Protocolized versus non-protocolized weaning for reducing the duration of mechanical ventilation in critically ill adult patients (Review)

Blackwood B, Alderdice F, Burns KEA, Cardwell CR, Lavery G, O'Halloran P

THE COCHRANE COLLABORATION®

This is a reprint of a Cochrane review, prepared and maintained by The Cochrane Collaboration and published in *The Cochrane Library* 2012, Issue 11

http://www.thecochranelibrary.com

[Intervention Review]

Protocolized versus non-protocolized weaning for reducing the duration of mechanical ventilation in critically ill adult patients

Bronagh Blackwood[1], Fiona Alderdice[2], Karen EA Burns[3], Chris R Cardwell[4], Gavin Lavery[5], Peter O'Halloran[6]

[1]School of Medicine, Dentistry & Biomedical Sciences, Queen's University Belfast, Belfast, UK. [2]Nursing and Midwifery Research Unit, Queen's University Belfast, Belfast, UK. [3]Interdepartmental Division of Critical Care and the University of Toronto, Keenan Research Centre/Li Ka Shing Knowledge Institute, Toronto, Canada. [4]Centre for Public Health, Queen's University Belfast, Belfast, UK. [5]Regional Intensive Care Unit, Royal Victoria Hospital and, Faculty of Health and Life Sciences, University of Ulster, Belfast, UK. [6]School of Nursing & Midwifery, Queen's University Belfast, Medical Biology Centre, Belfast, UK

Contact address: Bronagh Blackwood, School of Medicine, Dentistry & Biomedical Sciences, Queen's University Belfast, Health Sciences Building, Room: 111, 97 Lisburn Road, Belfast, Northern Ireland, BT9 7BL, UK. b.blackwood@qub.ac.uk.

Editorial group: Cochrane Anaesthesia Group.
Publication status and date: Edited (no change to conclusions), published in Issue 11, 2012.
Review content assessed as up-to-date: 30 January 2010.

Citation: Blackwood B, Alderdice F, Burns KEA, Cardwell CR, Lavery G, O'Halloran P. Protocolized versus non-protocolized weaning for reducing the duration of mechanical ventilation in critically ill adult patients. *Cochrane Database of Systematic Reviews* 2010, Issue 5. Art. No.: CD006904. DOI: 10.1002/14651858.CD006904.pub2.

ABSTRACT

Background

Reducing weaning time is desirable in minimizing potential complications from mechanical ventilation. Standardized weaning protocols are purported to reduce time spent on mechanical ventilation. However, evidence supporting their use in clinical practice is inconsistent.

Objectives

To assess the effects of protocolized weaning from mechanical ventilation on the total duration of mechanical ventilation for critically ill adults; ascertain differences between protocolized and non-protocolized weaning in terms of mortality, adverse events, quality of life, weaning duration, intensive care unit (ICU) and hospital length of stay (LOS); and explore variation in outcomes by type of ICU, type of protocol and approach to delivering the protocol.

Search methods

We searched the Cochrane Central Register of Controlled Trials (*The Cochrane Library* Issue 1, 2010), MEDLINE (1950 to 2010), EMBASE (1988 to 2010), CINAHL (1937 to 2010), LILACS (1982 to 2010), ISI Web of Science and ISI Conference Proceedings (1970 to 2010), Cambridge Scientific Abstracts (inception to 2010) and reference lists of articles. We did not apply language restrictions.

Selection criteria

We included randomized and quasi-randomized controlled trials of protocolized weaning versus non-protocolized weaning from mechanical ventilation in critically ill adults.

Data collection and analysis

Three authors independently assessed trial quality and extracted data. A priori subgroup and sensitivity analyses were performed. We contacted study authors for additional information.

Main results

Eleven trials that included 1971 patients met the inclusion criteria. 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^2 = 76%, P < 0.01) and weaning duration (I^2 = 97%, P < 0.01), which could not be explained by subgroup analyses based on type of unit or type of approach.

Authors' conclusions

There is some evidence of a reduction in the duration of mechanical ventilation, weaning duration and ICU LOS 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.

PLAIN LANGUAGE SUMMARY

The use of standardized protocols in weaning compared to usual weaning practice for reducing the time critically ill adult patients spend on mechanical ventilation

Helping patients to breathe with the use of a mechanical ventilator can be life saving. Yet as the duration of ventilation increases so does the likelihood of harmful effects such as (1) mechanical injury to the throat or vocal cords, (2) injury to or infection of the lungs and (3) complications of prolonged patient immobility such as clots in the legs or lungs and various infections (for example in the urinary tract). It is important therefore to recognize straight away when patients are ready to breathe for themselves so that the ventilator support can be reduced and stopped (this is known as weaning) as soon as possible. Usually weaning decisions are left to the judgement of the staff but recently protocols (or written guidelines) for weaning have been found to be both safe for patients and useful for staff. Some studies claimed that using protocols led to better practice, but there was no clear evidence that using them actually produced beneficial results for patients.

This review looked at the results of 11 studies involving 1971 critically ill patients. The studies compared the use of protocols to wean patients from the ventilator against usual practice and were conducted in America, Europe and Australia. The varied intensive care units cared for patients with heart conditions, breathing difficulties, head injuries, trauma and following major surgery. In eight studies, intensive care staff followed protocol guidelines to reduce the ventilator support; in three studies ventilator support was reduced by programmed computers according to a protocol. Overall, results showed that in comparison with usual practice, the average total time spent on the ventilator was reduced by 25%. The duration of weaning was reduced by 78% and length of stay in the intensive care unit reduced by 10%. However, these reductions were not consistent across all studies.

Among the 11 studies, there was considerable variation in the types of protocols used, the criteria for considering when to start weaning, the methods of weaning (by professionals or computers), the medical conditions of the patients and usual practice in weaning. There were insufficient studies to enable us to explore whether or not these factors were responsible for inconsistencies in individual studies. Caution will need to be applied when generalizing our findings to other intensive care units.