Critical care transition programs and the risk of readmission or death after discharge from an ICU: a systematic review and meta-analysis

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CRD summary
This review concluded that critical care transition programmes appeared to reduce the risk of intensive care unit readmission, for patients discharged to a general hospital ward. This conclusion reflects the evidence and seems reliable; the limitations of the evidence justify the authors’ recommendations for research.

Authors’ objectives
To compare the impact of programmes for the transition from critical care, versus standard care, on the risks of readmission to the intensive care unit (ICU) or death in adults.

Searching
MEDLINE, EMBASE, CINAHL, CINAHL Plus, and Cochrane Central Register of Controlled Trials (CENTRAL) were searched to October, 2012, with no language restrictions. ClinicalTrials.gov and Current Controlled Trials were also searched. Abstracts from four international conferences, held between 2009 and 2011 (named in the review), authors’ personal files, and the reference lists of included studies and relevant reviews were handsearched.

Study selection
Controlled studies comparing the impact of a transition programme (defined in the review), versus standard care, for adults being discharged from the ICU after an incident admission, were included. The outcomes of interest were the rates of readmission to the ICU and death in hospital.

Most of the included studies were conducted in the UK (half the studies) or Australia; a few were conducted in New Zealand or Canada. Most of the ICUs were mixed medical and surgical, and (where reported) were in a teaching hospital. Where reported, the transition programmes were implemented between 1998 and 2006, by ICU nurses, physicians, a respiratory therapist, or a nurse practitioner. Follow-up was once to twice daily, for 48 hours, or until the patient was clinically stable. The definition of the ICU readmission rate varied across the studies or was not reported.

Two reviewers independently selected studies for inclusion.

Assessment of study quality
The risk of bias in each study was assessed, using Cochrane criteria for randomisation, allocation concealment, baseline outcome and data similarity, incomplete outcome data, blinding, protection against contamination, selective reporting, and other bias.

The authors did not state how many reviewers were involved in the risk of bias assessment.

Data extraction
Two reviewers extracted the data for the number of ICU readmissions and in-hospital deaths to calculate risk ratios and 95% confidence intervals.

Methods of synthesis
The risk ratios and 95% confidence intervals from individual studies were pooled using fixed-effect and random-effects models. Statistical heterogeneity was assessed using Cochrane’s Q and I²; I² values over 25% indicated substantial heterogeneity. The results from stratified analyses were reported (details provided). A funnel plot was constructed and Begg’s test was performed to assess publication bias.

Results of the review
Nine before-and-after studies were included (16,433 patients; range 451 to 5,027; one study did not report the sample size). The studies were all at a high risk of bias for randomisation, allocation concealment, blinding and other bias; and
at a low risk for protection against contamination and selective reporting. The risks for the other domains were unclear, or a mix of low or high.

Compared with standard care, a transition programme was associated with a borderline statistically significant reduction in the risk of ICU readmission (RR 0.87, 95% CI 0.76 to 0.99; eight studies; I²=0). The results of the fixed-effect and random-effects models were identical.

Stratified analyses showed similar results, regardless of the programme structure, the presence of a physician, the follow-up duration, and the baseline reporting of study population age or scores on the acute physiology and chronic health evaluation. Stratified analyses for closed versus open ICUs, and early (<48 hours) versus late (>48 hours) readmissions, were not possible due to inconsistencies in reporting. It was also not possible to analyse whether the reduced risk of readmission was related to changes in a patient's goals of care because this was rarely reported.

Among patients discharged from ICU to the general ward (three studies), critical care transition programmes reduced the risk of in-hospital death, compared with standard care (RR 0.84, 95% CI 0.66 to 1.05). This difference between them was not statistically significant. Fixed-effect and random-effects models both showed similar results.

No evidence of publication bias was found.

**Authors' conclusions**
The critical care transition programmes appeared to reduce the risk of ICU readmission for patients discharged to a general hospital ward.

**CRD commentary**
The review question and inclusion criteria were well defined. An extensive array of relevant data sources was searched (including published and unpublished studies), with no restrictions on language; this reduced the risk of relevant studies being missed. The processes of study selection and data extraction were duplicated, but they were unclear for quality assessment; the risk of reviewer error and bias cannot be ruled out. Most of the quality assessment criteria were relevant for the before-and-after studies; the results showed that quality across the domains was mixed.

Some study details were presented, but the controls were not described. The methods of synthesis seem to have been appropriate. The authors acknowledged the limitations of the evidence, including high risks of bias and inconsistencies in reporting. Some studies had large differences in size between their groups; the overall effect sizes were small; and the differences between groups were borderline or not statistically significant.

The authors' conclusion reflects the evidence and seems reliable; the limitations of the evidence justify their recommendations for research.

**Implications of the review for practice and research**

**Practice:** The authors did not state any implications for clinical practice.

**Research:** The authors stated that their findings should be confirmed by research with robust methods, such as quasi-experimental studies or prospective randomised trials. Research was needed to identify whether there were patient and institutional characteristics that predicted greater benefit from the programmes. Before recommending their implementation, research should investigate the ideal model.

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