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HEALTH SERVICES
ASSESSMENT COLLABORATION

A systematic review of the literature: executive summary

October 2008

The effectiveness of interventions for reducing ambulatory
sensitive hospitalisations: a systematic review

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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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Executive summary

Introduction

Ambulatory sensitive hospitalisations (ASH), also known as ambulatory care sensitive conditions (ACSC), are defined as hospital admissions due to those medical conditions that could be avoided by provision of adequate primary care, and ASH rates are used as a measure of access to primary care (Jackson & Tobias, 2001; Page, Ambrose, Glover, & Hetzel, 2007; Weissman, Gatsonis, & Epstein, 1992). The primary care interventions aimed at reducing ASH include programmes for primary prevention, community interventions, screening and diagnostic services, and specific treatments for individuals in different age groups.

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). The following diseases (listed alphabetically) account for most of the prevalence of ASH in New Zealand – (1) Angina, (2) Bronchial Asthma, (3) Cellulitis, (4) Chronic Heart Failure, (5) Diabetes, (6) Ear, Nose and Throat (ENT) infections, (7) Epilepsy, (8) Gastroenteritis, and (9) Lower Respiratory Tract infections. Reduction in ASH admissions is a stated goal of the New Zealand health policy.

The purpose of this review is to summarise evidence on the effectiveness of different therapeutic interventions for the reduction of ASH. In this review, the authors have systematically appraised the literature from healthcare delivery systems – that are similar in New Zealand in access and quality of care – for ASH related diseases relevant to the context of New Zealand. Specifically, this review has attempted to identify overall effectiveness of different interventions in reducing ASH, and whether specific patterns of medical practice or health services delivery models are associated with reduced ASH.

Methods

A systematic process of literature search, study selection, extraction, appraisal, and synthesis of data was employed in the preparation of this report. The following steps outline this process.

Initially, a protocol was set up in collaboration with the Ministry of Health, Government of New Zealand, and the following disease conditions, based on existing statistical data on the prevalence of ASH conditions in New Zealand, were identified to be targeted as outcomes of the interventions to be evaluated. These included: (1) all-ASH (the term indicated ASH due to all conditions or more than one specific condition), (2) Angina, (3) Bronchial Asthma, (4) Cellulitis, (5) Chronic Heart Failure, (6) Diabetes Mellitus, (7) Ear Nose and Throat (ENT) conditions, (8) Epilepsy, (9) Gastroenteritis, and (10) Lower Respiratory Infections (Pneumonia).

The World Wide Web (WWW), and the following electronic databases were searched for publications on interventions to reduce hospital admissions attributable due to ASH. The websites and databases searched included those of the different district health boards, search engines, Pubmed interface of the United States National Library of Medicine, EMBASE, and the database of Cochrane Reviews. Combinations of specific terms and reserved words were used in the search to retrieve as wide a selection of articles and resources as possible. The publications identified included peer reviewed, quality controlled meta analyses, systematic reviews, primary research articles including randomised controlled trials, cohort and case control studies, secondary analysis of administrative databases on programme implementation, analysis of data from cross sectional surveys, and correlational studies. Reference lists of primary studies and systematic reviews were scanned for further references. These were retrieved and evaluated for inclusion in the database of resources considered for this review. Where an electronic copy was not available, the publication was hand searched and a hard copy was obtained. Wherever possible, experts were approached to provide further information on available literature and information on work in progress related to the topic.

Additionally, websites of each district health board of New Zealand (including that of District Health Boards New Zealand) was searched for evaluations and data on programmes that were aimed at reduction of ASH. While the websites contained information on different programmes, strategic plans, and newsletters provided information, there was little evaluative research on the various primary care oriented programmes aimed at reduction of ASH, conducted by the district health boards.

An iterative process was used to select articles for review. In the first step, studies were screened by their titles and abstracts or summaries. A publication was included for further review if it fulfilled all of the following criteria in its title and abstract or summary –

- (1) The study was conducted in a population comparable to that of New Zealand,
- (2) the interventions were appropriate or were administered in the context of primary care setting or in outpatient,
- (3) a valid comparison group was present, and
- (4) an outcome of the study included reduction of hospitalisation due to an ambulatory care sensitive condition.

Studies that did not satisfy these four criteria were excluded. In addition, a study was excluded if it had sample size less than 20 in each group, if it were published in a language other than English, if the study was pre-1990, and if the full text was not available from any source.

In addition to searching peer reviewed journal articles and other sources of primary studies and secondary data analyses, a search was made for all documents available on the websites of the different district health boards in New Zealand. A review of the content of the research and publication pages of these websites revealed that documents archived in these websites pertained to action plans, newsletters, and reports on the various aspects of medical, and public health care in New Zealand.

However, since these reviews were primarily reports, did not have comparison groups, or did not have avoidance of hospitalisations as primary or secondary outcomes, these were not further reviewed in the preparation of this report. A table with the listing of all relevant websites containing publications by the district health boards is included in Appendix H.

Full texts of all included studies were critically appraised by two independent researchers to further include or exclude studies on the basis of the rigorousness of the research methods, quality of evidence, quality of their reporting and relevance of the research with respect to the research question. Each randomised controlled trial was assigned a Jadad score to indicate its numerical quality. The appraised studies were maintained in a bibliographic database, and the abstracted information was maintained in a spreadsheet.

Information content of the publications were summarised for this review. The interventions were firstly categorised into six partially overlapping clusters. These were –

- (1) Comprehensive disease management programmes
- (2) Educational interventions
- (3) Telehealth applications
- (4) System level interventions
- (5) Specialist clinic based interventions
- (6) Individual drug or non-drug based interventions

These clusters (or ‘themes of interventions’) were constructed based on themes that ranged from the most complex combinations of health care interventions (in terms of context and content) to the most simple and unique mode of intervention. Complex combinations of inventions are comprehensive disease management programmes where a variety of different interventions and strategies of healthcare delivery were used in a number of different settings, ranging from interventions that were initiated in a hospital and continued to the home setting of the patient, to a combination of outpatients department and home settings. Simple interventions involve the use of either drug based or non-drug based intervention, free of context. Secondly, the information content of each article was reviewed by examining the content of the intervention, the duration of the follow up, the effect measure, and the extent of the range of effect measure (i.e., the 95% confidence interval – a measure that indicated the extent to which the effect of the interventions could be due to chance alone). Wherever multivariate measurements were reported, the measures obtained after adjusting for most variables in the model were considered as a summary measure.

Hospitalisation due to ambulatory care sensitive conditions was the primary outcome for this review. During the initial phase of search, selection, and retrieval of publications, it was apparent that the following ASH were most represented in published literature –

- (1) Most or all-ASH conditions
- (2) Bronchial asthma
- (3) Chronic heart failure
- (4) Diabetes

In this review, individual summaries are provided for these four outcomes. Summaries for all other diseases are categorised as ‘other conditions’ and treated separately, with indications for individual disease conditions wherever they were reported.

Each of the six themes or clusters of interventions was reviewed with respect to each of the five ASH outcomes. Thus, this study is in essence an overarching review (meta-review) of 30 single-outcome component reviews of intervention themes and disease conditions (based on the number of intervention classes and the number of ambulatory care sensitive conditions considered in this study). The studies were graded for the quality of their evidence using the Australian National Health and Medical Research Council (NHMRC) criteria. Subsequently, the results of all 30 component reviews were summarised to arrive at a description of the patterns from the overall results for this systematic review.

Results

Initial search of the WWW, databases, and associated hand searches resulted in the retrieval of 1738 titles/abstracts. Out of 1738 articles, 438 articles were included in the review based on their titles and abstracts. Full texts of all 438 articles were then further reviewed. Based on the appraisal of the full text of each of the 438 retrieved articles, a final list of 146 articles that met all the criteria for inclusion in this review was reached.

Key findings

A total of 146 publications were evaluated to form the body of this systematic review. Out of 146 publications, 35 (23.9%) were systematic reviews including meta analyses, 80 (54.8%) were primary reports of randomised trials, and 31 (21.2%) were primary studies based on various other different types of epidemiological designs and secondary data analyses of administrative databases or hospital based chart reviews. Out of 146 total different types of interventions that were evaluated belonging to each of the six intervention classes, 51 (35%) were disease management programmes, 25 (17.4%) were system level interventions, 32 (22%) were educational interventions, 23 (15.5%) were telehealth applications, 10 (6.7%) were based on specialist clinics, and only 5 (3.4%) were based on individual drug or non-drug interventions. Over 65% of studies had chronic heart failure (n = 54, 37%) or bronchial asthma (n = 44, 30%) as health outcomes, while a combination of only 8 studies (5.5%) had outcomes that included cellulitis, ear nose and throat related diseases (one study on tonsillitis), epilepsy and convulsions, pneumonia and gastroenteritis. Twenty six out of 146 studies (18%) studies discussed multiple or all ASH conditions, and 14 studies (9.5%) had diabetes as outcomes (see Tables 8 & 9). Overall, the majority of the reports that

discussed disease management programmes and telehealth application-based interventions, to reduce ambulatory hospitalisations, were based on chronic heart failure as an outcome (44 out of 72 total interventions reported, about 61.1%). However, the majority of reports on educational interventions and all of the individual drug or device-based interventions had targeted bronchial asthma as study outcomes (28 out of 38 studies combined, 73.7%).

Effectiveness

These observations suggested five emergent patterns of interventions (care processes) beneficial in reducing ASH for the diseases identified in the published literature. These were as follows:

- (1) Comprehensive, multidisciplinary, team based medical care programmes where patients were involved in discharge planning, were provided education in either 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. These comprehensive disease management programmes were likely to be beneficial for a wide array of ASH, as seen in these studies.
- (2) Programmes where education was a primary component, in addition to other care processes were beneficial in reducing ASH. However, programmes, where educational interventions were included within comprehensive disease management programmes performed better for ASH reduction.
- (3) System or institution-wide programmes or interventions aimed at increasing access, or a wider coverage of insurance to healthcare delivery services for all patients in the system, (in particular for children, and the underserved) were beneficial in reducing admissions due to a wide array of conditions. In the United States, this meant widening the insurance coverage for the poor and underserved, and expansion of Medicaid managed care or higher penetration of managed care in general. In healthcare systems with a strong emphasis on publicly funded primary care and universal access to primary care for all population, as in New Zealand, these findings suggest that wider availability of capitation based payment or coverage for specific procedures may reduce ASH.
- (4) Disease-specific observation units for diseases that are sensitive to monitoring for clinical progression and home-based pharmacological management were beneficial in reducing ASH. These included bronchial asthma and angina, or ischaemic heart disease. Pathophysiologically, these diseases are modifiable with appropriate medication and careful observation by trained staff without any need for further hospitalisations. Perhaps, these models of care could be replicated for other conditions such as seizures and ear, nose, and throat diseases but no study on the effectiveness of emergency room observation units for these conditions was identified. Another related model of care was an utilisation of ambulance services to provide observation and on-site care, but HSAC was unable to identify peer reviewed quality controlled comparative studies (either primary studies or systematic reviews) on the effectiveness of such services.

- (5) Telemedicine and computer based programmes, where patients and health care providers interacted with each other, were beneficial in reducing ASH. Use of interactive computer based programmes and telehealth applications using videoconferencing and electronic stethoscopes have been beneficial in reducing hospitalisations due to chronic heart failure.

Conclusions

ASH rates have been used as indicators of access to primary care. Since health care delivery system in New Zealand emphasises universal access to primary care for all its citizens, a system-wide reduction in ASH is deemed an important achievable milestone. This review was undertaken primarily to summarise available evidence on interventions that have reduced ASH worldwide. The review has been conducted in the context of health care delivery systems that are comparable to New Zealand. The databases were systematically searched and appraised to identify quality controlled, peer reviewed studies on the effectiveness of different intervention aimed at reduction of ASH.

Overall, five care processes emerged as beneficial in reducing ASH. These were:

- (1) Comprehensive, multidisciplinary, team based, collaborative, and patient-centric programmes,
- (2) education based comprehensive care programmes,
- (3) interventions that aimed at increasing access, or providing a wider coverage of healthcare delivery services for all patients in the system, in particular for children, the poor and underserved,
- (4) observation units for diseases that are amenable to home based pharmacological management, and
- (5) telemedicine and computer based programmes where patients and health care providers interacted with each other.

Considering the total body of evidence, it appears that the essential value of most or all ‘disease management’ and ‘educational’ type programmes lies in their ability to bring together enthusiastic people, with common ideas and goals.

The results of this review need to be interpreted in the light of its several limitations. First, being a systematic review, the overall quality of the review and its recommendations are based on the quality of information of the individual studies. In order to base conclusions on the best available evidence, studies that were peer reviewed were selected, and studies that fulfilled class I and II of National Health and Medical Research Council (Australia) were allotted higher weights than other studies. Several studies were identified that had low sample size and therefore had low power, or had short duration. However, since the idea of this review was to summarise the most available information, these studies were included in the review as well. It may be argued that inclusion of these studies resulted in somewhat conservative estimates of the effectiveness of several interventions. Third, the outcome of this review was avoidance of hospitalisation due to one or more diseases that are sensitive to primary

care based interventions. It may be argued that while this outcome makes good sense from the perspective of policy making and health services research, the majority of clinical research (from which data for this review came) considered health outcomes other than avoidance of hospitalisations. For instance, for diseases like diabetes, the changes in the levels of glycosylated haemoglobin levels (HbA1c) are deemed to be a more practically monitored marker than change in the hospitalisation, from the perspective of clinical management. Similarly, for diseases such as pneumonia, resolution of opacities in specific areas of lungs might be deemed as a more sensitive marker of effectiveness of interventions than overall how many hospitalisations might have been avoided. These considerations limited the number of studies that could be considered for this review.

These limitations make the results reported in this review largely conservative. In addition, a few potential interventions were found not to have beneficial effects, or had uncertain effects. These included discharge planning, written action plans and system-wide reforms aimed at influencing or modification of physician behaviour (by inducing changes in physician payment processes, or structured physician behaviour modification programmes).

Despite these limitations, three possible recommendations for reduction of ASH in New Zealand might be apparent from the results of this review. These are:

- (1) Expansion of access to care for children, poor and the underserved may well reduce the burden of ASH due to multiple conditions or for all-ASH,
- (2) multidisciplinary, comprehensive disease management programmes may reduce ASH due to chronic heart failure among the elderly, and
- (3) asthma related educational interventions for children and adults, for instance use of peak expiratory flow rate monitoring may eventually reduce asthma-related ASH in children and adults.

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. This review may serve as a first step in that direction.