Acute medical admissions: a critical appraisal of the literature
New Zealand Health Technology Assessment

Authors' objectives
To assess the effectiveness of interventions to reduce acute medical admission rates.

Searching
The authors searched the following databases (1993 onwards) for English language publications: MEDLINE, HealthStar, CINAHL, DARE, NHS EED, The Cochrane Library, and Current Contents. A number of other electronic and bibliographic sources were also searched including: New Zealand university and medical library catalogues; New Zealand Bibliographic Network; Index New Zealand; HMSO publications catalogues; International Network of Agencies for Health Technology Assessment (INAHTA) documents; Kings' Fund catalogue of publications; material referenced in publications obtained in the course of research on the topic; and internet sites and personal contacts.

Letters and non-English publications were excluded from the review.

Study selection
Study designs of evaluations included in the review
Meta-analysis, randomised controlled trials (RCTs), cohort studies, case-control studies, before and after studies (using a before and after comparison of an intervention), descriptive studies (including cross-sectional studies and ecological studies). Studies with a participation rate of less than 50% or with discrepancies in their description of methods/results or which did not clearly describe the methods and results were excluded from the review. Studies with limited generalisability to the New Zealand population were excluded.

Specific interventions included in the review
Macro-management (organisational level) interventions and micro-management (at the level of individual patients) interventions.

Macro-management interventions included hospital closures, changes to hospital reimbursement on admission rates, prospective diagnostic related grouping (DRG) payments, fundholding or budget-holding status, the effect of HMOs on admission rates, public health interventions to reduce admissions, the provision of home hospital care, hospital at home for acute illness, hospital at home to assist early discharge, hospital at home for terminal care, high technology at home, community hospitals/GP beds, and patient hotels.

Micro-management interventions included primary care, hospital outpatient-based interventions to reduce admissions, emergency department interventions, emergency observation units, chest pain observation units, maximising bed utilisation, interventions to reduce acute medical admissions in the elderly, utilisation review to reduce inappropriate admissions, use of guidelines/protocols/critical pathways/treatment algorithms, interventions to reduce medication-related admissions, and studies evaluating specific medical interventions that have used hospital admission as their primary end point.

Participants included in the review
Patients admitted to hospital for acute medical treatments.

Outcomes assessed in the review
The reduction of acute medical admission rates.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many of the authors performed the selection.

Assessment of study quality
Articles were formally appraised using the schedule developed by the Group Health Co-operative of Puget Sound and adapted by the New Zealand Guidelines Group of the National Health Committee.

The level of evidence was graded using an adapted version of the US Preventive Services Task Force protocol (I is the highest grade and IV the lowest).

The authors did not state how the papers were assessed for validity, or how many of the authors performed the validity assessment.

**Data extraction**
Data were extracted for the categories of author and country, study design and level of evidence, sample description (or patients and sample size), intervention, and result(s) or conclusion(s) of study.

The report did not state who, or how many of the reviewers performed the data extraction.

**Methods of synthesis**

How were the studies combined?
For each intervention assessed, the studies were grouped into a narrative review of the results of the included individual studies.

How were differences between studies investigated?
The authors did not state how differences between the studies were investigated.

**Results of the review**

**Macro-management:**

Four studies (number of participants not stated) on hospital closures (1 quasi-experimental, 1 ecological, 1 economic modelling/cross-sectional data, and 1 opinion). No studies were listed on changes to hospital reimbursement on admission rates.

Five studies (total number of participants not stated) on prospective diagnostic related grouping (DRG) payments (1 RCT (n = 1580), 2 quasi-experimental, and 2 cross-sectional).

Three studies (number of participants not stated) on fundholding or budget-holding status (2 quasi-experimental and 1 cross-sectional/record linkage).

Four studies (total number of participants not stated) on the effect of HMOs on acute admission rates (1 RCT (n = 1580), 1 cohort (n = 3006), 1 case-control, and 1 retrospective case series (n = 102)).

Eight studies (total number of participants not stated) on public health interventions to reduce admissions (2 quasi-experimental, 2 cohort (n = 26,446), 2 time series cross-sectional, and two ecological).

No studies were listed on the provision of home hospital care or for hospital at home for acute illness.

Nine RCTs (total number of participants not stated, 8 studies total 2,449 participants) on hospital at home to assist early discharge to reduce subsequent admissions.

Five RCTs (number of participants not stated, 4 studies total 914 participants) on hospital at home for terminal care.

No studies were listed for high technology at home.

Five studies (number of participants not stated) on community hospitals/GP beds (1 quasi-experimental, 1 case-control, 1 audit, 1 cross-sectional/audit, and 1 semi-systematic review).

Two descriptive studies (4,920 participants) on patient hotels.
Micro-management interventions:

Ten studies (number of participants not stated) on primary care initiatives on reducing admissions (1 RCT, 1 systematic review, 1 quasi-experimental, 5 cross-sectional, 1 ecological, and 1 non-systematic review).

Eleven studies (number of participants not stated) on hospital outpatient-based interventions to reduce admissions (2 RCTs (1,370 participants) and 1 meta-analysis (906 participants) on outpatient-based education delivered to individuals; 1 RCT (321 participants) and 1 case-control (84 participants) on group outpatient education; 2 RCTs (533 participants) and 2 cohort (275 participants) on increased outpatient services and improved GP referral to outpatient services; 1 quasi-experimental (number not stated) on urgent referral service for GPs with hospital consultants; and 1 quasi-experimental (52 participants) on outreach service provided by hospital outpatient departments).

Eight studies (number of participants not stated) on emergency department (ED) interventions (1 database review (102,411 participants) on increased ED services; 2 RCTs (9,325 participants) on use of GPs in the ED; 1 quasi-experimental (number of participants not stated) on provision of senior staff in the ED; 2 descriptive studies (572 participants) on the provision of a social worker in the ED; 1 case-control study (300 participants) on regional services and air ambulances; and 1 descriptive study (number of participants not stated) on separate paediatric emergency service).

Four studies (5,786 participants) on emergency observation units (2 RCTs and two before and after studies).

Six studies (number of participants not stated) assessing before and after costs associated with the introduction of an observation unit in relation to the treatment of different conditions.

Two studies (1,602 participants) on chest pain observation units (1 9-hour observation, and 1 24-hour surveillance).

Three studies (total number of participants not stated) on assessing the effect of case management on acute admissions (1 RCT (668 participants), 1 cohort (186 participants) and 1 systematic review). There were no studies listed on maximising bed utilisation.

Six RCTs (5 studies report number of participants = 1,947) on the efficacy of home visits to reduce acute medical admissions in the elderly.

Four studies (522 participants) examining the effect of personal alarms on acute admissions (3 quasi-experimental and 1 cost-benefit).

Four RCTs (total number of participants not stated, 2 studies list 1,179 participants) on preventing acute medical (re)admission amongst the elderly.

Five studies (total number of participants not stated) on utilisation review to reduce inappropriate admissions (1 RCT (7,445 participants), 2 quasi-experimental (1 lists 1,800 chart reviews), and 2 cross sectional (20,173 chart reviews)).

Five studies (6,294 participants) assessing the use of guidelines/protocols/critical pathways/treatment algorithms on hospital admissions (2 RCTs, 2 quasi-experimental, and 1 cohort).

Two uncontrolled descriptive studies (23 participants) on the effect of aerosolized antibiotics on admission rated for people with cystic fibrosis.

Four placebo-controlled trials (94 participants) on the effect of aerosolized antibiotics in cystic fibrosis.

The effect on number of admissions was reduced for the macro-management initiatives of (level of evidence for finding in parentheses after initiative): closure of hospitals (II); public health preventative interventions (II); alternatives to hospital (hospital at home for early discharge or terminal care or acute care - high tech) (I); community hospitals - GP beds (II); patient hotels (IV); comprehensive geriatric care (I); home alarm (II); and increased long-term care - improved nursing home care options (II).

The effect on number of admissions was mixed for the macro-management initiative of (level of evidence for finding...
in parentheses after initiative): home care (I).

The effect on number of admissions was reduced for the micro-management initiatives of (level of evidence for finding in parentheses after initiative): increase skill GP (IV); drug education to GPs and patients (II); hospital outreach services (II); ED-based GPs (I); ED more senior staff (II); provision of social worker in the ED (IV); separate paediatric ED (IV); observation units (II); chest pain units (II); and change hospital reimbursement to prospective funding (I).

The effect on number of admissions was mixed for the micro-management initiatives of (level of evidence for finding in parentheses after initiative): primary care - increased access to GPs (I); primary care - change behaviour of GPs (I); and GP-based budget holding (II).

There was no effect on number of admissions for the micro-management initiatives of (level of evidence for finding in parentheses after initiative): outpatient-based individual or group education (I); increased outpatient services (I); or regionalised ED services (III).

Authors’ conclusions
Generally, most effective interventions to reduce admissions were macro-management-based interventions that were often located at the interface between primary and secondary care. However, micro-management changes within either primary care or secondary care organisations could also effectively reduce the morbidity associated with hospital admissions. Good evidence existed (from RCTs) that specific interventions were effective at reducing admissions. These interventions include hospital-at-home schemes, comprehensive geriatric care and the placement of GPs in the emergency departments. Finally, it also appeared that the introduction of various guidelines, certain new technologies and the provision of prospective funding reduced admissions.

Some evidence existed that several other interventions were probably effective in reducing admissions. These initiatives included: various public health interventions, home alarms, increased options for long-term care for the elderly, drug education for patients and practitioners, and hospital outreach services. The provision of senior staff in the emergency department and the development of emergency department-based observation units and chest pain units were also probably effective in reducing admissions.

Some interventions appeared to be unsuccessful in reducing admissions although it should be noted that these interventions may have still improved other health outcomes. These ineffective interventions included: outpatient-based education for individuals or groups, increased outpatient services, and both utilisation review and case management.

CRD commentary
This was a good systematic review. The literature search was very good and the authors stated their search strategy in a separate appendix. The authors reported their inclusion and exclusion criteria. It was possible that additional relevant studies could have been found by including non-English publications. Extracted data was reported in several tables and discussed in a narrative review in the text. The authors did not report on how the articles were selected or who performed the data extraction.

The quality of the included studies was assessed and was reported with the level of evidence for each included study. It was appropriate not to statistically combine this data since there were few studies of similar study characteristics. The authors did not test for homogeneity but the differences between studies were acknowledged in the narrative review. The authors acknowledged several drawbacks about the quality and design of the included studies and the conduct of their review in the methodology section of the report. The review is useful as a comprehensive review and source of references for the available literature on reducing acute medical admissions.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that there were several areas that required further research concerning patient outcomes and cost effectiveness. These included: closure of hospitals, funding/budget holding effects, DRG payments, integrated care/managed care, primary care, hospital at home, observation unit, and outpatient care. The authors stated that considerably more research on the health outcomes associated with primary and secondary care, along with information on the effects of rising admissions rates and their implications was essential to more duly inform this issue.
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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.