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ABC NZ Study

ALLEVIATING
THE BURDEN OF CHRONIC
CONDITIONS IN NEW ZEALAND

Alleviating the Burden of Chronic Conditions in New Zealand
(ABCC NZ Study)

Literature Review

2011

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ALLEVIATING THE BURDEN OF CHRONIC CONDITIONS IN NEW ZEALAND

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Glossary

ACS	Acute coronary syndromes
ABCC NZ	Allieviating the Burden of Chronic Conditions in New Zealand
BMI	Body Mass Index
CCM	Wagner's original Chronic Care Model
CHF	congestive heart failure
COPD	chronic obstructive pulmonary disease
CVD	cardiovascular disease (atherosclerotic)
DHB	District Health Board
GP	General practitioner (medical)
HRQoL	Health Related Quality of Life
INR	International Normalised Ratio (blood coagulation time)
MI	Myocardial Infarction
PHO	Primary Health Organisation
RCT	Randomised Controlled Trial
TIA	Transient Ischaemic Attack

*For New Zealand, the National Health Committee recommended in 2007 that District Health Boards set disease-management programmes **within a chronic care model** in order to ensure effectiveness, and that generic disease-management programmes be developed in preference to single disease-management programmes.[4]*

The Committee noted the central importance of delivering effective primary care and the importance of implementing chronic care management to reduce health inequalities. It emphasised the need for culturally appropriate care, and attention to depression and pain as common co-morbidities across many chronic care conditions.

This review has been guided by Wagner's Chronic Care Model (CCM) and by the Center for Disease Control generic chronic care system model.

These models include explicit assumptions that:

- *any research aimed at improving chronic care management models needs to take a 'whole-systems' approach. This is because of the joined-up nature of patients, professionals, organisations and the wider communities in affecting outcomes*

- *service providers are located in separate organisations, with varying levels of connection with each another, with patients and the Chronic Care Model philosophy. Key aspects affecting the strength of these relationships include communication systems, leadership, feedback, alignment of values, mutual respect and understanding.*

1. Introduction

This literature review comprises the first part of a larger research study commissioned by District Health Boards New Zealand (DHBNZ).The reason for the research is the need to improve effectiveness and efficiency of services for those with chronic conditions. This burden is particularly evident in cardiovascular disease (CVD), chronic obstructive respiratory disease (COPD) and congestive heart failure (CHF). In New Zealand, 10% of adults are diagnosed with cardiac disease and over 5% with COPD.[A1] However, the burden appears to be much greater: up to 50% of people suffering chronic conditions remain undiagnosed and/or untreated.[A4,A5]

The prevalence of such problems and co-morbidity exponentially increases with age.[A1, A5] The percentage of New Zealanders aged 65 years and over will increase from 12% to 25% by 2050, with a four-fold increase in chronic conditions among aged 75 and over and a six-fold increase among in those aged 85 and over by 2025. Chronic illness is the leading cause of morbidity and mortality in New Zealand. It causes more than 80% of all deaths[A1] and is associated with a large, generally unrecognised carer burden.

Maori, Pacific peoples and those with poor socioeconomic status experience much higher levels of chronic disease and at much earlier stages in life.[A6] This results in higher levels of morbidity and lower life expectancy in these groups when compared with the non-Maori and non-Pacific population. Chronic conditions account for 80% of the difference in life expectancy between Maori and non-Maori. [A7] This is particularly evident for populations with CVD and COPD.[A8] For Maori, chronic health problems occur earlier than for non-Maori. The effects of these problems are increasingly evident among Maori aged 50-55 and over. Chronic conditions have major implications for Maori whanau. There is little evidence for effectiveness of chronic conditions management and its interaction with economic and cultural factors. This may be because of the complex interactions of variables. [A14]

Effective management of chronic conditions extends beyond better services or treatment. The New Zealand National Health Committee[A9] emphasises: (1) a people-centred approach; (2) self-management; (3) psychological and emotional/spiritual wellbeing; (4) multi-disciplinary teamwork; (5) "inter-service" integration; and (6) regular contact between people with chronic conditions and healthcare services which offer continuous rather than episodic care. This approach echoes the principles of the *Primary Health Care Strategy* [A10] and the *Health of Older People Strategy*.[A11] The approach is also the basis of the Principles and Action Areas of the *Australian National Chronic Disease Strategy*. [A12]

Effective management that conforms to this approach requires a shift from care that is episodic, reactive, and often delivered by secondary services, to care that is longer-term, continuous and managed. An effective model must be integrated into the wider social, cultural and economic context.[A13] The model requires stronger emphasis on prevention, early intervention and integration within primary care settings. However, these emphases however must not compromise evidence-based practice, especially with regard to service organisation.[A13]

Effective chronic conditions management which utilises the principles of a chronic care model (CCM) has been shown internationally and within New Zealand[A15,A16] to reduce morbidity, improve quality of life and yield financial savings. Further, there is recognition of the importance of systems approaches to health care services and longer-term outcomes. [A17] Examples of systems models include Wagner's Chronic Care Model,[A13;] the World Health Organization (WHO) *Innovative Care for Chronic Conditions Framework*, an adaptation of the CCM,[A18] and the Risk Stratification Pyramid.[A19] A number of elements are common to all frameworks.

The CCM identifies six essential elements of a health care system that encourage high-quality chronic disease care and well-being support. These are: the community; the health system; self-management support; delivery system design; decision support; and clinical information systems.

These evidence-based approaches have the potential to foster productive interactions between informed patients who take an active part in managing their health and providers who have resources and expertise. The CCM can be utilised for a range of chronic conditions, in varied health care settings and among different target populations. Evidence suggests that the results are healthier patients, more satisfied providers and cost savings.[A13]

There is growing evidence regarding the effective management of chronic conditions [A20] and frameworks for conceptualising care. However, better utilisation of evidence and closing of knowledge gaps is still required. For example, in New Zealand, as in other countries, patients do not always receive evidenced-based care.[A22]

This may be because:

- Evidence presented in an easily digestible format is not currently available to DHBs and clinicians in the range of practice settings [A24]
- While there are some good initiatives in place, information regarding local evidence of success (or not) in the New Zealand context is not easily accessible
- DHBs are unclear about the largest potential gains and how to reach them and
- DHBs and clinicians usually lack 'ownership' of evidence and guidelines, despite this factor being recognised as the single most important determinant of successful implementation.[A25]

Our larger research study will address these issues by:

- Creating a summary of the evidence in an easily digestible format (the current literature review)

- Providing a stock take of initiatives within New Zealand's DHBs

- Evaluating some of the key initiatives throughout New Zealand, and

- Developing a workbook for (and with) DHBs and service planners that will help development and implementation of new initiatives.

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Literature review structure

We describe the aims, objectives and methodologies used in the review, then discuss background assumptions that underpin the paper. The following sections are structured on the identified ABCC dimensions. In these, we review general and disease-specific literature and summarise best-practice guidelines for New Zealand. Finally, we present proposed themes and data collection items for the New Zealand stock-take.

Purposes and objectives of the literature review

The National Health Committee, in its 2007 report on chronic conditions,[4] recommended that **"each DHB develop and implement a chronic conditions framework that focuses on action, integrated service provision and is population specific".**

This literature review was undertaken to support a workbook for District Health Boards (DHBs) and Primary Health Organisations (PHOs) that will facilitate implementation, management and evaluation of chronic conditions management programmes and provider-consumer-community partnerships.

A second purpose was to support: (1) a stock take of chronic conditions management programmes in New Zealand; and (2) an evaluation of a purposive selection of these programmes. The focus of the evaluations will be to identify factors that act as facilitators or barriers to successful programme development, implementation and uptake.

While not comprehensive, the review aims to identify factors required for an integrated, New Zealand-specific chronic care model that efficiently leads to improved clinical outcomes. The objectives of the review are to:

- identify international and local literature on service activities and programmes to manage the relevant chronic conditions
- consider what makes these programmes efficient and effective, and whether they may be transferable to and/or within New Zealand
- identify key information that will be sought in a stock take of programmes around New Zealand
- inform a selection of success criteria that will be used to identify a limited number of programmes for more detailed evaluation
- identify measures and benchmarks that will aid these evaluations
- support a credible and pragmatically useful workbook.

The review focuses on four key chronic conditions: CVD, stroke, CHF and COPD. Diabetes is also considered.

> *The National Health Committee, in its 2007 report on chronic conditions,[4] recommended that **"each DHB develop and implement a chronic conditions framework that focuses on action and integrated service provision".***

Methodology

Based on the following definitions, three methods were used to develop a set of chronic conditions management dimensions. These, described in this section below, frame the paper.

Definitions

Definitions used in the review are as follows:

> *Disease management* refers to a programme focused on a single disease; it may involve primary care, secondary care, and other services.

> *Case management* refers to the coordination of care for a single patient. This may involve arranging various health and social services with respect to more than one condition for a patient. While alternative terms include 'care management' and 'care coordination', these are not used in this review.

> *Chronic conditions management programme* refers to a systematic, programmatic approach to management of chronic conditions. We utilise this term rather than the alternative *chronic care programme* and *chronic care management programme.* Chronic conditions management programmes may contain elements of disease management and/or case management.

Literature review search strategy

Although, where possible, this review builds on existing systematic reviews, our research questions dictate a purposive search across disciplines and types of literature, including academic and peer-reviewed papers, policy literature and unpublished documents. Search 'building blocks' were constructed for: (1) diseases; (2) chronic conditions programme models and components of models; and (3) literature types. Searches were run across Medline (search terms are listed in Appendix 1), CINAHL and Embase. Searches were limited to 'Human', 'English' and publication year 1998-2007. These initial searches were then extended, using less formal methods, to include literature related to chronic conditions management with regard to equity, access, and the New Zealand context. Disease and topic experts within the group identified relevant studies from the searches and research assistants extracted the data. The questions asked in the data extraction forms and the quality scores are shown in Appendix 2. The extended search included 'grey' and unpublished material.

Appendix 3 shows the number of papers identified at the different search stages.

Participatory Action Research

A participatory action research methodology was employed to develop a set of chronic conditions management dimensions. This included discussions within our research group, liaison with our Expert Advisory Group and a series of regional workshops for health care providers and community representatives in Auckland, Christchurch, Rotorua and Wellington. Participatory action research was used to

develop and expand the Wagner Chronic Care Management model (described below) in a New Zealand context.

Analysis of CCM survey instruments

A range of survey instruments related to chronic conditions management were analysed in order to determine the key themes they explored. These are described in Table 8 below (page 97). None of the instruments we reviewed investigated, to any extent, organisational and system barriers or enablers related to chronic conditions programme development, implementation, uptake and sustainability. We consider this to be a serious omission.

ABCC NZ chronic conditions management dimensions

The three research methods described above provided information that was utilised to develop a set of dimensions. The ABCC NZ Chronic Conditions Management dimensions are:

1. Conceptual understanding of chronic condition management
    a. Patient empowerment
    b. Patient self-management
    c. Self-management education

2. Leadership

3. Adherence to clinical guidelines

4. Collaboration

5. Development of sustainable community links

6. Self management and collaborative care

7. Reducing health inequalities

8. Delivery design system

9. Decision support systems in place

10. Knowledge transfer that is organised and appropriate

11. Attention to efficiency/cost/output

12. Attention to effectiveness/outcomes

13. Outcomes

The dimensions provide structure for this literature review. Some degree of repetition of text and/or cross-referencing, particularly in terms of analysis of programme content, is inevitable. We point out that Dimensions 11 and 12 (efficiency and effectiveness) are likely more relevant to the stock-take phase of the larger project, and that Dimension 13 (outcomes) is a pervasive theme throughout this review. Hence, Dimensions 11, 12 and 13 are not addressed as discrete sections.

Frameworks and assumptions about Chronic Care Models

The most-widely known chronic conditions care framework is the *Chronic Care Model* (CCM), first enunciated by Wagner in 1998.[1] The model attempted to draw together the chronic conditions management activities used at the time for which there was some evidence of effectiveness. The model describes an informed and activated patient (and when relevant, family) in partnership with a prepared and pro-active health care team. It consists of six components - community resources; the healthcare system; patient self-management; decision support; delivery system (re)design; and clinical information systems.

Figure 1 (below**)** shows that chronic care requires a whole system approach.

_____

Figure 1. Generic chronic disease population patterns and health system responses
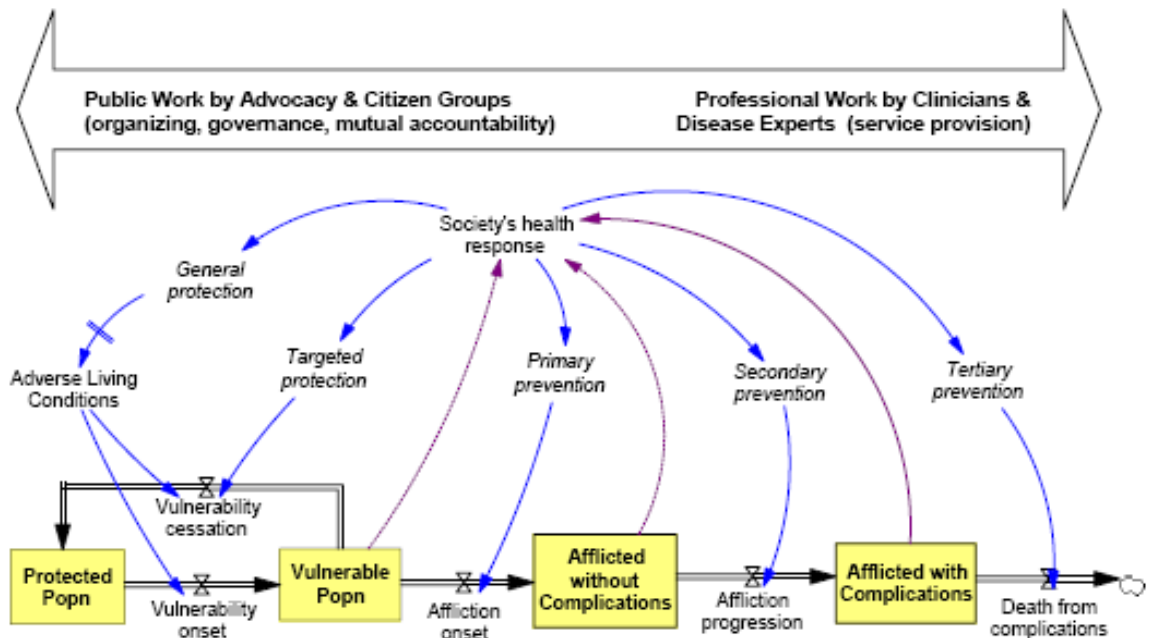
The six pillars of Wagner's CCM model operate within the communities and the provider organisations of local healthcare systems. The CCM model allows for the division of labour between systems and seamless movement to and from acute care and CCM care.

A recent meta-analysis of 112 studies concluded that interventions that contain at least one CCM element improve clinical outcomes, processes of care and quality of life for patients with chronic illnesses.[2] Nevertheless, the six components are each relatively broad, and what might be classified as, for example, decision support in one programme might be very different from decision support in another. Examples are shown in the following table.

Table 1. Strategies included within each category of the Chronic Care Model

Delivery System Design	Decision Support

o Care management roles
o Team practice
o Care delivery/coordination
o Proactive follow-up
o Planned visit
o Visit system change
o Self-management Support
o Patient education
o Patient activation/psychosocial support
o Self-management assessment
o Self-management resources and tools
o Collaborative decision making with patients
o Guidelines available to patients
	• Institutionalisation of guidelines/prompts
	• Provider education
	• Expert consultation support
	• Clinical Information Systems
	• Patient registry system
	• Use of information for care management
	• Feedback of performance data
	• Community resources
	   o For patients
	   o For community
	• Health Care Organization
	• Leadership support
	• Provider participation
	• Coherent system improvement and spread

Source: Tsai (2005)[2]

The World Health Organization (WHO) adapted the CCM to develop the *Innovative Care for Chronic Conditions Model*. This model focuses on community and policy aspects of improving chronic care. It describes three levels: the individual and family level (micro), healthcare organisation and community level (meso), and policy or macro level. [3]

Three influential US models focus on specific ways of delivering components of the chronic care model for specific high-risk populations. The *Kaiser Permanente Model* focuses on integrating services, removing the distinction between primary and secondary care, using team approaches to support a panel (number of enrolled patients) linked to a named primary care physician and strongly emphasising patient self-management. *United Healthcare's EverCare Model* targets people at highest risk, using nurse case managers to assess their care needs and coordinate care along formalised pathways. The *Pfizer* approach also targets those at highest risk, using telephone case management to supplement existing services.

All of these service delivery models include some form of case management and key aims include improving health, reduction of hospital admissions and containment of costs.[3] A more detailed description and comparison of these and other models is found in an excellent review by Singh and Ham.[3]

The New Zealand National Health Committee notes that, internationally, disease management and case management approaches have been utilised by health care organisations, despite the fact that these organisations have not adopted systematic chronic conditions management programmes. For New Zealand, the Committee recommends that DHBs set disease management programmes within a chronic care model in order to ensure effectiveness, and that generic disease management programmes be developed in preference to single disease management programmes.[4]

The Committee notes the central importance of delivering effective primary care and the importance of implementing chronic care management to reduce health

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inequalities. It emphasises the need for culturally appropriate care, and attention to both depression and pain as common co-morbidities across many chronic care conditions.

In particular, this review has been guided by Wagner's Chronic Care Model (CCM) and by the Center for Disease Control generic chronic care system model. These models make explicit several assumptions:

- Any research aimed at improving chronic care management models needs to take a 'whole-systems' approach. This is because of the joined-up nature of patients, professionals, organisations, and the wider community in terms of affecting outcomes

- Service providers are not located in any one organisation. Rather, they are located in separate organisations, with varying levels of connection between one another, to the patient, and to the CCM philosophy. Key aspects that affect the strength of these relationships include: communication systems, leadership, feedback models, alignment of values, mutual respect and understanding

Although the chronic care model has not been studied in its entirety, discrete components have been investigated and incorporated into programmes. The CCM framework provides healthcare policy-makers with the elements considered to be essential in the management of chronic conditions, despite needs for further research to clarify the effects of the components of the CCM on care processes and patient outcomes.

Programmes and programme contents

The key focus for this review is the *programme*.

A *programme* has some degree of comprehensiveness and continuity; its purpose is to identify and ensure delivery of all the contents relevant to a given patient/family, and its timeframe is the remainder of the life of each person with their chronic condition(s).

Programme contents are the specific elements of care which must be provided either individually or in combination in order to deliver optimal care. Contents are delivered in varied ways. They might be delivered: (1) as a singular intervention (for example, an angioplasty); (2) over a period of time (for example, a patient education package or (3) self-administered over a lifetime by a patient (for example, taking medication).

Contents may be *simple*, such as a prescribed drug, or *complex and variable*, such as rehabilitation interventions. A programme without appropriate content is worthless. Delivering appropriate content outside of a long-term delivery programme risks providing a patient with care that falls short of best practice.

In this review, we include simple content (although, for CVD, we provide detailed analysis of, for example, pharmacological treatments), but provide more detailed comment on complex content. Simple content is typically well-described in the

literature and is clearly presented in authoritative guidelines. Analyses of complex content show varied effectiveness, depending on details of implementation and on context.

For the purposes of this literature review and for asking District Health Boards (DHBs) and Primary Health Organisations (PHOs) to identify their programmes, we have chosen the following questions.

1. Can health care providers and planners recognise a part of their work as a programme? Is there specific funding? Is there specific management? Is there a specific problem or problems to be solved? Are there specific goals?
2. Has there been a conscious effort to ensure delivery of multiple elements of best practice content to a specific group of patients for the long term?
3. Is there a commitment to roll out elements of a current service project into a more comprehensive programme?
4. Does it include *any or all* of the classic Chronic Care Model components?
5. Does it include *any or all* of: mechanisms to address equity; access to and through services; intersectoral collaboration; community self determination; and health promotion and disease prevention?

Importing international evidence

The National Health Committee, in its 2007 report[4] warned that it is not always easy to apply international evidence to New Zealand. This is because evidence from elsewhere, particularly with regard to health service provision is likely to have been influenced by varying political and economic systems. Adopting a CCM approach developed elsewhere will require validation in the New Zealand setting. Hence, New Zealand CCM programmes should be developed in the context of national strategies and initiatives[4].

Chronic conditions management and the policy context

The *New Zealand Primary Health Care Strategy* emphasises CCM approaches and the 2007-10 *Primary Health Care Implementation Work Programme* has a particular emphasis on chronic conditions and on Maori and Pacific resource capacity.

Many DHB strategic plans prioritise chronic conditions, both in terms of prevalence and impact. These prioritise diabetes, CVD and cancer. Secondary priorities concern COPD, stroke and mental illness.[A18] Many DHBs are already developing chronic conditions strategies and some are developing chronic conditions management programmes. However, the *National Health Committee Report 2007*[4] states that chronic condition management models have yet to be consistently implemented and incorporated into comprehensive district planning.

Integrated care

Integrated care is a broad term that, relative to a chronic care programme, implies a greater degree of coordinated multidisciplinary and interdisciplinary service provision that is configured on and around the needs of both individual patients and patient populations. Integration has different meanings at different levels in the health care system. At the patient level, it refers to case management.

At the point of delivery, it refers to multiple interventions that are provided through one delivery channel. At the system level, integration refers to the bringing together the funding, management and support functions of different sub-programmes, and ensuring complementarity between different levels of care. In the context of integrated chronic conditions management, it is not always possible to identify specific programmes, as these have become part of routine service provision.

Co-morbidities are common

Most people with a chronic condition have one or more additional chronic conditions.

The New Zealand National Health Committee noted that, for adults, at any one time, one in four has chronic neck or back problems, one in five has asthma, one in six has arthritis, one in ten has heart disease, and one in 48 has had a stroke.[5] The following table describes these data with regard to the index chronic conditions addressed by this review:

Table 2. Co-morbidities per 100 people, showing index condition and additional chronic conditions

Index condition	Number with index condition who will also have:							
	CVD	Stroke	CHF	COPD	Diabetes	Arthritis	Depression	Other
CVD	(100)				7.7[6] 9-26[7]	34.7[6]	17-27[7]	
Stroke	42.9[8]	(100)	16.1[8]		7.3[8] 19.8[9]			6.2[9]
CHF	51[10]		(100)	26[10]	50[11] 20[12] 31[10]	16[10]	48[13] 8[10]	
COPD	40[14]	6[14]	26[14]	(100)	12[14]	29[14]		42[14]
Diabetes	2-8x[15] 21[16] 33.4[17]	5[16]		8.9[17]	(100)	29.5[17]	11-33[18] 25[7]	
Arthritis	10[19]	5.3[19]			12[19]	(100)	7.4[19]	62[19]
Depression		2.2[9] OR 2.7[7]			6.4[9] OR 2.2[7]	OR 1.3[7]	(100)	5[9]
Other								(100)

Starfield and colleagues have shown that, at least in the United States, health service resource use depended on the degree of co-morbidity rather than the index condition.[20] They concluded that "in view of the high degree of co-morbidity, even in a non-elderly population, single-disease management does not appear promising as a strategy to care for patients. In contrast, the burden is on primary care physicians and teams to provide the majority of care, not only for the target condition but for other conditions. Thus, management in the context of ongoing primary care and

oriented more toward patients' overall health care needs appears to be a more promising strategy than care oriented to individual diseases."

Diagnosis, health service access and fidelity

Following a schema presented by Wellingham,[21] issues of diagnosis, access and fidelity appear to numerically outweigh any other issues of programme delivery or programme content.

Currently, about 95% of the New Zealand population is registered with a Primary Health Organisation (PHO), yet perhaps half of all patients with CVD, stroke, CHF, COPD or diabetes remain undiagnosed.

Access is of considerable concern in New Zealand. A recent unpublished report in Counties Manukau (South Auckland) suggested that only 40% of patients who were eligible for the diabetes programme were actually enrolled in the DHB's Chronic Care Management programme (pers. com. Kenealy, Carswell, 2007). Similarly, although New Zealanders with diabetes are entitled to a free annual clinical review with the *Get Checked* programme, current estimates are that about half of those eligible receive a check each year (pers. com. Kenealy, 2007). Estimated proportions of enrolment in the Counties Manukau COPD, CVD and CHF programmes are much lower (pers. com. Kenealy, Carswell 2007).

The Chronic Care Management programme in Counties Manukau was designed to enable patients to see a general practitioner (GP) every three months. However, only about two thirds of the patients who were apparently enrolled in the programme were seen within the previous six months and about half were seen three times in a year (personal communication Kenealy, Carswell 2007).

Further, those people who enrol in a programme and remain engaged may not receive the intended standard of care and may not take their medication or achieve lifestyle changes.

Even when they and their health care team do 'everything right', many patients do not achieve the intended physiologic and personal targets. Counties Manukau DHB and other sources report similar results. Commonly, less than half of those on a programme achieve the intended targets. These changeable issues can be termed fidelity - of patient and of provider – to the programme.

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2. Conceptual understanding of long-term conditions management

This section examines components that are key to chronic conditions management. They are drawn from programme delivery and disease-specific literature.

Patient self-management

Self-management support is a central theme of all current programmes to manage chronic conditions. It has been suggested that self-management may be the most important component of chronic conditions management because the patient controls most of the direct management.[22] However, systematic reviews have identified mixed evidence of the effectiveness of self-management. Part of the explanation for this may be that the mere provision of knowledge does not change behaviour. Patients typically need practice at problem-solving skills and interacting with health professionals, support from family/whanau and peers, and repeated interaction or follow-up over the long term.[23]

Self-management education

Self-management and education approaches

Self-management plans have been shown to be effective in the care of patients with various chronic conditions. In New Zealand, studies of self-management plans in the primary care of patients with COPD[24] and heart failure[25] have recently been published. Wright and colleagues found that patients who attended self-management education programmes were significantly more likely to maintain self-management strategies, such as daily weighing, and had significantly higher self-management knowledge at 12 months[25]. McGeoch and colleagues found that the provision of a general practice based education and written self-management plan was associated with greater self-management knowledge at 12 months, but had no measurable effect on health or quality of life outcomes over the same period.[24]

Another 'self-empowerment' and patient education based study provided patients with diabetes with a *Diabetes Passport*,[26] but differed from the interventions of McGeoch et al [24] and Wright et al[25] in that no education sessions were offered. Instead, the passport provided information related to diabetes knowledge, self-assessments, and guidance around engaging with health professionals. Whilst a small improvement in HbA1c was observed, the intervention showed no change in diabetes knowledge, attitudes to diabetes, or risk factors for diabetic tissue damage.

A recent study demonstrated that demand for health services will increase in the future due to the increasing demands of chronic illness patients.[27,28] Self management has been proposed as a way of reducing this burden. However, in an article related to the above publication of Wright et al,[25] Pearl and colleagues found that self-management intervention was ineffective in reducing GP consultations.[29]

Shifting education into communities may be a way of improving effectiveness and reducing strain on primary healthcare professionals. Tregonning et al found that long-term unemployed people can be trained to provide diabetes education in primary prevention and group settings, with added benefits of extensive cultural competency, particularly with Maori and Pacific patients.[30]

Mixed results are common in the international self-management literature. These may be due to: (1) variations in the intensity or duration of programmes, (2) barriers such as no access to weighing scales preventing effective self management or (3) the limited effectiveness of treatments themselves, which renders education about their use ineffective.[24]

Despite mixed results in self-management education programmes, there is a need to pursue programmes that assist patients to make lifestyle changes. Coppell et al observed that, over the period 1998-2003, there were appreciable improvements in blood pressure and lipid control amongst people with diabetes in the Otago region, but no improvement in glycaemic control.[31] Improvements in blood pressure and lipid control were concomitant with an increase in the prescribing of ACE inhibitors, other antihypertensive medications and lipid lowering medications. Despite these positive findings, a failure to implement lifestyle changes may explain the lack of glycaemic control, an essential aspect of reducing the risk of diabetes related complications.

Education may be important for those at risk of diabetes. One study showed that group education aimed at reducing the fat content in the diets of individuals with glucose intolerance improved glucose tolerance and reduced rates of diabetes after one year, compared with a control group.[32] However, in this study, the intervention group displayed difficulties in maintaining lifestyle changes similar to the control group, and diabetes rates were not significantly different between the groups in subsequent follow up.

Education may provide a means of improving the numbers of patients agreeing to and implementing clinicians' recommendations – sometimes referred to as 'compliance' or 'concordance'. Dracup et al employed careful planning of interventions around a holistic theory of behaviour change in a patient education programme. The programme aimed to improve understanding of the symptoms of acute coronary syndrome among high risk patients to reduce pre-hospital delay, an important predictor of patient outcome.[33]

Roles of primary health care nurses in diabetes care and patient / whanau education

The role of nurses in patient education is a developing one. Primary health care practice nurses in particular, are taking central educative roles. In South Auckland, between 1990 and 1999, the number of patients with diabetes per GP increased from 20 to 33.[34] During the same period, the provision of care to these patients by primary health care teams changed. A 2004 study by Kenealy et al aimed to describe the diabetes-related work roles, training and attitudes of practice nurses in New Zealand and trace how these had changed during the 1990s. It aimed to consider whether barriers to practice nurse diabetes care had changed over the decade and to discuss how the primary health care reforms of the early 2000s may have addressed these barriers.[35] The study identified several important changes over the decade. Firstly, a large increase in the proportion of practice nurses with post-registration or

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postgraduate training in diabetes was observed (14.8% in 1990 compared with 47.1% in 1999).

Nurses in both 1990 and 1999 reported high involvement in provision of dietary advice and assisting with weight management. However, practice nurses in 1999 reported greater involvement in more complex aspects of diabetes care, including initial education about diabetes, sick-day management, hypoglycaemia management, glucose self-monitoring and injection technique. Despite this shift, the hours spent on diabetes care did not increase, and practice nurses in 1999 felt less able to spend time with patients than they did in 1990. A more positive change was the increased level of family or whanau inclusion in diabetes education. Although inclusion of family members in diabetes education was reported as important in both 1990 and 1999, nurses reported greater success in achieving family involvement in the 1999 survey.

Role of societies in patient/whanau education

Diabetes New Zealand is the key voluntary sector provider of diabetes education and support services in New Zealand. A recent study evaluated Diabetes New Zealand in four areas: (1) the extent to which Diabetes New Zealand is reaching groups most at risk of diabetes, (2) the degree to which it has encouraged levels of member involvement, (3) whether voluntary group provision of education is that most preferred by members and (4) the extent to which members see the voluntary sector model as being effective in combating the growth of diabetes.[36]

Through a focused study of six of the 41 societies linked to Diabetes New Zealand, it was found that membership was disproportionately skewed towards New Zealand Europeans (95.3%), females (57.5%) and older persons (>60 = 76.4%; >70 = 45.9%). Maori and Pacific peoples with diabetes were under-represented, making up only 2.8% of members combined. This is of particular concern given that 8.2% of people diagnosed with diabetes in the study region were Maori or Pacific.

With regard to member involvement, 55.3% of the members surveyed indicated that they were 'never' involved with their local society. Of note was the higher level of involvement indicated by rural members compared with their urban counterparts. This may be due to higher deprivation, smaller society size or a lack of health providers in rural areas. The existence of barriers to diabetes in primary health care services was hinted at, with 87% of members stating that they 'strongly/usually' preferred their GP or practice nurse as a provider of education but only 62% receiving 'almost all/quite a lot' of their education from this source. These figures were mirrored by the members' view of societies as a way of addressing increasing rates of diabetes. Of those surveyed, only 33.4% considered a diabetes society to be the best way of addressing increasing rates compared with 49.0% indicating that medical centres, GPs, practice nurses and primary health organisations would be the best/most effective way.

Chronic illness coping strategies

In a study of heart failure patients in general practice, Buetow and Coster found that approximately 40% of patients interviewed appeared not to understand the nature and seriousness of their condition. Maori, Pacific and Asian patients were over represented.[37] Three themes were found to characterise patients whose understanding was poor. Firstly, patients may have been presented with information, but that information did not register, or was not retained. Secondly, some patients

may deliberately avoid information, and as a consequence may not be presented with it. Thirdly, a minority of patients reported that their health care provider was unwilling to discuss the nature and gravity of their condition.

Drawing from the same study, Buetow et al developed a framework for conceptualising how patients with chronic heart failure cope with their illness. They described four coping strategies: avoidance, disavowal, denial and acceptance[38]. Disavowal, or 'healthy denial' was found to be the most common coping strategy. It involved "self-deception in the face of accurate perception". According to Buetow et al, patients who display disavowal acknowledge reality, but positively reconstruct its personal meaning or significance in order to palliate the emotional strain. Buetow et al suggest that disavowal is not a problem to be dealt with, but a process to be respected, and propose that GPs employ a concept of hope in their support of patients coping with chronic illness.

Discussion of prognosis

There is general agreement that a palliative care approach, which includes discussion of prognosis, is appropriate for incurable chronic illnesses. However, there is evidence that GPs, who provide most end-stage care for COPD patients, do not routinely discuss prognosis and many find it difficult to do so.[39] A study of GPs attitudes to discussing prognosis with patients with severe COPD found that 79.9% of Auckland GPs consider such discussion 'essential' or 'often necessary' in managing severe COPD. Despite these beliefs, a much smaller proportion of GPs reported that they undertake such discussions.

In response to this evidence, Halliwell and colleagues have developed seven strategies for facilitating discussion of prognosis with COPD patients.[40] They are:

- Be aware of implications of diagnosis – a lack of awareness of GPs around the implications of COPD was found to be a barrier to effective discussion.
- Plan to use unavoidable uncertainty to ease discussion – linked to the disavowal coping strategy, some GPs used the unavoidable uncertainty of COPD prognosis to ease discussions with patients.
- Build relationships with patients – long-standing relationships with good rapport were reported to facilitate discussions.
- Be caring and respectful – GPs should aim to be as 'supportive and compassionate as possible' respecting patients' coping strategies and cultural needs such as inclusion of family in discussions.
- Begin discussion early in the disease course – several GPs reported discussing prognosis as a component of patient education at an early stage.
- Identify and use opportunities to discuss prognosis.
- Work as a team – consistent with guidelines for the management of COPD, effective communication and role differentiation between team members were found to be conducive to appropriate discussions.

Long-term conditions management and disease groups

Congestive heart failure

Self management programmes in CHF aim to enable patients to assume a primary role in managing their condition. This includes, for example, monitoring their own symptoms, adjusting medications and deciding when additional medications may be required. A recent systematic review has reported the impact of self-management for patients with CHF.[41] This review identified six randomised controlled trials involving 857 patients. Results showed significant reductions in all-cause and heart failure-specific readmissions but no impact on all-cause mortality (see below Table 7, page 59).

A 2kg/m2 lower body mass index (BMI) is associated with an 8-12% lower stroke and ischaemic heart disease risk and a 20-30% lower diabetes mellitus risk. Increased body weight is also a strong risk factor for hypertension. A meta-analysis of 25 randomized controlled trials was performed to estimate the effect of weight reduction on blood pressure overall and in population subgroups.[42] A net weight reduction of -5.1 kg by means of energy restriction, increased physical activity, or both reduced systolic blood pressure by -4.44 mm Hg and diastolic blood pressure by -3.57 mm Hg. More details are included in the section on CVD literature (see page 76).

A wide variety of secondary prevention programmes improve health outcomes in patients with coronary disease with reduction in all cause mortality and recurrent myocardial infarction. A review by Clark and colleagues (meta-analysis of 63 randomised controlled trials) provides strong evidence that programmes that include risk factor education or counselling, with or without exercise, are important for secondary prevention of coronary artery disease.[43] Most of the programmes improved quality of life or functional status, but effect sizes were small. More details are in the section on CVD literature on page 76.

Little research evaluates interventions designed to improve uptake, adherence and professional compliance in cardiac rehabilitation.

Beswick et al, identified a wide range of possible interventions and indicated that further evaluations of methods was required.[44] A systematic review of studies that investigate failure of eligible patients to attend cardiac rehabilitation courses identified several reasons.[45] Predictor variables were usually categorised as socio-demographic, medical and psychological.

Non-attenders were more likely to be older, to have lower income/greater deprivation, to deny the severity of their illness, or to be less likely to believe they could influence outcome or to perceive that their physician recommends cardiac rehabilitation. Job status, gender and health concerns played an indirect role in attendance behaviour. The authors suggest that comparison of results between studies could be influenced by different case-mix, measurement instruments and country of origin. They conclude that a number of factors predict cardiac rehabilitation attendance, some of which are potentially modifiable. Proximity and integration with primary health care could be other factors.

Quitting smoking improves prognosis after a cardiac event. Therefore smoking cessation is highly recommended for patients with coronary heart disease. Critchley

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and Capewell conducted a systematic review to determine the magnitude of risk reduction achieved by smoking cessation among patients with CHD.[46] Results showed a 36% reduction in crude relative risk of mortality for patients with CHD who quit, compared with those who continued smoking. Results from individual studies did not vary greatly despite many differences in patient characteristics, such as age, sex, type of CHD, and the years in which studies took place. The authors point out that few studies included large numbers of elderly persons, women, ethnic minorities, or patients from developing countries. More details are given in the section on CVD literature.

Chronic Obstructive Pulmonary Disease (COPD)

Bourbeau, in a systematic review of disease-specific self-management programmes in COPD, reported inconclusive evidence, despite findings that four of the ten studies reviewed demonstrated reduced health resource use and one showed improvements in Health Related Quality of Life (HRQoL).[47] The ten randomised control trials included in the review utilised relatively small numbers of subjects and variable proportions of smokers. Further, they often did not use validated HRQoL instruments and included the use of "inappropriate educational interventions" in intervention strategies that varied widely. The conclusions of this review were heavily based on the results of a single strongly positive study conducted by the reviewer.

Weingarten et al failed to demonstrate positive effects (other than related to adherence to guidelines) of self management programmes in COPD.[48] Taylor et al, in a similar systematic review, showed no evidence of the benefit of self-management programmes in COPD on any disease parameter, but commented that "the data fails to exclude any clinically relevant benefit or harm arising from such interventions".[49]

Taylor et al found that nurse-lead interventions in COPD and generally forms of case-management including self-management strategies had no proven benefit in terms of mortality, health services utilisation or HRQoL.[49]

Turnock et al conducted a systematic review of the use of action plans in patients recruited from general practice, who included current smokers with moderate COPD. Turnock et al found no evidence of benefit in terms of healthcare utilisation, functional capacity or HRQoL.[50] All studies had methodological limitations particularly with respect to concealment. Numbers were limited and the inclusion of subjects with low morbidity reduced the likelihood of a positive result.

A further systematic review conducted by Monninkof et al showed that self-management education had no proven effects on emergency visits, hospitalisations, or lung function, was equivocal in its benefit on quality of life and symptoms, but did reduce use of rescue medication and use of steroids and antibiotics.[51]

McDonald et al conducted a review of evidence on the effectiveness of interventions to assist patients' adherence to prescribed medications. The review included five randomised control studies conducted among patients with asthma or COPD. The authors were unable to identify consistent characteristics of effective intervention[52]. However they point out a lack of high quality and adequately powered studies using the multifaceted, complex and individualised interventions likely to be required and suggest that results should be regarded as inconclusive.

Stroke

Following a first stroke, the risk of recurrent stroke is six times greater than first ever stroke in the general population. Secondary prevention to reduce this risk of recurrent stroke begins very early and continues indefinitely. Interventions include the use of anti-platelet therapy (or warfarin in those with atrial fibrillation) in those with ischaemic stroke, blood pressure and cholesterol lowering therapy and lifestyle modification. Failure to take prescribed medications is a major barrier to optimal outcome. Three systematic reviews have found modest effects for interventions to improve medication adherence, although none of these have been carried out specifically in stroke.[53-55] Compliance may be increased by the provision of information, reminders, self-monitoring, reinforcement, counselling, family therapy, and a reduction in the number of daily doses (Level I. Australian Stroke Rehabilitation Guidelines).[56]

A process of self management is required by stroke survivors, whereby adaptation to manage any residual disability and promote recovery are required.[56] One systematic review has found that a generic programme where individuals are provided with education about communicating with health professionals, managing change and setting and achieving goals, results in small to moderate improvements in health outcomes.[57] Australian guidelines suggest that self-management programmes should be available to people with stroke (and without cognitive impairment) discharged from hospital, and these people should be supported to access such programmes once they have returned to the community.[56]

3. Leadership and adherence to clinical guidelines

Active leadership

There is increasing consensus that, in complex healthcare systems, both clinical and non-clinical managerial champions are required to facilitate sustained access.

This is especially so in secondary care settings and at the interfaces of primary and secondary care.

Adherence to clinical guidelines

This section presents evidence-based guidelines for key disease groups. While guidelines have been developed in the UK and Europe, those included below are considered appropriate for implementation in New Zealand.

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COPD clinical guidelines

The Thoracic Society of Australia and New Zealand and the Australian Lung Foundation have developed The COPD-X Plan: Australian and New Zealand Guidelines for the management of Chronic Obstructive Pulmonary Disease 2006 (Apr 2006). These are summarised below and also on page 70.

C: Confirm diagnosis and assess severity

Smoking is the most important risk factor for COPD
Consider COPD in patients with other smoking-related diseases
Consider COPD in all smokers and ex-smokers older than 35 years
The diagnosis of COPD rests on the demonstration of airflow limitation that is not fully reversible
If airflow limitation is fully or substantially reversible, the patient should be treated as for asthma

O: Optimise function

Inhaled bronchodilators provide symptom relief in patients with COPD and may increase exercise capacity
Long-acting bronchodilators provide sustained relief of symptoms in moderate to severe COPD
Long-term use of systemic glucocorticoids is not recommended
Inhaled glucocorticoids should be considered in patients with a documented response or those who have severe COPD with frequent exacerbations
Identify and treat hypoxaemia and pulmonary hypertension
Prevent or treat osteoporosis
Pulmonary rehabilitation reduces dyspnoea, anxiety and depression, improves exercise capacity and quality of life and may reduce hospitalisation
In selected patients, a surgical approach may bring symptom relief.

P: Prevent deterioration

Smoking cessation reduces the rate of decline of lung function
General practitioners and pharmacists can help smokers quit. Treatment of nicotine dependence is effective and should be offered to smokers
Pharmacotherapies double the success of quit attempts; behavioural techniques further increase the quit rate by up to 50%
Influenza vaccination reduces the risk of exacerbations, hospitalisation and death
Long-term oxygen therapy (>15 hours/day) prolongs life in hypoxaemic patients (PaO2 < 55 mmHg, or 7.3 kPa)
Inhaled glucocorticoids are indicated for patients with a documented response or who have severe COPD with frequent exacerbations
Mucolytics may reduce the frequency and duration of exacerbations.

D: Develop support network and self-management plan

Pulmonary rehabilitation increases patient/carer knowledge base, reduces carer strain and develops positive attitudes towards self-management and exercise
COPD imposes handicaps which affect both patients and carers
Multidisciplinary care plans and individual self-management plans may help to prevent or manage crises
Enhancing quality of life and reducing handicap requires a support team

Patients and their family/friends should be actively involved in a therapeutic partnership with a range of professional disciplines

Patients should be encouraged to take appropriate responsibility for their own management.

X: Manage eXacerbations

Inhaled bronchodilators are effective treatments for acute exacerbations

Systemic glucocorticoids reduce the severity of and shorten recovery from acute exacerbations

Non-invasive positive pressure ventilation is effective for acute hypercapnic ventilatory failure

Exacerbations with clinical signs of infection (increased volume and change in colour of sputum and/or fever, leukocytosis) benefit from antibiotic therapy

Multidisciplinary care may assist home management

Early diagnosis and treatment may prevent admission

Controlled oxygen delivery (28% or 0.5–2 L/min) is indicated for hypoxaemia

Involving the patient's general practitioner in a case conference and developing a care plan may facilitate early discharge.

Cardiovascular disease

The following list is a summary of guidelines that are described below:

The joint contribution of established risk-factors is responsible for about 85% of the IHD burden and 73% of the stroke burden worldwide.

The simplest indicator of high absolute risk is established CVD, principally angina, previous myocardial infarction (MI), transient ischaemic attack/s (TIA), stroke or diabetes mellitus.

Most of the disease burden occurs in the large majority of the population with non-optimal levels, but without 'labelled' hypertension, hypercholesterolaemia or obesity. As such, most CVD is attributable to the combined effects of high blood pressure, cholesterol and body-weight levels. The associations between blood pressure, cholesterol and body mass index and CVD are direct and continuous.

Patients with type 2 diabetes mellitus (DM) either have manifest CVD or have a high risk for future cardiovascular events, men with diabetes mellitus have a 2- to 4-fold; and women with DM a 3- to 5-fold increased risk for cardiovascular death compared with non-diabetic individuals. Care of patients with type 2 DM should include yearly risk assessment by the use of published risk equations or risk charts.

Personal and population-based interventions are very important in reducing risk
In middle-aged populations, a 10mmHg lower systolic blood pressure (SBP) is associated with roughly a 30-40% lower stroke rate and a 20-25% lower ischaemic heart disease risk.

Encouragement of lifestyle modification and appropriate use of lipid-altering therapy will have a substantial impact on reducing the burden of cardiovascular disease. A 1mmol/l lower cholesterol level is associated with a 15 to 20% lower stroke and 20-25% lower IHD risk.

A 2kg/m2 lower BMI is associated with an 8-12% lower stroke and IHD and a 20-30% lower DM risk.

A wide variety of secondary prevention programmes improve health outcomes in patients with coronary disease with reduction in all cause mortality and recurrent myocardial infarction.

Quitting smoking improves prognosis after a cardiac event. Therefore smoking cessation is highly recommended for patients with coronary heart disease.

Time delay (both to first medical contact and reperfusion therapy) plays a major role in determining best management with ST-Elevation MI.

The standard of care in NSTEACS includes a full complement of anti-ischaemic, antithrombotic therapy and antiplatelet agents.

All patients with non-ST-segment-elevation acute coronary syndromes (NSTEACS) should have their risk stratified to direct management decisions.
Early revascularisation in high-risk ACS patients reduces morbidity and mortality from CVD.

Before discharge, patients with an ACS should be initiated on a medication regimen, including antiplatelet agent(s), B-blocker, angiotensin-converting enzyme inhibitor, and statin.

Implantable cardiac defibrillators should be considered in some patients who, despite optimal medical therapy, have persistently depressed left ventricular function more than six weeks after STEMI.

Depression and CHD frequently coexist. All patients with CHD should be assessed for depression and level of social support.

Disease management programmes improve processes of care, reduce admissions to hospital, and enhance quality of life or functional status in patients with coronary heart disease.

The New Zealand Guidelines Group (2003) provides the following guidelines related to assessment and management of cardiovascular risk:

Assessment of absolute cardiovascular risk is the starting point for all discussions with people who have cardiovascular risk factors measured. Reduction in cardiovascular risk is the goal of treatment.

People with known cardiovascular disease are clinically defined at very high risk.

Lifestyle change and drug intervention should be considered together. The intensity of intervention recommended depends on the level of cardiovascular risk:

- a life free from cigarette smoke, eating a heart healthy diet and taking every opportunity to be physically active is recommended for people at less than 10% 5-year CV risk
- lifestyle interventions for people at more than 10% 5-year CV risk are strongly recommended and this group should receive individualised advice using motivational interviewing techniques relating to smoking cessation if relevant, a cardioprotective diet and regular physical activity
- cardiovascular risk should be reduced in people at greater than 15% 5-year CV risk by lifestyle interventions, aspirin, blood pressure lowering medication and lipid modifying therapy (statins). There should be a greater intensity of treatment for higher risk people (more than 20 – 30%)
- after myocardial infarction, comprehensive programmes that promote lifestyle change for people are best delivered by a cardiac rehabilitation team. Most people with angina or after myocardial infarction will be taking at least four standard drugs, low-dose aspirin (75 – 150 mg), a beta blocker, a statin and an ACE-inhibitor
- virtually all ischaemic stroke and transient ischaemic attack survivors should be taking low dose aspirin, a combination of two blood pressure drugs and a statin.

Cardiac rehabilitation

Guidelines for cardiac rehabilitation have been developed by the New Zealand Guidelines Group (2002). The guidelines state that the goals of cardiac rehabilitation are:

- To prevent further cardiovascular events by empowering patients to initiate and maintain lifestyle changes
- To improve quality of life through the identification and treatment of psychological distress
- To facilitate the patient's return to a full and active life by enabling the development of their own resources.
- Prior to hospital discharge, all eligible patients should be referred to attend a comprehensive cardiac rehabilitation programme.

The main components of a comprehensive cardiac rehabilitation programme are:

- empowering patients to make lifelong changes
- exercise programmes
- nutrition management
- weight management
- smoking cessation
- managing psychosocial aspects of life
- pharmacotherapy
- ongoing personal follow-up and support.

Cardiac rehabilitation provides the opportunity to coach and encourage positive lifestyle behaviours and increases compliance with medication use.
For personal behaviour change, several key elements need to be present:

- A belief that change is possible
- Motivation to make the change
- A support network and personal capacity to enact and sustain change.

Physical activity improves functional capacity, risk factors and significantly reduces cardiovascular disease and total mortality. The benefits of regular, moderate physical activity are likely to outweigh any small increased risk of sudden death associated with vigorous exercise.

A cardioprotective dietary pattern reduces cardiovascular and total mortality and is recommended. Modification of dietary fat should not be considered in isolation from a whole diet approach.
All patients with coronary heart disease should be strongly encouraged to stop smoking and to avoid second-hand smoke.

Up to one in four patients will experience a disabling level of anxiety or depression following a myocardial infarction. Psychosocial interventions are recommended.

Pharmacotherapy with aspirin, a beta blocker, an ACE inhibitor and a statin can provide substantial benefits and these medications should be considered in all patients.

Cardiac rehabilitation should be viewed as a **continuum** from initial admission through to long-term follow-up. This requires integration between primary and secondary care.

Audit, evaluation and patient feedback are integral aspects of quality improvement. Specific groups may require special consideration. Patients requiring extra support or varied options may include women, the elderly, the socioeconomically disadvantaged and those living in rural areas. People with diabetes are at particularly high risk and warrant priority.

Ensuring Mäori and Pacific peoples access to cardiac rehabilitation programmes is important and will help reduce disparities in cardiovascular disease outcomes.

Existing programmes may need reorientation to increase responsiveness to Mäori and Pacific peoples needs.

Congestive heart failure

The UK National Institute for Clinical Excellence (NICE) in 2003 developed guidelines for the management of chronic heart failure in adults in primary and secondary care. NICE provides the following recommendations as priorities for implementation:

Diagnosis
The basis for historical diagnoses of heart failure should be reviewed, and only patients whose diagnosis is confirmed should be managed in accordance with this guideline. Doppler 2D echocardiographic examination should be performed to exclude important valve disease, assess the systolic (and diastolic) function of the (left) ventricle and detect intracardiac shunts.

Treatment
All patients with heart failure due to left ventricular systolic dysfunction should be considered for treatment with an ACE inhibitor.
Beta blockers licensed for use in heart failure should be initiated in patients with heart failure due to left ventricular systolic dysfunction after diuretic and ACE inhibitor therapy (regardless of whether or not symptoms persist).

Monitoring
All patients with chronic heart failure require monitoring. This monitoring should include:
- a clinical assessment of functional capacity, fluid status, cardiac rhythm, and cognitive and nutritional status
- a review of medication, including need for changes and possible side effects
- serum urea, electrolytes and creatinine.

Discharge
Patients with heart failure should generally be discharged from hospital only when their clinical condition is stable and the management plan is optimised.
The primary care team, patient and carer/family must be aware of the management plan.

Supporting patients and carers
Management of heart failure should be seen as a shared responsibility between patient and healthcare professional.

Stroke

The New Zealand Guidelines Group (2005) developed guidelines for the management of people with atrial fillrillation and flutter.

Stroke guidelines state that:

A high index of suspicion is warranted when examining people with an irregular pulse and an electrocardiograph (ECG) should be performed. Atrial fibrillation (AF) is common and increases with age (the overall prevalence in the general population is about 1%, but the prevalence in people aged over 80 years is close to 10%).

Echocardiography is an important part of the assessment of people with AF or atrial flutter (AFL). Improved access throughout New Zealand is recommended.
All people with AF/AFL require thromboembolic risk assessment. The majority of people with AF require anticoagulation to reduce their risk of stroke. A target International Normalised Ratio (INR) of 2.5, range 2.0 to 3.0, is recommended.
The benefits of stroke prevention with anticoagulation usually, but not always, outweigh the risk of bleeding.

Warfarin is underutilised. There is good evidence that the risks of bleeding on warfarin may have previously been overemphasised.

Rate control together with anticoagulant therapy, rather than rhythm control, is a reasonable option for the majority of people with AF/AFL.
The efficacy and safety of antiarrhythmic drugs vary depending on the indication and individual clinical factors. For example, sotalol should NOT be used solely for rate control. It appears to be ineffective for pharmacological cardioversion, but is effective for the maintenance of sinus rhythm.

People on antiarrhythmic therapy require regular monitoring. The main risk of antiarrhythmic therapy is ventricular proarrhythmia.

The New Zealand Guidelines Group (2003) provides **guidelines for the management of stroke**. These are as follows:

All people with stroke should expect inpatient rehabilitation by a multidisciplinary team with expertise in collaborative practice and stroke unless they have:
- No significant residual disability interfering with function identified by multidisciplinary team assessment *or*
- Moderate disability (e.g. transfer with one person) *and* early supported discharge service available *or*
- Institutional care *and* community rehabilitation service already available.

Inpatient rehabilitation
- Admission to stroke unit or care by stroke team within a rehabilitation unit
- Stroke-expert multidisciplinary team responsible for care
- Person-orientated goal setting
- Daily therapy input (eg five days a week)
- Family and caregivers involved in rehabilitation
- Appropriate information and support available to person and family.

Is the person ready for discharge to the community?

    Typically considered appropriate if medically stable *and*

- Multidisciplinary team has completed assessments of home situation and post-discharge requirements *and*
- An appropriate place for discharge has been identified *and*
- An appropriate plan has been agreed between multidisciplinary team, person, caregivers and other agencies *and*
- All necessary equipment has been provided *and*
- All follow-up arrangements are in place (rehabilitation, social and GP/primary care).

Community rehabilitation

- Can be provided with equal effectiveness in the community or a day hospital.

Life after stroke

- Person has contact information for Stroke Foundation field officers or other support
- Caregiver support
- Cultural issues
- Ongoing education about stroke
- Appropriate advice and information on sexuality, mood, employment, driving

Is diagnosis and secondary prevention an issue for this person?

    Typically appropriate if:

- Further stroke would have important clinical consequences and
- Person can cooperate and comply with investigations or antiplatelet drugs and
- If for carotid ultrasound, has significant functional recovery from an anterior circulation stroke and fit for surgery

    Typically not appropriate if terminal illness, severe dementia/disability e.g. in hospital-level care.

Outpatient clinic / review

    To confirm diagnosis, assess vascular risk factors and address secondary prevention
    Urgent outpatient assessment by clinicians knowledgeable about stroke
    ECG and bloods at GP or ED presentation
    Access within 1−2 weeks
    Review by physician with special interest or expertise in stroke management

Is the person ready for discharge from rehabilitation?

    Typically appropriate if:

- Person has achieved agreed therapy goals *and*
- No new goals are identified and agreed and
- Appropriate supports are in place.

Diabetes

The New Zealand Guidelines Group (2003) has provided guidelines for the management of type 2 diabetes.

Key points are:

The estimated number of people in New Zealand with diagnosed diabetes is predicted to increase substantially in the next 20 years, from 115,000 to over 160,000

The prevalence of diagnosed diabetes is higher among Mäori and Pacific peoples and complications are more common and more severe.

About half the people with diabetes are thought to be undiagnosed. Many of these people will be asymptomatic.

Lifestyle change is central to the management of all people with diabetes and requires advice on energy intake and dietary pattern, physical activity, and smoking cessation, where appropriate.
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Involving families in diabetes management planning is of particular importance to Mäori and Pacific people with diabetes.

- Regular screening for renal, retinal and foot complications should occur from diagnosis of type 2 diabetes

- Tight glycaemic control reduces the risk of and slows the progression of microvascular and macrovascular complications. A stepped approach is recommended to lower and maintain HbA1c to as close to physiological levels as possible, preferably less than 7%, without hypoglycaemia.

- Optimum blood pressure control, below 130/80 mm Hg, reduces the risk of and slows the progression of microvascular and macrovascular complications. Intensive blood pressure management is recommended in people with diabetes and overt nephropathy, microalbuminuria or other renal disease, with most requiring more than one blood pressure lowering agent.

- Any sustained reduction in both HbA1c and blood pressure is worthwhile

- Annual cardiovascular risk assessment is recommended for all people with diabetes. The National Heart Foundation cardiovascular risk chart should be used to calculate cardiovascular risk. Clinically, people with diabetes and overt nephropathy or other renal disease are at high risk of cardiovascular disease.

- For all people with diabetes the 5-year cardiovascular risk should be less than 15% and, where possible, the goal is to achieve: total cholesterol less than 4 mmol/L; triglycerides less than 1.7 mmo/L and blood pressure less than 130/80 mm Hg

- People with diabetes and microalbuminuria or overt nephropathy should be on an ACE-inhibitor or A2 receptor-blocker, if tolerated, to prevent disease progression.

4. Collaboration and sustained community links

Teams and collaboration

Bodenheimer suggests that the creation of primary care teams may comprise a means of enabling the success of other components of the chronic care model[22]. Teams may be a substrate upon which to build other interventions, rather than an intervention in themselves. For example, the addition of nurses or pharmacists to a team may make planned visits possible. The addition of a health educator or psychologist to the team may strengthen patient self-management training. The addition of community support worker may provide a culturally or language-appropriate connection between the patient and the team.

In New Zealand, Counties Manukau DHB has responded to increasing demand on secondary services, difficulty in meeting the needs of its relatively deprived population, and poor coordination between primary and secondary services by developing strong clinical and management leadership and a focus on intersectoral collaboration[58].

Collaboration and disease groups

Congestive heart failure

There is considerable evidence of the value of intersectoral collaboration in the field of CHF disease management. The interventions described below provide exemplars. More detail is in the disease-specific literature below. For CHF management, the following interventions have been described:

Increased access to primary care alone. A study by Weinberger et al[59] showed that close follow up of CHF patients in primary care resulted in an increase in hospital admissions. This 'adverse' effect of hospital admissions may have been associated with an increase in recognition of previously undetected problems, lack of a disease-specific protocol or lack of specialist involvement. No other trials specifically addressing increased access to primary care services alone have been performed.

Home-based interventions. Several randomised trials have assessed the effects of home-based multidisciplinary programmes for (often elderly) patients with heart failure, and have shown that nurse-directed, multidisciplinary interventions reduce hospital admissions and improve quality of life.[60-62] Overall, the data from these studies suggests that home-based, nurse-directed management programmes can have a significant impact for patients with heart failure. The home visits appear to be an important part of the design of these programmes, allowing the provision of education and other strategies within the context of the patients' own surroundings and facilitating tailoring of the programmes to the individual patients.

Strategies that combine hospital and home-based interventions. These interventions appear to have benefits. For example, a study of nurse-directed hospital discharge planning and subsequent home follow up of elderly patients, including those with heart failure, showed that hospital readmissions were reduced over six months of follow up.[63]

Hospital-based interventions. Overall, hospital outpatient-based management interventions alone appear to be less effective than the home-based or integrated care programmes, particularly in terms of any sustained effect on hospital (re)admission rate. Such interventions may need to include intervention during the initial hospitalization, involvement of primary care, and home visiting.[64,65-67]

Integrated management involving secondary care, primary care and patient self-management. Two randomised trials (in CHF) have specifically addressed this combination.[68 69] Both involved integration of care between a hospital heart failure clinic (with nurse specialist and cardiologist), the patient's general practitioner and the patient / family. The data from these two studies were consistent, with reduced readmissions and improved quality of life. Cost analyses from these studies suggest that the strategies are cost-neutral over six to twelve months of follow up.

The CHF literature suggests that disease management strategies which are purely hospital-based are ineffective. Conversely, those strategies which cross the primary/secondary care 'divide' and which utilise appropriate levels of collaboration, produce both patient and service benefits. This is particularly so when these strategies also employ multidisciplinary teamwork.

COPD, stroke and multiple co-morbidity

The conclusions identified above apply also to COPD management interventions and stroke management guidelines and interventions.[56,71-74] These are discussed in the disease-specific literature section below. The conclusions are also applicable to case management programmes for elderly people with multiple co-morbidity.[70]

Development of sustainable community links

Health is not only about health services. Howden-Chapman et al (2007) provide a ready New Zealand example of the ways in which social issues affect health. They showed that improved insulation in houses in socio-economically deprived communities resulted in improved scores for self-rated health and self-reported wheezing, fewer days off school and work, and fewer visits to general practitioners for respiratory conditions. The 1996/7 New Zealand Health Survey (NZHS) advised that an intersectoral approach was required to address health inequalities.[96]

Community participation in the design and planning of health care services is important. It is suggested that services are more likely to be accessible, relevant, appropriate and affordable if people are involved in the local planning processes. Community participation should be viewed as a core requirement in developing innovative services and health promotion, despite the necessary investment in time required by both community people and health workers.[77]

Non-government, non-profit organisations play an important role by providing a range of social and primary medical services to populations that are largely non-European living in deprived areas. Funding for these services is often insufficient.[78] Although there is little research on the success of community services in New Zealand, health researchers agree that access to care, utilisation of services and quality of care differ between Maori and non-Maori with relatively low consultation, investigation, and interventions for Maori in both primary and secondary settings.[79]

5. Focus on reducing health inequalities

Socioeconomic disparity

The relationship between income and health is well-established.[80-82] An individual's low socioeconomic status is associated with an increased likelihood of experiencing poor health. People who are less well off experience shorter life spans and more illnesses than those who are well off.[81]

In New Zealand, individuals on low incomes experience higher mortality and morbidity rates compared with the rest of the population.[83] It is suggested that risk taking behaviour is underpinned by socioeconomic status, which affects health status and health outcomes as well as levels of utilisation of health services.[90 96]

Maori and non-Maori disparity

People who belong to minority and indigenous populations and who live in deprived areas experience a greater burden of disease. Globally, indigenous populations experience poorer health and have shorter life expectancy. In New Zealand, health related research clearly shows that Maori are more likely to experience the burden of disease.[36,84] Colonisation, assimilation, urbanisation and the reforms of the 1980's have negatively impacted Maori health.[85-87] McCreanor and Nairn argue that Maori have been reduced to the status of second class citizens in New Zealand and this is reflected in differential health statistics.[88]

Many Maori reside in areas of high deprivation compared with non-Maori: half of the Maori population residing in the three highest decile rated areas, which indicates significant deprivation,[89] In 1999, the New Zealand Deprivation Index showed that 56 per cent of Maori live in areas with a deprivation rating of 8 or higher (great deprivation) compared with 24 per cent of non-Maori[89]. The 1997 National Nutrition Survey indicated that Maori were more likely than non-Maori to live in a household that ran out of food due to lack of money.[90] New Zealand research undertaken since these reports would indicate that little has changed.[88,90]

The gaps between Maori and non-Maori are increasing. Maori experience higher death rates and lower life expectancy than any other ethnic group in New Zealand.[91, 92] Robson describes two types of disparity for Maori, 'distribution gaps' and 'outcome gaps.'[86] Distribution gaps refer to the unequal distribution of socioeconomic resources or circumstances between ethnic groups, while outcome gaps refer to differential outcomes for Maori and non-Maori within each socioeconomic category, such as deprivation deciles. Outcomes can be defined in terms of health status, health service utilisation, or in terms of intermediary outcomes such as wages. A model developed by Williams proposes that culture, biology, racism, economic structures, political and legal factors are the basic causes of differences in health[93]. This is distinct from surface causes, which include health practices, stress, psychological resources and medical care[94].

The persistence of disparity between Maori and non-Maori is of increasing concern in the 21st century. Current research strongly suggests that interventions need to target risk factors such as poor nutrition, low levels of physical activity, and obesity. Small

changes in risk factor levels could have a major impact on population health within a decade with potential health gains for Maori.[95]

Ethnicity, Disparity and risk factors

Barnet et al. state that, despite policy advice and the mortality and morbidity rates, little attention has been given to the effects of changing patterns of health related behaviours, such as smoking.[98] These authors argue that behaviour is also influenced by 'rural residence as compared with urban residence[98].

Smoking is a major cause of preventable death. The New Zealand Health Survey (NZHS) reported that almost half of all Maori adults reported that they were current smokers[96]. The smoking rate for Maori women was two and a half times greater than the smoking rate for non-Maori women. Recent studies have found a continuing high prevalence of smoking amongst Maori women, particularly in the younger age groups.[99,100] Data from the NZHS showed a strong link between smoking status and measures of socioeconomic status.[90]

The proportion of Maori who are physically active reduces as age increases, while the proportion for non-Maori remains reasonably constant across all age groups. The NZHS found that over 50 per cent of Maori men and Maori women were overweight or obese. Rates increased significantly with age. Maori men and Maori women aged 45 years and over were overweight or obese at rates of 81 per cent and 78 per cent respectively. In contrast the rates for European men (54%) and women (47%) in the same age group were lower.[90 101] The Auckland Regional Community Stroke Survey (ARCOS) found that there was a higher incidence of risk factors in Maori with hypertension and diabetes.[97]

Hypertension

Hypertension is a well-known risk factor for stroke and heart disease. Maori and Pacific peoples have a higher age-standardised mortality rate for heart disease and stroke than the national average. Gentles et al. found that Maori have higher average blood pressure levels and an increased prevalence of raised blood pressure.[102] Lowering blood pressure even by modest amounts has been shown to markedly reduce the risk of death from heart attack, stroke and heart failure, and there is growing evidence that a person's blood pressure does not increase with age if lifestyle and environmental factors are favourable.[102] The National Nutrition Study in 1997 reported that only one-third of Maori with hypertension were on medication compared with almost half of non-Maori.[103]

A cross-sectional health screening survey found that there was a trend to a more adverse pattern of cardiovascular disease risk in lower socioeconomic groups.[104] The strongest associations were related to income and education. Raised blood pressure was associated with lower educational levels and a higher prevalence of diabetes mellitus was associated with a lower income. A better living standard, greater resources in primary health care, and health promotion targeted at the community level were viewed as essential to affecting change in differential health statistics.[105]

Diabetes

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The prevalence of diabetes is increasing worldwide[106] and is having a significant impact on health services.[107] New Zealand is experiencing an increase in the prevalence of diabetes. Local research reveals a surge in diabetes rates, particularly among Maori. According to the New Zealand Ministry of Health, diabetes mellitus will increase dramatically in the population, especially among Maori.[108] Maori in more deprived areas are three times more likely to develop diabetes than non-Maori.[36 109] The Maori and Pacific peoples of New Zealand are populations at high risk of both type 2 diabetes and gestational diabetes (GDM) during pregnancy. Babies born to mothers with both types of diabetes and GDM are at increased risk of developing diabetes and obesity.[110]

Maori have lower utilisation rates of diabetes screening when compared with non-Maori. Maori diabetic patients are also less likely than non-Maori to be on cholesterol-lowering medications and ACE inhibitors, and were less likely to have good glycaemic control.[81] While the incidence of diabetes mellitus is high among rural Maori, insulin resistance has been found to be prevalent, especially among Maori in the younger age groups.[106,111]

Simmons and Flemming found that the lack of ongoing diabetes management was greater in Maori than other ethnic groups.[112] This was associated with a reluctance to undertake self-care. The reasons for this were considered to relate to both income threshold and a lack of knowledge about how to access benefits and health services. The authors indicated a need for earlier support at the time of diagnosis. It is commonly agreed that there is a need for 'systematic opportunistic screening' in primary care, using a preventative emphasis (assessing for impaired glucose intolerance).[113]

Stroke

Maori, in common with other colonised indigenous peoples, suffer from obesity, hypertension and diabetes, all of which increase susceptibility to ischaemic stroke. The ARCOS study, completed in 2002/03, found that disparities in the rates of stroke were due to substantial differences found in risk factor profiles between different ethnic groups. On average, Maori and Pacific women suffered a stroke at an age 15 years younger than non-Maori/non-Pacific women. This has significant socioeconomic and health implications. Whilst there has been a rapid decline in stroke rates for NZ/ European people there has been a marked increase in rates for Maori and Pacific peoples. It has also been found that there are insufficient stroke prevention measures targeting high risk groups such as Maori, who are known to be less likely to take medications, particularly anticoagulants.[92 97]

Cardiovascular Disease

The highest disease-specific mortality rates for ischaemic heart disease among indigenous populations in four countries, including New Zealand, Australia, Canada and the United States, have been found in New Zealand Maori. New Zealand Maori have also been found to have the highest level of disparity for disease-specific mortality.[114]

The gap in life expectancy between Maori and non-Maori increased over the period 1980-1999. Most notably, the slow decline in Maori cardiovascular disease (CVD)

mortality rates over this period contrasted with the rapid decline in non-Maori rates.[115] Maori with ischaemic heart disease have mortality rates of at least twice that of non-Maori. The obesity epidemic is beginning to have an impact on CVD rates. While IHD mortality rates are slowly declining in New Zealand and other developed countries, this is not the case for New Zealand Maori.[116]

The levels of coronary artery bypass and angioplasty procedures, two invasive procedures to treat ischaemic heart disease, are lower for Maori and Pacific people despite their ischaemic heart disease mortality rates being higher than those of non-Maori/ non-Pacific peoples.[115,117,118] Research conducted by Bowling et al. found that the priority scoring system for coronary artery bypass graft (CABG) in New Zealand was more equitable than the guidelines in the United Kingdom.[119] However, in New Zealand there is evidence that, despite a scoring system, Maori are being under-treated when compared with non-Maori. On the basis of demand, cardiovascular intervention rates should be significantly higher for Maori, but in fact the converse is true. CABG and angioplasty have been consistently lower for Maori over many years.[114][119]

Respiratory Disease

In a review of hospital admissions conducted in 1995, chronic obstructive pulmonary disease and CHF were the most frequently recorded co-morbid conditions and were experienced by a third of patients.[120] This study also found co-morbidity was more likely to be recorded if patients were Maori or resided in deprived areas. Maori adults aged 15-44 years were more likely than non-Maori to be identified as having asthma.

Disparity and access to health care services

Collecting accurate information on ethnicity is vital to informing funding and planning decisions. However, mortality rates by ethnicity have been shown to be inaccurate as a result of numerator-denominator bias. Mortality rates are calculated through death registrations (numerator) and census records (denominator). The former uses the biological definition of ethnicity and the latter uses self-identified ethnicity data. Ajwani and colleagues assert that the mortality data for Maori is underestimated.[124] Furthermore, Maori are undercounted more in hospital discharge data than mortality data.[122]

However, despite methodological problems, it is clear that continuing high Maori morbidity and mortality rates among Maori suggest that the health sector is not meeting the serious health needs of many Maori.[121] Robson points out that, because Maori are more likely than non-Maori to experience ill health, they therefore require more support.[86] The New Zealand Ministry of Health has published a framework which draws on social and economic determinants of health to frame approaches to improve health and reduce inequalities. The framework recognises that health services are likely to play a greater role in Maori health gain than in non-Maori health gain. Policies such as the Primary Health Care Strategy and the creation of PHOs seek to improve access to services. However, current research indicates that barriers to accessing health care services are varied and problems of access are ongoing.

Maori have poorer communication with their GPs than non-Maori. Communication between doctor and patient is regarded as central to the provision of health care and

can influence the outcome of a consultation. GPs have been found to lack knowledge and understanding of a Maori worldview, thereby inhibiting communication and leading to poor decision-making. [88] A greater percentage of Maori women has reported unmet needs from general practitioner care compared with non-Maori women. The National Primary Medical Survey showed that age-specific rates of ordering blood lipid and glucose tests for Maori were lower than those for non-Maori in the 35-64 year age groups.[92]

The NZHS found that even though Maori adults were more likely than non-Maori adults to hold a Community Services Card, a higher proportion of Maori adults (60%) did not fill their prescriptions.[96] The main reason given for not filling a prescription was cost.[90] Maori and Pacific peoples have greater health needs than other ethnic groups.[109] However data on ethnicity is not reliable and this is an important consideration for general practitioners.[122] Maori have a lower primary care consultation rate than non-Maori.[103] This is the case even when income and self-reported health status are controlled for.

Brabyn and Barnett contend that access to general practice services in the more remote rural areas of New Zealand is of concern.[75] These authors reported the groups most affected in rural areas were those with the highest relative need for healthcare. People from generally deprived areas, in addition, have to travel long distances to obtain primary care. A study by Doolan-Noble and colleagues found no access to transport, being a woman, being older, and a diagnosis of heart failure were all significantly related to a reduced likelihood of referral to cardiac rehabilitation.[76] Whilst the costs of obtaining health care services have been found to be a significant deterrent for people on a low income, geographical and cultural barriers have also been identified as barriers. Such barriers also speak to the areas of equity and access (see 'Focus on Health Inequalities' below).

There is tension between the twin policy goals of primary health care reform - low cost access for all and very low cost access for the most vulnerable populations. Low cost access for all allows middle class New Zealanders to capture primary health care funding, and although co-payments are lowered, they are not low enough to improve access for the poor. Some PHOs *are* however improving access, despite their often limited size and infrastructure.[123]

Overall, there is consensus among health researchers that Maori and non-Maori differ in terms of access to primary and through secondary health care services. [125] Maori have longer hospitalisation stays than non-Maori and there is often no follow-up after discharge.[126] Schoen and colleagues reported that New Zealand physicians did not advise patients of treatment options or involve them in decisions about their health and care.[127] Poor transition of care from hospital to primary care settings, the inability to transfer information across sectors, and the duplication of tests were identified as problem areas. Not attending a cardiac rehabilitation programme was found to be associated with deprivation and access to transport.[76] Overall, there is a paucity of reliable information about health service utilisation by ethnicity following stroke. This is compounded by inaccuracies in ethnicity data.

Seddon and colleagues found that, despite a higher need for coronary artery intervention in Maori and Pacific men, a greater urgency in clinical priority was not demonstrated.[128] Clinicians did not appear to use the clinical priority assessment criteria, a scoring system to prioritise the patient's urgency for surgery. Revascularisation rates are also lower in both Maori and Pacific peoples.[117,118,129]

Hospitalisation rates for heart failure in Maori are typically more than double the rate for non-Maori.[118]

Maori have the poorest cardiovascular health outcomes of any ethnic group in New Zealand and progress towards better outcomes for Maori is slow.[103,130] Maori have poorer access to early detection and treatment services for conditions that precipitate heart failure compared to non-Maori.[131] Ellis et al. contend that people who are admitted to a hospital without cardiac interventional facilities receive fewer investigations and less revascularisation suggesting the management of acute coronary syndrome is geographically inequitable.[132]

Access to secondary and tertiary care for patients in rural communities remains poor, and despite the Government's intention to address inequalities in access to and through services, there is evidence that services have deteriorated over the last 20 years and as a result there has been a decrease in the availability of procedural services in rural communities.[80] A mobile interventional surgical service, targeting people living in rural and isolated areas, was developed in response to a specific community's need. The service evaluation reported that one in three patients accessing the surgical service were Maori.

Strategies to benefit Maori

Equitable funding

Carr et al. have stated that inequity of funding between PHOs with high proportions of Maori patients and those with proportionally few Maori patients is a major contributor to health inequality.[103] In addition, incentives under pharmaceutical budget-holding arrangements may have exacerbated the under-treatment of Maori.[131] Maori providers viewed funding as problematic and often static despite growth in demand for services.[91]

Victoria and colleagues [135] state that the rapid and extensive uptake of public health programmes (e.g. screening programmes) and interventions (e.g. cancer treatment) by wealthy socioeconomic groups will lead to increasing inequalities in health. This widening gap occurs because of the tendency for high socioeconomic groups to secure maximum possible benefit from the new knowledge and treatments before less advantaged groups have received benefit.[136]

Community-based strategies

Community-level strategies, self management and educational, and preventative measures have been identified as key factors.[36] It is also important that community-based programmes target those at highest risk and are specific for ethnic and cultural groups.[97]

Maori representation

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There is agreement among researchers and government agencies that Maori representation and participation in key health reforms and the development of services is not only important, but vital. However, Boulton and colleagues warn that increasing Maori providers does not guarantee improved outcomes.[91] Maori healthcare providers and cultural safety education are key elements.[125] Further, mainstream and Maori providers need to support and complement each other to maximise the efficiency and effectiveness of services.[134]

Addressing risk factors

Systematic opportunistic screening with an emphasis on preventative care is a strong theme in the literature. Addressing life style risk factors and being diligent about providing ongoing management is an absolute requirement.[97,112,113,115] Improved referral processes and promotion of services is the next step.

Innovative programmes

The design and implementation of innovative and effective ways of delivering services is essential to the improvement of entry to the health care system in the early stages of a health problem.[76] Monitoring and ethnicity data collection is also important to assess future demand and plan services   Differences in bed usage, and use of community resources which are associated with ethnicity need to be fully explored to ensure accurate interpretations are made. Interventions need to be designed to ensure equity of access and equity of outcome for all ethnic groups in New Zealand.[126] A preventative treatment approach is required and Maori-specific models of primary care are suggested.[133]

There is agreement in the literature that approaches that target inequality are required. These approaches are relevant at primary or secondary level and in a range of services, such as a diabetes clinic or a stroke rehabilitation service.[108 115 137]

By Maori for Maori approaches

In the last decade the New Zealand government has acknowledged that, for some types of health care, Maori are best able to deliver health services to Maori. These services are imbued with Maori culture, values and aspirations. There is increased appreciation that Maori are the key to addressing their own health problems. However, this approach requires support by all levels of society from local communities through to government agencies. Riddell advises that, underlying inequities in New Zealand is the issue of racism, which, while often discussed, is only reluctantly examined.[138]

There number of Maori providers of health and disability support services has increased.[91] However, New Zealand literature warns that increasing the number of Maori providers does not necessarily guarantee improved health outcomes. The literature does agree that there needs to be more Maori represented in the health professions and that Maori are currently grossly under-represented across the range of health professions.[91,114,130]

The more clinicians are able to appreciate the cultural perceptions of their clients, including spiritual and religious beliefs, the greater the opportunity for engagement

and effective care.[91] The He Korowai Oranga strategy requires health workers to consider individual patients as part of a whanau and to take a multidisciplinary approach. Recognising and incorporating the importance of whanau to Maori patients is arguably the most effective difference a health professional can make to the health and wellbeing of Maori patients. An understanding of the local community, knowledge of the person, their family and local social environment are important.

Some authors strongly contend that improving Maori health requires a **whanau approach**, rather than a focus on the individual. With the whole family involved, the family becomes the solution. Whanau ora encompasses wider health elements that Maori consider the essentials of life, such as, food, water, warmth, companionship or love, and social existence.[139-141]

Cultural concepts and practices, such as tapu, noa and the ritual of tangi, have been described as key components of a Maori view of health. Practices and cultural concepts that are imperative to Maori health and wellbeing have often been undermined by dominant Pakeha views.[140] Durie's models of the necessities of Maori health make explicit the critical need for Maori to feel secure in their traditions and worldview.[88] The qualitative research conducted by McCreanor and Nairn found that general practitioners gave explanations of Maori health that did not relate in any way to widely available Maori theories or models of health.[88] This conflict of understanding combined with an underlying power imbalance is a contributing factor in health inequities for Maori.

Despite the growing number of Maori health providers, Robson claims that Maori-led services still only receive a small fraction of the funding available, thereby limiting the availability and accessibility of services to some Maori consumers.[86] Despite the guarantees of the Treaty of Waitangi, inequalities in health are embedded in the system.[86] This is further support by Blakely and colleagues who state that Maori providers receive only $180 million of the $6.6 billion health budget and therefore are only able to provide a limited range of primary care services to a relatively small proportion of the Maori population.[142]

Maori healthcare providers and workers who are from the local community have been shown to have strong links with Maori community elders, who in turn offer support and endorse the services that are being provided.[143] The New Zealand government is making attempts to address the importance of traditional Maori methods of healing by developing standards of practice [144]. However, this has yet to remedy the disadvantage experienced by Maori in the health system.

Maori research

Kaupapa Maori research is "a theory and an analysis of the context of research which involves Maori and approaches research with, by and/or for Maori".[140] It is clear that innovative ways of delivering care are needed and that Kaupapa Maori research can support this activity. It is necessary that Maori are supported by research to explore and address new models of service delivery.[114] While some services are meeting the needs of their local populations it is evident that many mainstream services are failing. A report on Iwi and Maori provider success found that partnership, capacity building, resource allocation and collaboration are integral processes that ensure provider success.[145]

Most of the New Zealand literature supports a multi-sectoral approach that includes structural interventions (social policy to address ethnic power relations and racism in New Zealand), social interventions (policy to increase Maori access to affordable and high quality housing) and health sector interventions (such as measures to increase Maori access to culturally competent health services and boost the Maori workforce). [138] Funding, access, monitoring, implementation and evaluation are common themes in the literature and improvement in all areas is needed. [79,105,109,146] Many authors have stated that there is enough evidence to prove that action should now be taken.

6. Delivery design, decision support and knowledge transfer

Appropriate delivery design system

Systems and organisations

Any network-based organisational system has a number of key aspects that contribute to improved performance. Many of these are required for effective performance. These factors are as follows:

Effective communication channels

Engaged and visible leadership

Systems for feedback

Knowledge management strategies

Necessary resources – financial, workforce

Programme champion

Decision support systems

Strategy for creating programme sustainability

There is a growing body of literature that gives empirical backing for the factors that support the effective functioning of networked organisations. These include the following:

Level of engagement – with patients and practitioners

Network integration
- Service links
- Organisation links

Network centralisation
- Number of links to core agency
- Organisational links (total agencies linked to core agency)

Network density
- Service links
- Organisational links

Overall system integration structure (decentralised – centralised continuum)

Network membership growth

Range of services provided

Absence of service duplication

Strength of relationships

Creation and maintenance of network administrative infrastructure

Level of service integration and coordination

Member commitment to network goals

Collaborative capacity

Social capital
- Trust
- Honesty

Institutional commitment
- Institution created
- Programme reflects that stated in the vision statement
- Resilience across time

Good faith bargaining (extent to which participants believe others will keep their word)

The perceived utility of collaborative problem-solving approaches.

Programmes and components

Singh recently presented a useful review of the effectiveness of strategies to improve management of chronic conditions.[153] Her summary table (Table 3, with permission) is provided below.

We have used this summary to shape the data collation for this review. Blank cells indicate insufficient evidence to form a conclusion.

Table 3. Evidence summary for the effects of chronic disease management programmes, or components of programmes

Component	Patient outcomes	Quality of care	Clinical outcomes	Resource use
Organisation				
Broad managed care programmes	Some evidence of improved satisfaction	Good evidence of improved quality of care	Some evidence of improved clinical outcomes	Some evidence of reduced costs
Integrated care	Some evidence of improved satisfaction with multidisciplinary teams	Inconsistent evidence, with the trend towards improved care		Evidence of reduced resource use and cost
Greater use of primary and community care				May reduce overall healthcare costs, although evidence is inconsistent
New models of commissioning				Evidence that different models affect the cost of care
Systems				
Identifying those most at risk			Some evidence of improved outcomes	Some evidence of reduced resource use
Case management for the most vulnerable	Some evidence of improved satisfaction		Some evidence that targeting those at high risk improves outcomes	Some evidence that targeting those at high risk reduces resource use
Evidence-based care pathways		Some evidence of improved quality of care		
Appropriate data collection / monitoring		Some evidence that disease registries improve quality of care	Some evidence that disease registries improve clinical outcomes	
Learning and sharing among professionals; reminders, feedback, audit				
Self-care				
Involving patients in decision-making	Some evidence of improved satisfaction		No strong evidence of an effect on clinical outcomes	
Accessible structured information	Evidence that written information and group sessions improve knowledge	Evidence that educational sessions improve adherence	No evidence that written information alone improves outcomes	
Self-management education	Good evidence of improved self-care and satisfaction	Some evidence of improved quality of care	Some evidence of improved clinical outcomes	Evidence of reduced resource use
Self-monitoring and referral systems		Some evidence of improved quality of care	Some evidence of improved clinical outcomes	

Decision support

Decision support systems

It is commonly considered that decision support for primary care is an effective way of providing timely, patient-specific, specialist advice that can help coordinate the actions of primary and secondary care. Current efforts concentrate on embedding such support within practice management systems and other parts of information technology, Nevertheless, Mitchell et al. noted relative sparse formal evaluation of such projects, attributing this to two factors.[147] Firstly, the instability of the technology with hardware and software 'hovering between the obsolescent and the non-existent.' Secondly, the evaluation paradox in which systems cannot be evaluated until they are believed, but cannot be believed until they are evaluated.

Reminders, the simplest form of decision support, can improve adherence to pre-planned activities although there is a limit to how many reminders are either tolerated by or effective with physicians. They may be more effective when directed at physician assistants (in the US system),[22] or (conceivably) primary health care nurses and practice support staff in New Zealand.

In a New Zealand study involving a diabetes screening programme, Kenealy and colleagues compared the effectiveness of computer and patient reminders.[148] A computer reminder consisted of a flashing icon that appeared on screen when the file of an eligible patient was opened. The patient reminder consisted of a screening survey similar, but more extensive, to that described above. The computer reminder was found to be more effective than either the patient reminder alone or the patient and computer reminders together. A computer reminder is potentially more sustainable than a patient reminder, and may be a way of effectively integrating screening into primary care on a wide scale.

Risk assessment

Quantitative assessment of projected cardiovascular disease risk is now an accepted basis for the implementation of interventions in the primary prevention of cardiovascular disease.[149] Models based on the Framingham equations are the most widely accepted method for projecting cardiovascular disease risks and are used in New Zealand, British and European guidelines. Construction of tabular and graphical methods, with their inherent simplification, does not necessarily ensure that risk estimates will be the same as risk calculations.

One study used a cohort of primary care patients being assessed for coronary heart disease prevention to evaluate the relative accuracy of various models based on the Framingham equations.[150] The study found that tables developed in New Zealand and Britain share the same sensitivities and specificities. It was shown that revisions to the New Zealand tables, whilst improving sensitivities, worsen specificities to the point that false positives far outnumber true positives. The authors conclude that the 'modified joint British recommendations charts' offer the best combination of specificity, sensitivity and ease of use, but that the direct calculation of coronary heart disease and cardiovascular disease risks with the Framingham equations

programmed for personal or laboratory computers is practicable and desirable due to the improved accuracy of risk assessment.

Knowledge transfer

Knowledge transfer means capturing, organising and disseminating experience and knowledge so it can be understood and used by service-team members, patients, families, community and organisational leaders.

Knowledge transfer that is organised and appropriate is a crucial underpinning for planned encounters between patients and providers, whether patient or practice team initiated. Knowledge transfer enables use of patient data, decision support from the range of disciplines, self-management support and community resources.

7. Attention to effectiveness and outcomes

This section addresses chronic conditions management with regard to effectiveness and clinical outcomes.

Information is organised by disease group:

Congestive heart failure

COPD

Cardiovascular disease

Stroke

Congestive heart failure and the Chronic Care Model

Background

Congestive heart failure (CHF) is a major clinical condition with increasing prevalence and high annual mortality rates often exceeding 20%, even after institution of contemporary treatment. The true prevalence of CHF in New Zealand is unknown. However, it is projected to affect approximately 2% of the adult population (at least 80,000 people). Prevalence is strongly age related, with CHF affecting 1 in 10 people over the age of 80. Each year there are 12,000 hospital admissions of patients with CHF, with an average length of stay of seven days. It is thus an important public health problem for New Zealand.

The effectiveness of different disease management approaches for improving outcomes for patients with heart failure has now been examined in multiple randomised controlled trials. These trials have involved different interventions and differing patient groups, and include various components of the Chronic Care Model. Within the trials there is often overlap in the interventional strategy; for example, the combining of educational interventions with clinical follow up and telephone monitoring. However, it is convenient to consider the trials in the approximate categories relating to their predominant intervention. Disease management strategies may involve:

- Hospital-based clinics (usually multidisciplinary)
- Home-based interventions (usually multidisciplinary)
- Primary care-based interventions
- Telemonitoring or structured telephone support (remote monitoring)
- Self management and educational interventions
- Social support

Several systematic reviews of these trials have been undetaken over recent years. These reviews have included similar trials but have had different foci of analysis. Three recent systematic reviews are discussed below in more detail. These reviews appear scientifically robust and provide an appropriate summary of the effects of these interventions.

Disease management

Five systematic reviews of disease management interventions for heart failure have been performed.[154-158] The most recent and robust are outlined below.

A review by McAlister et al, 2004[154] included 29 multidisciplinary CHF management trials involving 5,039 patients. There was significant heterogeneity between the trials. Furthermore, it is not necessarily appropriate to combine the results from trials where the interventions have importantly different structure. Thus, the trials were grouped according to the structure of the main intervention:

- Multidisciplinary CHF clinic and multidisciplinary intervention (not clinic-based)
- Telephone / tele-monitoring (data quoted here but see section below for more up to date systematic review of remote monitoring)
- Self-Care / educational activities

Table 4. McAlister, et al., 2004

End point	Risk Ratio	95% CI
All-cause mortality (22 trials)		
Overall	0.83	0.70 – 0.99
Multidisciplinary	0.75	0.59 – 0.96
Telephone	0.91	0.65 – 1.29
Self-care / Education	1.14	0.67 – 1.94
All-cause readmissions	N/A	N/A
HF-readmissions (19 trials)		
Overall	0.73	0.66 – 0.82
Multidisciplinary	0.74	0.63 – 0.87
Telephone	0.75	0.57 – 0.99
Self-care / Education	0.66	0.52 – 0.83

The study concluded that:
- Multidisciplinary interventions reduce mortality and heart failure readmissions.

- Education alone had no effect on mortality, but decreased heart failure admissions (though note relatively small number of studies and patients).

- Each intervention had some differences in structure, but common themes emerge: (1) the multidisciplinary nature of the intervention: including the CHF nurse specialist role, doctors in primary-secondary-tertiary care, pharmacists, social workers, and occupational therapists; (2) multi-faceted interventions, including critical pathways, implementation of evidence-based guidelines (including drug therapy), importance of reminders / feedback; (3) patient-centered interventions, including education, self-management, and structured follow up.

Gohler et al, 2006[155] reviewed 36 randomised trials of disease management programmes for patients with CHF involving 8,341 patients. This systematic review analysed all trials combined, despite significant heterogeneity in trial designs.

Table 5. Gohler, et al., 2006

End point	Risk difference	95% CI	NNT	95% CI
All-cause mortality (30 trials)	3%	-0.05, -0.01	33 (6 months)	20-100%
All-cause readmissions 32 trials	8%	-0.11, -0.05	13	9-20%
HF readmissions	N/A	N/A	N/A	N/A

- Gohler et al. concluded that Multidisciplinary interventions reduce mortality and all-cause readmissions, with low numbers needed to treat.

Specific disease management interventions

This section reviews key interventions in management of CHF. These argue that:
- Disease management interventions for patients with heart failure reduce all-cause mortality, decrease all-cause readmissions and decrease heart failure readmissions.
- Remote monitoring decreases all-cause mortality and heart failure readmissions but does not appear to decrease all-cause readmissions.

- The content of the disease management interventions has involved a varying combination of patient self management, education, attention to compliance, structured follow up (often in shared-care structures with hospital and primary care), social support and other initiatives. Common themes emerge from these interventions but successful programmes need to have flexibility of the intervention to the individual patient and local healthcare environment.
- Heart failure nurse specialists have key roles in the disease management interventions, and usually work as part of a multidisciplinary team.

Increased access to primary care alone

A study by Weinberger et al,[59] involving 1396 patients with chronic lung disease, diabetes or heart failure (13%), showed that close follow up by a primary care practitioner and nurse resulted in an increase in hospital admissions. This 'adverse' effect of hospital admissions may have been associated with an increase in recognition of previously undetected problems, lack of a disease-specific protocol or lack of specialist involvement. No other trials specifically addressing increased access to primary care services alone have been performed.

Home-based interventions

Several randomised trials have assessed the effects of home-based multidisciplinary programmes for patients with heart failure. The first of these studies, by Rich et al.,[159] demonstrated that a nurse-directed, multidisciplinary intervention reduced hospital admissions and improved quality of life in high risk, elderly patients with heart failure. Subsequent studies, involving a wider range of lower risk patients with heart failure, have shown similar results with reduced hospital readmissions and improved quality of life.[60-62] Overall, the data from these studies suggests that home-based, nurse-directed management programmes can have a significant impact for patients with heart failure. The home visits appear to be an important part of the design of these programmes. Many patients with heart failure are elderly, and access to hospital-based clinics may be difficult. Home visiting allows the provision of education and other strategy within the context of the patients own surroundings and facilitates tailoring of the programme to the individual patient.

Further benefit may be achieved by strategies that combine hospital and home-based interventions. For example, a study of nurse-directed hospital discharge planning and subsequent home follow up of elderly patients, including those with heart failure, showed that hospital readmissions were reduced over six months of follow up.[63]

Hospital-based interventions

Hospital discharge planning alone has been shown to decrease hospital readmissions in short-term follow-up (six weeks),[64] although the effects of this intervention do not appear to be sustained. These results were reinforced by the finding of a virtual elimination of hospital readmissions in management and control groups in a management study that involved careful stability criteria before hospital discharge.[67] Three randomised controlled trials have assessed the effect of predominately hospital-based out-patient management programmes for patients with

heart failure.[65-67] Overall, the hospital outpatient-based management interventions alone appear to be less effective than the home-based or integrated care programmes. Such interventions may need to include intervention during the initial hospitalisation, involvement of primary care and home visiting.

Integrating patient, secondary care and primary care

Two randomised trials have specifically addressed the issue of integrated management involving patient with primary and secondary care.[68 69] The first of these trials involved 197 patients admitted to hospital with an exacerbation of heart failure.[68] The management approach involved integration of care between a hospital heart failure clinic (with nurse specialist and cardiologist), the patient's general practitioner and the patient / family. Education, follow up and support were key components. This intervention did not decrease the time to first readmission for the combined end point of death and all-cause readmission, but there were significant improvements in quality of life and a 26% reduction in total hospital admission rate.

The study by Kasper et al[69] involved a similar approach, with a multidisciplinary team of a heart failure nurse, cardiologist, another nurse to coordinate telephone follow up and the primary care practitioner. The study selected patients at high risk for readmission, using one or more clinical criteria such (>70, LVEF <35%, aetiology of heart failure, severe hypertension, one prior admission for heart failure in the last year and other clinical markers). This study was unique in that the heart failure nurse was able to initiate and titrate pharmacological therapy. The primary outcome of number of deaths and heart failure readmissions over six months was reduced from 72 in the control group to 50 in the intervention group. This result, while clinically meaningful, only reached a p value of 0.09. Quality of life, percentage of patients receiving target dosages of heart failure therapy and adhering to dietary recommendations were significantly improved with the intervention.

The data from these two studies are consistent, showing reduced readmissions and improved quality of life. Cost analyses from these studies suggests that the strategies are cost-neutral over 6 to 12 months of follow up.[68,69]

Telemonitoring or structured telephone support (remote monitoring)

Two systematic reviews of telemonitoring interventions for heart failure have been performed.[160 161] The most recent was conducted by Clark, 2007.[160] Clark considers telemonitoring to be transfer of physiological data such as blood pressure, weight, ECG, oxygen saturation through telephone or digital cable from home to healthcare provider. Structured telephone support is defined as support between patients and healthcare provider which may or may not include transfer of physiological data.

Fourteen randomised controlled trials, involving 4,264 patients were included. Four trials involved telemonitoring, nine trials structured telephone support, and one trial included both interventions.

Table 6. Clark, Inglis et al. 2007

End point	Risk reduction	95% CI
All-cause mortality	0.80	0.69 – 0.92
All-cause readmissions	0.95	0.89 – 1.02
HF-readmissions	0.79	0.69 – 0.89

Conclusions
- Remote monitoring reduced all cause mortality, and reduced heart failure readmissions, but had no significant effect on all-cause admissions
- Quality of life, costs, and acceptability were infrequently reported
- Monitoring is a means of systematically organising effective care
- Effects are likely to be associated with triage of patients by the telemonitoring nurse at first signs of worsening heart failure, and intervention thereafter by primary care physician.

Self management and educational support

Although self-management is addressed in section two (above), this expands that data. Self-management programmes aim to enable patients to assume a primary role in managing their condition(s), including for example, monitoring their own symptoms, adjusting medications and deciding when additional medications may be required.

A recent systematic review has reported the impact of self-management for patients with CHF.[41] This review identified six randomised controlled trials involving 857 patients. Results showed significant reductions in all-cause and heart failure-specific readmissions but no impact on all-cause mortality:

Table 7. Jovicic et al., 2006

End point	Odds ratio	95% CI	P value
All-cause mortality	0.93	0.57 – 1.51	0.76
All-cause readmissions	0.59	0.44 – 0.80	0.001
HF-readmissions	0.44	0.27 – 0.71	0.001

The data reported from the systematic review by McAlister[154] (above) also reported effects of self-management and education on outcomes. The main limitation of these data is that there are relatively few trials with relatively small numbers of patients from which to draw firm conclusions.

Social support

It is recognised that, for most CHF disease management programmes, the support resources for patients with heart failure are important. A recent overview of the literature regarding the impact of social support for patients with heart failure [162] identified 17 studies that investigated the relationship between social support and different clinical outcomes in patients with heart failure. It did not formally combine these 17 studies, but rather, made summary conclusions based on groupings of the studies. Several studies found relationships between social support and hospital readmissions and mortality, although relationships with quality of life were less certain. However, because of the relatively sparse literature, it is difficult to draw firm conclusions regarding the impact of social support alone on clinical outcomes for

patients with heart failure. This overview was limited in its ability to draw more definitive conclusions due to the limited trial data.

Outcomes of disease management interventions for patients with heart failure

Guidelines for the prevention of CVD differ between countries in terms of recommended drug therapies and determining who is eligible for such therapies. A study by Marshall compared the national guidelines of Australia, New Zealand, the UK, the USA and Canada to evaluate the resource cost and health implications of each.[167] The study found that New Zealand guidelines identify the lowest proportion of people as eligible for treatment, as well as preventing the least amount of CVD. However, the New Zealand guidelines resulted in the lowest costs of any of the guidelines and were found to be the most cost effective (cost per event prevented) in all age groups. Marshall suggests increasing the CVD prevented under the New Zealand guidelines by integrating the US guideline on aspirin use which would increase the total cardiovascular events prevented from 30.0 to 35.9, whilst still maintaining the New Zealand guidelines status as most cost effective.

Screening and physical activity in general practice

Primary care has been proposed as a setting for addressing the issue of physical inactivity. A recent study by Elley et al. assessed the feasibility of screening for physical inactivity in the general practice setting in New Zealand.[168] Patients attending participating practices were handed a screening form at the reception desk which asked: "As a rule, do you do at least half an hour of moderate or vigorous exercise (such as walking or a sport) on five or more days of the week?" Patients who answered No were classified as 'sedentary' and invited to take part in a study involving a lifestyle intervention. The positive predictive value of the screening question was 81% and it was found that of those identified as sedentary, 93% had at least one risk factor for cardiovascular disease, 79% were overweight, 43% were obese and 10.5% had diagnosed diabetes.

In a related publication focusing on older people, the effectiveness of the lifestyle intervention prescribed above was assessed.[169] Sixty-seven percent of patients identified as sedentary agreed to be involved in the lifestyle intervention. Advice was individualised to the patient's age, capability, medical condition, and everyday activities and was prescribed on a Green Prescription which was presented to the patient and faxed to exercise specialists. Support via approximately three phone calls over the following three month period was provided by the exercise specialists. The study found that the lifestyle intervention was effective in increasing 'leisure time moderate activity' and 'leisure energy expenditure' significantly, as well as producing statistically and clinically significant improvements in 'vitality' and 'general health' as measured by the SF-36. In light of the efficiency and effectiveness of screening, both studies concluded that the public health issue of physical inactivity may justifiably be seen as a clinical problem within primary health care.

COPD and the Chronic Care Model

We have found only one systematic review which comprehensively evaluates the utility of all CCM components in the management of COPD. We are aware that other reviews are in preparation but these are, as yet, unpublished. Three other systematic reviews have assessed the value of aspects of the CCM programme but not all its components

Adams et al., in a review published in 2007, concluded that, overall, there is limited currently published evidence evaluating the efficacy of CCM components in COPD management.[203] However, they show that patients with COPD, who received interventions that include two or more CCM components, had lower rates of hospitalisation, shorter length of hospital stay and lower rates of emergency and unscheduled visits than controls. The results of this systematic review are disappointing but, as the reviewers point out, most of the randomised controlled trials (RCTs) in this area did not evaluate the effect of all components of the CCM. The reviewers suggest that one of the most valuable CCM components is an extensive self-management programme with an individualised action plan. Other important components are: a knowledgeable health care provider, guideline based therapy and a clinical registry system. This reference to self management programmes, in the context of a CCM package ,contrasts with the generally accepted view (see below) that self management programmes, when used in isolation in COPD, have minimal or no beneficial effect.

Adams et al. noted that few RCTs included psychiatric illnesses (particularly depression) which are particularly important in COPD patients. They commented that concomitant cardiac disease (a common co-morbidity in COPD) was an exclusion criterion for many studies, and highlighted the need for further research on CCM programmes in COPD.

Bourbeau, in a systematic review of disease-specific self-management programmes in COPD concluded that the evidence was inconclusive although four of the 10 studies demonstrated reduced health resource use and one showed improvements in HRQL.[47] However the 10 RCTs included had relatively small numbers of subjects and variable proportions of smokers, often did not use validated HRQL instruments and included the use of "inappropriate educational interventions" in the intervention strategies that varied widely. These studies were collected over a period of 17 years and many of the study interventions would not meet the criteria of "an extensive self management programme with an individualized action plan". Further, the conclusions of this review were heavily based on the results of a single strongly positive study conducted by the reviewer.

Weingarten et al. failed to demonstrate positive effects (other than on adherence to guidelines) of self management programmes in COPD.[48] Taylor et al., in a similar systematic review showed no evidence of benefit of self management programmes in COPD on any disease parameter, but commented that "the data fails to exclude any clinically relevant benefit or harm arising from such interventions."[49]

Taylor et al. also found that nurse-lead interventions in COPD, which generally comprised forms of case-management including self-management strategies, had no proven benefit in terms of mortality, health services utilisation or HRQL.[49] However, the extent to which interventions differed from usual car was sometimes unclear and

there was a lack of consistency in the outcomes measured. Furthermore the studies did not assess self-management skills, adherence or patient satisfaction.

Turnock et al., in a systematic review of the use of action plans in patients with moderate COPD, including current smokers, who were recruited from general practice, found no evidence of benefit in terms of healthcare utilisation, functional capacity or HRQL.[50] All the studies reviewed by Turner et al. had methodological limitations, particularly with respect to concealment. Numbers were limited and the inclusion of subjects with low morbidity reduced the likelihood of a positive result.

Monninkof et al., in a systematic review, showed that self management education had no proven effects on emergency visits, hospitalisations, or lung function. They further showed that self management education was equivocal in its benefit on quality of life and symptoms but did reduce use of rescue medication and use of steroids and antibiotics.[51]

McDonald et al. conducted a review of evidence on the effectiveness of interventions to assist patients' adherence to prescribed medications. The review included five RCTs conducted in a population of people with asthma and/orCOPD. McDonald et al. were unable ton identify consistent characteristics in effective interventions.[52] However they noted a lack of high quality and adequately powered studies using the multifaceted, complex and individualised interventions likely to be required, and thus suggested that the results should be regarded as inconclusive.

Ashworth et al. undertook a systematic review of home versus centre based physical activity programmes in older adults; which included two trials in COPD.[204] The results were conflicting. Systematic review of pulmonary rehabilitation (which incorporates physical training) has clearly demonstrated benefits in terms of clinically and statistically significant improvement in quality of life, functional exercise capacity and maximum exercise capacity, reduction in dyspnoea and produces a trend towards reducing hospitalisation and number of days spent in hospital. Unanswered questions concern the relative contributions of the components of the programme, optimal duration and content of the programme, and impact on outcome.

Specific disease management interventions follow.

Oxygen therapy and oxygen services

Wijkstra et al. undertook a systematic review of nocturnal non-invasive positive pressure ventilation for patients with stable hypercapnoeic COPD. They found that this "invasive" intervention was not associated with improvement on some physiological parameters (FEV_1, $PaCO_2$), functional capacity, sleep efficiency or HRQL, although there were improvements in inspiratory muscle pressures.[205] However, they noted that the studies reviewed recruited small numbers of patients, had considerable numbers of "drop-outs", insufficient pressures may have been used and data was incomplete in some studies. They suggested that results should be regarded as inconclusive and that further research is required.

Long term oxygen therapy

Cranstan et al. conducted a systematic review of RCTs of long term oxygen therapy in COPD.[209] Based on MRC and NOTT trials, they concluded that oxygen therapy improves survival in patients with severe hypoxaemia (PA0$_2$ < 8.0 kPa). Although a significant improvement in mortality was only demonstrated in NOTT at 24 months and in the MRC study the difference in mortality occurred only after 500 days. (The NNT based on MRC was 4.5).

Cranstan et al. showed that LTOT therapy for nocturnal arterial desaturation or mild to moderate daytime hypoxaemia was not associated with survival benefit, although it is noted that, in the latter studies, oxygen therapy was used for ≤ 13.5 hours per day. There was insufficient data on which to draw conclusions on other outcomes, including HRQL. This may be because many studies were unblinded and patients were generally highly selected, younger, had fewer co-morbidities, thus raising doubts about the generalisability of these results. Because of the relatively small numbers of patients in the trials of nocturnal desaturation and moderate hypoxaemia, type II errors could not be excluded. We were unable to find systematic reviews of organisation of oxygen services.

Ambulatory oxygen therapy

Technology for the provision for the ambulatory oxygen is developing rapidly. A systematic review (2002) showed that no firm conclusions could be drawn concerning the effectiveness of long-term ambulatory oxygen therapy for patients with COPD. Most outcome differences between active and placebo groups were not significant.[113]

Short burst oxygen therapy

The evidence in this area is limited both in terms of clinical benefit and in terms of health economics. RCTs reported in the NICE guidelines have reported reductions in dyspnoea and improvement in both exercise capacity and time to recovery after exercise.

Vaccination: influenza and pneumococcal

Observational cohort studies in elderly patients with chronic lung disease have demonstrated marked benefit of influenza vaccination; approximately 50% reduction in hospitalisation; and an approximately 70% reduction in death rate during the influenza season. In a systematic review of RCTs of influenza vaccination for COPD patients, Poole et al. reported substantial reduction in exacerbations occurring three or more weeks after vaccination and due to influenza.[207] The size of the effect was similar to that seen in cohort studies (approximately 60% reduction). Effect size was greater if the trial was conducted at the time of an influenza epidemic. There was no evidence of an 'early' increase in exacerbation rate, suggesting that vaccination does not cause exacerbations. No differences in effectiveness were found between intra-nasal live attenuated and inactivated intra-muscular vaccination. There was insufficient data to determine whether there was an effect on hospitalisation or mortality in COPD patients. There were significantly more local side effects associated with intra-muscular vaccination but these were minor and self limiting.

Longer term benefits far outweighed these minor adverse effects and the intervention was considered highly cost effective.

Poole et al. did not discuss the organisation of immunisation services or strategies to increase vaccination rate. Although data is incomplete, it is unlikely that further large placebo-controlled, randomised trials will be conducted because of ethical issues.

A systematic review of pneumococcal vaccination in COPD by Granger et al. found that neither the 14-valent nor the 23-valent vaccine was associated with a reduction in acute exacerbations of COPD,[208] nor were there reductions in pneumonia, health care utilisation (hospital admissions and ED presentations) or mortality. This is reflected in the GOLD guidelines: '…pneumococcal vaccine containing 23 virulent serotypes has been used but sufficient data to support its general use in COPD patients are lacking'.

Smoking cessation

We have found no systematic reviews on smoking cessation specific to COPD. RCTs reported in the NICE Guidelines have shown the benefits of smoking cessation on both lung function decline and on symptoms in COPD, as well as demonstrating the benefits of bupropion over placebo, in COPD patients.

Respiratory nurse specialists

Research in this area is scarce. Respiratory nurses may be found in primary and secondary care settings and have a varying role depending on local circumstances. Current literature themes include oxygen assessment, home care provision, nurse prescribing, care co-ordination, support and education and involvement in hospital at home care teams (see below).

Self-management programmes and education

This area has been discussed by Adams et al. (described above) in the context of a CCM package.[203] In contrast, a systematic review by Sin et al. concluded that the data on disease management programmes in COPD were heterogeneous but that overall there was no demonstrable effect on hospitalisation or on survival.

Monninkhof et al. reached similar conclusions regarding hospitalisations. However, they suggested a trend in reduction of admissions for those with previous multiple admissions, and also reported an increase in use of antibiotics and of oral steroids.[51]

Pulmonary Rehabilitation (PR)

It appears that:
PR produces clinically and statistically significant improvement in quality of life.
PR produces clinically and statistically significant improvements in functional exercise capacity and maximum exercise capacity.
PR reduces dyspnoea.
PR produces a trend towards reducing hospitalisation and number of days spent in hospital.
A minimum of 6 weeks and a maximum of 12 weeks PR is required.

Supervised programmes produce greater improvement than self monitored programmes.

PR programmes must include an exercise training element which may be strength, endurance or combining strength and endurance training.

There is no justification for selection by age, disability, impairment, oxygen use, or smoking status.

Geography and transport may be relevant factors (this is particularly so of New Zealand).

Non-invasive ventilation (NIV) in stable COPD

A systematic review by Sin et al. demonstrated that NIV in the context of stable COPD has no effect on long term outcomes. RCTs reported in the NICE Guidelines have however shown improvement in daytime PaCO2 and in breathlessness, together with a trend towards improvement in quality of life at 2 years.[210] There was no improvement in hospitalisation or in lung function.

Palliative care

Numerous studies have demonstrated the high mortality of patients with COPD who have been discharged after an acute exacerbation of COPD. In view of this high mortality and the severe and disabling nature of COPD symptoms, a palliative care approach has been advocated for patients at highest risk. In order to direct such a palliative care approach to those at highest need, it is necessary to define risk factors for "early" death. In a review of the prediction of appropriate timing of palliative care for older adults with non-malignant disease which included COPD, Coventry et al. found that although a number of predictors were identified "no prognostic index (was) suitable for routine clinical use".[206] They indicate a need for further studies specifically in clearly defined COPD populations using disease-specific parameters (including psychological and sociological factors) to define and then test (including acceptability and feasibility) predictors of "early" (3-6 month) mortality

In large national survey conducted in the USA and in a regional survey conducted in Western Australia, patients with end-stage COPD comprised approximately 10% of all patients estimated to be in need of palliative care.[211 212] In New Zealand, People with COPD are underrepresented amongst those receiving specialist palliative care services. This may be because they are not recognised as being in need of end-of-life care, are not referred for palliative care services, or do not wish to receive these services. The interface between primary care and palliative care is variable. Various models have been piloted to enable primary care to more effectively deliver palliative care with easy access to specialist palliative care expertise when needed. These projects have not emphasised access for those with COPD. We have found no systematic reviews relating to palliative care in COPD.

At Home Teams for Acute Exacerbations of COPD (AECOPD) and for stable COPD

There is very limited evidence available from New Zealand where for example geographic and cultural factors are likely to be relevant. However, hospital-at-home

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programmes may be effective foe people with COPD. Further, there is limited evidence that suggests that such schemes may be cheaper than in-patient care.

An RCT by Hermiz and colleagues concluded that a hospital-at-home team scheme for *stable* COPD sufferers (i.e. outside the context of AECOPD) was associated with better symptom scores and high patient satisfaction but did not result in improvements in quality of life.[213]

Evidence-based guidelines mostly concern the management of patients with AECOPD. Not all patients with AECOPD need hospitalisation. The need for referral to hospital (from primary care) and the need for hospitalisation (if referred and assessed in hospital) can be predicted by the evidence based guidelines. For patients assessed as suitable for specialist nurse-led hospital-at-home care:

Hospital at home and assisted discharge schemes are safe

There is no excess mortality.

There is no excess in readmission.

There is a significant reduction (approximately halving) of length of stay

There is no excess burden on GPs or on carers for those patients treated at home.

Patients' preferences about treatment at home or in hospital should be considered.

Stroke and the Chronic Care Model

Background

Stroke is the third most common cause of death after heart disease and all cancers combined, and is the commonest cause of long-term adult disability. Each year approximately 7600 people have a stroke in New Zealand of whom 1960 have a second or recurrent stroke.[72] A disproportionate burden falls on Maori and Pacific peoples, with the age at first stroke 10 years earlier and with a three-fold greater likelihood of being dependent at 12 months, compared to Europeans. A relatively small proportion of people recover fully following stroke and more than 50% of survivors have a persisting motor deficit at 12 months. The proportion of people in New Zealand requiring institutional care following stroke is approximately 20%. A small decrease in this figure with extra support provided in the community would have a significant impact on overall costs.

Priority is organised stroke services

The main priority for all health providers is that people with stroke should have access to organised stroke services.[56 72] The term "organised stroke services" covers the following: The organisation has a "lead clinician", and all people with stroke are the responsibility of, and are managed by a multidisciplinary team specialising in stroke and rehabilitation. Systems should exist to identify those people with stroke managed in the community.[72] However, surveys of all district health boards in 2002 found that only five have organised stroke services and only one provided a dedicated inpatient stroke rehabilitation unit.[214 215]

Organised stroke services should be provided as part of the continuum of care for people discharged from hospital (Grade C, NZ Stroke Guidelines). [72] There must be a high level of coordination between inpatient and community stroke services within each DHB, aiming for seamless management of the person with stroke wherever they are managed, and seamless liaison with providers of primary care. There should be good liaison with providers of culturally appropriate services for Maori and Pacific peoples.

There are at present no systematic reviews that have comprehensively evaluated the utility of all CCM components in stroke. There are also no systematic reviews on how to implement programmes incorporating CCM components in stroke. However, there are a number of reviews that examine some individual components of CCM.

Patient self-management education

A systematic review of interventions to improve the discharge of older people from inpatient hospital care found no effect on mortality or length of hospital stay.[70] However, there is a significant reduction in the risk of re-admission with educational interventions. This effect was seen when the intervention was carried out in hospital and the patients home, but not when the intervention was only carried out only in the hospital. There is also some systematic review evidence to show that provision of information combined with educational sessions improves knowledge and is more effective than providing information only.[216]

A process of self management is required by stroke survivors, in order to enable them to manage any residual disability and promote recovery. [56] One systematic review found that a generic programme, in which individuals are provided with education about communicating with health professionals, managing change and setting and achieving goals, resulted in small to moderate improvements in health outcomes.[57]

Self-management programmes should be available to people with stroke (and without cognitive impairment) discharged from hospital. These people should be supported to access such programmes once they have returned to the community (Level II, Australian Stroke Rehabilitation Guidelines).[56]

Secondary prevention

The risk of recurrent stroke is six times greater than first ever stroke in the general population. Secondary prevention to reduce this risk of recurrent stroke begins very early and continues indefinitely. These interventions include: the use of anti-platelet therapy (or warfarin for those with atrial fibrillation) in those with ischaemic stroke; blood pressure and cholesterol lowering therapy; and lifestyle modification. Failure to take prescribed medications is a major barrier to optimal outcome. Three systematic reviews have found modest effects for interventions to improve medication adherence, although none of these have been carried out specifically in stroke.[53-55] Compliance may be increased by the provision of information, reminders, self monitoring, reinforcement, counselling, family therapy, and a reduction in the number of daily doses (Level I. Australian Stroke Rehabilitation Guidelines). [56]

Home-based services and community rehabilitation

A single systematic review of 14 RCTs found that patients resident in the community within 1 year of a stroke or discharge from hospital, who are offered further outpatient rehabilitation therapy, do better in terms of less deterioration [OR 0.72 (95% CI 0.57-0.92), p=0.009], and increased ability to perform [standardised mean difference 0.14, (95% CI 0.02-0.25), p=0.02], activities of daily living compared with patients offered routine care.[217] The types of interventions included: occupational therapy (8 RCTs); physiotherapy (2 RCTs); and multidisciplinary team services (4 RCTs). With the exception of a single trial, all rehabilitation therapy was managed from or through hospitals by staff with specific interest in stroke.

Level I evidence from meta-analysis confirms that early, supported discharge home can be considered for people with stroke as soon as they are able to transfer independently from bed to a chair. This is appropriate where there is a competent caregiver at home, where equivalent rehabilitation input coordinated by a multidisciplinary team can be delivered at home, where adequate support services are available in the community and if there are no environmental impediments (Grade A recommendation, NZ Stroke Guidelines, Level I Australian Stroke Rehabilitation Guidelines).[56 71-74] Early supported discharge can result in significant reductions in length of stay and readmission rates. There is no evidence to show that this increases carer strain. However, early supported discharge predominantly

involves people with mild to moderate disability so that fewer than 50% of people requiring stroke rehabilitation may be eligible.[218]

Community rehabilitation can be provided with equal effectiveness from a day hospital or home based setting (Grade A recommendation, Royal College of Physicians Stroke Guidelines and NZ Stroke Guidelines, Level 1 Australian Stroke Rehabilitation Guidelines).[56 72] One systematic review found that community rehabilitation has a worthwhile effect.[218] However no one model of comprehensive services is more effective than other models. Community rehabilitation should be delivered by a coordinated multidisciplinary team and include educational programmes.

The Post-Stroke Rehabilitation Outcomes Project (PSROP) is a multi-site study of stroke rehabilitation conducted in six United States (US) sites and one New Zealand (NZ) site.[219] PRSOP used clinical practice improvement methodology to collect detailed observational type information about the interaction of patients with physiotherapists, occupational therapists, and speech and language therapists. The purpose of the study was to discern the relative contributions of specific interventions and therapies to rehabilitation outcomes, and to compare US and NZ practises and outcomes. PSROP found that NZ physiotherapists spent a greater proportion of their time with patients, and engaged in assessment and lower-level mobility activities than their US counterparts, who spent a greater proportion of their time in higher-level mobility activities.[220]

Occupational therapists were also found to spend a large proportion of their time on assessment activities, with some differences in work role identified when compared with US occupational therapists. Differences in work role, in terms of rehabilitation activities performed, were also found between NZ and US speech and language therapists. US patients had better outcomes, with more rapid improvements in disability scores, and a lower chance of discharge to institutional care. This was in spite of increased severity of disability at the time of rehabilitation admissions. The authors concluded that, for NZ services, an overemphasis on assessment may contribute to delays in initiating active therapy, leading to longer-than-necessary hospital stays, and suggested an increase in therapist input for NZ patients on more days during a rehabilitation stay.

8. Adherence to clinical guidelines

The preceding sections have considered components of long-term conditions management programmes. This section presents evidence-based guidelines for key disease groups. While guidelines have been developed in the UK and Europe, those included below are considered appropriate for consistent implementation in New Zealand.

COPD Clinical guidelines

The Thoracic Society of Australia and New Zealand and the Australian Lung Foundation *have developed* The COPD-X Plan: Australian and New Zealand Guidelines for the management of Chronic Obstructive Pulmonary Disease 2006 (Apr 2006)*.* These are summarised as follows:

C: Confirm diagnosis and assess severity
>Smoking is the most important risk factor for COPD
>Consider COPD in patients with other smoking-related diseases
>Consider COPD in all smokers and ex-smokers older than 35 years
>The diagnosis of COPD rests on the demonstration of airflow limitation which is not fully reversible
>If airflow limitation is fully or substantially reversible, the patient should be treated as for asthma

O: Optimise function
>Inhaled bronchodilators provide symptom relief in patients with COPD and may increase exercise capacity
>Long-acting bronchodilators provide sustained relief of symptoms in moderate to severe COPD
>Long term use of systemic glucocorticoids is not recommended
>Inhaled glucocorticoids should be considered in patients with a documented response or those who have severe COPD with frequent exacerbations
>Identify and treat hypoxaemia and pulmonary hypertension
>Prevent or treat osteoporosis
>Pulmonary rehabilitation reduces dyspnoea, anxiety and depression, improves exercise capacity and quality of life and may reduce hospitalisation
>In selected patients, a surgical approach may be considered for symptom relief.

P: Prevent deterioration
>Smoking cessation reduces the rate of decline of lung function
>General practitioners and pharmacists can help smokers quit. Treatment of nicotine dependence is effective and should be offered to smokers
>Pharmacotherapies double the success of quit attempts; behavioural techniques further increase the quit rate by up to 50%
>Influenza vaccination reduces the risk of exacerbations, hospitalisation and death
>Long-term oxygen therapy (>15 hours/day) prolongs life in hypoxaemic patients (PaO2 < 55 mmHg, or 7.3 kPa)
>Inhaled glucocorticoids are indicated for patients with a documented response or who have severe COPD with frequent exacerbations
>Mucolytics may reduce the frequency and duration of exacerbations

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Pulmonary rehabilitation increases patient/carer knowledge base, reduces carer strain and develops positive attitudes towards self-management and exercise

COPD imposes handicaps which affect both patients and carers

Multidisciplinary care plans and individual self-management plans may help to prevent or manage crises

Enhancing quality of life and reducing handicap requires a support team

Patients and their family/friends should be actively involved in a therapeutic partnership with a range of professional disciplines

Patients should be encouraged to take appropriate responsibility for their own management

X: *Manage eXacerbations*

Inhaled bronchodilators are effective treatments for acute exacerbations

Systemic glucocorticoids reduce the severity of and shorten recovery from acute exacerbations

Non-invasive positive pressure ventilation is effective for acute hypercapnic ventilatory failure

Exacerbations with clinical signs of infection (increased volume and change in colour of sputum and/or fever, leukocytosis) benefit from antibiotic therapy

Multidisciplinary care may assist home management

Early diagnosis and treatment may prevent admission

Controlled oxygen delivery (28% or 0.5–2 L/min) is indicated for hypoxaemia

Involving the patient's general practitioner in a case conference and developing a care plan may facilitate early discharge.

Cardiovascular disease clinical guidelines

The following list is a summary of the guidelines described below:

The joint contribution of established risk-factors is responsible for about 85% of the IHD burden and 73% of the stroke burden worldwide

The simplest indicator of high absolute risk is established CVD, principally angina, previous myocardial infarction (MI), transient ischaemic attack/s (TIA), stroke or diabetes mellitus

Most of the disease burden occurs in the large majority of the population with non-optimal levels, but without 'labelled' hypertension, hypercholesterolaemia or obesity. As such, most CVD is attributable to the combined effects of high blood pressure, cholesterol and body-weight levels. The associations between blood pressure, cholesterol and body mass index and CVD are direct and continuous

Patients with type 2 diabetes mellitus (DM) either have manifest CVD or have a high risk for future cardiovascular events, men with DM have a 2- to 4-fold; and women with DM a 3- to 5-fold increased risk for cardiovascular death compared with non-diabetic individuals. Care of patients with type 2 DM should include yearly risk assessment by the use of published risk equations or risk charts.

Personal and population-based interventions are very important in reducing risk

In middle-aged populations, a 10mmHg lower systolic blood pressure (SBP) is associated with roughly a 30-40% lower stroke rate and a 20-25% lower ischaemic heart disease risk

Encouragement of lifestyle modification and appropriate use of lipid-altering therapy will have a substantial impact on reducing the burden of cardiovascular disease. A 1mmol/l

lower cholesterol level is associated with a 15 to 20% lower stroke and 20-25% lower IHD risk.

A 2kg/m2 lower BMI is associated with an 8-12% lower stroke and IHD and a 20-30% lower DM risk.

A wide variety of secondary prevention programmes improve health outcomes in patients with coronary disease with reduction in all cause mortality and recurrent myocardial infarction.

Quitting smoking improves prognosis after a cardiac event. Therefore smoking cessation is highly recommended for patients with coronary heart disease.

Time delay (both to first medical contact and reperfusion therapy) plays a major role in determining best management with ST-Elevation MI.

The standard of care in NSTEACS includes a full complement of anti-ischaemic, antithrombotic therapy and antiplatelet agents.

All patients with non-ST-segment-elevation acute coronary syndromes (NSTEACS) should have their risk stratified to direct management decisions.

Early revascularisation in high-risk ACS patients reduces morbidity and mortality from CVD.

Before discharge, patients with an ACS should be initiated on a medication regimen, including antiplatelet agent(s), B-blocker, angiotensin-converting enzyme inhibitor, and statin.

Implantable cardiac defibrillators should be considered in some patients who, despite optimal medical therapy, have persistently depressed left ventricular function more than six weeks after STEMI.

Depression and CHD frequently coexist. All patients with CHD should be assessed for depression and level of social support.

Disease management programmes improve processes of care, reduce admissions to hospital, and enhance quality of life or functional status in patients with coronary heart disease.

The New Zealand Guidelines Group (2003) provides the following guidelines related to assessment and management of **cardiovascular risk**:

Assessment of absolute cardiovascular risk is the starting point for all discussions with people who have cardiovascular risk factors measured. Reduction in cardiovascular risk is the goal of treatment.

People with known cardiovascular disease are clinically defined at very high risk. Lifestyle change and drug intervention should be considered together. The intensity of intervention recommended depends on the level of cardiovascular risk:

- a life free from cigarette smoke, eating a heart healthy diet and taking every opportunity to be physically active is recommended for people at less than 10% 5-year CV risk
- lifestyle interventions for people at more than 10% 5-year CV risk are strongly recommended and this group should receive individualised advice using motivational interviewing techniques relating to smoking cessation if relevant, a cardio-protective diet and regular physical activity
- cardiovascular risk should be reduced in people at greater than 15% 5-year CV risk by lifestyle interventions, aspirin, blood pressure lowering medication and lipid modifying therapy (statins). There should be a greater intensity of treatment for higher risk people (more than 20 – 30%)
- after myocardial infarction, comprehensive programmes that promote lifestyle change for people are best delivered by a cardiac rehabilitation

team. Most people with angina or after myocardial infarction will be taking at least four standard drugs, low-dose aspirin (75 – 150 mg), a beta blocker, a statin and an ACE-inhibitor
- virtually all ischaemic stroke and transient ischaemic attack survivors should be taking low dose aspirin, a combination of two blood pressure drugs and a statin.

Guidelines for cardiac rehabilitation have been developed by the New Zealand Guidelines Group (2002). The guidelines state that the goals of cardiac rehabilitation are:

To prevent further cardiovascular events by empowering patients to initiate and maintain lifestyle changes

To improve quality of life through the identification and treatment of psychological distress

To facilitate the patient's return to a full and active life by enabling the development of their own resources.

Prior to hospital discharge, all eligible patients should be referred to attend a comprehensive cardiac rehabilitation programme.

The main components of a comprehensive cardiac rehabilitation programme are:
- Empowering patients to make lifelong changes
- Exercise programmes
- Nutrition management
- Weight management
- Smoking cessation
- Managing psychosocial aspects of life
- Pharmacotherapy
- Ongoing personal follow-up and support.

Cardiac rehabilitation provides the opportunity to coach and encourage positive lifestyle behaviours and increases compliance with medication use.
For personal behaviour change, several key elements need to be present:
- A belief that change is possible
- Motivation to make the change
- A support network and personal capacity to enact and sustain change.

Physical activity improves functional capacity, risk factors and significantly reduces cardiovascular disease and total mortality. The benefits of regular, moderate physical activity are likely to outweigh any small increased risk of sudden death associated with vigorous exercise.

A cardio-protective dietary pattern reduces cardiovascular and total mortality and is recommended. Modification of dietary fat should not be considered in isolation from a whole diet approach.
All patients with coronary heart disease should be strongly encouraged to stop smoking and to avoid second-hand smoke.

Up to one in four patients will experience a disabling level of anxiety or depression following a myocardial infarction. Psychosocial interventions are recommended.

Pharmacotherapy with aspirin, a beta blocker, an ACE inhibitor and a statin can provide substantial benefits and these medications should be considered in all patients.
Cardiac rehabilitation should be viewed as a **continuum** from initial admission through to long-term follow-up. This requires integration between primary and secondary care.

Audit, evaluation and patient feedback are integral aspects of quality improvement. Specific groups may require special consideration. Patients requiring extra support or varied options may include women, the elderly, the socioeconomically disadvantaged and those living in rural areas. People with diabetes are at particularly high risk and warrant priority.

Ensuring Mäori and Pacific peoples access to cardiac rehabilitation programmes is important and will help reduce disparities in cardiovascular disease outcomes.

Existing programmes may need reorientation to increase responsiveness to Mäori and Pacific peoples needs.

Congestive heart failure guidelines

The UK National Institute for Clinical Excellence (NICE) in 2003 developed guidelines for the management of chronic heart failure in adults in primary and secondary care. NICE provides the following recommendations as priorities for implementation:

Diagnosis
> The basis for historical diagnoses of heart failure should be reviewed, and only patients whose diagnosis is confirmed should be managed in accordance with this guideline. Doppler 2D echocardiographic examination should be performed to exclude important valve disease, assess the systolic (and diastolic) function of the (left) ventricle and detect intracardiac shunts.

Treatment
> All patients with heart failure due to left ventricular systolic dysfunction should be considered for treatment with an ACE inhibitor.
> Beta blockers licensed for use in heart failure should be initiated in patients with heart failure due to left ventricular systolic dysfunction after diuretic and ACE inhibitor therapy (regardless of whether or not symptoms persist).

Monitoring
> All patients with chronic heart failure require monitoring. This monitoring should include:
> - a clinical assessment of functional capacity, fluid status, cardiac rhythm, and cognitive and nutritional status
> - a review of medication, including need for changes and possible side effects

- serum urea, electrolytes and creatinine.

Discharge

Patients with heart failure should generally be discharged from hospital only when their clinical condition is stable and the management plan is optimised.

The primary care team, patient and carer/family must be aware of the management plan.

Supporting patients and carers

Management of heart failure should be seen as a shared responsibility between patient and healthcare professional.

Review of the Cardiovascular Disease (CVD) literature

Epidemiology, Risk, Primary and Secondary Prevention

- In 2001 cardiovascular disease surpassed infectious disease and communicable diseases as the number one reason for loss of productive life years world-wide (Mather et al., 2001;WHO 2002a)
- Cardiovascular disease is the leading cause of death (40%) in New Zealand, with the death rate from coronary heart disease more than twice as high in men as in women.[163]
- In New Zealand, coronary heart disease death rates are highest for Maori, followed by Pacific people and lowest for those of neither Maori nor Pacific origin.[163]
- The joint contribution of established risk-factors is responsible for about 85% of the IHD burden and 73% of the stroke burden worldwide.[164]
- The simplest indicator of high absolute risk is established CVD, principally angina, previous MI, TIA, stroke or DM.
- The associations between blood pressure, cholesterol and body mass index and CVD are direct and continuous.[165]
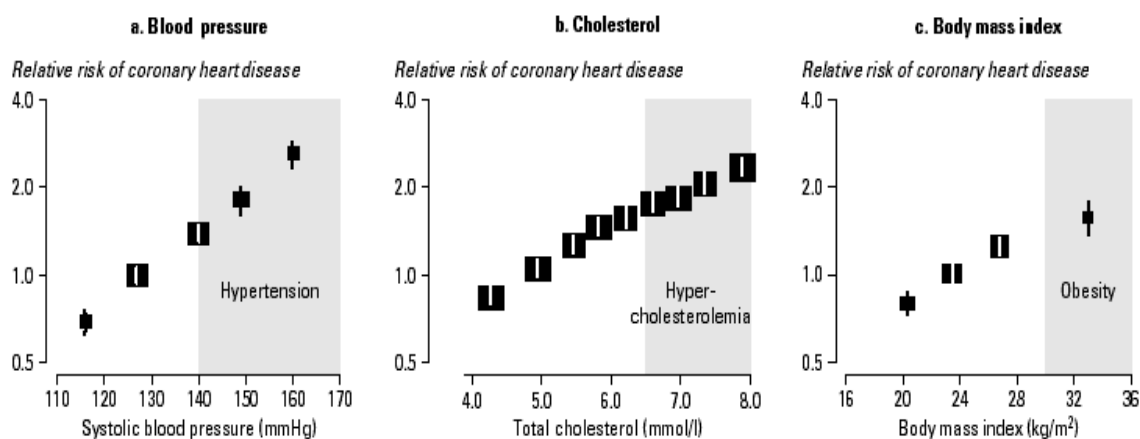
Figure 45.1 Continuous Risks of Blood Pressure, Cholesterol, and Body Mass and Coronary Heart Disease Risk

- Patients with type 2 DM either have manifest CVD or have a high risk for future cardiovascular events. Men with DM have a 2- to 4-fold, and women with DM a 3- to 5-fold increased risk for cardiovascular death compared with non-diabetic individuals. Care of patients with type 2 DM should include yearly risk assessment by the use of published risk equations or risk charts.
- Personal and population-based interventions are very important in reducing risk

A systematic review, however, recently reported by Ebrahim and colleagues concludes that multiple risk factor intervention may be of limited value in primary prevention.[166] They assessed the effects of multiple risk factor intervention for reducing cardiovascular risk factors, total mortality, and mortality from CHD among adults without clinical evidence of established cardiovascular disease. A total of 39

trials were found of which ten reported clinical event data. In the ten trials with clinical event end-points, the pooled odds ratios for total mortality and CHD mortality were 0.96 (95% confidence intervals (CI) 0.92 to 1.01) and 0.96 (95% CI 0.89 to 1.04) respectively. Net changes in systolic and diastolic blood pressure, and blood cholesterol were (weighted mean differences) -3.6 mmHg (95% CI -3.9to -3.3 mmHg), -2.8 mmHg (95% CI -2.9 to -2.6 mmHg) and -0.07 mMol/l (95% CI -0.8 to -0.06 mMol/l) respectively. Odds for reduction in smoking prevalence was 20% (95% CI 8% to 31%). Statistical heterogeneity between the studies with respect to mortality and risk factor changes was due to trials focusing on hypertensive participants and those using considerable amounts of drug treatment.

The authors concluded that the pooled effects suggest multiple risk factor intervention has no effect on mortality. However, a small, but potentially important, benefit of treatment (about a 10% reduction in CHD mortality) may have been missed. Risk factor changes were relatively modest, were related to the amount of pharmacological treatment used, and in some cases may have been over-estimated because of regression to the mean effects, lack of intention to treat analyses, habituation to blood pressure measurement, and use of self-reports of smoking. Interventions using personal or family counselling and education with or without pharmacological treatments appear to be more effective at achieving risk factor reduction and consequent reductions in mortality in high risk hypertensive populations. The evidence suggests that such interventions have limited utility in the general population.

Specific Questions of Management within CVD

- In middle-aged populations, a 10mmHg lower systolic blood pressure (SBP) is associated with roughly a 30-40% lower stroke rate and a 20-25% lower ischaemic heart disease risk.

A meta-analysis by Staessen and colleagues investigated whether antihypertensive drugs offer cardiovascular protection beyond blood pressure lowering.[170] The aim was to investigate whether pharmacological properties of antihypertensive drugs or reduction of systolic pressure accounted for cardiovascular outcome in hypertensive or high-risk patients. Nine randomised trials comparing treatments in 62,605 hypertensive patients were identified. Compared with old drugs (diuretics and beta-blockers), calcium-channel blockers and angiotensin converting-enzyme inhibitors offered similar overall cardiovascular protection, but calcium channel blockers provided more reduction in the risk of stroke (13·5%, 95% CI 1·3–24·2, p=0·03) and less reduction in the risk of myocardial infarction (19·2%, 3·5–37·3, p=0·01).

Heterogeneity was significant between trials because of high risk of cardiovascular events on doxazosin in one trial, and high risk of stroke on captopril in another; but systolic pressure differed between groups in these two trials by 2–3 mm Hg. Similar systolic differences occurred in a trial of diltiazem versus old drugs, and in three trials of converting-enzyme inhibitor against placebo in high-risk patients. Meta-regression across 27 trials (136,124 patients) showed that odds ratios could be explained by achieved differences in systolic pressure. Interpretation: The findings emphasise that blood pressure control is important. All antihypertensive drugs have similar long-term efficacy and safety. Calcium-channel blockers might be especially effective in stroke prevention. They did not find that converting-enzyme inhibitors or Beta-blockers affect cardiovascular prognosis beyond their antihypertensive effects.

- Encouragement of lifestyle modification and appropriate use of lipid-altering therapy will have a substantial impact on reducing the burden of cardiovascular disease.
- A 1mmol/l lower cholesterol level is associated with a 15 to 20% lower stroke and 20-25% lower IHD risk.

A systematic review and meta-analysis by Law and colleagues quantifying effect of statins on low density lipoprotein cholesterol, ischaemic heart disease, and stroke has recently reported.[171] The objective was to determine by how much statins reduce serum concentrations of low density lipoprotein (LDL) cholesterol and incidence of ischaemic heart disease (IHD) events and stroke, according to drug, dose, and duration of treatment. Three meta-analyses: 164 short term randomised placebo controlled trials of six statins and LDL cholesterol reduction; 58 randomised trials of cholesterol lowering by any means and IHD events;and nine cohort studies and the same 58 trials on stoke were identified.

Reductions in LDL cholesterol (in the 164 trials) were 2.8 mmol/l (60%) with rosuvastatin 80 mg/day, 2.6 mmol/l (55%) with atorvastatin 80 mg/day, 1.8 mmol/l (40%) with atorvastatin 10 mg/day, lovastatin 40 mg/day, simvastatin 40 mg/day, or rosuvastatin 5 mg/day, all from pretreatment concentrations of 4.8 mmol/l. Pravastatin and fluvastatin achieved smaller reductions. In the 58 trials, for an LDL cholesterol reduction of 1.0 mmol/l the risk of IHD events was reduced by 11% in the first year of treatment, 24% in the second year, 33% in years three to five, and by 36% thereafter (P < 0.001 for trend).

IHD events were reduced by 20%, 31%, and 51% in trials grouped by LDL cholesterol reduction (means 0.5 mmol/l, 1.0 mmol/l, and 1.6 mmol/l) after results from first two years of treatment were excluded (P < 0.001 for trend). After several years a reduction of 1.8 mmol/l would reduce IHD events by an estimated 61%. Results from the same 58 trials, corroborated by results from the nine cohort studies, show that lowering LDL cholesterol decreases all stroke by 10% for a 1 mmol/l reduction and 17% for a 1.8 mmol/l reduction.

Estimates allow for the fact that trials tended to recruit people with vascular disease, among whom the effect of LDL cholesterol reduction on stroke is greater because of their higher risk of thromboembolic stroke (rather than haemorrhagic stroke) compared with people in the general population. The authors concluded that statins can lower LDL cholesterol concentration by an average of 1.8 mmol/l which reduces the risk of IHD events by about 60% and stroke by 17%.

While the role of hydroxymethyl glutaryl coenzyme A reductase inhibitors (statins) in secondary prevention of cardiovascular (CV) events and mortality is established, their value for primary prevention is less clear. To clarify the role of statins for patients without CV disease, Thavendiranathan et al performed a meta-analysis of randomized controlled trials (RCTs).[172] They included RCTs with follow-up of 1 year or longer, more than 100 major CV events, and 80% or more of the population without CV disease. From each trial, demographic data, lipid profile, CV outcomes, mortality, and adverse outcomes were recorded. Summary relative risk (RR) ratios with 95% confidence intervals (CIs) were calculated using a random effects model.

Seven trials with 42,848 patients were included. Ninety percent had no history of CV disease. Mean follow-up was 4.3 years. Statin therapy reduced the RR of major coronary events, major cerebrovascular events, and revascularizations by 29.2% (95% CI, 16.7%-39.8%) (P<.001), 14.4% (95% CI, 2.8%-24.6%) (P = .02), and 33.8%

(95% CI, 19.6%-45.5%) (P<.001), respectively. Statins produced a non-significant 22.6% RR reduction in coronary heart disease mortality (95% CI, 0.56-1.08) (P = .13). No significant reduction in overall mortality (RR, 0.92 [95% CI, 0.84-1.01]) (P = .09) or increases in cancer or levels of liver enzymes or creatine kinase were observed. The authors concluded in patients without CV disease, statin therapy decreases the incidence of major coronary and cerebrovascular events and revascularizations but not coronary heart disease or overall mortality.

- A 2kg/m2 lower BMI is associated with an 8-12% lower stroke and IHD and a 20-30% lower DM risk.

Increased body weight is also a strong risk factor for hypertension. A meta-analysis of randomized controlled trials was performed to estimate the effect of weight reduction on blood pressure overall and in population subgroups.[42] Twenty-five randomized, controlled trials (comprising 34 strata) published between 1966 and 2002 with a total of 4874 participants were included. A random-effects model was used to account for heterogeneity among trials.

A net weight reduction of -5.1 kg (95% confidence interval [CI], -6.03 to -4.25) by means of energy restriction, increased physical activity, or both reduced systolic blood pressure by -4.44 mm Hg (95% CI, -5.93 to -2.95) and diastolic blood pressure by -3.57 mm Hg (95% CI, -4.88 to -2.25). Blood pressure reductions were -1.05 mm Hg (95% CI, -1.43 to -0.66) systolic and -0.92 mm Hg (95% CI, -1.28 to -0.55) diastolic when expressed per kilogram of weight loss.

As expected, significantly larger blood pressure reductions were observed in populations with an average weight loss >5 kg than in populations with less weight loss, both for systolic (-6.63 mm Hg [95% CI, -8.43 to -4.82] vs -2.70 mm Hg [95% CI, -4.59 to -0.81]) and diastolic (-5.12 mm Hg [95% CI, -6.48 to -3.75] vs -2.01 mm Hg [95% CI, -3.47 to -0.54]) blood pressure. The effect on diastolic blood pressure was significantly larger in populations taking antihypertensive drugs than in untreated populations (-5.31 mm Hg [95% CI, -6.64 to -3.99] vs -2.91 mm Hg [95% CI, -3.66 to -2.16]). This meta-analysis clearly shows that weight loss is important for the prevention and treatment of hypertension.

- A wide variety of secondary prevention programmes improve health outcomes in patients with coronary disease with reduction in all cause mortality and recurrent myocardial infarction.

The review by Clark and colleagues provides strong evidence that programmes that include risk factor education or counselling, with or without exercise, are important for secondary prevention of CAD.[43] This meta-analysis included 63 randomised trials (21 295 patients with coronary disease).

Effects were similar for programmes that included risk factor education or counselling with a structured exercise component (risk ratio, 0.88 [CI, 0.74 to 1.04] for mortality and 0.62 [CI, 0.44 to 0.87] for myocardial infarction), for programmes that included risk factor education or counselling without an exercise component (risk ratio, 0.87 [CI, 0.76 to 0.99] for mortality and 0.86 [CI, 0.72 to 1.03] for myocardial infarction), and for programmes that were solely exercise based (risk ratio, 0.72 [CI, 0.54 to 0.95] for mortality and 0.76 [CI,0.57 to 1.01] for myocardial infarction). Most of these programmes improved quality of life or functional status, but effect sizes were small.

Although these programmes may reduce total health care costs, published data on the costs of the programmes are inadequate to conclusively comment on their cost-effectiveness.

Secondary prevention programmes v usual care for coronary artery disease*					
		Weighted event rates			
Outcomes	Type of programme	Programme	Usual care	RRR (95% CI)	NNT (CI)
All cause mortality at ⩽ 5 years	All programmes	8.1%	9.5%	15% (6 to 23)	70 (46 to 175)
	Programme + no exercise	7.9%	9.1%	13% (1 to 24)	85 (46 to 1105)
	Programme + exercise	9.5%	11%	12% (−4 to 26)	Not significant
	Exercise only	6.5%	9.0%	28% (5 to 46)	40 (25 to 222)
Recurrent MI at median 12 months	All programmes	8.0%	9.6%	17% (6 to 26)	62 (41 to 174)
	Programme + no exercise	7.0%	8.1%	14% (−3 to 28)	Not significant
	Programme + exercise	7.5%	12%	38% (13 to 56)	22 (15 to 65)
	Exercise only	7.0%	9.2%	24% (−1 to 43)	Not significant

*MI = myocardial infarction; other abbreviations defined in glossary. RRR, NNT, and CI calculated from data in article using a random effects model.

Little research has been reported evaluating interventions to improve uptake, adherence and professional compliance in cardiac rehabilitation. A wide range of possible interventions was identified and further evaluations of methods are indicated.[44]

Many eligible patients fail to attend cardiac rehabilitation courses. To undertake potential reasons behind such 'access' problems a systematic literature review of studies that have investigated factors associated with cardiac rehabilitation attendance was performed.[45] Fifteen studies were identified and predictor variables were usually categorized as sociodemographic, medical and psychological. Non-attenders were more likely to be older, to have lower income/greater deprivation, to deny the severity of their illness, to be less likely to believe they can influence its outcome or to perceive that their physician recommends cardiac rehabilitation. Job status, gender and health concerns played an indirect role in attendance behaviour. Comparison of results between studies could be influenced by different case-mix, measurement instruments and country of origin. The authors concluded that a number of factors predict cardiac rehabilitation attendance and some of these are potentially modifiable.

- Quitting smoking improves prognosis after a cardiac event. Therefore smoking cessation is highly recommended for patients with coronary heart disease.

Critchley and Capewell conducted a systematic review to determine the magnitude of risk reduction achieved by smoking cessation in patients with CHD.[46] From the literature search, 665 publications were screened and 20 studies were included. Results showed a 36% reduction in crude relative risk (RR) of mortality for patients with CHD who quit compared with those who continued smoking (RR, 0.64; 95% confidence interval [CI], 0.58-0.71). Results from individual studies did not vary greatly despite many differences in patient characteristics, such as age, sex, type of CHD, and the years in which studies took place. Adjusted risk estimates did not differ substantially from crude estimates.

Many studies did not adequately address quality issues, such as control of confounding variables, and misclassification of smoking status. However, restriction to 6 higher-quality studies had little effect on the estimate (RR, 0.71; 95% CI, 0.65-0.77). Few studies included large numbers of elderly persons, women, ethnic minorities, or patients from developing countries. They concluded that quitting smoking is associated with a substantial reduction in risk of all-cause mortality

among patients with CHD. This risk reduction appears to be consistent regardless of age, sex, index cardiac event, country, and year of study commencement.

- Disease management programmes (DMPs) improve processes of care, reduce admissions to hospital, and enhance quality of life or functional status in patients with coronary heart disease.

A systematic review by McAlister and colleagues examined the effects of DMPs on processes of care, morbidity, and mortality of patients with known coronary disease.[173] Their results indicate that DMPs do not affect short term morbidity and mortality rates, but do decrease hospital readmission rates and enhance quality of life or functional status. A total of 12 trials (n=9803) were included. Patients who received DMPs did not have greater reductions in recurrent MI (7 trials) (p=0.44)* or all cause mortality (10 trials) (p=0.40)* than those who received usual care. Admission to hospital was reduced among patients who received the intervention (6 trials) (p=0.01). Five of seven trials showed reductions with DMPs in cardiovascular risk factors (cholesterol, smoking, and blood pressure). Five of seven trials showed increased prescriptions of >1efficacious drug (antiplatelet agents, beta-blockers, or lipid lowering drugs).

Acute Coronary Syndromes (ACS)

- Improvements in the management of patients with ACS are associated with significant reductions in the rates of new heart failure and mortality and in rates of stroke and myocardial infarction at 6 months.

Randomized trials provide robust evidence for the impact of pharmacological and interventional treatments in patients with ST-segment elevation and non–ST-segment elevation acute coronary syndromes (NSTE ACS), but whether this translates to changes in clinical practice is unknown. In the Global Registry of Acute Coronary Events (GRACE), a multinational cohort study, 44 372 patients with an ACS were enrolled and followed up in 113 hospitals in 14 countries between July 1, 1999, and December 31, 2006.[174] Use of pharmacological medications increased over the study period (beta-blockers, statins, angiotensin-converting enzyme inhibitors, thienopyridines with or without percutaneous coronary intervention [PCI], glycoprotein IIb/IIIa inhibitors, low molecular- weight heparin; all P< 001). Pharmacological reperfusion declined in patients with STEMI by −22 percentage points (95% confidence interval [CI], −27 to −17), whereas primary PCI increased by 37 percentage points (95% CI, 33-41).

 In patients with non-STEMI, rates of PCI increased markedly by 18 percentage points (95% CI,15-20). Rates of congestive heart failure and pulmonary edema declined in both populations: STEMI, −9 percentage points (95% CI, −12 to −6) and NSTE ACS, −6.9 percentage points (95% CI, −8.4 to −4.7). In patients with STEMI, hospital deaths decreased by 18 percentage points (95% CI, −5.3 to −1.9) and cardiogenic shock by −24 percentage points (95% CI, −4.3 to −0.5). Risk-adjusted hospital deaths declined −0.7 percentage points (95% CI, −1.7 to 0.3) in NSTE ACS patients. Six-month follow-up rates declined among STEMI patients: stroke by −0.8 percentage points (95% CI, −1.7 to 0.1) and myocardial infarction by −2.8 percentage points (95% CI, −6.4 to 0.9). In NSTE ACS, 6-month death declined −1.6 percentage points (95% CI, −3.0 to −0.1) and stroke by 0.7 percentage points (95% CI, −1.4 to 0.1).

ST Elevation MI

- Primary angioplasty results in fewer deaths, re-infarctions, and strokes than pharmacological reperfusion.

A meta analysis by Keeley and colleagues identified 23 trials, which together randomly assigned 7739 thrombolytic-eligible patients with ST-segment elevation AMI to primary PTCA (n=3872) or thrombolytic therapy (n=3867).[175] Streptokinase was used in eight trials (n=1837), and fibrin specific agents in 15 (n=5902). Most patients who received thrombolytic therapy (76%, n=2939) received a fibrin-specific agent. Stents were used in 12 trials, and platelet glycoprotein IIb/IIIa inhibitors were used in eight.

Primary PTCA was better than thrombolytic therapy at reducing overall short-term death (7% [n=270] vs 9% [360]; p=0·0002), death excluding the SHOCK trial data (5% [199] vs 7% [276]; p=0·0003), non-fatal re-infarction (3% [80] vs 7% [222]; p<0·0001), stroke (1% [30] vs 2% [64]; p=0·0004), and the combined endpoint of death, non-fatal re-infarction, and stroke (8% [253] vs 14% [442]; p<0·0001).The results seen with primary PTCA remained better than those seen with thrombolytic therapy during long-term follow up, and were independent of both the type of thrombolytic agent used, and whether or not the patient was transferred for primary PTCA.
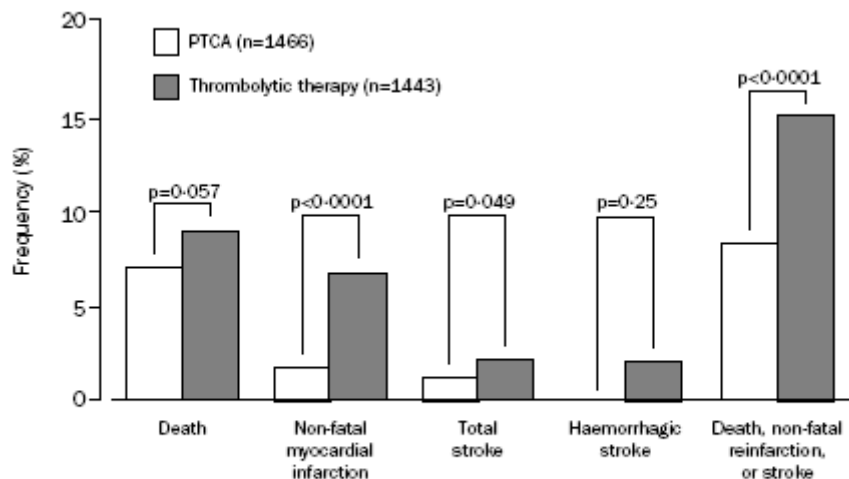
Figure 4: **Short-term clinical outcomes in individuals treated with on-site thrombolysis or after emergent transfer for primary PTCA**[13,15,27,20,21]

The comprehensive meta-analysis of 25 trials comparing the efficacy of primary percutaneous coronary intervention (PPCI) vs. fibrinolytic (FT) drugs in patients with ST-segment elevation acute myocardial infarction reported by Boersma and colleagues is a significant contribution to the literature.[176] Strengths of this meta-analysis are the large amount of individual patient data from 22 trials and the rigorous statistical methodologies. The conclusions support and update prior analyses that suggest that 'all things being equal,' PPCI is the superior reperfusion strategy.

- Time delay (both to first medical contact and reperfusion therapy) plays a major role in determining best management with ST-Elevation MI.

An increasing number of clinical studies suggest that the survival benefit of angioplasty is compromised when delays to intervention become excessive, at least in high-risk patients. Time to treatment remains a fundamental tenet of reperfusion therapy but should not supersede considerations of the total ischaemic time in a given patient.

From a clinical perspective, the decision in hospitals with on-site PCI facilities is simple—PPCI is the preferred form of therapy, but the systems need to be in place to perform this expeditiously, 7 days a week and 24 hours a day. In hospitals without this option, the selection of the optimal reperfusion modality is dependent, at least in part, upon an assessment of the duration of ischaemia prior to therapy.[177][178]

- Facilitated percutaneous coronary intervention offers no benefit over primary percutaneous coronary intervention in STEMI treatment and should not be used outside the context of randomised controlled trials. Furthermore, facilitated interventions with thrombolytic-based regimens should be avoided.

A meta-analysis by Keeley and colleagues identified 17 trials of patients with STEMI assigned to facilitated (n=2237) or primary (n=2267) percutaneous coronary intervention.[179] The facilitated approach resulted in a greater than two-fold increase in the number of patients with initial TIMI grade 3 flow, compared with the primary approach (832 patients [37%] vs 342 [15%], odds ratio 3·18, 95% CI 2·22–4·55). However, final rates did not differ (1706 [89%] vs 1803 [88%]; 1·19, 0·86–1·64). Significantly more patients assigned to the facilitated approach than those assigned to the primary approach died (106 [5%] vs 78 [3%]; 1·38, 1·01–1·87), had higher non-fatal reinfarction rates (74 [3%] vs 41 [2%]; 1·71, 1·16–2·51), and had higher urgent target vessel revascularisation rates (66 [4%] vs 21 [1%]; 2·39, 1·23–4·66); the increased rates of adverse events seen with the facilitated approach were mainly seen in thrombolytic-therapy based regimens. Facilitated intervention was associated with higher rates of major bleeding than primary intervention (159 [7%] vs 108 [5%]; 1·51, 1·10–2·08). Haemorrhagic stroke and total stroke rates were higher in thrombolytic-therapy-containing facilitated regimens than in primary intervention (haemorrhagic stroke 15 [0·7%] vs two [0·1%], p=0·0014; total stroke 24 [1·1%] vs six [0·3%], p=0·0008).

Primary vs. Facilitated Angioplasty for STEMI: A Meta-analysis

MI = myocardial infarction
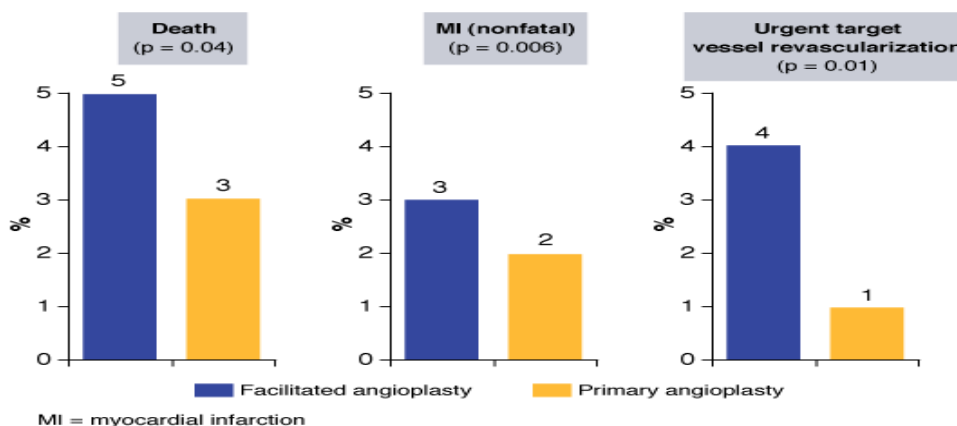
- Routine PCI of the Infarct- related occluded artery in asymptomatic patients post MI is non-beneficial.

The Open Artery Trialists (OAT) conducted a randomized study involving 2166 stable patients who had total occlusion of the infarct-related artery 3 to 28 days after myocardial infarction and who met a high-risk criterion (an ejection fraction of <50% or proximal occlusion).[180] Of these patients, 1082 were assigned to routine PCI and stenting with optimal medical therapy, and 1084 were assigned to optimal medical therapy alone. The primary end point was a composite of death, myocardial reinfarction, or New York Heart Association (NYHA) class IV heart failure.

The 4-year cumulative primary event rate was 17.2% in the PCI group and 15.6% in the medical therapy group (hazard ratio for death, reinfarction, or heart failure in the PCI group as compared with the medical therapy group, 1.16; 95% confidence interval [CI], 0.92 to 1.45; P = 0.20). Rates of myocardial reinfarction (fatal and nonfatal) were 7.0% and 5.3% in the two groups, respectively (hazard ratio, 1.36; 95% CI, 0.92 to 2.00; P = 0.13). Rates of nonfatal reinfarction were 6.9% and 5.0%, respectively (hazard ratio, 1.44; 95% CI, 0.96 to 2.16; P = 0.08); only six reinfarctions (0.6%) were related to assigned PCI procedures. Rates of NYHA class IV heart failure (4.4% vs. 4.5%) and death (9.1% vs. 9.4%) were similar. There was no interaction between treatment effect and any subgroup variable (age, sex, race or ethnic group, infarct-related artery, ejection fraction, diabetes, Killip class, and the time from myocardial infarction).

- Adjunctive therapy includes anti-platelet agents, B-blockers, ACE inhibitors and early initiation of statin therapy.[181]

- Implantable cardiac defibrillators should be considered in some patients who, despite optimal medical therapy, have persistently depressed left ventricular function more than 6 weeks after STEMI.

Sudden cardiac death (SCD) is a major challenge facing contemporary cardiology. For an increasing number of patients, the current standard of care for the treatment and prevention of SCD is the implantable cardioverter-defibrillator (ICD). Since its introduction, there have been numerous advances in ICD technology, and indications for its use have expanded greatly in the past year. To highlight the evolving indications for and the numerous advances in ICD technology, with emphasis on primary and secondary prophylaxis of SCD a meta-analysis was performed by Goldberger.[182] A total of 22 trials were identified. The results show ICD implantation improves survival in patients with a history of life-threatening ventricular arrhythmia.

More recent evidence shows that ICD implantationals improves survival as primary prophylaxis against SCD in patients at high risk for ventricular arrhythmias, including those with left ventricular ejection fraction (LVEF) of 35% or less and New York Heart Association class II or III heart failure and those with a history of myocardial infarction and LVEF of 30% or less. Cardiac resynchronization improves symptoms, quality of life, and survival for patients with advanced heart failure and intraventricular conduction delays and ventricular dyssynchrony. The investigators conclude ICDs have been shown to improve survival as both primary and secondary prophylaxis in an expanding population of patients. Ongoing ICD research may continue to delineate groups with survival benefit from ICDs, and the use and indications of these devices in clinical practice will continue to expand.

Non ST- Elevation Acute Coronary Syndromes

- The standard of care in NSTEACS includes a full complement of anti-ischemic, anti-thrombotic therapy, anti-platelet agents and lipid lowering therapy.[183] [184]

- All patients with non-ST-segment-elevation acute coronary syndromes (NSTEACS) should have their risk stratified to direct management decisions.[183] [184]

The NZACS audit group in 2004 report poor risk stratification in New Zealand with only 20% undergoing treadmill testing and 20% angiography following admission with suspected ACS.[185]

The Global Registry of Acute Coronary Syndromes (GRACE), the largest real world registry of ACS, also reports on inappropriate risk stratification with 46% of low risk patients undergoing angiography and only 28% non-invasive testing.[186]

- Managing non–ST-segment elevation acute coronary syndromes by early invasive therapy improves long-term survival and reduces late myocardial infarction and rehospitalisation for unstable angina.

A meta-analysis of seven randomized trials[187] (including early studies prior to the widespread use of stents and multi-drug adjunctive therapy) comparing routine angiography (n = 4608) followed by revascularization with a more conservative strategy (invasive care only in patients with recurrent or inducible ischaemia (n = 4604) showed reduced rate of death and MI at the end of follow-up (12.2 vs. 14.4%, OR 0.82, 95% CI 0.72–0.93, P = 0.001) for routine invasive vs selective invasive. At the same time point, there was a non-significant trend towards fewer deaths (5.5 vs. 6.0%, OR 0.92, 95% CI 0.77–1.09), whereas a significant reduction in MI alone was observed (7.3 vs. 9.4%, OR 0.72, 95%CI 0.65–0.88, P < 0.001) for routine invasive vs. selective invasive.

These results were obtained despite an early hazard observed during initial hospitalization in the routine invasive group, where a significantly higher risk of death, and death and MI was noted (1.8 vs. 1.1%, OR 1.6,95% CI 1.14–2.25, P = 0.007 for death; 5.2 vs. 3.8%, OR 1.36, 95% CI 1.12–1.66, P = 0.002 for death and MI) for routine invasive vs. selective invasive. The beneficial effect was actually achieved from hospital discharge to the end of follow-up, where a significant risk reduction in death and death and MI was observed (3.8 vs. 4.9%, OR0.76, 95% CI 0.62–0.94, P = 0.01 for death; 7.4 vs. 11.0%, OR 0.64, 95% CI 0.55–0.75, P < 0.001 for death and MI) routine invasive vs. selective invasive. Over a mean follow-up of 17 months, recurrent angina was reduced by 33% and re-hospitalization by 34% in the routine invasive group.

A review of the most contemporary trials by the Cochrane collaboration[188] confirmed the initial observations reported by Mehta et al. This meta-analysis confirmed the existence of a trend towards an early excess of mortality with an invasive strategy (RR 1.59, 95% CI 0.96–2.54), but with a significant long term benefit in terms of death (RR 0.75, 95% CI 0.62–0.92) or MI (RR 0.75, 95% CI 0.62–0.91) with invasive vs. conservative at 2–5-year follow-up.

A more recent meta-analysis including seven trials (the recently published ICTUS trial, the results of which results challenge the paradigm of superior outcome with routine invasive strategy is included in this meta-analysis) with 8375 patients available for analysis showed after a mean follow-up of 2 years a significant risk reduction for all-cause mortality (4.9 vs. 6.5%, RR 0.75, 95% CI 0.63–0.90, P = 0.001) for early invasive vs. conservative, without excess of death at 1 month (RR 0.82, 95% CI 0.50–1.34, P = 0.43).[189] At 2 years of follow-up, the incidence of non-fatal MI was 7.6 vs. 9.1% (RR = 0.83, 95% CI 0.72–0.96, P = 0.012), without excess at 1 month (RR = 0.93, 95% CI 0.73–1.19, P = 0.57).

In all randomised trials, a large proportion of patients in the conservative arm eventually underwent revascularisation ('crossover') such that the true benefit of revascularisation was underestimated. When comparing the relative mortality benefit between routine and selective revascularisation strategies with the actual difference in the revascularisation rates between arms, a linear relationship emerges: the greater the difference in the rate of revascularisation, the greater the benefit on mortality (Figure 9).[190]
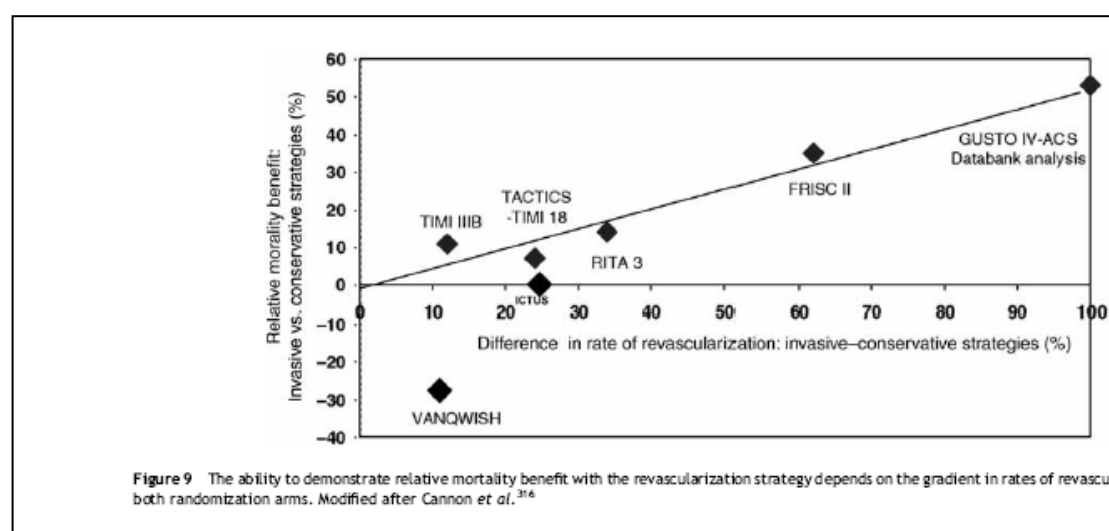
Figure 9 The ability to demonstrate relative mortality benefit with the revascularization strategy depends on the gradient in rates of revascula both randomization arms. Modified after Cannon et al.[316]

- Implantable cardiac defibrillators should be considered in some patients who, despite optimal medical therapy, have persistently depressed left ventricular function more than 6 weeks after STEMI.

- Depression and CHD frequently coexist. All patients with CHD should be assessed for depression and level of social support.

- Disease management programmes improve processes of care, reduce admissions to hospital, and enhance quality of life or functional status in patients with coronary heart disease.

Chronic Angina

- Chronic angina is a cardinal manifestation of ischaemic heart disease.

The treatment of chronic angina has two main goals: first, to prevent more serious cardiovascular events, such as myocardial infarction or death, and second, to improve patients' quality of life by reducing symptoms caused by ischaemia.

A recent meta-analysis by Reynolds and colleagues reports on the on the economic burden of chronic angina, including both the direct costs of healthcare and the indirect costs of lost productivity, admittedly in the US healthcare model.[191] Seventeen studies were identified as assessing the healthcare cost of managing chronic angina and twenty reported work limitations. Substantial healthcare costs caused by frequent medical visits, medications, and expensive revascularization procedures were noted.

Workplace productivity loss because of angina is also substantial, but lasting long-term improvement in work status has been difficult to achieve. Interventions for chronic angina resulted in some improvement in employment and work limitations over the short term. However, the positive effect of revascularisation procedures tended to erode over the long term (3 years and beyond) in a substantial number of patients.

During the past 30 years, the use of angioplasty has become common in the initial management strategy for patients with stable coronary artery disease particularly in North America, even though treatment guidelines advocate an initial approach with intensive medical therapy, a reduction of risk factors, and lifestyle intervention (optimal medical therapy). In 2004, more than 1 million coronary stent procedures were performed in the United States, and recent registry data indicate that approximately 85% of all angioplasty procedures are undertaken electively in patients with stable coronary artery disease in the New York area.[192] In New Zealand however, practice patterns are different with only 20-25% of angioplasty performed in this patient group (NZ PCI Registry).

- Medical treatment

Schulper and colleagues reviewed in all, 197 papers in full – 148 relating to clinical effectiveness, 24 to health-related quality of life and 25 to cost and cost-effectiveness.[193] They reported the following
   - Few studies exist of long-term effectiveness, with little evidence of large differences between different classes of drug.
   - There is little evidence on patients' quality of life.[193]
   - No major cost or cost-effectiveness studies were identified.
   - Angioplasty does not reduce mortality or myocardial infarction but does result in symptomatic benefit in chronic angina.

This issue has however until recently been studied in fewer than 3000 patients, many of whom were treated before the widespread use of intracoronary stents and current standards of medical management.[194] The recent COURAGE trial randomised 2287 patients who had objective evidence of myocardial ischaemia and significant coronary artery disease to undergo PCI with optimal medical therapy (PCI group) and 1138 to receive optimal medical therapy alone (medical-therapy group).[195] The primary outcome was death from any cause and nonfatal myocardial infarction during a follow-up period of 2.5 to 7.0 years (median, 4.6). PCI did not reduce the risk of death, myocardial infarction, or other major cardiovascular events when added to optimal medical therapy.

One-third of the medical therapy group required PCI during follow-up for symptoms. In addition the proportion of angina-free patients was modestly but significantly higher at 1 and 3 years in the PCI group (with lower use of antianginal medications), but not at 5 years, confirming previous observations that PCI is effective at relieving symptoms. Optimal medical therapy of patients in COURAGE included anti-ischaemic agents, particularly B-blockers, dual anti-platelet therapy with aspirin and clopidogrel and intensive secondary risk factor modification.

- Coronary Artery Bypass Grafting (CABG) provides symptomatic benefit and has mortality benefit in patients with severe disease

The systematic review, by Sculpher and colleagues, of patients with chronic stable angina report coronary artery bypass grafts (CABG) have mortality benefits for up to 5 years and possibly longer (up to 10 years) compared with medical therapy, in patients with greater extent of disease.[193] Available economic data suggests CABG is most cost-effective where there is greatest incremental benefit – in patients with severe angina, left main disease and multi-vessel disease.

- CABG v PTCA

Hoffman and colleagues recently reported a meta-analysis of 13 randomised trials on 7,964 patients comparing PTCA with CABG. The results suggest that, when compared with PTCA, CABG is associated with a lower five-year mortality, less angina, and fewer revascularisation procedures. For patients with multi-vessel disease, CABG provided a survival advantage at five to eight years, and for diabetics, a survival advantage at four years. The addition of stents reduced the need for repeat revascularization by about half.[196]

A systematic review by Bakhai and colleagues of PTCA with stents v CABG identified nine studies (3519 patients).[197] Four RCTs included patients with multiple vessel disease, five focused on single vessel disease. Four studies reported beyond 1 year. No statistical differences were observed between CABG and stenting for meta-analysis of mortality or acute myocardial infarction, but there was heterogeneity. Composite cardiac event and revascularisation rates were lower for CABG than for stents. Odds ratios resulting from meta-analysis of event rate data at 1 year were, odds ratio 0.43 (95% CI 0.35 to 0.54) and at 3 years, odds ratio 0.37 (95% CI 0.29 to 0.48).

Odds ratios for revascularisation at 1 year were, odds ratio 0.18 (95% CI 0.13 to 0.25) and at 3 years, odds ratio 0.09 (95% CI 0.02 to 0.34). Binary re-stenosis at 6 months (single vessel trials) favoured CABG, odds ratio 0.29 (95% CI 0.17 to 0.51). The authors concluded that CABG is associated with reduced rates of major adverse cardiac events, mostly driven by reduced repeat revascularisation. However, the RCT data are limited by follow-up, unrepresentative samples and rapid development of both surgical techniques and stenting.

The potential impact of drug eluting stents on these outcomes is currently been assessed in two large on going randomised trials (FREEDOM and SYNTAX).

The effectiveness and cost-effectiveness of the use of coronary artery stents in patients with coronary heart disease has recently been reported in a systematic reviews. Randomised controlled trials that include comparisons of percutaneous transluminal coronary angioplasty (PTCA) versus PTCA with stent, stent versus coronary artery bypass graft (CABG), and drug-eluting stents (DES) versus non-DES

in patients with CAD in native or graft vessels and those with stable angina or acute coronary syndrome (ACS) and unstable angina were also included. Data on the following outcome measures were included in the review: combined event rate or event-free survival, death, acute myocardial infarction, target vessel revascularisation, repeat treatment (PTCA, stent or CABG) and binary restenosis.

An economic model was developed based on extrapolation of trends in mortality and revascularisation from clinical trials data to a 5-year time horizon. The inclusion criteria were fulfilled by 50 studies comparing the use of stents with PTCA, six comparing stents with CABG and 12 comparing DES eluting stents with non-DES. No studies were identified that compared DES with PTCA or DES with CABG. Existing quality of life data suggest that revascularisation procedures reduce the patient's quality of life for a short period only.

Stents were found to be more effective than PTCA in preventing adverse events and revascularisations. In multiple-vessel disease there was no evidence of a difference in mortality (at 1 year) between patients treated surgically and those receiving a stent. Patients treated surgically required fewer revascularisations. There is no evidence of a difference in mortality between patients receiving DES and those treated with bare metal stents at 1 year. A reduction in event rate at 9 and 12 months was found in patients treated with DES. This event rate is primarily made up of increased revascularisation rates in patients treated with bare metal stents. Two-year outcome data from one study indicate that this benefit of DES continues over the longer term.

The economic model proved sufficient to indicate long-term trends in cost-effectiveness. CABG was found initially to be more expensive than bare metal stenting in multi-vessel disease and may have higher immediate risks, but over time the cost differential is reduced and long-term outcomes favour CABG over stenting. A similar situation was found for DES versus CABG in multiple-vessel disease. However, DES may not generally be considered a cost-effective alternative to bare metal stenting in single-vessel disease by policy makers as substantially higher costs are involved with a very small outcome benefit. The authors conclude that DES might be considered cost-effective if the additional cost (compared with ordinary stents) was substantially reduced, the outcome benefits from the use of DES were much improved, and/or its use were targeted on the subgroups of patients with the highest risks of requiring re-intervention.

Long-term clinical studies are needed that focus on significant outcomes such as mortality. Further research should consider: the differences among plain stents; head-to-head comparisons within DES, CABG compared with DES; and the evaluation of newer non-DES against DES. Evaluation of the effects of revascularisation procedures and especially repeat revascularisation procedures on the patient's quality of life would also be useful, as would the development and testing of risk assessment tools to identify patients likely to need further revascularisations.[198]

- The effectiveness of psycho-education interventions for improving angina outcomes is inconclusive.

Chronic stable angina (CSA) is a cardinal symptom of coronary artery disease and has a major impact on health-related quality of life (HRQOL). There are few data on the effectiveness of psycho-educational interventions for CSA patients that target HRQOL-related outcomes. A systematic review of randomised controlled trials

(RCTs) testing the effects of psycho-educational interventions on angina symptoms, angina symptom related distress, and physical functioning was conducted.

Four primary studies (1994–97) were included that had
      (a) specified treatment and control conditions,
      (b) participants with angina class I-III (Canadian Cardiovascular Society) and
      (c) psycho-educational interventions.

These studies were reviewed for methodological rigour. A pooled common effect could not be determined because of heterogeneity of outcomes, measures and analyses. The results showed while positive effects were reported, methodological problems with respect to sampling, randomisation, controls and measurement precluded generalization. As such the effectiveness of psycho-education interventions for improving angina outcomes is inconclusive. Future RCTs of psycho-educational programmes require methodologically robust methods to reduce biases and random error, and to enhance the generalisability of findings for CSA management. Journal of Nursing Management 12, 174–182

- Depression and CHD frequently coexist. All patients with CHD should be assessed for depression and level of social support.

As noted above it is unclear whether stress management and other forms of psychological intervention for people with heart disease reduce cardiovascular events. The impact on anxiety and depression, which frequently coexist, is also unknown but it is thought that inclusion in rehabilitation programmes may help.

A recent meta-analysis to determine the effectiveness of psychological interventions, in particular stress management interventions, on mortality and morbidity, psychological measures, quality of life, and modifiable cardiac risk factors, in patients with coronary heart disease (CHD), identified thirty six trials with 12,841 patients.[199] Of these, 18 (5242 patients) were Stress Management (SM) trials. Quality of many trials was poor with the majority not reporting adequate concealment of allocation, and only six blinded outcome assessors. Combining the results of all trials showed no strong evidence of effect on total or cardiac mortality, or revascularisation. There was a reduction in the number of non-fatal re-infarctions in the intervention group (OR 0.78 (0.67, 0.90), but the two largest trials (with 4809 patients randomised) were null for this outcome, and there was statistical evidence of publication bias.

Similar results were seen for the SM subgroup of trials. Provision of any psychological intervention or SM intervention caused small reductions in anxiety and depression. Few trials reported modifiable cardiac risk factors or quality of life. The authors concluded that, overall, psychological interventions showed no evidence of effect on total or cardiac mortality, but did show small reductions in anxiety and depression in patients with CHD. Similar results were seen for SM interventions when considered separately. However, the poor quality of trials, considerable heterogeneity observed between trials and evidence of significant publication bias make the pooled finding of a reduction in non-fatal myocardial infarction insecure.

Chest Pain Units

Chest pain observation units have the potential to improve care for patients presenting with acute, undifferentiated chest pain and reduce costs to the health service. Care in the chest pain observation unit is safe and practical, but reliable evidence of effectiveness and cost effectiveness is lacking.[200]

Goodacre and colleagues recently reported in a randomised trial on effectiveness and cost effectiveness of providing care in a chest pain observation unit compared with routine care for patients with acute, undifferentiated chest pain in Sheffield, UK. 972 patients with acute, undifferentiated chest pain (479 attending on days when care was delivered in the chest pain observation unit, 493 on days of routine care) followed up until six months after initial attendance. Use of a chest pain observation unit reduced the proportion of patients admitted from 54% to 37% (difference 17%, odds ratio 0.50, 95% confidence interval 0.39 to 0.65, P < 0.001) and the proportion discharged with acute coronary syndrome from 14% to 6% (8%, -7% to 23%, P = 0.264).[201]

Rates of cardiac event were unchanged. Care in the chest pain observation unit was associated with improved health utility during follow up (0.0137 quality adjusted life years gained, 95% confidence interval 0.0030 to 0.0254, P = 0.022) and a saving of £78 per patient (-£56 to £210, P = 0.252). They concluded care in a chest pain observation unit can improve outcomes and may reduce costs to the health service. It seems to be more effective and more cost effective than routine care.

A systematic review and modelling of the investigation of acute and chronic chest pain presenting in primary care by Mant concluded the following.[202]

      a) In patients in whom ACS is suspected, emergency referral for further assessment in a specialist setting is justified.

      b) ECG interpretation in acute chest pain can be highly specific for diagnosing MI.

      c) Point of care testing with troponins is cost effective in triaging patients with suspected ACS.

      d) Resting ECG and exercise ECG are of only limited value in the diagnosis of CHD.

      e) The potential advantages of Rapid Assessment Chest Pain Clinics are lost if there are long waiting times for further investigation.

Stroke Guidelines

The New Zealand Guidelines Group (2005) developed guidelines for the management of people with atrial fibrillation and flutter.

Stroke guidelines state that:

- A high index of suspicion is warranted when examining people with an irregular pulse and an electrocardiograph (ECG) should be performed. Atrial fibrillation (AF) is common and increases with age (the overall prevalence in the general population is about 1%, but the prevalence in people aged over 80 years is close to 10%).

- Echocardiography is an important part of the assessment of people with AF or atrial flutter (AFL). Improved access throughout New Zealand is recommended.

- All people with AF/AFL require thromboembolic risk assessment. The majority of people with AF require anticoagulation to reduce their risk of stroke. A target International Normalised Ratio (INR) of 2.5, range 2.0 to 3.0, is recommended.

- The benefits of stroke prevention with anticoagulation usually, but not always, outweigh the risk of bleeding.

- Warfarin is underutilised. There is good evidence that the risks of bleeding on warfarin may have previously been overemphasised.

- Rate control together with anticoagulant therapy, rather than rhythm control, is a reasonable option for the majority of people with AF/AFL.

- The efficacy and safety of antiarrhythmic drugs vary depending on the indication and individual clinical factors. For example, sotalol should NOT be used solely for rate control. It appears to be ineffective for pharmacological cardioversion, but is effective for the maintenance of sinus rhythm.

- People on antiarrhythmic therapy require regular monitoring. The main risk of antiarrhythmic therapy is ventricular proarrhythmia.

The New Zealand Guidelines Group (2003) provides guidelines for the management of stroke. These are as follows:

All people with stroke should expect inpatient rehabilitation by a multi-disciplinary team (MDT) with expertise in stroke unless:
- No significant residual disability interfering with function on MDT assessment *or*
- Moderate disability (e.g. transfer with 1 person) *and* early supported discharge service available *or*
- Already in institutional care *and* community rehabilitation service available

Inpatient rehabilitation

- Admission to stroke unit or care by stroke team within a rehabilitation unit
- Stroke-expert MDT responsible for care
- Person-orientated goal setting
- Daily therapy input (Mon−Fri)
- Family and caregivers involved in rehabilitation
- Appropriate information and support available to person and family

Is the person ready for discharge to the community?

Typically appropriate if medically stable *and*

- MDT has completed assessments of home situation and post-discharge requirements *and*
- An appropriate place for discharge has been identified *and*
- An appropriate plan has been agreed between MDT, person, caregivers and other agencies *and*
- All necessary equipment has been provided *and*
- All follow-up arrangements are in place (rehabilitation, social and GP/primary care)

Community rehabilitation

- Can be provided with equal effectiveness in the community or a day hospital

Life after stroke

- Person has contact information for Stroke Foundation field officers or other support
- Caregiver support
- Cultural issues
- Ongoing education about stroke
- Appropriate advice and information on sexuality, mood, employment, driving

Is diagnosis and secondary prevention an issue for this person?

Typically appropriate if:

- Further stroke would have important clinical consequences and
- Person can cooperate and comply with investigations or antiplatelet drugs and
- If for carotid ultrasound, has significant functional recovery from an anterior circulation stroke and fit for surgery

Typically not appropriate if terminal illness, severe dementia/disability e.g. in hospital-level care

Outpatient clinic / review

To confirm diagnosis, assess vascular risk factors and address secondary prevention

Urgent outpatient assessment by clinicians knowledgeable about stroke

ECG and bloods at GP or ED presentation

Access within 1−2 weeks

Review by physician with special interest or expertise in stroke management

Is the person ready for discharge from rehabilitation?

Typically appropriate if:

- Person has achieved agreed therapy goals *and*
- No new goals are identified and agreed and
- Appropriate supports are in place

Diabetes clinical guidelines

Guidelines for the management of type 2 diabetes has been provided by the New Zealand Guidelines Group (2003). Key points are:

The estimated number of people in New Zealand with diagnosed diabetes is predicted to increase substantially in the next 20 years, from 115,000 to over 160,000

The prevalence of diagnosed diabetes is higher among Mäori and Pacific peoples and complications are more common and more severe.

About half the people with diabetes are thought to be undiagnosed. Many of these people will be asymptomatic
Lifestyle change is central to the management of all people with diabetes and requires advice on energy intake and dietary pattern, physical activity, and smoking cessation, where appropriate.
Involving families in diabetes management planning is of particular importance to Mäori and Pacific people with diabetes.

- Regular screening for renal, retinal and foot complications should occur from diagnosis of type 2 diabetes
- Tight glycaemic control reduces the risk of and slows the progression of microvascular and macrovascular complications. A stepped approach is recommended to lower and maintain HbA1c to as close to physiological levels as possible, preferably less than 7%, without hypoglycaemia.
- Optimum blood pressure control, below 130/80 mm Hg, reduces the risk of and slows the progression of microvascular and macrovascular complications. Intensive blood pressure management is recommended in people with diabetes and overt nephropathy, microalbuminuria or other renal disease, with most requiring more than one blood pressure lowering agent.
- Any sustained reduction in both HbA1c and blood pressure is worthwhile
- Annual cardiovascular risk assessment is recommended for all people with diabetes. The National Heart Foundation cardiovascular risk chart should be used to calculate cardiovascular risk. Clinically, people with diabetes and overt nephropathy or other renal disease are at high risk of cardiovascular disease.
- For all people with diabetes the 5-year cardiovascular risk should be less than 15% and, where possible, the goal is to achieve: total cholesterol less than 4 mmol/L; triglycerides less than 1.7 mmo/L and blood pressure less than 130/80 mm Hg
- People with diabetes and microalbuminuria or overt nephropathy should be on an ACE-inhibitor or A2 receptor-blocker, if tolerated, to prevent disease progression

9. Stock-take data collection

Stock-take data requirements

The stock-take needs to collect data in two key areas:

1. The components of an effective and efficient chronic care management model

2. The organisational systemic factors that act as facilitators or barriers for successful programme development, implementation, and uptake across the system.

Analysis of the stock-take date will utilise success case methodology to determine the programmes that are high performers and those that are poor performers. These are the programmes that will be selected for subsequent evaluation.

Key dimensions

A number of chronic care management survey instruments, which are based primarily on Wagner's CCM, were analysed to determine the key themes they explored: These included:

- The California chronic care learning communities initiative collaborative
- The MacColl Institute for Healthcare Innovation Assessment of Chronic Illness Care (also advocated by the Institute for Healthcare improvement)
- The Berkeley National Survey of Physician Organisations and the Management of Chronic Illness
- The Karolinska Institute Medical Management Center (based on a revised version of the National Survey of Physician Organisations and the Management of Chronic Illness)
- The NHS Institute for Innovation & Improvement – Improving care for people with long-term conditions
- National Diabetes Education Programme – Making systems changes for better diabetes care
- RAND Corporation – Improving chronic illness care evaluation

Analysis indicated that the New Zealand stock-take instrument should reflect the following themes:
- The organisation, showing concrete support for CCM through their leaders, the organisational plans, and incentive systems
- The number, range, and type of linkages to community based organisations
- The attention given to self-management support
- Access to decision support including guidelines, specialist input, and provider education
- A system for service delivery in which the practice team engages with one another, there is a programme champion, and patients are systematically followed up.
- Clinical information systems are used to link patients to care plans, and provide timely feedback to providers on patient progress.

We note that none of the instruments reviewed examined, to any extent, organisational or system barriers and facilitators for long-term conditions management programme development, implementation, uptake, and sustainability. This is a significant gap.

Proposed areas of measurement

Four sections are proposed:

1. ***Programme overview***, including::
   - the disease(s) included,
   - general/targeted populations
   - resources allocated (dollars and workforce)
   - outcome measures (actual or perceived)

2. ***Programme rating*** against the six aspects of Wagner's CCM, drawing on the inventories identified above

3. ***Programme development, implementation and uptake enablers***.
These will need to be developed.
They should address general organisational system factors, and those related to a networked organisation. Table 8, below, provides a preliminary conceptual and measurement framework.

4. A series of ***items relating to the New Zealand context***. This will include measures (actual or perceived) of the ways in which the programme reduces inequalities.

ALLEVIATING THE BURDEN OF CHRONIC CONDITIONS IN NEW ZEALAND

Table 8. Performance indicators and measurements for stock-take

Performance Indicator	Measurement
Stages of programme development; Level of programme development against a bench mark	Compilation of process factors
Degree of implementation The overall implementation of an intervention e.g. coverage and reach, set up to meet targets	• Number of individuals • No practices • No PHO
Level of engagement	• Individuals >2visits • Practice increase in individual over time • Perception of engagement
Initiative management Level & quality of management, structures, leadership; plans, implementation, monitoring	• Practice • PHO • DHB
Programme Evaluation ; Extent to which programme evaluation is conducted and finding acting upon	• Monitoring • Process • Outcomes • Utilization
Evaluation readiness :Willingness and capacity to engage in evaluation	• Evaluation of delivery • Experience and culture of programme evaluation in organisation
Knowledge management Flow of information around organisations	Number of procedures in place to promote transfer and use of knowledge
Information management IT system	Quality of IT system
Programme adaptation: programme change over time	Reported programme change
Communication – level & quality of communication between all stakeholders	• Perception of amount of communication • Quality of communication between DHB & PHOs
Cost effectiveness	Overall cost x degree of implementation
Resources-financial	Resources x need to run course
Resource-workforce	DHB PHO/NGO Practice
Policy incentives : need, political, social, economic	Perception of need
Programme sustainability Ability of programme to become mainstream	Resources, guidelines, leadership, policy & systems
Collaborative Action: Activities that occur as a consequence of collaboration between partnerships	• Perception of programme change as a consequence of discussions • Reactions to feedback
Internal Support Ongoing buy-in from lead organisation/s	Perception of support from DHB-resources and perception
External support for programme out lead organization	Perception of support from other stakeholders Resources and perceptions
Programme concept	Belief in programme
Programme Champions	No of leaders and supporters in networks of PHOs, DHB, practices, communities
Process Outcomes	• Collaboration • IT partnerships • Networks • Organisational structures
Sustainability of effects Measures of how long programme effect lasts for	Outcomes sustained over three year period for individuals & practices

Appendix 1: Search terms

Table 9. Search term 'building blocks' used to construct searches

Congestive heart failure
1   exp Heart Failure, Congestive/
2   exp Ventricular Dysfunction/
3   congestive cardiac failure.mp.
4   congestive heart failure.mp.
5   CHF.mp.
6   CCF.mp.
7   1 or 2 or 3 or 4 or 5 or 6

Chronic obstructive pulmonary disease
1   Pulmonary Disease, Chronic Obstructive/
2   pulmonary emphysema/
3   bronchitis, chronic/
4   copd.mp.
5   coad.mp.
6   chronic obstructive pulmonary disease.mp.
7   chronic obstructive airways disease.mp.
8   chronic obstructive respiratory disease.mp.
9   1 or 2 or 3 or 4 or 5 or 6 or 7 or 8

Cardiovascular disease
1   exp myocardial ischemia/
2   MI.mp.
3   IHD.mp.
4   CVD.mp.
5   1 or 2 or 3 or 4

Cerebrovascular accident
1   exp cerebrovascular accident/
2   intracranial embolism/
3   intracranial thrombosis/
4   stroke.mp.
5   cva.mp.
6   1 or 2 or 3 or 4 or 5

Diabetes mellitus
1   diabetes mellitus/
2   diabetes mellitus, type 1/
3   diabetes mellitus, type 2/
4   diabetes.mp.
5   diabetes mellitus, experimental/
6   *diabetes mellitus, gestational/
7   *diabetic ketoacidosis/
8   *prediabetic state/
9   exp diabetes insipidus/
10   (1 or 2 or 3 or 4) not (5 or 6 or 7 or 8 or 9)

Chronic care model
1   *Chronic Disease/
2   *disease management/
3   *long-term care/
4   chronic care model.mp.
5   (chronic adj (care or disease or illness or condition)).mp.
6   1 or 2 or 3 or 4 or 5

Chronic care model components
1   exp Self Care/
2   exp Self-Help Groups/
3   exp Consumer Participation/
4   Patient Education/
5   self management.mp.
6   exp patient care team/
7   Patient Compliance/
8   ((care or case or disease) adj (plan or path$ or coordinat$ or co-ordinat$ or integrat$ or management)).mp.
9   decision support systems, clinical/ or medical records systems, computerized/ or

reminder systems/
10   Patient-Centered Care/
11   Continuity of Patient Care/
12   1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11
Systematic reviews (from Montori 2005)[223]
1   Cochrane database of systematic reviews.jn.
2   search.tw.
3   meta-analysis.pt.
4   Medline.tw.
5   systematic review.tw.
6   1 or 2 or 3 or 4 or 5
Other study designs
1   programme evaluation/
2   exp controlled clinical trials/
3   "outcome and process assessment (health care)"/
4   exp medical audit/
5   1 or 2 or 3 or 4

Appendix 2: Data extraction and quality assessment

Table 10. Quality assessment for different study designs

	1 yes 0 no
Systematic review	
• The clinical question explicitly stated; study participant details given and relevant our purpose	
• search criteria, sources, inclusion and exclusion criteria all stated	
• studies are critically appraised using standard process; quality of included studies taken into account in considering overall findings	
• the review interprets the results in light of the totality of available evidence; describe potential biases in the review process (eg, publication bias)	
Randomised controlled trial	
• clinical outcome defined and relevant and measured in all	
• blinded outcome assessment	
• unbiased recruitment and follow-up i.e. same chance for all participants of getting in either group and drop out similar in each group	
• equal measures and procedures in all groups (i.e. the intervention is the only difference between groups)	
Before and after study	
• clinical outcome defined and relevant and measured in all	
• all participants followed up and included in analysis (i.e. not just those who completed)	

Table 11. Data extraction form, questions for systematic reviews
Similar forms were used for other study designs.

Author / date
Reference
Is this study relevant to our purpose? (if not, stop now)
Type of study (SR, rct etc)
What was intended to be done
What was done
Why did they chose this intervention
Methods
Quality
Type of subjects
Number of subjects
What was the social and health system context
What outcomes were measured
What was the effect
What influenced that effect (measured)
What was thought to influence the effect (intro, discussion)
What maintained success
What would they do next time
Future research recommended
Comments

Appendix 3: Study numbers for main searches

Systematic reviews

COPD 21 Apr 07
Medline 45 Embase 21 CINAL 21 -> 87
Removal of 18 full duplicates or prior versions of Cochrane reviews -> 69 (Medline 40, Embase 15, CINAL 14)
Relevant -> 34 (on title and abstract)

Stroke 21 Apr 07
Medline 77 Embase 176 CINAL 32 -> 285
Removal of 51 full duplicates or prior versions of Cochrane reviews -> 234 (Med 71, E 151, CINAL 14)
Relevant ->

CHF 21 Apr 07
Medline 72 Embase 56 CINAL 24 -> 152
Removal of 27 full duplicates or prior versions of Cochrane reviews -> 125 (Med 72, E 39, CINAL 14)
Relevant ->

CVD 21 Apr 07
Medline 67 Embase 61 CINAL 22 -> 150
Removal of 23 full duplicates or prior versions of Cochrane reviews -> 127 (Medline 63, E 50, CINAL 14)
Relevant ->

Diabetes 21 Apr 07
Medline 216 Embase 316 CINAL 76 -> 608

Removal of 158 full duplicates or prior versions of Cochrane reviews -> 450 (Medline 209, E 216, CINAL 25)
Relevant ->

CCM or component (no disease specified)
Medine 2944; 2515 not included in previous lists
Embase
Cinal 995; 972 not included in previous lists

Controlled trials

CHF Medline 127 Embase 659 CINAL
COPD Medline 32 Embase 489 CINAL 76?
Stroke Medline 81 Embase 1732 CINAL
CVD Medline 125 Embase 701 CINAL 129
Diabetes Medline 148 Embase 2874 CINAL 260

Other designs

CHF Medline 130 Embase 496 CINAL 23
COPD Medline 54 Embase 445 CINAL 15
Stroke Medline 85 Embase 1290 CINAL ?
CVD Medline 127 Embase 446 CINAL 19
Diabetes Medline 397 Embase 2365 CINAL 63

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