Early weaning from invasive pressure ventilation among critically ill patients

**Purpose:** To review the studies comparing outcomes with early weaning from the IPV among critically ill patients. **Results:** 11 of the studies were randomized controlled trials, 8 were nonrandomized controlled trials and 7 were cohort studies. 16 of these studies concluded that early weaning decreases the duration of IPV, length of stay, morbidity, and mortality in the intensive care units (p<0.05). 10 of the studies showed significant differences using sedation vacation, spontaneous breathing trials, spontaneous awakening trials, and mobilization while on IPV. **Conclusion:** Best practices in early weaning include a sedation vacation, spontaneous breathing trials, spontaneous awakening trials, mobilization and respiratory management.

**KEYWORDS:** Invasive pressure ventilation, early weaning, nurses, intensive care unit, critically ill patients, clinical practice.

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**INTRODUCTION:**

Invasive pressure ventilation (IPV) is a lifesaving intervention in the care of critically ill patients with pneumonia, acute lung injury, neurologic emergencies, cardiopulmonary arrest (Mehta S, Burry L, Cook D, et al. 2012). Early weaning from the IPV reduces the incidence and prevalence of complications like barotraumas, ventilator-associated pneumonia (VAP), length of stay (LOS) and total expenses in the intensive care unit (Klopmas M, Branson R, Eichenwald EC, et al., 2014; Balas MC, Vasilevskis EE, Olsen KM, et al., 2014), stress ulcer, gastrointestinal bleeding. Weaning is a major challenge among the critical care nurses. There is a need for safe early weaning for critical care care nurses to provide high-quality standards of care with the use of advanced technology (Fan L, Su Y, Elmadhoun OA, et al. 2015).

Mechanical ventilators (MV) is used among critically ill patients for managing ventilation, gas exchange capabilities, acute respiratory failure and when the respiratory drive is incapable of initiating ventilator activity (MacIntyre, N. R. 2012; Haas, C. F., & Bauser, K. A. 2012). Weaning from the MV is a process of gradual or sudden ventilator support withdrawal in critically ill patients (Frutos-Vivar, F., & Esteban, A. 2013). Evidence-based guidelines on the ventilator discontinuation process for timely weaning and use of spontaneous breathing trials (SBTs) (Rose et al., 2015, McConvilie & Kress 2013; Peñuelas, Ø., Thille, A. W., & Esteban, A. 2015). This review explores the clinical outcomes for early weaning in invasive pressure ventilation among critically ill patients.

**MATERIALS AND METHODS:**

Search engines of Pubmed, CINAHL, Cochrane library using keywords mechanical ventilation, invasive pressure ventilation, early weaning, physicians, respiratory therapists, nurses, critically ill patients, ICU, clinical practice, evidence-based practice without date limitation were used. 78 articles were identified during our literature search, excluding duplicated articles selected from different search engines. Finally, 26 relevant studies were included in the review.

**Results:**

11 of the studies were randomized controlled trials, 8 were nonrandomized controlled trials and 7 were cohort studies. 16 of these studies concluded that early weaning decreases the duration of IPV and length of stay in the intensive care units (p<0.05). 10 of the studies showed significant differences using sedation vacation, spontaneous breathing trials, spontaneous awakening trials, and mobilization while on IPV.

Three studies showed that early weaning was associated with significant changes (P=0.01) in tidal volume, PEEP, respiratory rate, oxygen administration, head-of-bed elevation, reduction in mortality from 54.8% to 39.5% (P<0.01) (Fuller, B. M., Ferguson, I. T., Mohr, N. M., Dewry, A. M., Palmer, C., Wessman, B. T., ... & Kolomiets, A. A. 2017; Dries, D. J., McGonigal, M. D., Malian, M. S., Bor, B. J., & Sullivan, C. 2014; Marelich, G. P., Murin, S., Battistella, F., Inciardi, J., Vierra, T., & Roby, M. 2000). Studies have shown that implementing early weaning is associated with improved medical outcomes (tidal volume, respiratory rate, oxygen administration, and head-of-bed elevation, lung-protective ventilation). Early weaning had led to reductions in the duration of IPV, reduction in more than one course of MV, length of stay (LOS), decrease mortality, and hospital costs. Early weaning from invasive pressure ventilation was successful to wean patients from IPV more efficiently using first spontaneous breathing trial (SBT) and reducing.

Ventilator mechanical protective was effective in reducing the duration of IPV support without any adverse effects. Weaning and sedation protocols of IPV and ventilator-associated pneumonia (VAP) had successful extubation, reduced complications, shorter ICU stays and decrease use of ventilator days/ICU day’s ratio. Daily screening of the respiratory function of adults receiving MV, and SBT in appropriate patients and physician’s decision, respiratory therapists, and nurses to identify spontaneous breathing and tests followed by 2-hour SBT when the SBT was successful, reduced the duration of MV and the cost of intensive care and was associated with fewer complications.

Early weaning protocols (progressive decreases in the level of assistance as tolerated with daily assessment for SBT) utilized were safe and feasible for guiding weaning from MV on proportional assist ventilation (PAV) was better than PSV.
CONCLUSIONS:
Early weaning directed bundle care reduces weaning times, duration of MV, LOS in neurological patients, and effects are more significant for conscious patients than in unconscious patients. A daily interruption of sedative drug infusions, paired sedation and weaning protocol of daily SATs and SBTs were better at reducing the length of MV, LOS and one-year mortality in invasive pressure ventilation. Non-invasive positive-pressure ventilation facilitates weaning and supports respiration for early weaning from IPV. Awakening and breathing coordination protocol significantly improved measure compliance, pre-intervention rates of screening, performing and coordinating SAT and SBTs in invasive pressure ventilation.

Acknowledgment:
The authors thanks for the English language for editing this manuscript.

REFERENCES: