

The Effectiveness of Interventions for Reducing Ambulatory Sensitive Hospitalisations

Summary Report

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Background

In 2007/08, a package of health targets was introduced to focus health sector efforts on the Minister of Health's priority areas for health improvement (Ministry of Health & Minister of Health, 2007). Reducing the number of ambulatory sensitive hospital admissions is one of the ten stated targets. Broadly, ambulatory sensitive hospital admissions (ASH), also known as ambulatory care sensitive conditions (ACSC) are admissions that might have been prevented if services had been delivered effectively in the community (**Figure 1**) (Jackson & Tobias, 2001; Page, Ambrose, Glover, & Hetzel, 2007; Weissman, Gatsonis, & Epstein, 1992). Overall, ambulatory sensitive hospitalisations account for approximately 24% of all medical and surgical discharges (including day cases) and this has remained stable since 2000/01. For Māori and Pacific peoples, the percentages are higher at 28% and 31% respectively and this has also remained stable since 2000/01 (Ministry of Health & Minister of Health, 2007).

These figures show that a substantial volume of admissions are potentially avoidable and by reducing the number of ambulatory sensitive hospital admissions health resources may be freed up for use in other priority areas.

The research question

What is the effectiveness of different interventions and/or treatment protocols, care pathways, or organised programmes of work, administered across a range of care settings, in reducing ambulatory sensitive hospitalisations?

The purpose of this document is to provide a rapid summary/overview of the following systematic review:²

Basu, A., & Brinson, D. The effectiveness of interventions for reducing ambulatory sensitive hospitalisations: A Systematic Review. HSAC Report 2008; 1(6).

This report summarises interventions and programmes of work that aim to reduce the overall rates of ambulatory sensitive hospital admissions and decrease the associated ethnic disparities.

- For further details of any aspect of this report, readers are directed to the full report (Basu & Brinson, 2008) and/or the original articles. The full report is available at: www.healthsac.net

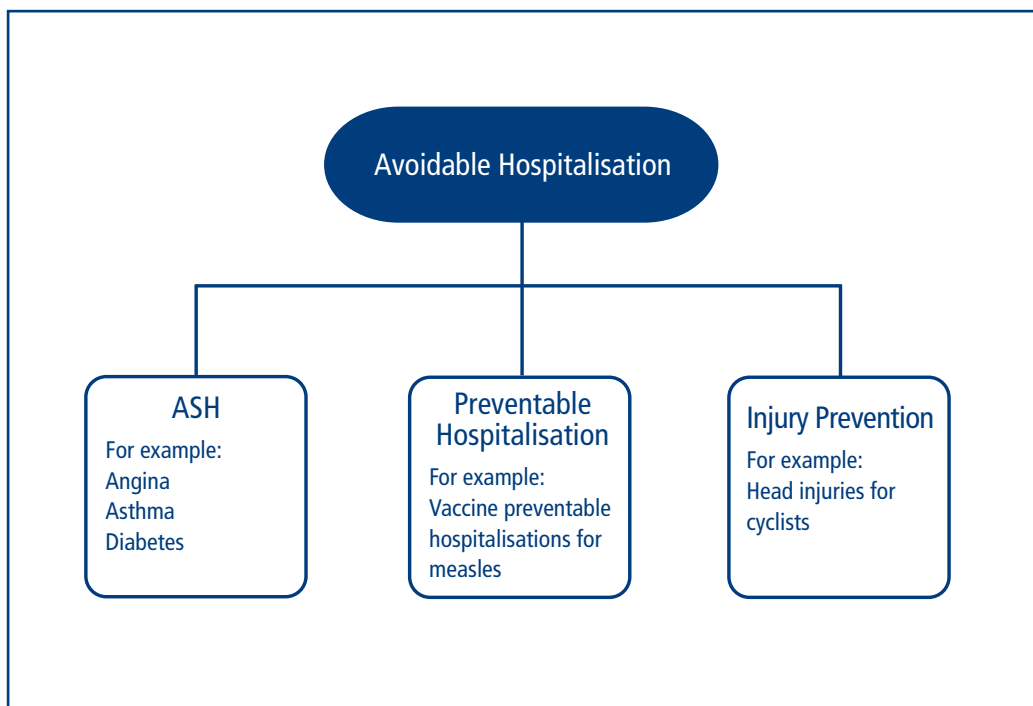


Figure 1 Ambulatory sensitive hospitalisations shown as a sub-set of all avoidable hospitalisations and differentiated from preventable hospital admissions and injury prevention

Prevalence and priorities

Based on existing prevalence data for ASH conditions in New Zealand (Mackenzie, 2007), the following ambulatory care sensitive conditions (outcomes) were identified for inclusion in this review: hospitalisations related to (1) Angina, (2) Bronchial Asthma, (3) Cellulitis, (4) Chronic Heart Failure, (5) Diabetes Mellitus, (6) Ear Nose and Throat conditions, (7) Epilepsy, (8) Gastroenteritis, and (9) Lower Respiratory Infections (Pneumonia). In addition, the outcome 'all-ASH' was used to indicate ASH due to all conditions or more than one specific condition combined. Of all the conditions categorised as ambulatory sensitive, these nine conditions cover approximately 75% of all ambulatory sensitive hospitalisations (Mackenzie, 2007). Considerable variability exists in the specific disease conditions that result in ASH between Māori/Pacific peoples and Other populations and across different age groups.

Review of the evidence

In this review, the authors systematically searched and critically evaluated research related to ambulatory care sensitive conditions, in order to summarise the overall effectiveness of different interventions in reducing ASH. The authors also attempted to identify whether specific patterns of medical practice or health services delivery models are associated with reduced ASH. Where possible, the authors identified studies conducted within health care delivery systems and contexts that were as similar to New Zealand as possible, in terms of access and quality of care. However, this was not always possible for all intervention types across all ambulatory care sensitive conditions.

Key Learning

Overall the review suggests the following.

- Different disease conditions have different sensitivities to interventions in general and specific types of interventions in particular. Therefore, specific disease management processes should be tailored to specific patient populations.
- In general, programmes that increase access to care for all sections of a population or particular subgroups are associated with reductions in ambulatory sensitive hospitalisations.
- Comprehensive, patient-focused, disease management programmes that bring together enthusiastic people with common ideas and goals are associated with reductions in ambulatory sensitive hospitalisations. Disease management programmes normally involve multidisciplinary teams of physicians, nurses, and other caregivers and may vary widely in the combinations of intervention components included (for example, education, self-management education, after-hours telephone access, scheduled patient reminders and follow-up, case management and discharge planning). Generally, the clear-cut effectiveness of the separate intervention components is not known but it appears that a number of intervention components need to be combined together in a programme to significantly reduce ambulatory sensitive hospitalisations.
- Education and self-management education programmes are associated with a reduction in ambulatory sensitive hospitalisations (particularly when included within disease management programmes), however education is much less effective as a 'stand-alone' intervention.
- The establishment of disease-specific observation units in emergency departments is associated with reductions in ambulatory sensitive hospitalisations for specific conditions.
- Specialist clinics may be effective for a few specific conditions.
- Telehealth applications, which involve the provision of healthcare interactions via telephone, video conference or over modems, show promise for reducing ambulatory sensitive hospitalisations.

Methods³

Search process

A systematic process of literature search, study selection, data extraction from individual studies, critical appraisal, and synthesis of data was employed in the preparation of this report. The authors searched and abstracted data for this review from the following – websites of the different district health boards, Pubmed, Embase, and the Cochrane Library. In addition, the authors undertook extensive hand-searching. Bibliographic references contained in the original research reports were further explored to identify other research pertaining to the question under review. This resulted in an initial identification of 1738 resources. This review is based on abstraction of data from 146 eligible studies.

Intervention-outcome cube

Interventions

Critical evaluation of the various interventions suggested a diverse range of intervention types. Therefore, to allow for meaningful comparisons, the authors grouped the various interventions into six partially overlapping clusters or ‘themes’. These intervention ‘themes’ were constructed based on their structure, content and context. The six intervention themes and the ambulatory care sensitive conditions for which sufficient data were available formed a multidimensional matrix cube (**Figure 2**) – suggesting that a rubric of interventions work for different combinations of disease processes that eventually result the in reduction of ambulatory sensitive hospitalisations across the system. In the following sections, the authors tease out the individual components and present in essence, a summary of many individual ‘single outcome’ reviews of effectiveness⁴.

Outcomes

Initially, all of the ASH conditions that are most prevalent in New Zealand were considered. However, this review necessarily focused on those ASH conditions that are most represented in the international literature: all-ASH conditions across the board, bronchial asthma, chronic heart failure, and diabetes mellitus.

The following sections are based on the intervention-outcome cube (**Figure 2**) and provide an overview of the intervention themes for which there is a sound evidence base and the effectiveness of these interventions when evaluated across the listed ASH conditions.

Figures 4,6,8 & 10 give a ‘snapshot’ of which ambulatory care sensitive conditions appear most amenable to the different intervention themes (in other words, the sensitivity of a particular condition to a particular type of intervention)⁵.

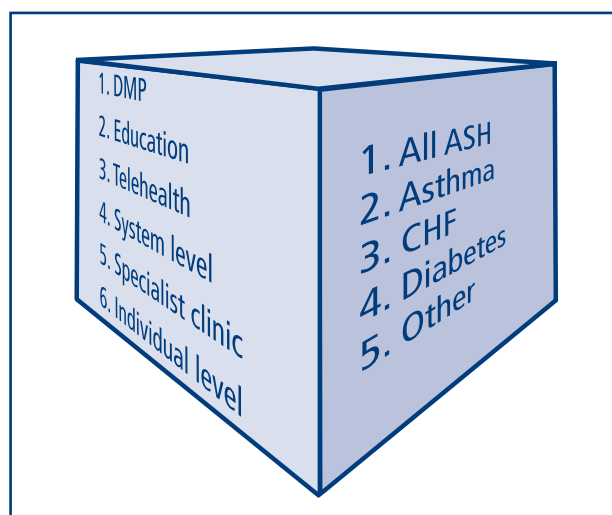


Figure 2 Matrix of interventions and disease outcomes

3. For full text of the review methodology, refer to the following review: Basu, A., & Brinson, D. The effectiveness of interventions for reducing ambulatory hospitalisations: A Systematic Review. HSAC Report 2008; 1(6).
4. This review only considers one outcome: hospitalisation (or not). Included studies reported multiple outcomes including biochemical outcomes, adherence to medical management, quality of life, and a range of other utilisation outcomes such as unscheduled emergency department visits and ‘length of stay’. Please refer to the original articles for the full details of these outcomes.
5. However, consideration should be given to the limitations of the evidence base as described in the Discussion section of the main report.

Summary of Key Findings

A total of 146 publications were evaluated to form the body of the main review. Out of 146 publications, 35 were systematic reviews including meta-analyses, 80 were primary reports of randomised trials, and 31 were primary studies based on various other different types of epidemiological designs and secondary data analyses of administrative databases or hospital based chart reviews. These observations suggested five emergent themes of interventions that may be beneficial in reducing ASH for the diseases identified in the published literature. These intervention themes are as follows: comprehensive disease management programmes, educational interventions, telehealth applications, system level interventions (including disease-specific observation units) and specialist clinics. Individual-level drug and non-drug interventions, delivered in isolation and not in association with other intervention components and/or system level changes, are generally not effective in reducing ambulatory sensitive hospitalisations. These individual (patient) level interventions are not discussed further in this summary report.

Comprehensive disease management programmes⁶

Disease management programmes (DMP) were defined as multidisciplinary teams of physicians (primary care and specialist physicians in some cases), and nurses (including nurse practitioners), co-ordinating services that ranged between comprehensive planning of treatments implemented across a range of settings, to caring for individual patients on a one-on-one basis. **Figure 3**, adapted and simplified from Norris, Nicholas and Caspersen (2002), illustrates the framework that underpins most disease management programmes. For example, integrated care, care programmes led by pharmacists, or by teams of physicians and nurses at the time of patient discharge, and/or individual case management with regular follow-up on a one-on-one basis. Case management (a sub-set of DMP) is defined as managing and integrating all the health care needs of a patient, not just disease specific-related needs.

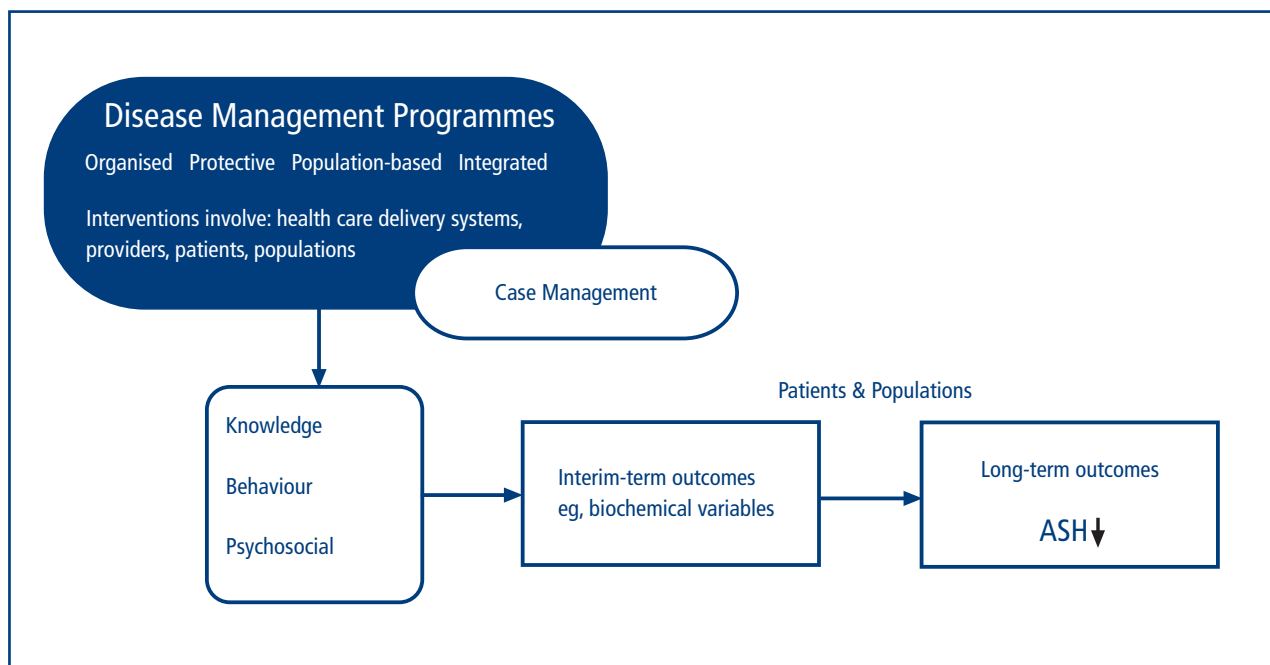


Figure 3 A generic framework for disease management programmes (Norris, Nicholas & Caspersen, 2002)

6. See **Table 10** in the main report.

Results

Fifty-one out of 146 studies evaluated the roles of comprehensive disease management programmes in reducing ASH. Out of 51 studies, 29 (57%) found significant reductions in ASH. Twenty of the 29 studies (69%) found that well co-ordinated, multidisciplinary care programmes were effective in reducing hospitalisation or rehospitalisation for elderly patients recovering from chronic heart failure (**Figure 4**). Out of 51 studies, 22 (43%) showed non-significant benefits.

Conclusions

Comprehensive, multidisciplinary, team-based medical care programmes where patients were involved in discharge planning, were provided education in either a one-on-one setting or using interactive discussions, and were regularly followed up, were likely to be beneficial compared to programmes that included only one or none of these components. However, for all-ASH and diabetes, studies showed that comprehensive disease management programmes were not very effective.

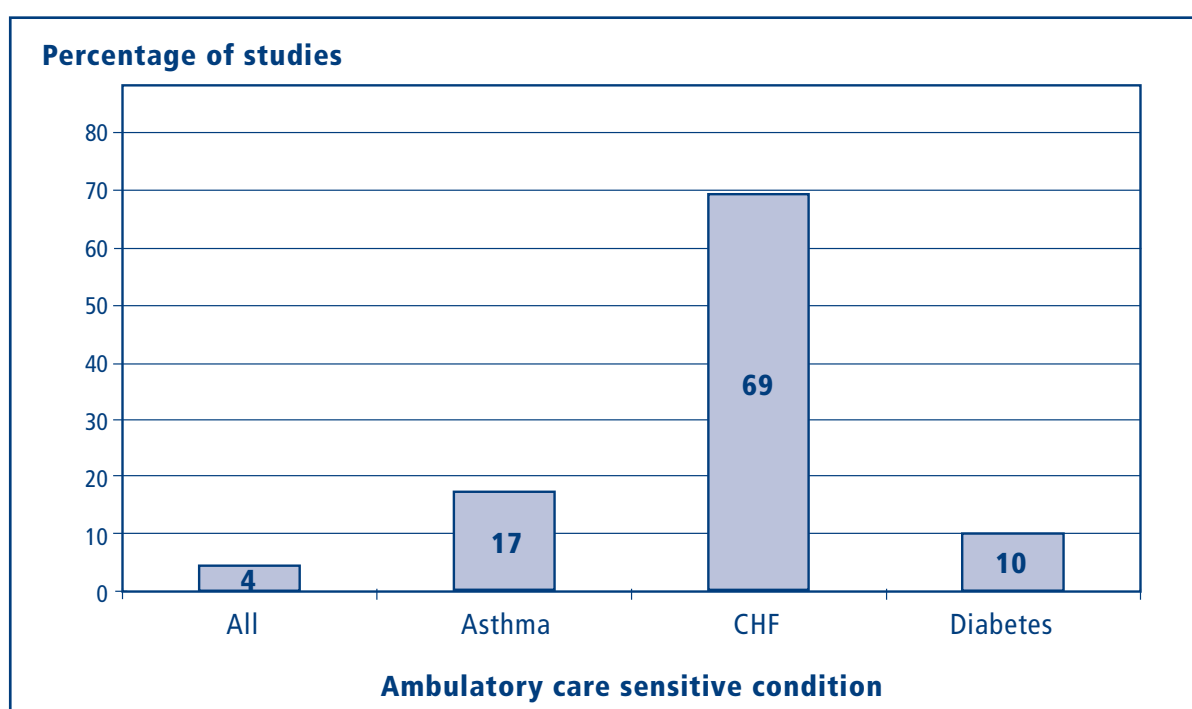


Figure 4 The percentage of all included DMP studies that indicated a significant reduction in ambulatory sensitive hospital admissions, across each condition

Example

Intervention: one-on-one orientation visits with the asthma outreach nurse, education, and peak-flow meters, individualised step-care treatment programme, personal or telephone contact with the families on a regular basis.

Outcome: patients enrolled in a programme experienced a significant reduction in asthma-related hospital admissions and utilisation of the emergency department (Greineder, Loane, & Parks, 1995) (see pages 27 & 35 of the main report).

Educational interventions⁷

Educational interventions were provided at the point of care (patient education on an individual basis), or over the Internet, or to school children in the form of educating a small group of patients and/or healthy peers, or provision of self-management education to individuals and groups of different sizes (**Figure 5**).

Results

Thirty two out of 146 studies evaluated the roles of educational interventions in reducing ASH. Out of these 32 studies, 19 (59%) found significant reductions in ASH. Twelve of the 19 studies (63%) found that educational programmes were effective in reducing hospitalisation for exacerbations of asthma (**Figure 6**). Out of 32 studies, 13 (40%) showed non-significant benefits.

7. See **Table 11** in the main report.

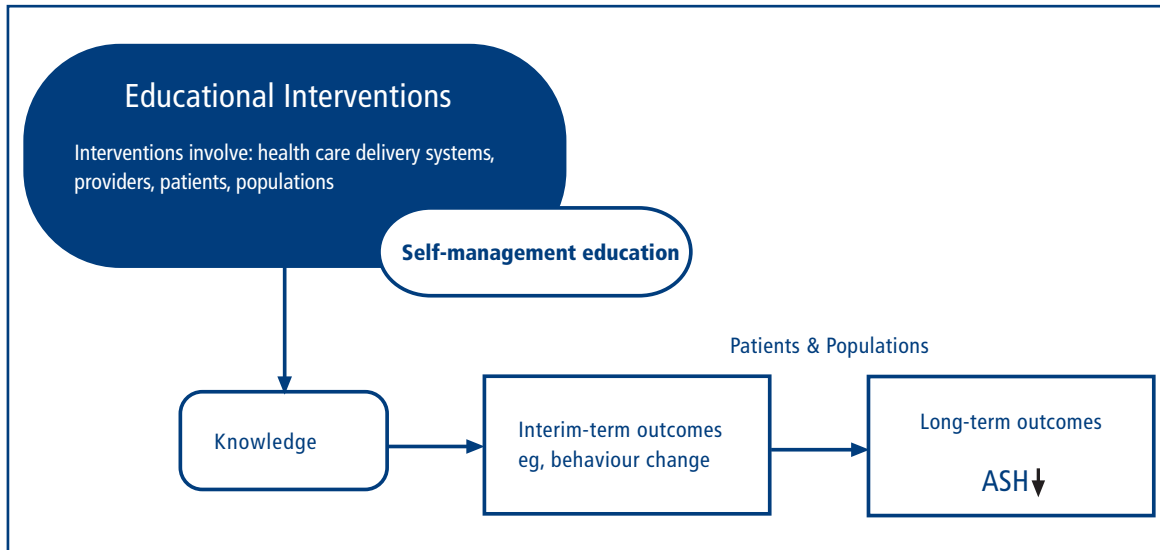


Figure 5 A generic framework for educational interventions

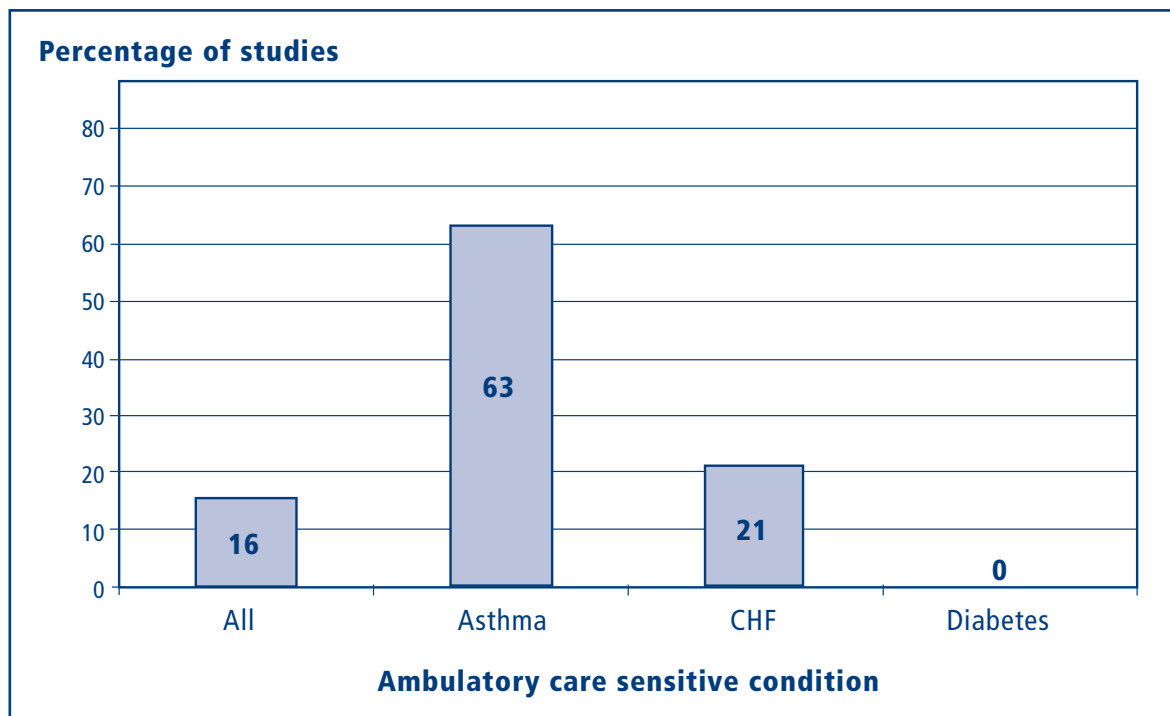


Figure 6 The percentage of all the included educational intervention studies that indicated a significant reduction in ambulatory sensitive hospital admissions, across each condition

Conclusions

In general, educational interventions that were included within comprehensive disease management programmes performed better than ‘stand alone’ education interventions in the reduction of ASH. However, for diabetes in particular, studies showed that educational interventions alone were not very effective.

Example

Intervention: ‘Women take pride’ self-management education for chronic heart disease. Four 2.5 hour group sessions over four weeks and tailored to the patients’ unique needs, plus an educational video, a pedometer, and other written resources. **Outcome:** a heart disease self-management education programme can reduce health care utilisation and potentially yield monetary benefits to a health plan (Wheeler, Janz, & Dodge, 2003) (see pages 44 & 52 of the main report).

Telehealth applications⁸

Telehealth applications were defined as applications or interventions that included the use of telephones, modems, or another mode of distance communication as a primary means of health care provision (**Figure 7**). This term includes telemonitoring which is transmitting information about clinical indicators such as blood pressure over a telephone or modem, and telecare/telecounselling, which indicate provision of healthcare consultations over either a telephone or video conference or modem (Internet-based applications).

Results

Twenty three out of 146 studies evaluated the roles of telehealth applications in reducing ASH. Out of these 23 studies, 17 (73%) found significant reductions in ASH. Fourteen of the 17 studies (83%) found that telehealth applications were effective in reducing hospitalisation or rehospitalisation for elderly patients recovering from chronic heart failure (**Figure 8**). Out of 23 studies, 6 (27%) showed non-significant benefits.

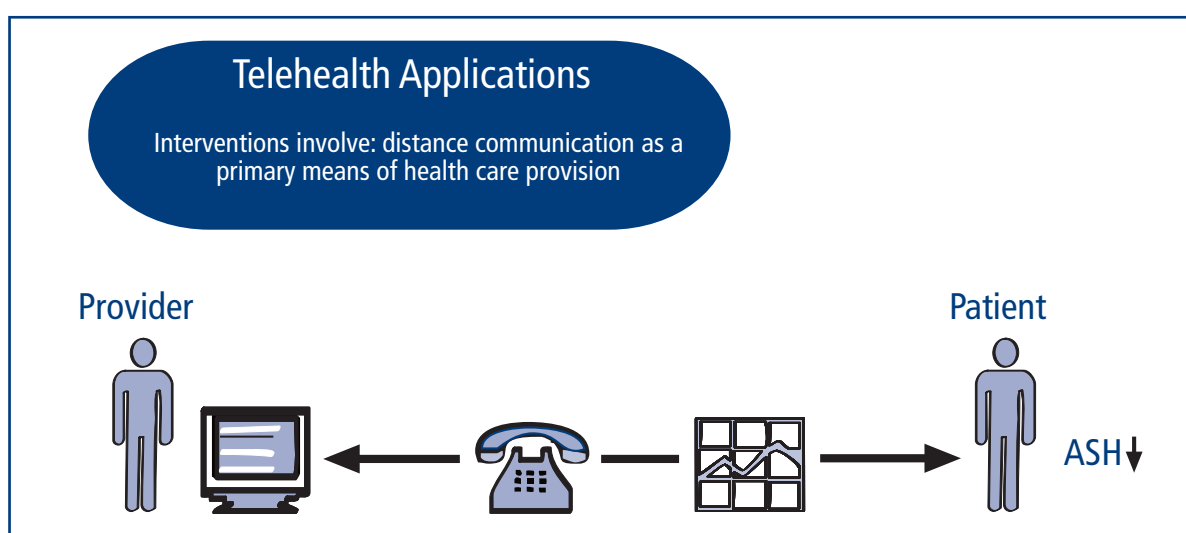


Figure 7 Telehealth applications involve distance communication and the transfer of biochemical data, specific advice and adjustment of medical management, counselling and often unlimited 24 hour access

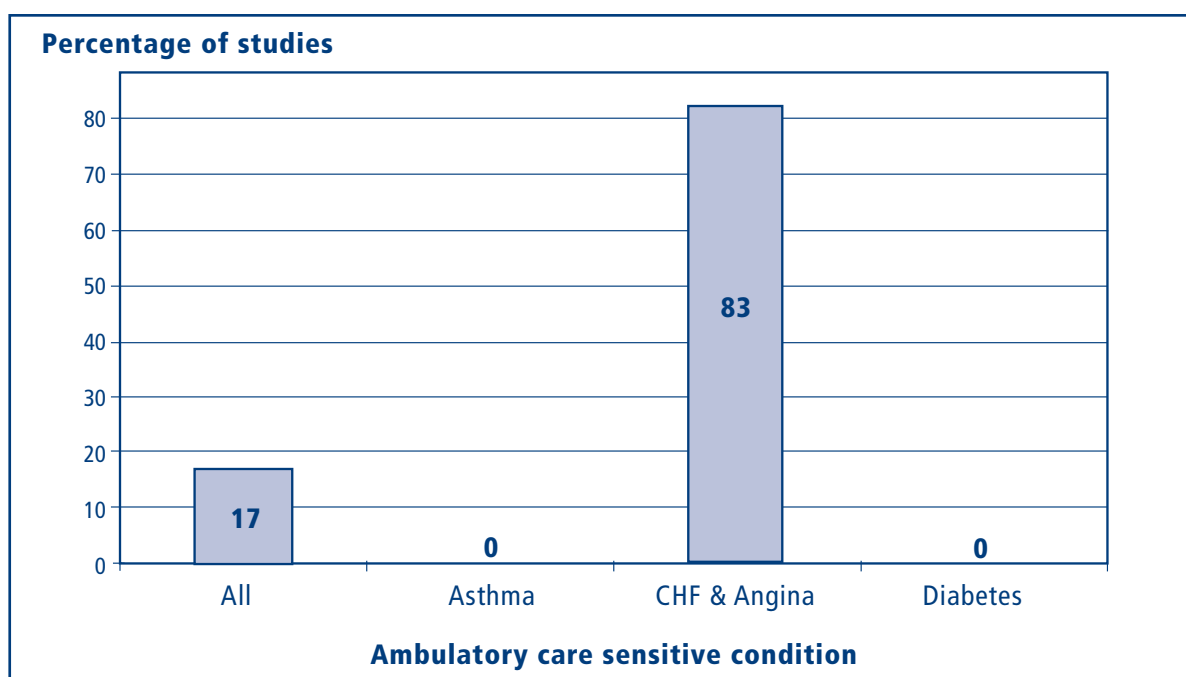


Figure 8 The percentage of all the included telehealth studies that indicated a significant reduction in ambulatory sensitive hospital admissions, across each condition. Note: In this case, the eight chronic heart failure studies and two angina studies have been added together as they include related concepts

8. See **Table 12** in the main report.

Conclusions

Computer-based programmes, where patients and health care providers interacted with each other, were beneficial in reducing ambulatory sensitive hospitalisations. These interventions are likely to improve patient outcomes, by increasing access to high quality medical care for people who are otherwise remotely located. This may be especially relevant in the context of New Zealand's geographically dispersed population. However, for asthma and diabetes, studies showed that telehealth applications were not very effective.

Example

Intervention: a three month programme of nurse telemanagement of patients' weight, blood pressure, heart rate and oxygen saturation. Practice nurse worked collaboratively with a cardiologist and subsequently treated patients via the telephone. **Outcome:** the intervention significantly reduced hospital readmission for chronic heart failure at three months (Benatar, Bondmass, Ghitelman, & Avitall, 2003) (see pages 55 & 61 of the main report).

System Level Interventions⁹

System level interventions include all interventions that were targeted at the level of health care delivery systems (**Figure 9**). System level interventions include policy changes to affect primary care practice patterns of physicians, institutions, or implementation of critical care pathways (guidelines or protocols to help people move smoothly through different parts of the healthcare system, based on principles of evidence based healthcare), establishment of structures and programmes such as hospital-at-home and outreach programmes by way of nurse home visits. For example, a programme specifically targeting the education of physicians or nurses, with the objective of reducing hospital admissions would be deemed as a system level intervention.

Results

Twenty five out of 146 studies evaluated the roles of system level interventions in reducing ASH. Out of these 25 studies, 16 (64%) found significant reductions in ASH. Nine of the 16 studies (56%) found that system level interventions were effective in reducing hospitalisation for all-ASH conditions and four studies (25%) found that system level interventions were effective in reducing hospitalisation for chronic heart failure and angina (combined) and three studies (13%) found that system level interventions were effective in reducing hospitalisation for asthma (**Figure 10**). Out of 25 studies, 9 (36%) showed non-significant benefits.

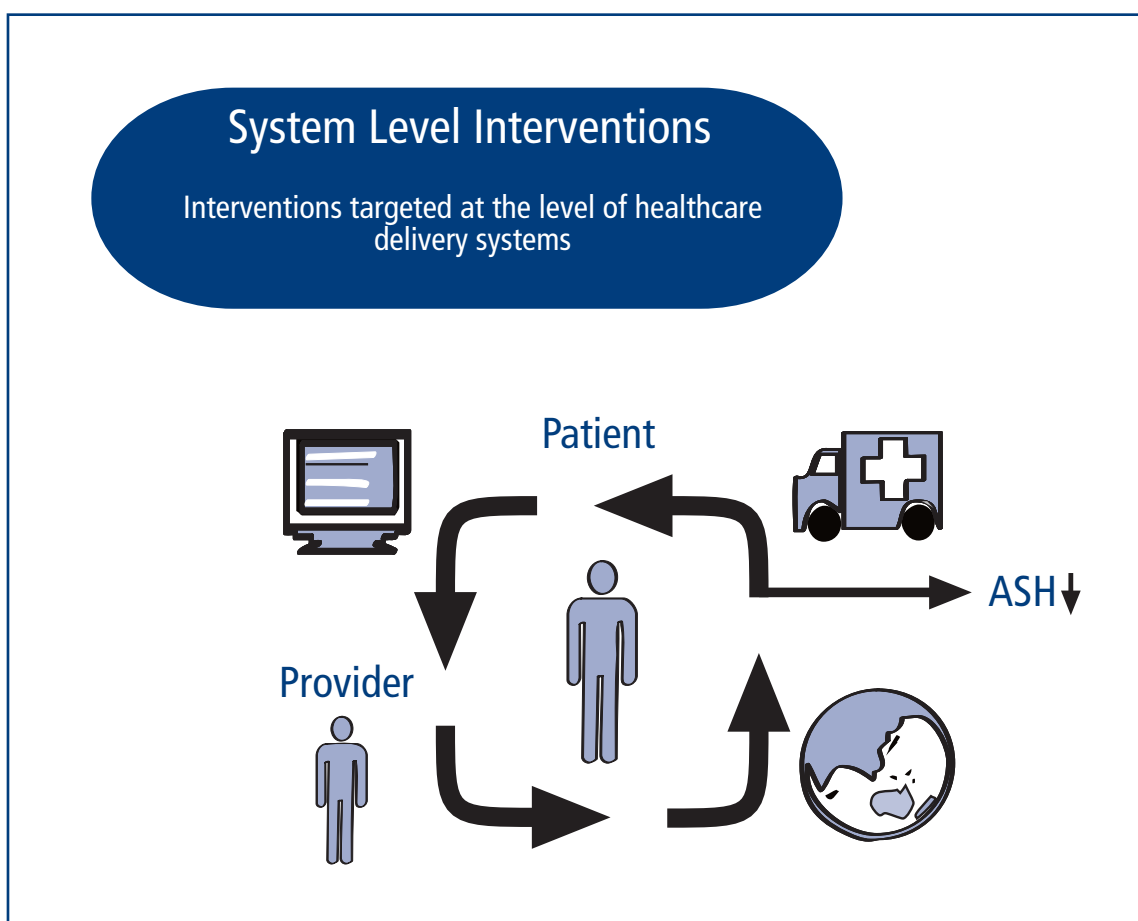


Figure 9 System level interventions involve critical care pathways, establishment of structures and programmes such as hospital-at-home and outreach programmes

9. See **Table 13** in the main report.

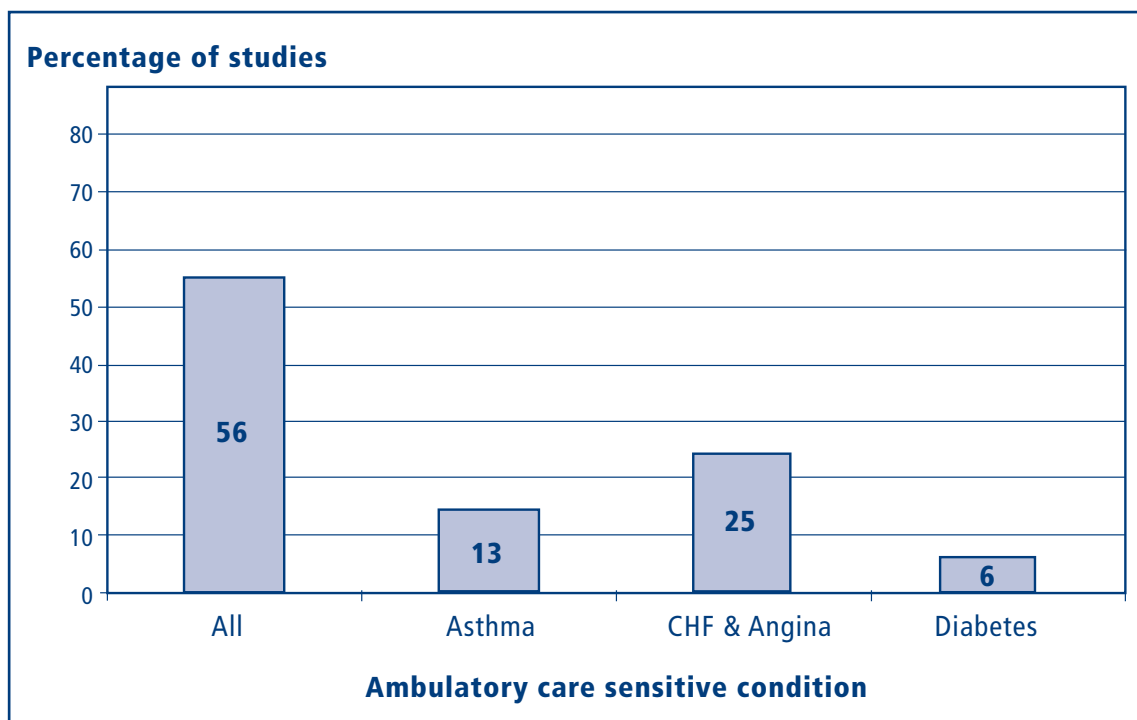


Figure 10 The percentage of all the included system level intervention studies that indicated a significant reduction in ambulatory sensitive hospital admissions, across each condition. Note: In this case, the four chronic heart failure studies and three angina studies have been added together as they include related concepts.

Conclusions

System level or institution-wide programmes or interventions aimed at increasing access for all patients in the system were beneficial in reducing admissions due to a wide array of conditions. In healthcare systems with a strong emphasis on publicly funded primary care and universal access to primary care for all the population, as in New Zealand, these findings suggest that wider availability of capitation based payment or coverage for specific procedures may reduce ASH. System level interventions include discharge planning, or planning of treatment at the time of discharge from hospital after initial stay, when this discharge planning was appropriately tailored to the need of the patient. Discharge planning included explanation of medications, diet, follow-up plans and indication of the ways in which patients could contact the health care providers in times of need. System level interventions also included disease-specific observation units for diseases that are sensitive to monitoring for clinical progression and home-based pharmacological management. These diseases included asthma, and angina, or ischaemic heart disease and these diseases are generally modifiable with appropriate medication and careful observation by trained staff without any need for further hospitalisations. For diabetes, studies showed that system level interventions were not very effective.

Examples

Intervention: Improving Cardiovascular Outcomes in Nova Scotia (ICONS) project (cardiovascular outcomes): serial audits and feedback of practice/outcomes, web-based publications, newsletter-based education, reminders, physician small-group workshops, pharmacy monitoring and compliance programmes, care maps, algorithms, discharge forms and patient information cards. **Outcome:** ICONS demonstrated that provider prescribing patterns and patient re-hospitalisation rates were continuously improved in three disease states and across an entire health system (Cox, Johnstone, Nemis-White, & Montague, 2008) (see pages 66 & 74 of the main report).

Intervention: a management protocol introduced into an existing Emergency Department observation unit for heart failure: including diagnostic and therapeutic algorithms, cardiology consultation, close monitoring, patient education, and discharge planning. **Outcome:** the management protocol safely decreased inpatient hospitalisations by 64% and Emergency Department visits by 56% (Peacock et al., 2002) (see pages 65 & 72 of the main report).

Specialist Clinics¹⁰

Specialist Clinics were defined as provision of services by individual physicians in an outpatient setting, or in private clinics or treatment received by a patient in the setting of a clinic run by a nurse (nurse-practitioner), and treatment received at day care units (**Figure 11**). The scope of this definition of specialist clinic also includes clinics organised by primary care physicians (GPs), as well as any care provided by specialists. Here, the arrangement of a point of care, such as a specialist clinic, is considered an intervention by itself.

Results

Ten out of 146 studies evaluated the roles of specialist clinics in reducing ASH. Out of these ten studies, four (40%) found significant reductions in ASH. Two of the four studies found that specialist clinics were effective in reducing hospitalisation for asthma. One study of a hospital-based physician-led clinic for chronic heart failure found that the intervention was effective in reducing hospitalisations. One study found that a specialist clinic was effective in reducing hospitalisations for respiratory disease. All three included studies on diabetes showed that specialist clinics were not very effective in reducing hospitalisations.

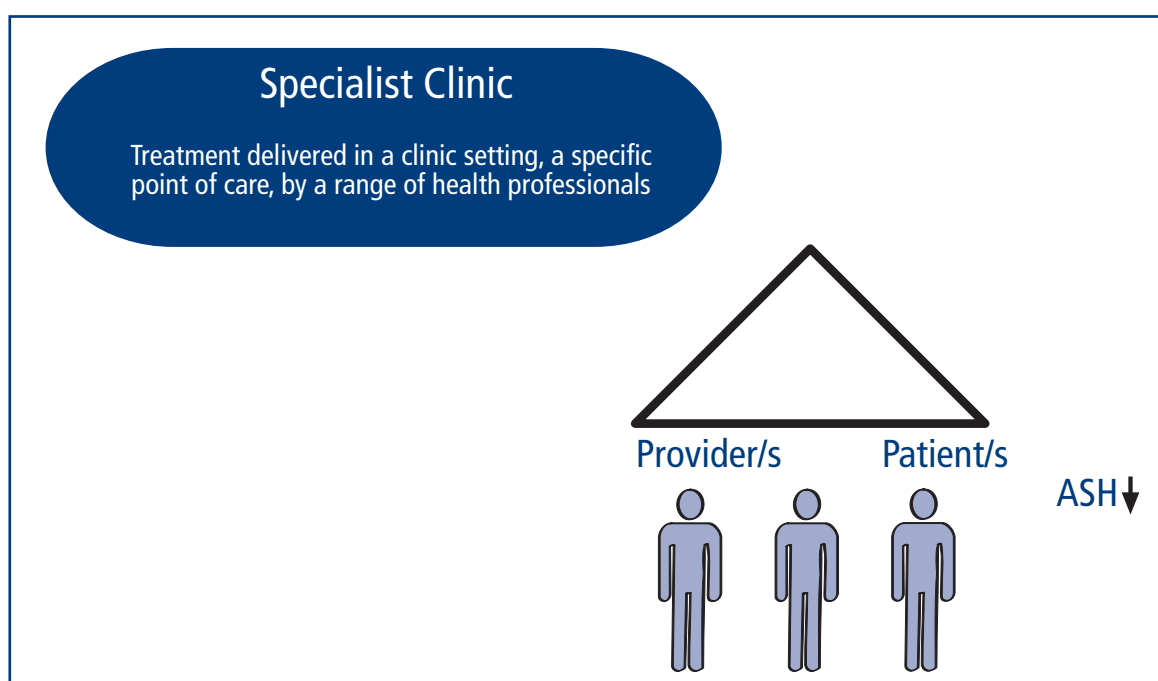


Figure 11 Specialist clinics involve treatment delivered in a clinic setting, a specific point of care, by a range of health professionals

Conclusions

The evidence for the effectiveness of 'stand alone' specialist clinics is limited. However, specialist clinics have been shown to be important components of more comprehensive disease management programmes.

Example

Intervention: Specialist hospital-based clinic including regular physician-based evaluation, regular clinical review after discharge, individual and group education sessions, personal diary to record medications and body weights, use of information booklets. **Outcome:** the intervention significantly reduced hospital readmission for chronic heart failure. The main effect was attributable to the prevention of multiple readmissions (Doughty, Wright, & Pearl, 2002). See pages 75 & 77 of the main report.

10. See **Table 14** and also the limitations of the evidence base as described in the Discussion section of the main report.

Rapid review

What works?

There is good evidence to suggest that the following interventions may reduce ambulatory sensitive hospitalisations:

Note: page numbers in brackets refer to the main report

DISEASE MANAGEMENT PROGRAMMES (pages 25-40)

- Comprehensive, patient-focused, multidisciplinary team-based and collaborative programmes of care
- Hospital-based case management was beneficial in reducing admissions for several diseases including chronic heart failure, and asthma
- Case management for diabetes

EDUCATION (pages 41-53)

- Programmes where education was the primary component (often delivered in addition to other care processes)
- Self-management education: Asthma; chronic heart failure
- For children with asthma, interactive computer games on self-management of asthma
- For children and adults, in-hospital, nurse-led teaching and discussions on asthma education incorporating one-on-one education sessions

TELEHEALTH (pages 54-63)

- Use of interactive telemedicine and computer-based programmes where patients and health care providers interacted with each other
- Remote telemonitoring of chronic heart failure patients by using devices to collect information on their electrocardiographic changes, weight gains, and other parameters where such information was transmitted over telephone lines
- Scheduled periodic telephone calls and regular follow-ups from the point of care or nurses and also video-conferencing (for specific conditions not chronic disease in general)

SYSTEM LEVEL (pages 64-74)

- Interventions in the form of programmes aimed at increasing access, or providing a wider coverage of healthcare delivery services and/or a regular source of care, for all patients, in particular for children, the poor and underserved and non-dominant populations (socio-culturally/numerically)
- Discharge planning, or planning of treatment at the time of discharge from hospital after initial stay, when this discharge planning was appropriately tailored to the need of the patient
- Specialised observation units in hospitals for diseases that can be monitored for progress and/or are amenable to intravenous medications and management without the need for admissions




SPECIALIST CLINICS (Note: limited evidence) (pages 75-80)

- Periodic half-day specialised clinics for diabetes
- Hospital-based physician-led clinic for CHF (New Zealand, 12 month randomised trial, see pages 75 & 77)




What didn't work?

There is little or no evidence to suggest that the following interventions reduce ambulatory sensitive hospitalisations:






EDUCATION¹¹

-  Self-management education for non-dominant populations (socio-culturally/numerically): a different approach appears to be necessary
-  Lay-led self-management education
-  Written action plans by themselves, not part of DMP (principally asthma)
-  Educational interventions alone (not as part of a comprehensive disease management programme) were not found to be effective in reducing hospitalisations due to diabetes

TELEHEALTH¹²

-  Telemonitoring of diabetes patients was not associated with a reduction in diabetes-related hospitalisations
-  Telehealth for chronic disease in general (but effective for very specific disease conditions e.g. chronic heart failure and angina)
-  Web-based/Home-based patient monitored and patient managed telemonitoring for chronic heart failure (requires patient self-monitoring rather than automated measurement of parameters)

SYSTEM LEVEL¹³

-  System wide reforms aimed at influencing or modification of physician behaviour by inducing changes in physician payment processes, use of clinical guidelines, or more structured physician behaviour modification programmes
-  Hospital-in-home programmes
-  Primary care based asthma clinics were not beneficial in reducing asthma-related hospitalisations
-  The use of handheld computer-based guidelines for physicians
-  Pharmacist mediated or pharmacist-led enhanced care programmes for asthma/CHF

SPECIALIST CLINICS¹⁴

-  The evidence for the effectiveness of 'stand alone' specialist clinics is limited. However, specialist clinics have been shown to be important components of more comprehensive disease management programmes
-  Individual drug or non-drug based interventions

11. See **Table 11** in the main report

12. See **Table 12** in the main report

13. See **Table 13** in the main report

14. See **Tables 10, 13, 14** as these intervention themes and/or intervention elements partially overlap in some cases

Who can do what?

The evidence suggests that the essential value of most or all disease management, educational and system level type programmes lies in their ability to bring together enthusiastic people, with common ideas and goals. The identification and modification of disease-specific risk factors requires a combination of a suitably skilled clinical team, appropriate care delivery systems, adequate time and other resources, and an informed and engaged patient.

All health-care providers, at all levels, could contribute to a reduction in ambulatory sensitive hospitalisations by: firstly, 'doing well' what we already know works, being meticulous and exact, and fostering collaboration and enthusiasm; secondly, considering the evidence presented in this report and by judiciously applying the principles, practices and interventions that have been shown to be effective in reducing ambulatory sensitive hospitalisations.

Broadly, the 'top-five' intervention types that have been shown to reduce ambulatory sensitive hospitalisations are:

- comprehensive, multidisciplinary, team based, collaborative, and patient-centred programmes (including specialist clinics for some conditions)
- education-based comprehensive care programmes
- interventions that aim to increase access to care
- disease-specific observation units
- telehealth applications

Limitations¹⁵

Primary studies included in this review had considerable variation in the duration of the intervention, sample sizes and power, follow-up times, and overall generalisability of findings to 'real life' settings in the New Zealand context. Often, hospitalisation was not the primary study outcome. It may be argued that compared to changes in physiological or bio-chemical parameters as outcomes of interest, changes in the patterns of hospitalisation usually take a longer time to be reflected. Therefore, inferences drawn in reviews that include studies of short duration are likely to be more conservative estimates than those provided by studies of longer duration.

Recommendations

There is a need for more studies on the association of innovative programmes already under way in New Zealand for containing hospitalisations due to other prevailing conditions. More New Zealand specific studies are needed to assimilate and integrate relevant information for reducing hospitalisations due to ASH across the range of conditions in New Zealand. It is recommended that the limitations of the research base be given due consideration and that any issues of generalisability be carefully evaluated, before the implementation of any intervention that aims to reduce ambulatory sensitive hospitalisations.

15. For full text of the review of the methodological and contextual limitations, refer to the following review: Basu, A. and Brinson, D. The effectiveness of interventions for reducing ambulatory sensitive hospitalisations: A Systematic Review. HSAC Report 2008; 1(6).

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