Author Year Country Date included in the review Number of articles Level of evidence Type of study AMSTAR Score	Method Databases	Conclusions
Schreiber et al. 2021 Canada Reviewed published articles up to August 2021 N = 39 **Level of evidence:** Newcastle–Ottawa Scale **Type of study:** N/A AMSTAR: 6	**Methods:** Investigate the probability of weaning success, duration of mechanical ventilation (MV), mortality, and their predictors in mechanically ventilated adult patients with SCI. **Database:** OVID Medline, CINAHL, the Cochrane Central Register of Controlled Trials and the Cochrane Database of Systematic Reviews, Ovid Embase and Scopus.	1. 14,637 patients were enrolled (13,763 in intensive care unit [ICU], 874 in rehabilitation units). 2. The mean time from injury to hospitalization was 8 h [95% CI 7–9] for studies conducted in ICU, 40 days [95% CI 29–51] for studies performed in rehabilitative units. 3. Probability of weaning from MV after SCI: a. 63% [45–78%] of the patients hospitalized in ICU were completely separated from the ventilator; 72% [51–86%] of the patients admitted to a rehabilitative ward were completely, and 82% [70–90%] were either completely or partially liberated from the ventilator. 4. Secondary outcomes:

		a. In ICU, the mean duration of MV was 27 days, LOS 23 days, hospital LOS 44 days. 81% of patients were tracheostomized and 30% of them were decannulated. Incidence of pneumonia and mortality were 40% and 8%, respectively. b. Patients hospitalized in rehabilitation centres were ventilated for a mean of 97 days (including duration of MV prior to admission and during the stay in rehabilitation) and stayed in the unit for 78 days. All patients were tracheostomized and 83% of them were decannulated; 36% developed pneumonia, and less than 1% died. 5. Predictors of weaning and duration of MV: a. A high number of comorbidities, high Injury Severity Score, high-level lesions (C1–C3 vs. C4–C7), elevated heart

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<td>rate, and presence of tracheostomy appeared to be associated with increased odds of weaning failure.
b. Shorter time to admission to a specialized SCI center, high-level lesions (C1–C4 vs. C5–C8), complete lesion, LTV and high positive end-expiratory pressure within 24 h from admission, and presence of tracheostomy were associated with a longer duration of MV.</td>
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<td colspan="2">Figure 1. Forest plots for the outcome of complete liberation from the ventilator (left panel) and for the outcome of partial or complete weaning after rehabilitation (right panel). Studies are presented according to setting classification (intensive care units vs. rehabilitation units): both overall and subgroup estimates are reported.
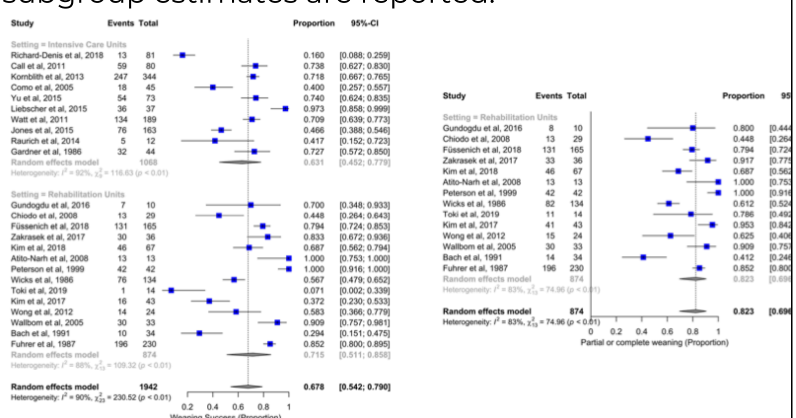
Figure 2. Forest plot for the outcome of duration of MV in intensive care units and rehabilitation units</td>
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(upper panel). Studies are presented according to setting classification (intensive care units vs. rehabilitation units): both overall and subgroup estimates are reported. Forest plots for the outcome of duration of MV for rehabilitation units (including the time to admission to rehabilitation) (lower panels). Weight refers to the relative contribution of each study to the meta-analytic estimate and is generated using the inverse variance method.

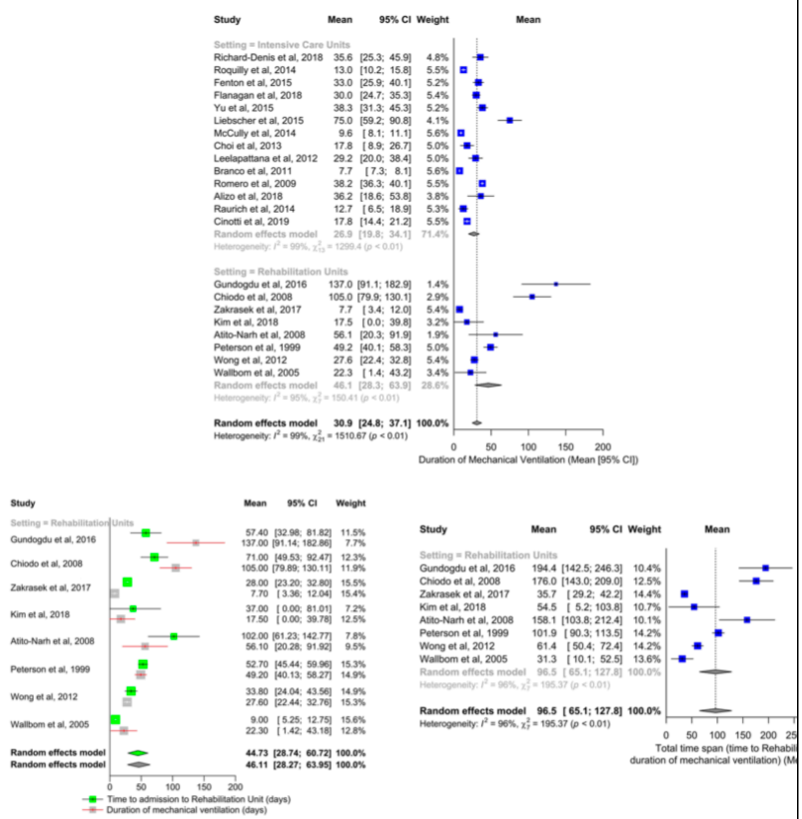

Figure 3. Forest plot for mortality. Studies are presented according to setting classification (intensive care units vs. rehabilitation units): both overall and subgroup estimates are reported.

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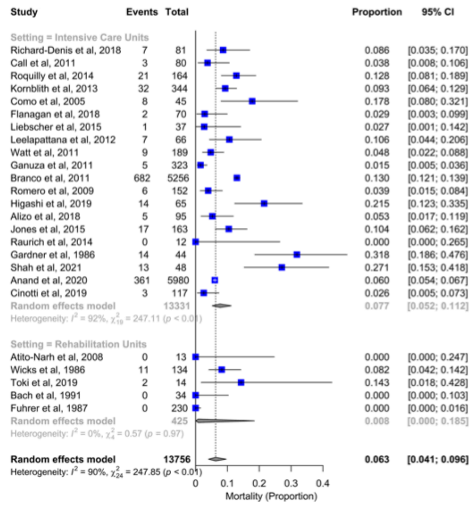

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<td>Foran et al. 2021
Canada

Reviewed published articles up to January 2020.

N = 17

Level of evidence:
The Newcastle-Ottawa Scale (NOS)

Type of study:
Cohort studies and case series.

AMSTAR: 7</td>
<td>Methods: Reviewed and evaluated evidence regarding the timing of tracheostomy in patients with acute traumatic SCI.
Database: MEDLINE, EMBASE, CINAHL, Scopus, Web of Science, and the Cochrane Central Register of Controlled Trials (CENTRAL).</td>
<td>1. Studies differed in their definitions of ET and LT although the majority used a range of 7 days or less (from either injury, intubation, or surgery) for ET.
2. ET was not found to be associated with short-term mortality (RR, 0.84; 95% CI, 0.39–1.79; p = 0.65; 10 studies; n = 2,072; 125 events; I^2 = 52%; Fig. 2, Table 2).
3. ET was found to be associated with:
a. Reduced mean duration of MV by 13.91 days (95% CI, –6.70 to –21.11; p = 0.0002; 10 studies; n = 855; I^2 = 96%).
b. Reduced mean ICU LOS by 10.20</td>
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		days (95% CI, –4.66 to –15.74; p = 0.0003; 10 studies; n = 855; I^2 = 90%). c. Reduced mean hospital LOS by 7.39 days (95% CI, –3.74 to –11.03; p < 0.0001; eight studies; n = 423; I^2 = 3%). d. Decreased incidence of VAP (RR, 0.86; 95% CI, 0.75–0.98; p = 0.02; 10 studies; n = 2,043; 691 events; I^2 = 41%), as well as the number of tracheostomy-associated complications with ET (RR, 0.64; 95% CI, 0.48–0.84; p = 0.001; eight studies; n = 812; 158 events; I^2 = 0%).
Mubashir et al. 2021 USA Reviewed published articles up to October 2019. N = 8 **Level of evidence:** Study quality using the Newcastle-Ottawa Scale (NOS) for cohort studies. **Type of study:** Retrospective cohorts.	**Method:** Reviewed the optimal timing of tracheostomy and evaluate potential subsequent beneficial effects by comparing early tracheostomy (ET) vs. late tracheostomy (LT) in patients with SCI. **Database:** Medline (Ovid), PubMed (non-Medline records only), Embase, Cochrane Central, Cochrane Database of Systematic Reviews, and PsycINFO, ClinicalTrials.gov and the	1. 1220 patients among the included studies (ET, n = 441 and LT n = 779). 2. Mortality was lower among patients in the ET group compared to the LT population, but the results were not significant (OR = 0.56; 95% CI, 0.32–1.01; p = 0.054; I^2 = 0%). 3. ET was associated with reduced mean ICU LOS by 13 days (95% CI, −19.18 to

AMSTAR: 9	International Clinical Trials Registry Platform.	−7.00; *p* = 0.001; I^2 = 88.8%) and mean duration of MV by 18.30 days (95% CI, −23.33 to −12.28; *P* = 0.001; I^2 = 85.6%). 4. There were no significant differences in total pneumonia rates between the ET and LT groups (odds ratio (OR) = 0.66; 95% CI, 0.34–1.29; *p* = 0.226; I^2 = 35.6%). 5. Stratified analysis demonstrated that patients with cervical SCI were twice as likely to undergo ET compared to thoracic SCI (OR = 2.13; 95% CI, 1.24–3.64; *P* = .006; I^2 = 0%). Moreover, patients with a higher cervical SCI (C1–C5 vs. C6–C8) were more likely to undergo ET, but without reaching significance (OR = 1.63; 95% CI, 0.88–3.03; *P* = .119; I^2 = 0%).
McCaughey et al. 2016b Australia Reviewed published articles until 23 December 2014 N = 14 **Level of evidence:** N/A	**Methods:** Systematic review and meta-analysis made to identify whether abdominal FES is an effective intervention to improve respiratory function in both an acute and chronic manner after SCI. **Databases:** Pubmed. **Protocols of abdominal FES used:** The median maximum amplitude was	1. Low participant numbers and heterogeneity across studies reduced the power of the meta-analysis (141 participants were included in total (n = 128 receiving abdominal FES; n = 13 acting as controls). 2. 10 studies assessed acute respiratory

Type of study: Self-control (randomized crossover) and RCTs AMSTAR: 7	100 mA (range 100–450 mA), the mean pulsewidth (pulse duration) was 259 μs (range 25–400 μs) and almost all studies used a stimulation frequency of 50 Hz. There was a lack of homogeneity in electrode position, with a range of positions used to stimulate either or both of the rectus abdominis and external oblique muscles.	effects of abdominal FES and showed a significant acute improvement in CPF (figure 1) whereas FEV_1 approached significance (figure 2). 3. 4 studies assessed chronic respiratory effects of FES; showing only a significant increase and effect in FVC (P = 0.043), with a continued improvement after training (figure 6); in VC (P = 0.013); and in PEF (P = 0.026).
Berlowitz and Tamplin 2013 (Tamplin & Berlowitz 2014) Australia Reviewed published articles (searches were not restricted by date, language, or publication status) N=11 **Level of evidence:** PEDro scale was used to evaluate studies **Type of study:** 11 RCT AMSTAR: 10	**Method:** Systematically review the effectiveness of RMT on pulmonary function, dyspnea, respiratory complications, respiratory muscle strength, and quality of life for people with cervical SCI. There were no date, language, or publication restrictions. Only RCTs were included. **Database:** Cochrane Injuries and Cochrane Neuromuscular Disease Groups' Specialized Register, the Cochrane Central Register of Controlled Trials (CENTRAL) (2012, Issue 1), MEDLINE, EMBASE, CINAHL, ISI Web of Science, PubMed, and clinical trials registries (Australian New Zealand Clinical Trials Registry,	1. 11 RCTs with 212 participants with cervical SCI were included. 2. Meta-analysis revealed a statistically significant effect of RMT for 3 outcomes: VC (MD mean end point 0.4L, 95% CI 0.1 to 0.7), MIP (MD mean end point 10.5 cmH_2O, 95% CI 3.4 to 17.6), and MEP (MD mean end point 10.3 cmH_2O, 95% CI 2.8 to 17.8). (Berlowitz & Tamplin 2013) 3. Meta-analysis revealed a statistically significant effect of RMT for 2 extended outcomes: MVV (MD mean end point

	Clinical Trials, Controlled Trials metaRegister), and hand searching.	17.51L/min, 95% CI 5.20 to 29.81), and IC (MD mean end point 0.35L, 95% CI 0.05 to 0.65). (Tamplin & Berlowitz 2014) 4. RMT showed a combined benefit in VC & FVC (MD mean end point 0.41L, 95% CI 0.17 to 0.64) (Tamplin & Berlowitz 2014) 5. There was no effect on FEV_1 or dyspnoea. 6. The results from quality of life assessment tools could not be combined from the three studies for meta-analysis. 7. No adverse effects as a result of RMT were identified in cervical SCI.
Berney et al. 2011 Australia Reviewed published articles from 1950 to 2008 N= 21 **Level of Evidence:** PEDro Scale and the Newcastle–Ottawa Scale (NOS) with nine scored criteria **Type of study:** 1 RCT 3 cohort	**Methods:** Literature search for English articles with quantitative study designs on the effectiveness of treatment strategies for the respiratory management of acute tetraplegia. **Databases:** MEDLINE (1950–2008), CINAHL (1982–2008), EMBASE (1980–2008), the Cochrane Library (2008), Web of Science (1900–1914–2008), http://www.guideline.gov and http://www.icord.org/scire/	1. A clinical pathway with a structured respiratory protocol that includes a combination of treatment techniques, provided regularly is effective in reducing respiratory complications and cost. 2. Mortality (ARR=0.4, 95% confidence interval (CI) 0.18, 0.61), the incidence of respiratory complications (ARR=0.36, 95% CI

3 case–control 14 retrospective case series reports. AMSTAR: 6	chapters.php on 20 October 2008.	(0.08, 0.58)), and requirement for a tracheostomy (ARR=0.18, 95% CI (-0.05, 0.4)) were significantly reduced by using a respiratory protocol. 3. Overall, study quality was moderate. Further studies using specific interventions that target respiratory complications associated with specific regions of the cervical spine, using more methodologically rigorous designs are required.
Sheel et al. 2008 Canada Review published articles from 1980 to 2006 N=13 **Level of Evidence:** PEDro scale – RCTs Modified Downs and Black – non RCTs **Type of study:** 3 RCTs 1 pre-post 6 case series 2 cohort 1 case report AMSTAR: 6	**Methods:** Literature search for articles assessing exercise training and inspiratory muscle training (IMT) for the improved respiratory function of patients with SCI. **Databases:** MEDLINE/ PubMed, CINAHL, EMBASE, PsycINFO.	1. There is Level 2 evidence supporting exercise training as an intervention to improve respiratory strength and endurance. 2. There is Level 4 evidence to support exercise training as an intervention to improve resting and exercising respiratory function in people with SCI. 3. There is Level 4 evidence to support IMT as an intervention to decrease dyspnea and improve cardiovascular function in people with SCI.