

Weaning from mechanical ventilation usually implies two separate but closely related aspects of care, discontinuation of mechanical ventilation and removal of any artificial airway [5]. Patients receiving mechanical ventilation incur significant morbidity, mortality and costs and because both premature weaning as well as delayed weaning can cause harm [3]. Accordingly, both for clinical and economic reasons, every effort should be made to determine as soon as possible which patients can be rapidly extubated, and to keep the weaning period to a minimum. From a clinical standpoint, it is very important to recognize as soon as possible when a patient is ready to be weaned. Accordingly, a daily routine follow-up should be performed in every patient in order to verify whether patients meet clinical criteria to be disconnected from the ventilator [6].

Patient may develop ventilator dependency if weaning is delayed unnecessarily. Ventilator dependency may be a consequences of a need for high levels of expiratory pressures and FiO<sub>2</sub> to maintain an adequate oxygen content. Due to mismatch between performance capacity of ventilator pump and load placed on it, there is ventilator dependency. Metabolic factors like hormones, oxygen transport affect ventilator muscle function [7]. Patients requiring prolonged mechanical ventilation develop significant tracheal obstruction. This may prevent weaning and be severe enough to be life threatening [8]. Complications of mechanical ventilation include sinusitis, ventilator associated pneumonia, tracheal stenosis, vocal cord injury, tracheal-oesophageal fistula, pneumothorax, oxygen toxicity. Hypotension, tracheal-vascular fistula. Immobility due to mechanical ventilation cause skin breakdown, venous thromboembolic disease, atelectasis [9]. Psychological factors may be among the most important non-respiratory factors leading to ventilator dependence [10].

Most patients do not require a prolonged period of gradual withdrawal of mechanical ventilation, which carries the risks of ventilator induced lung injury, nosocomial pneumonia, airway trauma, and increased cost of care. On the other hand, overly aggressive and premature discontinuation of ventilator support can precipitate ventilatory muscle fatigue, gas exchange failure, and loss of airway protection [11]. Although mechanical ventilation can be an effective form of “therapy” of respiratory/ventilatory failure, its use is associated with a host of complications including infection, barotrauma, cardiovascular compromise, tracheal injuries, and oxygen toxicity. Undue prolongation of ventilator support increases the possibility of these risks. At the same time, premature discontinuation of mechanical ventilation leading to reintubation may increase the morbidity, mortality, intensive care unit stay, and the chance of transfer to long-term ventilator dependency [12].

Weaning success is defined as extubation and the absence of ventilatory support 48 h following the extubation. Weaning failure is defined as one of the following: (1) failed SBT; (2) reintubation and/or resumption of ventilatory support following successful extubation; or (3) death within 48 h following extubation. There are a number of factors which are important in the weaning process, which can help determine whether weaning is successful. These factors include weaning techniques, breathing circuits, weaning criteria or predictors, work of breathing, muscle weakness and fatigue, nutrition, humidification and pulmonary hygiene [13]. Successful liberation from mechanical ventilation in the ICU depends on the application of skilled judgment, decision making, and medical and nursing interventions [11].

In most studies, weaning failure is defined as either the failure of SBT or the need for reintubation within 48 h following extubation. Failure of SBT is defined by: (1) objective indices of failure, such as tachypnoea, tachycardia, hypertension, hypotension, hypoxaemia or acidosis, arrhythmia; and (2) subjective indices, such as agitation or distress, depressed mental status, diaphoresis and evidence of increasing effort. Failure of a SBT is often related

to cardiovascular dysfunction or inability of the respiratory pump to support the load of breathing. Extubation failure may be related to the same causes, in addition to upper airway obstruction or excessive secretions. Rate of weaning failure after a single SBT is reported to be 26—42%. Failure of extubation is associated with high mortality rate, either by selecting for high-risk patients or by inducing deleterious effects such as aspiration, atelectasis and pneumonia [14].

There is very strong evidence that weaning/liberation protocols can be successfully implemented in ICUs while expediting weaning and improving the success of liberation from mechanical ventilation [11]. It has been suggested that the mode used for weaning may be less important than the strategy used to determine when weaning should begin. The decision as to when and how the weaning process should be initiated has historically been primarily one of individual clinical judgment. In recent times it has been suggested that a protocol directed approach could potentially improve the weaning outcome [4]. Ventilator weaning protocols have the potential to expedite the weaning process and have been shown to reduce weaning time and the duration of mechanical ventilation in several studies. Weaning protocols might improve patient care and outcomes, but their implementation should be based on local clinical characteristics and needs, and accompanied by an intensive education effort and measurement of adherence and outcomes [15].

The procedure followed by physicians to wean a patient from mechanical ventilation is called physician directed protocol. Physician directed protocol for weaning require longer durations of mechanical ventilation. Hospital cost savings for patients in physician directed protocol is less compare to therapist driven protocol [16]. Studies demonstrate poor communication between physicians of critically ill patients and their families. Physician demonstrate on decision maker inconsistency in their use of physiologic data for decision making. Physicians often fail to adhere to reputable standards. High practice variability is seen, which can be avoided if good treatment can be identified and practiced [15].

Study showed that the commitment of time by physicians appeared minimal, since most monitoring was done by respiratory therapists and nurses as part of their standard patient care. Using clinical judgment alone, physicians do not accurately predict whether mechanical ventilation can be discontinued successfully [17]. Differences in clinicians' intuitive threshold for the reduction or discontinuation of ventilatory support appear to have a greater impact on the failure of spontaneous breathing trials, or on reintubation, than do modes of weaning. When clinicians set a high threshold, many patients who could tolerate weaning continue to receive mechanical ventilatory support longer than is necessary [18].

Therapist driven protocols also known as patient driven protocols are prescribed plans for a specific respiratory care service practitioner's supervision. Therapist driven protocols have been proposed as a way to improve the allocation of respiratory care services and several lines of evidence suggest their efficacy in enhancing appropriate allocation [19].

Institution of a therapist driven weaning protocols is safe and may reduce time requirements of critical care physicians, increasing their availability for other critical care issues [20]. Use of therapist driven protocol represents a significant reduction of both ventilator and ICU days and cost while reducing the risks and trauma of being mechanically ventilated [21]. Implementation and utilization of therapist driven protocol appear to be effective in reducing hospital length of stays for related diagnosis [22]. The data suggest that use of a therapist driven protocol may significantly reduce ventilator length of stay in pediatric patients when compared to traditional physician directed approach [23].

Therapist driven protocol is safe and can lead to extubation more rapidly than physician directed weaning [15]. There is significant improvement on weaning time and duration of mechanical ventilation with implementation of respiratory therapist driven protocol in premature population [24]. The duration of mechanical ventilation can be reduced by using clinical protocols that can be executed by respiratory therapists and not necessarily by ICU physicians

[11]. Respiratory Protocols promote an approach to patient care that is based solely on the individual needs and therapeutic responses of each patient. Protocols also help establish care/treatment parameters by which practice differences can be minimized, so as to maximize patient safety and desirable clinical outcomes [25].

Protocol-driven weaning reduces use of mechanical ventilation and VAP. Injured and general surgical patients show reduction in complications, but shorter ICU LOS depends on resources elsewhere in the health care system.

**Aim of the study:** To find out the efficacy of the therapist driven protocols when compare to physician directed protocols to wean mechanically ventilated patients.

### REVIEW OF LITERATURE

Weaning covers the entire process of liberating the patient from mechanical support and from the endotracheal tube. Many controversial questions remain concerning the best methods for conducting this process [14]. Successful weaning from ventilatory support is the ultimate goal for all those involved in the care of mechanically ventilated patients in intensive care units. At present there are a number of key issues surrounding weaning, such as the causes of weaning failure, the factors that predict weaning success or failure, and the optimal procedural strategies for weaning. Physiotherapists have an established role in the care of mechanically ventilated patients, but their role during weaning is less well documented [4].

**Criteria to be used to consider a patient for weaning:** Underlying disease process that necessitated ventilation has resolved or improved. Pa O<sub>2</sub> / Fi O<sub>2</sub> > 200 (PEEP <5, Fi O<sub>2</sub> < 0.5, P H > 7.25). Afebrile, conscious and coherent.

#### Stable Cardiovascular Function:

- a) HR <140/min
- b) Absence of myocardial ischaemia
- c) Absence of vasopressors or low dose inotropes.

Hb > 8 g%.

Absence of respiratory acidosis [27]

**Important factors in weaning:** The decision to initiate weaning is usually subjective, as wean-

ing criteria can be unreliable. Weaning remains a challenge in critically ill patients ventilated for prolonged periods, as those ventilated for short periods can usually be weaned without difficulty. There are a number of factors which are important in the weaning process, which can help determine whether weaning is successful. These factors include weaning techniques, breathing circuits, weaning criteria or predictors, work of breathing, muscle weakness and fatigue, nutrition, humidification and pulmonary hygiene [13].

Robert L chatburn studied if weaning protocols can be implemented in all mechanically ventilated patients and concluded that Ventilator weaning protocols have the potential to expedite the weaning process and have been shown to reduce weaning time and the duration of mechanical ventilation. For a protocol to improve outcomes, a high adherence rate is necessary. Thus, implementing a protocol requires intensive clinician education and measurement of clinician adherence and outcomes [15].

James K stoller did a study on effectiveness of respiratory care protocols and concluded that protocols can accelerate patients' liberation from mechanical ventilation, with associated benefits of shorter ICU stay and cost savings [19].

A randomized controlled trial of protocol-directed versus physician-directed weaning from mechanical ventilation by Kollef and co-workers concluded that protocol guided weaning of mechanical ventilation, as performed by nurses and respiratory therapists is safe lead to extubation more rapidly than physician-directed weaning [16].

A study on therapist driven protocols by M.Vitacca suggested that therapist driven protocol should be used routinely during weaning and help to safely and efficiently liberate patients from mechanical ventilation reducing unnecessary or harmful variation approach [28]. A prospective randomized trial of protocol-directed versus physician-directed weaning in children by Schultz TR and Lin RJ concluded that protocol directed weaning resulted in a shorter weaning time than physician directed weaning in these pediatric patients [23].

Wood G and MacLeod studied on weaning from mechanical ventilation: physician versus a respiratory therapist directed protocol concluded that respiratory therapist can safely and efficiently wean cardiac surgery patients from mechanical ventilation [29].

James K Stoller worked on respiratory therapist driven protocols and concluded that therapist driven protocols appear to be effective strategies for improving the allocation and provision of respiratory care services in the current cost attentive area [19].

Hermeto F and Bottino MN studied on implementation of a respiratory therapist driven protocol for neonatal ventilation and concluded that there was improvement on weaning time and duration of mechanical ventilation with the implementation of a ventilation protocol driven by a respiratory therapist in premature population [24].

In a study of protocolized versus non-protocolized for reducing the duration of mechanical ventilation in critically ill adult patients by Blackwood B and co-workers suggested that Patients experiencing difficulty in weaning require a longer hospital stay and have higher morbidity and mortality. Consequently, efforts to reduce weaning time are desirable to reduce the duration of ventilation and related complications. Standardized weaning protocols are safe and effective in reducing the time spent on mechanical ventilation. Notwithstanding, the evidence supporting their use in practice is inconsistent. The discordant results of studies may reflect the fact that protocols vary in composition and are implemented in different environments by various healthcare providers. 1971 patients on total of eleven trials concluded that the total duration of mechanical ventilation geometric mean in the protocolized weaning group was on average reduced by 25% compared with the usual care group (N = 10 trials, 95% CI 9% to 39%, P = 0.006); weaning duration was reduced by 78% (N = 6 trials, 95% CI 31% to 93%, P = 0.009); and ICU LOS by 10% (N = 8 trials, 95% CI 2% to 19%, P = 0.02). There was significant heterogeneity among studies for total duration of mechanical ventilation (I<sup>2</sup> = 76%, P < 0.01) and weaning duration (I<sup>2</sup> = 97%, P < 0.01), which could not be explained by subgroup

analyses based on type of unit or type of approach. There is some evidence of a reduction in the duration of mechanical ventilation, weaning duration and ICU loss of stay with use of standardized protocols, but there is significant heterogeneity among studies and an insufficient number of studies to investigate the source of this heterogeneity. Although some study authors suggest that organizational context may influence outcomes, these factors were not considered in all included studies and therefore could not be evaluated [30].

Many controlled trials conducted in North America have demonstrated the effectiveness of nursing-based and respiratory therapist-based protocols in the early liberation from mechanical ventilation and reducing the length of stay in the ICU, weaning from mechanical ventilation in Europe has generally been less common and mainly physician-directed. Blackwood and colleagues interviewed a sample of ten consultant physicians in two European ICUs and reported that although local physicians were supportive in theory, introduction of protocolized weaning is likely to be difficult because of the breadth of information required for successful decision making. Consultants' views in this study were not consistent with North American findings that physicians' caution may unnecessarily prolong weaning. Two recent European studies reported conflicting results on the utility of protocolized weaning in affecting the outcome and duration of mechanical ventilation. Blackwood and colleagues, using a physician-driven protocol, reported that protocolized weaning did not reduce the duration of mechanical ventilation and was not associated with an increased rate of re-intubation or ICU mortality [11].

Complications of mechanical ventilation can be divided into those resulting from endotracheal intubation, from mechanical ventilation itself, or from prolonged immobility and inability to eat normally. The presence of an endotracheal tube causes risk of sinusitis (which is rarely of clinical importance), ventilator-associated pneumonia (see Pneumonia: Hospital-Acquired Pneumonia), tracheal stenosis, vocal cord injury, and rarely tracheal-esophageal or tracheal-vascular fistula. Purulent tracheal aspirate in a

febrile patient who has an elevated WBC count > 48 h after ventilation has begun suggests ventilator-associated pneumonia. Complications of ongoing mechanical ventilation itself include pneumothorax, O<sub>2</sub> toxicity, hypotension, and ventilator associated lung injury. Relative immobility increases the risk of venous thromboembolic disease, skin breakdown, and atelectasis [9].

A study done to determine the efficacy of weaning protocol in medical intensive care unit of tertiary care center by Bumroongkit C, Liwsrisakun C and co-workers concluded that protocol-directed weaning proved to have more efficacy in weaning patients from a ventilator than physician-directed weaning in terms of weaning duration and ICU length of stay without a deteriorating effect to the patients. They also proved that. The duration of mechanical ventilation before weaning was 5.89 +/- 3.71 days in the protocol-directed group and 7.41 +/- 5.54 days in the physician-directed group ( $p < 0.05$ ). Weaning duration in the protocol-directed group was significantly shorter than the physician-directed group (14.58 +/- 16.98 hours VS 47.09 +/- 38.23 hours;  $p < 0.05$ ). Kaplan-Meire analysis demonstrated that patients in the protocol-directed group had significantly shorter durations of mechanical ventilation compared to patients in the physician-directed group ( $p = 0.001$ , log-rank test). The ICU LOS was significantly shorter in the protocol-directed group (7.91 +/- 4.71 vs 11.53 +/- 7.80 days;  $p < 0.05$ ). The 28 days mortality rate and the incidence of hospital acquired pneumonia seemed to be less in the protocol-directed group (4.60% vs 6.10% and 5.60% vs 10.10% consecutively) and reintubation rate seemed to be higher in the protocol-directed group (6.1% vs 4.5%) than the physician-directed group but differences were not significant ( $p > 0.05$ ) [31].

A study by the effect of physiotherapy on ventilatory dependency and the length of stay in an intensive care unit by Malkoç, Mehtap and co-workers concluded that physiotherapy has a great impact on ventilatory dependency and length of stay in the ICU. The aim of this study was to assess the effect of physiotherapy on ventilator dependency and lengths of intensive care unit (ICU) stay. Patients were divided into

two groups. The control group, which received standard nursing care, was a retrospective chart review. The data of control patients who were not receiving physiotherapy were obtained from the hospital records. The intervention group was prospectively taken into the chest physiotherapy program. This study was planned on mechanically ventilated patients who were admitted to a six-bed multidisciplinary internal medicine intensive care unit of the university hospital. A total of 510 patients who were hospitalized in the ICU were included in the study. Control patients had a longer period of ventilator dependency than the intervention patients and this difference was statistically significant ( $P < 0.05$ ). It was noted that the resulting length of stay in the ICU was significantly lower in the intervention group than in the control group ( $P < 0.05$ ). Although the patients had similar diagnoses and physical features, the length of stay in the ICU was significantly lower in the intervention group [32].

A study by Patrick J Dunne on the benefits of respiratory care protocols has demonstrated that respiratory care protocols, when used in an intensive-care setting for weaning from mechanical ventilation, are more effective than physician-directed weaning. Protocols promote an approach to patient care that is based solely on the individual needs and therapeutic responses of each patient. Protocols also help establish care/treatment parameters by which practice differences can be minimized, so as to maximize patient safety and desirable clinical outcomes. To say that the use of protocols represents a truly cost-effective alternative approach to providing respiratory care services is indeed an understatement [25].

A prospective large-scale implementation of a respiratory-therapist-driven protocol (TDP) that included 117 respiratory care practitioners (RCPs) managing 1,067 patients with respiratory failure over 9,048 patient days of mechanical ventilation by E.wesley ELY, Patricia A and co-workers concluded that conclude that implementation of a validated weaning strategy is feasible as a TDP without daily supervision from a weaning physician or team. RCPs can appropriately perform and interpret DS data more than 95% of the time, but significant barriers to SBTs

No.	Article	Result
1	Efficacy of weaning protocol in medical intensive care unit of tertiary care center.	Protocol-directed weaning proved to have more efficacy in weaning patients from a ventilator than physician-directed weaning in terms of weaning duration and ICU length of stay without a deteriorating effect to the patients.
2	Should Weaning Protocols Be Used With All Patients Who Receive Mechanical Ventilation?	Ventilator weaning protocols have the potential to expedite the weaning process and have been shown to reduce weaning time and the duration of mechanical ventilation in several studies.
3	The effect of physiotherapy on ventilatory dependency and the length of stay in an intensive care unit	The results show that physiotherapy has a great impact on ventilatory dependency and length of stay in the ICU
4	collaborative practice: development, implementation, and evaluation of a weaning protocol for patients receiving mechanical ventilation	The need to provide efficient care requires the collaboration of all disciplines involved in providing patients' care. The weaning protocol introduced in this study demonstrates the benefits of using a collaborative team to identify best practices and implement them in a
5	comparison of ventilator length of stay in pediatric patients using a patient driven protocol versus a physician directed protocol	Use of a PDP may significantly reduce Ventilator Length Of Stay in pediatric patients when compared to the traditional physician-directed approach. The use of PDP allowed more rapid changes on the initial phase of ventilation that could potentially reduce the time
6	A retrospective analysis of mechanical ventilator days before and after implementation of a therapist driven weaning protocol in 1772 patients.	Result in a significant reduction in both the number of days a patient is mechanically ventilated and the number of days a patient receiving mechanical ventilation is in the hospital.
7	Large Scale Implementation of a Respiratory Therapist-driven Protocol for Ventilator Weaning.	Implementation of a validated weaning strategy is feasible as a TDP without daily supervision from a weaning physician or team. Respiratory Care Practitioners can appropriately perform and interpret Daily Screen data more than 95% of the time, but significant
8	Protocol Weaning of Mechanical Ventilation in Medical and Surgical Patients by Respiratory Care Practitioners and Nurses	A Ventilator Management Protocol designed for multidisciplinary use was effective in reducing duration of mechanical ventilatory support without any adverse effects on patient outcome. The protocol was also associated with a decrease in incidence of Ventilator Associated Pneumonia in trauma patients.
9	Mechanical Ventilator Weaning Protocols Professionals Driven by Nonphysician Health-Care	this evidence-based review suggests that Protocols driven by nonphysician Health Care Practitioners to manage the weaning and liberation of patients from MV can reduce the time that patients spend receiving MV.
10	Outcomes in Post-ICU Mechanical Ventilation: A Therapist-Implemented Weaning Protocol	Patients weaned from Prolonged Mechanical Ventilation using a new therapist-implemented protocol, had significantly shorter time to weaning than historical control subjects, with comparable outcomes. The weaning outcome data collected after the implementation of the TIPS protocol are in fact attributable to its use, as they found a high degree of compliance with the protocol.
11	Protocol-driven ventilator weaning reduces use of mechanical ventilation, rate of early reintubation, and ventilator-associated pneumonia.	Protocol-driven weaning reduces use of mechanical ventilation and VAP. Injured and general surgical patients show reduction in complications
12	Therapist driven protocols: a look back and moving into the future.	Therapist-driven protocols have been shown to decrease the duration of mechanical ventilation, reduce cost, length of stay, and improve
14	Protocolized weaning from mechanical ventilation: ICU physicians' views	Local physicians were supportive in theory, introduction of protocolized weaning is likely to be difficult because of the breadth of information required for successful decision-making.

15	Respiratory Therapist-Driven Protocols Rationale and Efficacy	Therapist-driven protocols appear to be effective Strategies for improving the allocation and provision of respiratory care services in the current cost-attentive era.
16	Therapist driven protocols:effectiveness of implemetation	Study does not demonstrate a significant difference between the appropriateness of respiratory therapy when ordered by a physician (75%) and when guided by RTs (79%) but it does show that RTs were at least as successful as physicians at ensuring that proper indications existed. In addition, follow-up assessment significantly improved when performed by RTs (90%) compared to follow-up by physicians (66%).
17	Evaluation of the effect of therapist driven weaning protocol on length of ventilation,re-intubation rates and hospital costs	Use of the daily Wean Screen protocol represents a significant reduction of both ventilator and ICU days and costs while reducing the risks and trauma of being mechanically ventilated.
18	Protocol-directed weaning: a process of continuous performance Improvement	The use of a nursing-directed and/or respiratory therapist-directed protocol in many intensive care units for weaning from mechanical ventilation is associated with a shorter duration of ventilation and length of stay in the ICU.
19	Utilization of respiratory therapist driven protocols –weaning ventilated patients in SICU	Institution of respiratory therapist driven weaning protocols is safe and may reduce time requirements of critical care physicians, increasing their availability for other critical care issues.
20	Integration of therapist driven protocols into a clinical pathway: the effect on cost and reduction in length of stay	Resulted in cost reductions,. Accelerated discharge from the ICU and reduction in oxygen time allowing discharge home were both positively influenced by utilizing TDP's.
21	Evaluation of a therapist driven protocols impact on pulmonary related hospitalization length of stay	Implementation and utilization of therapist driven protocols appear to be effective in reducing hospital length of stays for patients admitted with a pulmonary related diagnosis.
22	Implementation of a respiratory therapist driven protocol for neonatal ventilation: impact on the premature population	Significant improvement on the weaning time and duration of mechanical ventilation with the protocol.
23	Weaning from mechanical ventilation: physician directed vs a respiratory therapist directed protocol	Respiratory therapist can safely and effectively wean cardiac surgery patients from mechanical ventilation.
24	A randomized controlled trial of protocol directed versus physician directed weaning from mechanical ventilation.	Protocol directed weaning performed by nurses and respiratory therapist is safe and led to extubation more rapidly than physician directed weaning.
25	Therapist driven protocols	Therapist driven protocols should be used routinely during weaning and help to safely and effectively liberate patients from mechanical ventilation

exist. Through a staged implementation process, using periodic reinforcement of all participants in ventilator management, improved compliance with this large-scale weaning protocol can be achieved [17].

A study by JM Graybeal CRTT. GB Russell on utilization of respiratory therapist driven protocols – weaning ventilator patients in surgical intensive care units concluded that institution of respiratory therapist driven weaning protocols is safe and may reduce time requirements of critical care physicians, increasing their availability for other critical care issues [20].

David R and co-workers studied on integration of therapist driven protocols in clinical pathway and concluded that therapist driven protocols provide early discharge and cost reductions [33].

Frank miller on evaluation on a therapist driven protocol on pulmonary related hospitalization length of stay concluded that implementation and utilization of therapist driven protocols appear to be effective in reducing hospital length of stays for patients admitted with a pulmonary related diagnosis [22].

A study done by David JS and co-workers on outcomes on post-ICU mechanical ventilation says that therapist-implemented protocols have been used to extubate patients or wean patients, as appropriate, in the ICU setting. Two recent randomized, controlled trials have shown that the time to both outcomes for patients can be safely shortened by the use of such protocols. Patients weaned from prolonged mechanical ventilation using a new therapist implemented protocol, in the post-ICU setting of a long term acute care specializing in weaning, had significantly shorter time to wean than historical control subjects, with comparable outcomes [34].

Koch RL studied on therapist driven protocols demonstrate that therapist-driven protocols have been shown to decrease the duration of mechanical ventilation, reduce cost, length of stay, and improve the rate of weaning when compared with physician-directed weaning [35].

A study by Hansen on physicians' perception on protocol directed weaning in ICU in Norway showed that an unclear pattern of responsibility and poor interprofessional collaboration and communication [36].

## METHODOLOGY

The materials and methods used in this study include literature search.

**Source Of Data:** PUBMED, MEDLINE, OVID, GOOGLE SCHOLAR

Criteria for selection:

**Inclusion criteria:** Articles in English language, Articles from year 1995 onwards

**Exclusion criteria:** Articles in any other languages than English. Articles published before year 1995

**Procedure: Key Words used:** weaning protocol, weaning from mechanical ventilation, weaning by physiotherapist.

To identify relevant studies databases like PUBMED, MEDLINE, EMBASE, OVID were searched. Key words used were weaning protocol, weaning from mechanical ventilation weaning by physiotherapist. Search was restricted to English language. Total of 25 articles were included in the study.

## DISCUSSION

The result of the study shows that the therapist directed protocol can effectively wean patients from mechanical ventilation when compared to physician directed protocol. The length of stay in ICU and the cost of hospitalization was also reduced following the implementation of therapist driven protocol. Therapist driven protocol is safe and can lead to extubation more rapidly than physician directed weaning. In randomized controlled trial by Kollef involving 357 patients in 4 ICU showed that the benefits of the protocol included significantly shorter duration of mechanical ventilation and a trend toward lower costs. The protocol had no identified adverse effects. Therapist driven protocols had been used to wean pediatric patients, neonates and for adults.

Physician directed protocols demonstrate high practice variability. Using clinical judgment alone, physicians do not accurately predict whether mechanical ventilation can be discontinued successfully. This in turn leads to prolonged periods of mechanical ventilation unnecessarily and can cause detrimental effects on patient. Hospital cost savings is less in

physician directed protocol when compared to therapist directed protocol. Use of therapist directed weaning protocol also increases availability of clinicians for other critical issues. There is no uniformity in clinicians' practice.

Thus therapist driven protocol can safely and rapidly wean patients from mechanical ventilation. It will have effect on ICU length of days and also on hospitalization cost and therapist driven protocol reduces the both. So it is safe to wean the patients using therapist driven protocol.

## CONCLUSION

Based on the literature search it is concluded that the therapist driven weaning protocols can effectively wean the patients from mechanical ventilation and also reduces length of stay and cost of hospitalization when compared to physician directed protocol. Still more research work is needed in this area. More number of randomized controlled trials should be done to prove the effectiveness of therapist driven protocols. Institution of therapist driven protocols can safely and effectively wean patients from mechanical ventilation and reduce length of stay in ICU and also reduces the cost.

**Conflicts of interest: None**

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