4. The Tentative Model

The Project Team has performed a systematic literature review, national public survey, and sought advice from peak organisations on the potential contributions that pharmacists could make to reduce the societal impact of CVD. Based on these findings, the Project Team has developed a list of potential priority areas where community pharmacy could play a useful role. These are listed below.

**Public/preventive health promotion**
- Health promotion to prevent development and progression of cardiovascular disease
- Improving community awareness of risk factors
- Improving awareness of symptoms and early warning signs of acute episodes

**Continuum of care**
- Transfer of medication-related information between hospital and community
- Follow-up of patients post-discharge to identify and remedy any drug-related problems

**High-risk patients**
- Referral for screening and risk-assessment
- Pharmacy-based risk factor screening and referral

**Compliance with therapy**
- Promoting patient compliance with drugs, diet and exercise

**Medication management and reviews**
- Promoting evidence based drug therapy of cardiovascular disease and preventing drug-related problems
- Monitoring and educating patients eg through the Home Medicines Review scheme
Each of these proposed elements will be discussed in turn in the following sections of the report. This discussion will include the following.

- The relevant National Chronic Disease Strategy key points.
- National Service Improvement Framework for Heart Stroke and Vascular Disease critical intervention points.
- Evidence for the proposed element.
- Strategy for improvement.
- Examples of supporting resources.
5. Elements of the Pharmacy Cardiovascular Health Care Model:

Public/preventive health promotion

- prevent development and progression of CVD,
- improve awareness of risk factors,
- improve awareness of early warning signs

5.1 Guiding principles and existing framework

**National Chronic Disease Strategy:**

- Key direction 8: Develop consistent health messages addressing the common behavioural risk factors for chronic disease - tobacco smoking, physical inactivity, poor diet and nutrition, and risky and high risk alcohol use.
- Key direction 9: Ensure health promotion is effectively targeted and delivered through appropriate settings and formats.
- Key direction 11: Encourage all health services to identify opportunities to promote health and identify and address risk factors for chronic disease.
- Key direction 13: Encourage primary care to engage in early intervention, through appropriate opportunistic screening, use of approaches such as the SNAP Framework to identify and address the risk factors for chronic disease, and support for self-management.

**National Service Improvement Framework for Heart, Stroke and Vascular Disease**

**Critical intervention points:***

- Adopt National, State/Territory and local plans to further reduce rates of smoking using evidence based public health strategies and government actions.
- Adopt National, State/Territory and local plans to promote awareness of Heart, Stroke and Vascular Disease risk factors, healthy eating and active living including healthy weight in collaboration with other national health priorities and policies.
Promote awareness among people of the early symptoms of heart, stroke and vascular
disease and associated conditions, and emergency response where appropriate.

“All health services, from community pharmacy to specialist care, have a responsibility to
promote health and prevent illness as appropriate to their setting and professional role. This
must be undertaken in developmentally and culturally appropriate ways, and with a special
emphasis on the major risk factors of smoking, risky and high risk alcohol use, poor
nutrition and lack of physical activity.”

This arm of the model addresses three principal goals.

- Health promotion to prevent development and progression of cardiovascular disease
- Improving community awareness of risk factors via screening
- Improving awareness of symptoms and early warning signs of acute episodes.

5.2 **Health promotion to prevent development and progression of CVD**

Prevention of CVD in Australia is far from optimal. Ninety percent of Australian adults
have at least one modifiable risk factor for heart, stroke and vascular diseases and 25% have
three or more risk factors. The ‘SNAP’ risk factors, relating to Smoking, Nutrition, Alcohol
and Physical activity, are the four most preventable contributors to disease in Australia.

- 60% are overweight
- 54% are not sufficiently active to achieve health benefits
- 20% smoke daily
- 10% drink at levels considered harmful to their health

The major interventions in the prevention of CVD are considered to be lifestyle changes
(including the cessation of smoking) and the treatment of hypertension and dyslipidaemia
(Figure 15).

The National Heart Foundation of Australia and Cardiac Society of Australia and New
Zealand recently published goals of strategies, largely directed at lifestyle changes, to prevent
cardiovascular events in people with coronary heart disease (Figure 16). They emphasise
smoking cessation, healthy eating, alcohol intake, physical activity; and weight, blood pressure, blood lipids and diabetes management, as well as addressing psychosocial issues.

Similarly, the National Vascular Disease Prevention Alliance (Diabetes Australia, Kidney Health Australia, National Heart Foundation of Australia, and National Stroke Foundation of Australia) developed a consensus statement on the prevention of vascular disease (Figure 17).  

It would seem that pharmacists, being the most readily accessible health professional in the community setting, could fulfil a useful role in the counselling and detection of members of the public at risk of CVD. While the social mandate of the pharmacy profession is to ensure the safe and effective drug therapy of individual patients, pharmacists also frequently provide advice on minor health problems and lifestyle to people who consider themselves as basically well. Pharmacists also play a significant role in the early detection of more serious pathology and in recommending that the consumer seeks a more extensive medical assessment of his/her condition. In fact, one of Australia’s most valuable primary health care resources is the pharmacy profession. Community pharmacists provide an established and visible network, extending to remote areas, of easily accessible health professionals. The consumer can consult a pharmacist without an appointment, with minimal waiting times.

Pharmacists are ideally situated to encourage the adoption and maintenance of healthy lifestyle behaviours, improve the detection and management of various diseases and make a significant impact on current health care practices and expenditure in Australia.

It could be argued that the participation of community pharmacists in harm reduction public health strategies, including sterile needle and syringe distribution, methadone maintenance treatment and smoking cessation programs, is one of the most important and cost-effective roles that the profession can fulfil in society. Indeed, the involvement of pharmacy in these harm minimisation programs has generally been a resounding success and a major achievement for the profession.
<table>
<thead>
<tr>
<th>Lifestyle interventions and drug treatments</th>
<th>Relative risk reduction (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking cessation</td>
<td>50%</td>
</tr>
<tr>
<td>Regular physical activity</td>
<td>50%</td>
</tr>
<tr>
<td>Reducing blood pressure</td>
<td>15–25%</td>
</tr>
<tr>
<td>Reducing cholesterol with diet and statins</td>
<td>30–50%</td>
</tr>
<tr>
<td>Antiplatelet therapy with low-dose aspirin</td>
<td>25%</td>
</tr>
<tr>
<td>Beta-blockers post myocardial infarction</td>
<td>20–30%</td>
</tr>
<tr>
<td>ACE inhibitors post myocardial infarction</td>
<td>20–26%</td>
</tr>
<tr>
<td>Controlling blood glucose</td>
<td>14%</td>
</tr>
</tbody>
</table>

**Figure 15**  Lifestyle interventions and drug treatments shown to reduce the risk of cardiovascular morbidity and/or mortality.\(^46\)
LIFESTYLE / BEHAVIOURAL RISK FACTORS AND MANAGEMENT

Motivational interviewing / behavioural change assessment: Establish goals appropriate for patient's readiness to change in accordance with patient's risk factor profile.

Referral where indicated: Heartline [1300 36 27 67]. Appropriately trained health professional(s) (cardiac rehabilitation practitioner, dietitian, psychologist, etc).

Smoking
Goals: Complete cessation. Avoidance of passive smoking.
• Strongly encourage patient and family to stop smoking. Provide smokers and passive smokers with appropriate facts on smoking. Even 3-5 minutes of time taken to encourage smokers to attempt to quit can increase cessation success.
• Refer to Quitline [13 18 45]. Consider referral to smoking cessation program.

Consider pharmacotherapy for patients smoking >10 cigarettes per day:
• Nicotine replacement therapy (NRT) is the first line choice of medication.
• If used, aim to combine pharmacotherapy with behavioural and psychosocial support.
• NRT patches can be used safely in smokers with less severe cardiovascular disease (e.g. stable angina or a history of myocardial infarction), but is not recommended with recent myocardial infarction, unstable angina, severe arrhythmias, refractory angina or recent cerebrovascular event.
• Although not a first line agent, bupropion can be considered as a treatment option for patients with stable cardiovascular disease. Note: safety of bupropion in patients who have had an acute coronary event has not been established.
• Bupropion in combination with NRT can be considered for patients requiring additional assistance.
• Consider high risk of continuing to smoke when assessing benefits and risks of pharmacotherapy.

Nutrition
Goal: Establish / maintain healthy eating including saturated + trans fatty acid intake no more than 6% of total energy intake.
• In order to achieve this goal patients will need to follow the NHFA "Enjoy Healthy Eating" messages (see Enjoy Healthy Eating messages on back cover). These messages encourage patients to choose:
  - mainly plant based foods — vegetables, fruits and legumes (dried peas, dried beans and lentils) and grain based foods (preferably wholegrain) such as bread, pasta, noodles and rice
  - moderate amounts of lean meats, poultry, fish and reduced fat dairy products
  - moderate amounts of polyunsaturated or monoeno saturated fats.
• Refer to a dietitian.

Alcohol
Goal: Low risk alcohol consumption.
• Assess patient motivations for potential interactions with alcohol and advise as appropriate.
• Encourage patients with hypertension who drink alcohol to limit intake to no more than 2 standard drinks per day (men), or 1 standard drink per day (women).
• It is not recommended that abstainers should take up drinking or that drinkers should increase their alcohol intake.

Physical Activity
Goals: Establish / maintain at least 30 minutes of moderate intensity physical activity* on 5 or more days / week (i.e. 150 mins / week minimum). Can be accumulated in shorter bouts of 10 minutes duration.
• Assess patient’s physical activity habits together with severity of disease and co-morbidities. Conditions that require clinical assessment and supervision include unstable angina, uncontrolled hypertension, severe aortic stenosis, uncontrolled diabetes, complicated acute myocardial infarction (within 3 months), untreated heart failure or cardiomyopathy, symptoms such as chest discomfort or shortness of breath on low exertion, resting heart rate >100 bpm.
• Discuss physical activity needs/capabilities/barriers and encourage the patient to be active. Together discuss and provide written guidelines for everyday physical activity tasks, including a light-moderate walking program or equivalent. General practitioners should consider using the “Physical Activity Module”.
• Begin at low intensity and gradually increase over several weeks, particularly in the post-acute event period. Advise the patient to begin with one or two activities for a short time at low intensity. Gradually increase the time spent, the intensity, and the variety of activities over several weeks, towards achieving the goal and moving beyond it. Note: vigorous physical activity is generally not encouraged for people with coronary heart disease.
• Refer to cardiac rehabilitation program where appropriate and available. This is particularly useful in the post-acute event period.
• Monitor progress/response to the physical activity regimen in consultation with the patient.
* Moderate activity will cause a slight increase in breathing and heart rate, and may cause light sweating e.g. brisk walking, lawn mowing, low paced swimming, cycling, gentle aerobics.

Weight Management
Goals*:
Waist measurement
Male ≤ 94cm
Female ≤ 80cm
BMI < 25 kg/m²
• Assess and continue to monitor both waist circumference and Body Mass Index (BMI).
• BMI = weight (kg) / height (m)²
• Set intermediate, achievable goals.
• Encourage healthy eating and physical activity. For weight loss to occur, it is necessary to use up more energy through regular physical activity and consume less kilojoules from food and drinks.
• Goals based mainly on evidence of increased risk of death in European populations and may not be appropriate for all age groups and ethnic groups.

Figure 16 Lifestyle guidelines for preventing cardiovascular events

16
<table>
<thead>
<tr>
<th>Risk factor</th>
<th>How to assess</th>
<th>Who to treat if abnormal</th>
<th>Treatment target</th>
<th>Monitoring interval*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking</td>
<td>History</td>
<td>All</td>
<td>Smoking cessation</td>
<td>Every visit</td>
</tr>
<tr>
<td>Nutrition</td>
<td>History</td>
<td>All</td>
<td>Reduced intake of saturated fat&lt;br&gt;Incorporation of fish into at least two meals per week&lt;br(Meals based around vegetables, fruits, legumes and grain based cereal products)</td>
<td>Every visit</td>
</tr>
<tr>
<td>Alcohol</td>
<td>History</td>
<td>All</td>
<td>Low risk drinking pattern&lt;br&gt;For those with hypertension&lt;br&gt;≤ 2 standard drinks per day (men)&lt;br&gt;≤ 1 standard drinks per day (women)**</td>
<td>Every visit</td>
</tr>
<tr>
<td>Physical activity</td>
<td>History</td>
<td>All</td>
<td>At least 20 minutes of moderate physical activity on most days</td>
<td>Every visit</td>
</tr>
<tr>
<td>Overweight/Obesity</td>
<td>Measure weight (kg) and height (m) and calculate BMI or measure waist circumference</td>
<td>All</td>
<td>BMI 18.5-24.9&lt;br&gt;Waist circumference: men &lt;94 cm&lt;br&gt;women &lt;80 cm</td>
<td>Every 6 months</td>
</tr>
<tr>
<td>Hypertension</td>
<td>Measure systolic and diastolic pressure sitting after 5 minutes rest&lt;br&gt;Diagnosis should be based on multiple BP measurements taken at several separate occasions</td>
<td>Depend on risk assessment</td>
<td>&lt;65 years, or diabetes, or renal insufficiency ≤130/85&lt;br&gt;&gt;65 years (and without diabetes or renal insufficiency) ≤140/90*</td>
<td>Every visit and at least every 6 months once BP stabilised</td>
</tr>
<tr>
<td>Dyslipidaemia</td>
<td>Measure fasting total and HDL cholesterol, triglycerides and calculate LDL cholesterol</td>
<td>Depend on risk assessment</td>
<td>LDL cholesterol &lt;2.5 mmol/L&lt;br&gt;HDL cholesterol &gt;1.0 mmol/L&lt;br&gt;Triglycerides &lt;2.0 mmol/L</td>
<td>At least every 12 months depending on response to therapy</td>
</tr>
<tr>
<td>Diabetes</td>
<td>Measure fasting plasma glucose in people without known diabetes***</td>
<td>All***</td>
<td>In people with known diabetes&lt;br&gt;HbA1c ≤7%</td>
<td>Every 3-6 months depending on response to therapy</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>Auscultate pulse&lt;br&gt;Confirm with ECG</td>
<td>All</td>
<td>Sinus rhythm and/or treatment with anticoagulants if indicated</td>
<td>Every visit</td>
</tr>
<tr>
<td>Proteinuria</td>
<td>Dipstick urines: if positive on two occasions, further quantify and look for the cause†</td>
<td>Treat all with proteinuria &gt;1g/d or diabetes</td>
<td>Prevent/delay deterioration&lt;br&gt;if proteinuria &gt;1 g/day BP &lt;125/75&lt;br&gt;if tolerated</td>
<td>Every 3 months</td>
</tr>
<tr>
<td>Renal insufficiency</td>
<td>Measure serum creatinine&lt;br&gt;Calculate GFR</td>
<td>All</td>
<td>Prevent/delay deterioration</td>
<td>At least every 3 months depending on severity</td>
</tr>
</tbody>
</table>

* Monitoring interval when risk factor is present
** Refer to NHMRC Australian Alcohol Guidelines, 2001
*** Refer to the NHMRC diabetes guidelines for a detailed consideration of who and how to screen for undiagnosed diabetes
† For assistance in developing healthy eating patterns, consider referral to a dietitian
‡ Note: BP targets may be lower in adults with proteinuria. Refer to source guidelines for further information

Figure 17  Risk factor assessment, targets and monitoring intervals for the prevention of vascular disease⁴⁵
5.2.1 The SNAP Framework

One resource that should be investigated further for its potential application in community pharmacy practice is the SNAP Framework, which has been developed to guide the implementation of integrated approaches to a limited set of behavioural risk factor modification in general practice focusing on smoking, nutrition, alcohol and physical activity (SNAP). 48 49

The SNAP Framework aims to improve health outcomes in the community by supporting and enhancing the role that general practice plays in increasing levels of good nutrition and physical activity and decreasing smoking prevalence and alcohol misuse. The SNAP Framework represents a system wide approach to behavioural risk factor identification and management and it acknowledges the importance of socio-economic factors in behavioural risk factor modification. The initiative targets consumer awareness of the links between behavioural risk factors and chronic disease and highlights the role of the general practitioner as an agent for supporting behavioural change.

Use of the SNAP Framework by other health professionals was proposed during the development of the Framework:

“A possible extension of the SNAP initiative, beyond the general practice setting, would be to develop a complementary systematic and integrated approach to behavioural risk factor management for broader primary health care and community care settings. This would substantially strengthen the capacity of the health sector to tackle prevention and management of chronic disease, and facilitate the building of clinical partnerships between health professionals.” 48 49

The SNAP guide covers why the risk factors are important and why general practice is the right place to influence SNAP risk factor behaviour in adults; how to assess if a patient is ready to make lifestyle changes; a five step model (5As; Figure 18) for detection, assessment and management of SNAP risk factors (ask, assess, advise, assist, arrange); effective clinical strategies for SNAP risk factors (and overweight and obesity) using the 5As model; practical business strategies to apply the SNAP approach to general practice (including samples of roles for practice staff); a sample SNAP Care Plan; and where to find the right guidelines, tools and organisations for support when giving brief advice to patients.
2. Introduction to the 5As and stages of change theory

2.1 The 5As

At the practice level, there are five main roles for assisting patients (adapted from the 5As approach developed by the US Department of Health) which are similar across all SNAP risk factors (Figure 1):

- **Ask (1)**: identify patients with risk factors
- **Assess (2)**: level of risk factor and its relevance to the individual in terms of health
  - readiness to change/motivation
- **Advise (3)**: provide written information
  - lifestyle prescription
  - brief advice and motivational interviewing
- **Assist (4)**: pharmacotherapies
  - support for self-monitoring
  - referral to special services
  - social support groups
  - phone information/counselling services
  - follow up with the GP
- **Arrange (5)**

Figure 1. The 5As

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Tobacco smoking is estimated to be the risk factor responsible for the greatest burden of disease in Australia (about 12% of the total burden of disease and injury in males and 7% in females). It is the largest preventable cause of death, illness and disability, and places a
huge financial drain on the community. In 1998, an estimated 19,019 people died in Australia as a result of tobacco smoking (approximately one in seven adult deaths). In 1997-98, nearly 150,000 hospital separations were attributable to tobacco smoking.

Australia is widely recognised as being among the world leaders in tobacco control, with daily smoking rates among adult Australians now being one of the lowest in the developed world. Smoking rates among Australian adults have declined steadily since the early 1970s. Of major concern, however, is the increased smoking rate among young females. Current figures suggest that within the next decade smoking will be more common among Australian women than men. Lung cancer mortality rates among men are declining, while they are still increasing for women. Not only are women at greater risk of lung cancer and other diseases from smoking than men, they also have less success quitting.

Ceasing smoking is very difficult. Less than 8% of smokers are able to quit without help. However, stopping smoking, even after many years, has substantial benefits for health. People who stop smoking, even well into middle age, avoid most of their subsequent risk of lung cancer, and stopping before middle age avoids more than 90% of the risk attributable to tobacco. Of all preventive care efforts, smoking cessation promotion has the potential to achieve the most dramatic reduction in morbidity and mortality, and improvement in public health.

Hurley recently examined the benefits of a reduction in smoking on acute myocardial infarction (AMI) and stroke hospitalisations and costs in Australia. She estimated the numbers of AMI and stroke hospitalisations in 35–64-year-olds and the associated costs that could have been avoided over a 7-year period from 2001–02 if smoking prevalence had decreased by 1% in the first year (Scenario 1) or by 1% per annum for 5 consecutive years (Scenario 2). Under Scenario 1, almost 1000 hospitalisations for AMI and about 350 hospitalisations for stroke would have been avoided over 7 years, saving about $20.4 million in health care costs. Under Scenario 2, over 3000 AMI hospitalisations and over 1000 stroke hospitalisations would be avoided, and health care costs could be reduced by $61.6 million (2.75% of costs for AMI and stroke over the period). The economic model hence illustrated that modest and achievable reduction in smoking rates can substantially improve health outcomes and reduce health care costs, even in the short term.

Pharmacists can and should take a more active role in counselling members of the public about tobacco cessation. A report by the Commonwealth Department of Health and Ageing concluded that pharmacists should be actively involved in smoking cessation programs.
a minimum, they should implement the 5A’s approach to smoking cessation intervention (Ask about smoking at every opportunity, Advise to quit, Assess willingness to quit, Assist in quitting, and Arrange follow-up).

Pharmacists are ideally placed to help people quit smoking, as it is widely acknowledged that pharmacists:

- are trusted and respected by the public. This finding has importance in community health programs when one considers that a person who is trusted, respected and perceived as non-threatening is more likely to influence another person’s behaviour, and is therefore a positive instrument for bringing about behavioural and lifestyle changes.
- are the health professionals most accessible to the general public. Community pharmacists provide an established and visible network, extending to remote areas, of easily accessible health professionals. The consumer can consult a pharmacist without an appointment, with minimal waiting times. Pharmacists may reach smokers who do not access other primary care services.
- are frequently asked for health advice. Australian surveys have shown that the public considers that (i) pharmacists have an important role in health care, (ii) pharmacists are expected to be knowledgeable in the areas of prescription and non-prescription medications and minor conditions, and (iii) when consulted, pharmacists are generally thought to provide useful information.
- are perceived by patients to be concerned about individual health status and public health.
- often know the patient history best.
- have proven effective treatment options at their disposal - nicotine replacement therapy (NRT), by any delivery system, has been shown to double patients’ chances of successful quitting.
- are available at point of purchase to provide counselling, information and advice.

Community pharmacy is an extremely inexpensive, cost-effective option for providing a broad range of health services. Community pharmacists also have access to people who are apparently healthy and who rarely come into contact with general practitioners or nurses.
Pharmacies are an ideal location for routinely delivering brief, consistent messages concerning tobacco use and cessation. Pharmacists are aware of how tobacco can interact with a number of medications, as well as how tobacco directly affects the disease for which the patient is receiving medications. By directly linking an individual patient’s prescription to the hazards of tobacco use, pharmacists can individualise advice to quit smoking.\textsuperscript{61}

Randomised trials from overseas\textsuperscript{53, 74-76} and an uncontrolled, non-randomised trial in Australia\textsuperscript{77} have shown that a structured package of behavioural support and NRT provided by pharmacists can be effective in aiding smoking cessation. It is unfortunate, then, that Australian community pharmacists are not being sufficiently active in this important area. Feedback from a number of surveys indicate that pharmacy - particularly in the identification of the smoker, providing initial counselling on smoking cessation options and following up - is failing.\textsuperscript{78} Simply stocking products such as NRT and giving occasional advice is not enough.\textsuperscript{62} A US study suggested that the improvements seen in smoking cessation rates from the use of NRT appear to have been lost since these products became available over-the-counter.\textsuperscript{79} It has been reported that many smokers and ex-smokers have inadequate knowledge of and negative attitudes toward NRT.\textsuperscript{80} There is also the suggestion that there has been no increase in smokers’ rates of using NRT, making a quit attempt, or stopping smoking after NRT became available for over-the-counter sale.\textsuperscript{81} These results confirm the importance of not using NRT alone, but in combination with counselling and support. Pharmacists should develop and demonstrate effective pharmacy-based programs for smoking cessation.\textsuperscript{53}

"Many pharmacists remain to be convinced of their role and their responsibility in the area of smoking cessation. Many believe that the barriers to involvement are insurmountable. They think they do not have the time to provide an effective service, they fail to appreciate that they need to develop new skills, they feel there is little reward for their involvement, and they often question the relevance of smoking cessation to their role. Smoking cessation provides a golden opportunity for our profession. It allows us to undertake a professional role in primary and secondary disease prevention and in doing so it will improve our businesses. But, currently these opportunities are passing us by and, if they are lost, the loss will cause us problems in supporting a case for our involvement in other areas of health care."\textsuperscript{64}

"Pharmacy has neither the time nor reason to be complacent in how it delivers in this important public health area. Standards are in place, processes have been identified and opportunity awaits."\textsuperscript{65}
There are comprehensive data indicating that more active or physically fit individuals are less likely to experience coronary heart disease, or acquire coronary heart disease at a later age, and have lower mortality rates than their sedentary counterparts. In fact, the most sedentary individuals generally demonstrate twice the rate of coronary artery disease as the most physically active individuals. Community pharmacists can again play an important role in promoting the benefits of exercise and encouraging all patients to be physically active. This approach by pharmacists can be particularly useful in counselling patients on intervention strategies to prevent or delay the onset of diabetes mellitus.

The National Heart Foundation’s Heartmoves is a sustainable exercise program, delivered and managed by the local fitness industry, capable of retaining clients and attracting the population of older Australians who have not exercised for a while and who want to prevent or better manage their chronic conditions by becoming active for life. The Heartmoves model provides a resource whereby general practitioners, practice nurses and ‘Allied Health Professionals’ (presumably including pharmacists) are provided with the information and tools to confidently assess, screen, and refer their patients to the local Heartmoves program provider.
Researchers in Ottawa, Canada have recently described and tested a decision aid for patients with hypertension and/or hyperlipidaemia that can be utilised to assist in the
provision of pharmaceutical care. The decision aid consists of a booklet containing general, evidence-based information and a personal worksheet (see excerpt in Figure 20). The latter provides information on patient risk factors, personal estimates of CVD risk, the benefits of treatment options and a values clarification exercise. There are two versions of the decision aid: (i) for people with no history of heart disease or stroke and (ii) for people who have had a history of heart disease or stroke.

A small trial found that the decision aid was acceptable to patients and improved their knowledge, risk perception and decisional conflict relating to taking action to reduce CVD risk.

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**Heart Disease and Stroke**

Let’s look at what happens to people who have heart attacks or strokes.1

Out of 100 people who have a heart attack...

- 50 will die within one month (50%)
- 25 will have to limit their activities due to chest pain or shortness of breath (25%)
- 25 will be able to get back to their normal activities after a few weeks (25%)

Out of 100 people who have a stroke...

- 20 will die within one month (20%)
- 30 will go to a nursing home as they need help with eating, going to the bathroom and walking (30%)
- 20 will return home, but will have some problems walking or talking (20%)
- 30 will be able to return home and recover fully (30%)

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**Major Risk Factors**

Personal factors, for example, being under stress, and lifestyle habits (for example, smoking), increase your risk of heart disease and stroke. The six main risk factors are:

- Abnormal blood cholesterol
- High blood pressure
- Lack of physical activity or exercise
- Smoking
- Being overweight or obese
- Stress

If you suffer from diabetes or if you had a heart attack or stroke in the past, your cardiovascular risk is higher. Let’s look at the risk factors more closely and learn what you can do to reduce them.

**ABNORMAL BLOOD CHOLESTEROL**

Cholesterol is a fat-like material. It is necessary to help the body function. However, too much cholesterol is bad because it sticks to the walls of the arteries and makes them narrower. This means that blood cannot flow well through the arteries.

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Figure 20 Excerpt from the patient decision aid “Making Choices: Life Changes to Lower Your Risk of Heart Disease and Stroke”, developed by the Ottawa Health Research Institute (http://decisionaid.ohri.ca/decaids.html).91
In the United States, pharmacists are being asked to help achieve the public health goals expressed in ‘Healthy People 2010’, a document issued by the federal government that expresses the areas of focus for Americans in the first decade of the 21st century. Healthy People 2010 provides general goals for 10 leading health indicators (such as tobacco use, over-weight and obesity, and immunisations), and these are then further subdivided into 28 focus areas, many of them with quantifiable goals.

“As health care professionals, pharmacists have the responsibility to help the country meet these goals. Ideas for increased pharmacist involvement are described in the article, including the conduct of screening programs and provision of specialized services that focus on such areas as hypertension, diabetes, asthma, patient education, smoking cessation, or general medication management. Pharmacists can build their efforts in these and similar areas by collaborating with physicians and other appropriate professionals, identifying target patients who have obtained services at the pharmacy, contacting patients in at-risk populations within the pharmacy’s patient base and/or the community, choosing and monitoring an objective of interest, and maintaining efforts for sustained time periods. Pharmacists, uniquely positioned as the most accessible health care providers in the community, can dedicate their considerable strengths toward using Healthy People 2010 as a tool to organise their own efforts and motivate their patients.”

“Community pharmacies are an excellent setting for health promotion in the community; they see over 90% of the population per year. Pharmacy education and training is changing and health promotion is now part of the undergraduate curriculum. There is an increasing body of research about the effects of pharmacy health promotion and a number of examples of good practice. Pharmacists see healthy as well as sick people. They have a special relationship with many of their regular customers which enables them to promote health, they can also give population messages to passing trade.”

There is no reason why community pharmacists in this country cannot be expected to make a similar contribution to national strategies to prevent CVD. Many resources are available to assist in this role. The National Heart Foundation of Australia, in particular, has a vast range of materials for health professionals and consumers, many of which can be freely obtained from its website (www.heartfoundation.com.au). The ‘Broadband for Health: Pharmacy’ program means that pharmacists across Australia should be able to access these and other materials without difficulty. Other extensive educational brochures and booklets (on healthy eating, physical activity, heart health and conditions, surgery, blood pressure etc.) can be ordered at low cost through the Heart Foundation’s Heartline. Some information is
available in a range of languages. These materials can also be useful resources for community pharmacists when giving community talks.

The community pharmacy can be an important place for consumers to access cardiovascular health information via leaflets and posters. This material can act as a prompt for consumers to change their lifestyle or raise issues with the pharmacist or general practitioner.

The New Zealand Guidelines Group has recently (June 2005) released the New Zealand Cardiovascular Guidelines Resource on CD-ROM, an excellent resource developed to assist primary care practitioners in providing evidence-based care (www.nzgg.org.nz). It contains full text of CVD guidelines, summaries and consumer resources (including a range of the National Heart Foundation of Australia’s consumer materials).

Figure 21  Example of materials for consumers available from the National Heart Foundation of Australia’s website.
Similar material (on stroke, transient ischaemic attacks, atrial fibrillation, hypercholesterolaemia and hypertension) is available from the Stroke Foundation.

Figure 22 Information leaflets for patients with CVD available from the National Heart Foundation of Australia’s website.
Positive steps to reduce your risk of heart disease

Your heart needs care for life. A healthy heart is about enjoying a healthy lifestyle and making this a part of your everyday life. It is also about taking positive steps to reduce risk factors.

Everyone can do something to help prevent heart disease, including people who already have heart disease or who have had a heart event. The good news is that if you lead a healthy lifestyle, as outlined below, you can reduce your risk of developing heart disease.

The best ways to reduce the risk of developing heart disease, and to help prevent it getting worse if it already exists is to reduce or remove the risk factors over which we have some control. To do this, have ongoing heart disease risk assessments with your doctor and lead a healthy lifestyle as outlined below. Being male, increasing age and having a family history of early death from heart disease are also risk factors for developing heart disease, but are much more difficult to control or change.

1. Be smokefree

Smoking reduces the amount of oxygen in your blood and damages the artery walls. Stopping smoking is the single most important thing you can do to reduce your risk of coronary heart disease. For more information on quitting smoking, call the Quitline on 131 848.

2. Enjoy healthy eating

Cholesterol and fat contribute to the deposits which build up in the artery walls and cause disease. You can help lower your blood cholesterol level and limit further artery clogging by reducing the amount of saturated fat you eat. Saturated fat is found in fatty meats, full cream dairy products, butter, two vegetable oils (coconut and palm oils), most fried take-away foods and commercially baked products. Replace saturated fats with moderate amounts of monounsaturated and polyunsaturated fats such as canola, olive, sunflower and soybean oils.

3. Be physically active

The body is designed to move, and regular, moderate physical activity is good for the heart. Being active is also a great way to have fun. Physical activity can also help control other risk factors such as high blood pressure and being overweight. The Heart Foundation recommends that people include 30 minutes or more of moderate intensity physical activity (such as brisk walking) on most, if not all days of the week, for health benefits. The amount of activity can be accumulated in shorter bouts, e.g. three 10-minute walks.

4. Control blood pressure

High blood pressure can strain your heart and speed up the process of coronary heart disease. Have regular blood pressure checks. If your blood pressure is high, reduce salt intake, limit alcohol to two drinks or less daily and follow your doctor's advice. Long-term medication may be required to manage high blood pressure.

5. Maintain a healthy weight

Being overweight and carrying too much weight around the waist are risk factors for coronary heart disease and diabetes. Healthy eating and being physically active assists weight loss. Your doctor can advise you on your waist measurement goal.

For more information on preventing heart disease please call the Heart Foundation’s national telephone information service, Heartline, on 1300 36 27 87.

Figure 23 Example of general material on prevention of CVD for consumers available from the National Heart Foundation of Australia’s website.
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Figure 24 Educational material available for order through the National Heart Foundation of Australia’s Heartline

The Pharmaceutical Society of Australia’s Self Care program also has useful material on CVD for patient education (Figure 25 and Figure 26).
Figure 25  Pharmacy Self Care card on exercise and CVD
Pharmacy Cardiovascular Health Care Model

Figure 26 Pharmacy Self Care card on hypertension

Blood pressure check every 1 to 2 years, even if high blood pressure before

When your blood pressure is normal, the reading will include two numbers,

120 over 80. These refer to the systolic (120) and diastolic (80) blood pressures.

Elevated blood pressure can be controlled by the heart straining to pump enough blood to the body. This can cause serious damage to the heart.

Healthy lifestyle changes that can lower blood pressure can be as simple as

- Losing weight
- Eating a heart-healthy diet
- Regular physical activity
- Quitting smoking
- Limiting alcohol
- Reducing sodium intake

If your blood pressure is high, your doctor may prescribe medicine or other lifestyle changes to help control it.

Your blood pressure would be:

- 120/80 to 129/89: normal
- 130/80 to 139/89: high blood pressure
- 140/90 or higher: stage 1 hypertension

If you have high blood pressure, your doctor may recommend:

- Lifestyle changes: diet, weight loss, exercise
- Medications: diuretics, beta-blockers
- Additional tests: cholesterol, glucose, kidney function

Your pharmacist can help you manage your high blood pressure.

Figure 26 Pharmacy Self Care card on hypertension
Obesity and excess weight gain are public health concerns because they are associated with a number of comorbid conditions that compromise health.\cite{1} Obesity is negatively associated with diabetes, dyslipidaemia, atherosclerosis, cardiovascular disease, stroke, arthritis, cancer, gallstones, and sleep apnoea. According to data from the 1999 National Health and Nutrition Examination Survey,\cite{2} 61% of American adults are overweight or obese -- a 5% increase in prevalence since 1994. In response to this trend, the U.S. Department of Health and Human Services has expanded its 2010 health objectives to include a goal of reducing the prevalence of obesity to less than 15% among U.S. adults over the next decade.\cite{1}

If this goal is to be achieved, health care professionals must aggressively target excess weight gain and obesity, help their patients learn more about the health risks associated with excess weight, and help patients understand how to prevent and manage obesity. Pharmaceutical care services centered on nutrition and weight loss can be an important component of this strategy.

This article focuses on the overweight and obesity management component of the Auburn University Pharmaceutical Care Center's (AUPCC) Healthy Habits Wellness Program.

Bednall R, 2001\cite{5}

"This article summarises the UK and North American evidence based guidelines for intervention. Smoking results in a significant drain on the healthcare resources of this country. As health care professionals, pharmacists are ideally placed to promote the benefits of a smoke-free lifestyle. Every opportunity should be taken to pass on this message to smokers we encounter - because EVERY LITTLE HELPS."

5.3 **IMPROVING COMMUNITY AWARENESS OF THEIR RISK FACTORS**

General population screening for CVD risk factors (e.g. hypertension or hyperlipidaemia) is another possible activity for community pharmacists under the heading of Public/preventive health promotion, and has been reported in the literature. However, a targeted approach, focussing on at-risk individuals, is more likely to be cost-effective and should be integrated with an absolute CVD risk assessment process.

Assessment of the need for pharmacological intervention (eg. treatment of dyslipidaemia or hypertension) in at-risk individuals without established vascular disease should be based on quantification of the individual’s absolute risk of future vascular events and the reduction in this risk which could be anticipated as a result of the intervention.\cite{45}

We have previously concluded that “any pharmacy-based CVD screening program should be specifically targeted to those individuals likely to be at elevated risk and should
incorporate absolute risk assessment” (Pharmacy Guild of Australia/Government, Third Community Pharmacy Agreement Research and Development Grants Program. Project 2002-022: “Pharmacy-based Heart Assessment and Referral Methodology: a program to tackle coronary heart disease in the Australian community”;

Although screening is a widely recognised approach to early detection, population-based screening is unlikely to be appropriate or cost-effective for the detection of all chronic diseases. Instead, focussing on risk factors and identifying high-risk population groups offers opportunities for more targeted and cost-effective approaches to screening. 21

McKenney JM, 1993 96 no abstract

Earle KA et al, 2001 97

Hypertension is poorly managed. Hospital-based pharmacists working with physicians have been shown to improve the rate of achievement of ‘target’ blood pressure in selected patients. It is unknown if such schemes can operate in the community and to what extent they would attract volunteers with poorly managed blood pressure. We assessed the feasibility of pharmacists to provide community-based, open-access, blood pressure monitoring. In addition, we describe the blood pressure profile of the group in comparison to that of the 1994 Health Survey of England (HSE). Pharmacists from six pharmacies were trained to deliver the service. Adults living within the postal districts of the pharmacies were invited, through an advertising campaign, to volunteer to have their blood pressure measured. Blood pressure data and information on treatment for hypertension and/or diabetes were collected on 263 registrants. Patients were advised to have their blood pressure managed by the general practitioner immediately (category 1), re-measured within 2-3 months (category 2) or in 12 months time (category 3). The mean (s.d.) blood pressure of patients in categories 1 (n = 16), 2 (n = 177) and 3 (n = 130) was 186(16)/97(29), 151(13)/94(9) and 139(22)/86(13) mm Hg respectively; P < 0.001. Ninety-one patients (35%) were in receipt of antihypertensive therapy. Forty-five percent of the treated group had controlled blood pressure (<160/95 mm Hg) compared with 30% in the HSE dataset. A large proportion of known hypertensive patients with poor blood pressure control who had visited their general practitioner within the previous 6 months were detected by the pharmacist-led service. Pharmacists operating an open-access blood pressure monitoring service may be of value in improving the management of hypertension.

Atthobari J et al, 2003 98

...a screening of the general population on cardiovascular and renal risk factors with subsequent letter to intervene with drug treatment in hypertension and/or hyperlipidemia is effective, although definitely not optimal. The level of blood pressure and plasma cholesterol, and not the presence of other cardiovascular risk factors, influences the general practitioner to prescribe a blood pressure and/or lipid lowering drug.

Boyle T et al, 2004 99

A positive public health initiative involving community pharmacists was demonstrated in this study. Community pharmacists had a significant impact on motivating men to see a physician
for follow-up care once a potential health risk was identified. The MHRAT (Men’s Health Risk Assessment Tool) and the pharmacist recommendation or patient education were the motivating factors and not follow-up telephone interventions by the pharmacist. Given community pharmacists’ unique accessibility an enormous opportunity exists for community pharmacists to raise awareness of men’s health care and influence men’s health behaviour.

5.4  PROMOTE AWARENESS OF THE EARLY SYMPTOMS OF ACUTE CARDIOVASCULAR EVENTS

Community pharmacy would seem to be one ideal site to locate awareness programs directed at encouraging early presentation of patients with possible acute myocardial infarction or cerebrovascular accidents for emergency medical attention.

Time is also a critical factor in the survival of people who experience a cardiac arrest, with the likelihood of survival decreasing by 10 per cent every minute. While treatments for cardiac arrest have improved, delays in seeking treatment continue to contribute to mortality. When cardiac arrest victims are offered prompt defibrillation following the event, their chance of survival increases dramatically.

It is estimated that around 4,000-5,000 lives could be saved each year in Australia in people aged 69 years and younger if heart attack victims recognised their symptoms and promptly sought treatment. At least that number again could be saved in the over 70 age group. The greatest gains could be achieved by reducing the time between an acute event and access to emergency treatment, by raising awareness within the community of the importance of swift action. In addition, appropriate placement of public access defibrillators could help to provide prompt treatment for the 15 per cent of cardiac arrests that occur in public places.

Emergency treatment of stroke is critical to limit damage to the brain and to prevent complications and recurrent stroke events. However, recognition of the signs and symptoms of stroke in the general community is poor, resulting in delays in seeking medical care and early treatments.

Improving knowledge of the early warning signs of stroke has been linked to people seeking earlier access to emergency treatment both in Australia and overseas.45

5.4.1  Chest pain

Chest pain: prompt referral is the best approach

Chest pain is a worrisome symptom for both patients and health professionals.100 The evaluation of acute chest pain remains challenging, despite many insights and technological innovations over the past two decades,101 with entire books devoted to the subject.102 The prevalence of chest pain is quite high, with studies reporting a prevalence of this symptom in 7-11% of general practice patients.100 Up to 25% of the general population experiences some form of chest pain during their lifetime.100,103
The major dilemma here for health professionals is that chest pain is often non-cardiac in origin, and it can be very difficult to distinguish cardiac from non-cardiac pain. A cardiac aetiology is present in only 11-34% of the ambulatory population with chest pain. A population-based study of 672 randomly selected individuals in Sydney found that 39% reported having chest pain at some time in their lives, with 85% of these cases being subsequently classified as non-cardiac chest pain. Causes of unexplained non-cardiac chest pain include oesophageal disorders, psychiatric disorders, and musculoskeletal injuries (Table 18). These conditions frequently overlap. At least 50% of non-cardiac chest pain syndromes are attributable to gastroesophageal reflux disease or panic or depressive disorders, while it is estimated that approximately 20-25% of non-cardiac chest pain has a musculoskeletal basis.

In a typical population of patients with acute chest pain who present at an emergency department, approximately 15% have acute myocardial infarction (AMI) and about 30-35% have unstable angina, while a minimum of 30% have non-cardiac chest pain. Non-cardiac chest pain accounts for approximately 2-5% of all emergency department presentations, and 20-30% of all medical admissions to hospital are for acute chest pain. Hospital costs alone associated with non-cardiac chest pain have been conservatively estimated to exceed $30 million annually in Australia. Up to 39% of patients with chest pain present again to hospital within four months.

Chest pain has been a diagnostic problem for centuries, and today’s doctors may be no better at diagnosing cardiac pain accurately than their predecessors 60 years ago. Many countries have implemented specialist rapid-access chest pain clinics to expeditiously diagnose and manage patients with chest pain, but there has been considerable debate about their effectiveness. While chest pain clinics may improve outcomes, this has not been established conclusively.

Early presentation to hospital after the onset of acute chest pain has been widely promoted to the public, so that patients with AMI can benefit from early thrombolytic therapy. However, patients are still putting their lives at risk because they often do not recognise the symptoms of AMI and, consequently, do not present for treatment quickly enough. Leslie and colleagues interviewed 313 patients in Glasgow who had survived an AMI and found that, although 86% of them had suffered chest pain, only 20% had recognised this as being a symptom of AMI. Many patients who had no previous cardiac history had “no idea” what had caused their symptoms or thought that they had indigestion. Only 25% of the patients had made a call for medical help within one hour of the symptoms starting and in 12% of cases the delay had exceeded 24 hours. When asked why they had delayed calling
for medical help, most patients responded that they had thought the symptoms “would go away” or that they had not been serious enough. It was concluded that health care professionals should raise awareness of thrombolysis and the benefits of seeking medical attention promptly.\textsuperscript{121} There is evidence that individuals from lower socioeconomic groups are less likely to present for medical attention in response to chest pain.\textsuperscript{122} There clearly is an important role here for community pharmacists in educating patients, particularly those with a history of ischaemic heart disease, about the need to rapidly respond to symptoms of chest pain.

Over the last decade, most hospitals have observed a decline in the number of presentations with AMI, while there has been a proportionately greater increase in admissions with unstable angina or non-cardiac chest pain. Patients with AMI who are mistakenly discharged from the emergency department of hospitals have short-term mortality rates of about 25%, at least twice what would be expected if they were admitted.\textsuperscript{101} Approximately 4% of patients with AMI are mistakenly sent home from emergency departments.\textsuperscript{101, 113} The legal costs that can result from such cases constitute the largest category of losses from malpractice litigation in the emergency department.\textsuperscript{101, 104} Fitzpatrick described the case of a 38-year-old male who presented to the emergency department of a Sydney hospital with chest pain.\textsuperscript{123} He had diabetes and had been a smoker in the past. Clinical examination, an electrocardiogram and blood tests for cardiac enzymes were all found to be normal. The diagnosis was indigestion and the patient was discharged for follow-up by his general practitioner. The next day the patient again developed chest pain, while visiting the zoo with 3 young children, and collapsed. A bystander commenced cardiopulmonary resuscitation on the unconscious man until an ambulance arrived. He was found to be in ventricular fibrillation and the ambulance officers attempted unsuccessfully to defibrillate him. He was dead on arrival at hospital.

On the one hand there is the possibility that the patient with chest pain is having an AMI and should be immediately referred to a hospital emergency department for assessment and possible thrombolytic therapy or angioplasty. On the other hand, referral to a hospital could prove to be an over-reaction in a patient with gastroesophageal reflux. The evaluation of chest pain in a patient presenting to a pharmacist, or any other health professional, should begin with questioning that focuses on the characteristics of the pain, the time of onset, and the duration of symptoms.\textsuperscript{101} Attention should be paid to the severity, location, radiation and duration of the pain, along with any precipitating and relieving factors.\textsuperscript{106} It should also be determined whether the patient has any other symptoms, such as nausea and vomiting, or shortness of breath. A past medical history of ischaemic heart disease or
gastroesophageal reflux disease can perhaps provide some indication of the likely cause but, as in the cases outlined, may also prove to be red herrings. High-risk symptoms include severe or ongoing pain lasting 20 minutes or more, new pain at rest or with minimal activity, and severe dyspnoea.\textsuperscript{107} There are some differentiating features with the major causes of chest pain (Table 19),\textsuperscript{108} but there is significant overlap in terms of character, quality, location, pattern of radiation, severity, and duration.\textsuperscript{109} Although a cardiac cause is not the commonest origin, a high index of suspicion is needed. When the diagnosis is not clear, a cardiac cause should be considered until proven otherwise.\textsuperscript{124} The most important single source of data is the electrocardiogram,\textsuperscript{101} hence the need for prompt referral of all patients presenting to a community pharmacy with acute chest pain.\textsuperscript{106} It really is a matter of being safe rather than sorry.
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<td>Reflux oesophagitis</td>
<td></td>
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<tr>
<td>Oesophageal dysmotility (achalasia, oesophageal spasm)</td>
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</tr>
<tr>
<td>Peptic ulcer disease</td>
<td></td>
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<tr>
<td>Pancreatitis</td>
<td></td>
</tr>
<tr>
<td><strong>Psychiatric</strong></td>
<td></td>
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<tr>
<td>Depression</td>
<td></td>
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<tr>
<td>Panic and anxiety disorders</td>
<td></td>
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<tr>
<td>Somatisation</td>
<td></td>
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<tr>
<td><strong>Pulmonary</strong></td>
<td></td>
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<tr>
<td>Asthma</td>
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<tr>
<td>Hyperventilation</td>
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<tr>
<td>Pleural effusion</td>
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<tr>
<td>Pleurisy</td>
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<tr>
<td>Pneumothorax</td>
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<tr>
<td>Pulmonary embolism or infarction</td>
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<tr>
<td>Pulmonary hypertension</td>
<td></td>
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<tr>
<td><strong>Rheumatologic/musculoskeletal</strong></td>
<td></td>
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<tr>
<td>Cervical and thoracic radiculopathy</td>
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<tr>
<td>Chest wall trauma</td>
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<tr>
<td>Costochondritis</td>
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<tr>
<td>Fibromyalgia</td>
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<td>Shingles</td>
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</table>
### Table 19  Differentiating features with the major causes of chest pain

<table>
<thead>
<tr>
<th>Cause of chest pain</th>
<th>General characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myocardial ischaemic pain</td>
<td>Duration usually over 20 minutes</td>
</tr>
<tr>
<td></td>
<td>Located in the retrosternal area, possibly radiating to the arms (the pain is most common in the left shoulder and arm), back, neck or the lower jaw</td>
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<td></td>
<td>The pain is usually described as pressing, crushing, squeezing, weight-like or a sensation of heaviness; breathing or changing posture does not notably influence the severity of the pain</td>
</tr>
<tr>
<td></td>
<td>Continuous, enduring, severe pain</td>
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<tr>
<td></td>
<td>Myocardial ischaemic pain due to coronary arteriosclerosis (angina) is usually exertion-related, at least initially. However, the pain of AMI may occur suddenly when the patient is at rest</td>
</tr>
<tr>
<td></td>
<td>Rapid, weak or irregular pulse</td>
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<tr>
<td></td>
<td>Nausea and vomiting are sometimes the main symptoms</td>
</tr>
<tr>
<td>Oesophagitis</td>
<td>Heartburn</td>
</tr>
<tr>
<td></td>
<td>Worse in recumbent position, but also during exertion, like angina</td>
</tr>
<tr>
<td>Depression</td>
<td>Continuous feeling of heaviness in the chest, no correlation to exertion</td>
</tr>
<tr>
<td>Hyperventilation</td>
<td>The main symptom is dyspnoea, as in pulmonary embolism or spontaneous pneumothorax</td>
</tr>
<tr>
<td></td>
<td>Often a young patient</td>
</tr>
<tr>
<td></td>
<td>Tingling and numbness of the limbs, dizziness</td>
</tr>
<tr>
<td>Pleuritis</td>
<td>A jabbing pain when breathing. A cough is the most common cause</td>
</tr>
<tr>
<td>Costochondral pain</td>
<td>Palpation tenderness, movements of chest influence the pain</td>
</tr>
<tr>
<td>Early herpes zoster</td>
<td>Rash, localised paraesthesia (tingling) before rash</td>
</tr>
</tbody>
</table>
Current recommendations for chest pain education generally focus attention on individuals who have the greatest potential benefit. Therefore, education and counselling should be aimed at reducing presentation delay for patients at high-risk for a future AMI. This would include patients with established CVD, clinical atherosclerotic disease of the aorta or peripheral arteries, or clinical cerebrovascular disease.

Community pharmacy would seem to be one ideal site to locate awareness programs directed at encouraging early presentation of patients with possible AMI or cerebrovascular accidents for emergency medical attention. The community pharmacist is an excellent resource for reinforcing the doctor’s initial educational intervention for several reasons.

- The pharmacist is readily accessible to high-risk patients.
- Patients’ trust in their pharmacist has been well documented. People are more likely to accept and act on information provided from a source they trust.

Therefore, the availability of and the confidence placed in community pharmacists makes them a logical resource for providing the additional educational interventions needed to effect behavioural change in this high-risk group.

Holt and Hand have described the pivotal role of the community pharmacist as a key intermediary for educating high-risk individuals (with pre-existing coronary heart disease, peripheral vascular disease, or cerebrovascular disease) and their family members about early symptom recognition and appropriate response.\textsuperscript{125}
### Table 20  Counselling Plan for High-Risk Patients

#### Who

1. Patients with a diagnosis of coronary heart disease (CHD); patients with clinical atherosclerotic disease of the aorta, arteries to the limbs, or carotid arteries (includes patients with previous myocardial infarction [MI] or angina; patients who have had coronary angioplasty or coronary artery bypass surgery); patients with clinical symptoms and signs of peripheral vascular disease; patients with transient ischemic attacks or past stroke or demonstrated carotid atherosclerosis.
2. Elderly patients, women, low-income patients.

#### What to Discuss

1. Typical symptoms of an acute myocardial infarction (AMI)
   a. Chest discomfort/pain, possibly radiating to the arm, neck, or jaw
   b. Shortness of breath
   c. Sweating and gastrointestinal complaints (nausea)
2. Expectations about symptoms
   a. Symptoms may come on gradually or may be intermittent
   b. A heart attack is not necessarily accompanied by sudden, crushing chest pain and unconsciousness
   c. Symptoms may or may not resemble prior symptoms
3. Steps to take if experiencing symptoms
   a. Take appropriate medications
      i. Nitroglycerin (if prescribed)
      ii. Aspirin (chew one 300 mg adult uncoated tablet)
   b. Call emergency medical services (EMS) if symptoms continue for more than 15 minutes
   c. Know the location of the hospital with 24-hour emergency services closest to home or work
   d. Identify and address potential health care system barriers
4. Emotional aspects
   a. Emphasize the big reward for acting quickly and getting definitive treatment before irreversible myocardial damage occurs
   b. Denial of the serious nature of symptoms contributes to treatment delay
   c. Attribution of symptoms to a system other than cardiac is common, but contributes to delay
   d. Prior negative experiences in seeking care need to be reconciled
5. Social aspects
   a. Family members/significant others should be included in all education and counselling and have a good understanding of the nature of AMI symptoms and importance of calling EMS quickly
   b. Family members/significant others should consider taking a cardiopulmonary resuscitation (CPR) class
   c. Family members/significant others have an important role in preventing patient denial and in facilitating the call to access EMS

#### When and Where to Educate

1. Physician office/clinic, inpatient hospital setting, and cardiac rehabilitation programs
2. Community setting such as pharmacy or a home health nurse

How to Educate

1. One-on-one instruction
   a. Keep message simple and consistent
   b. Repeat message in variety of settings

2. Use supplementary means of reinforcing your message about symptoms and action steps
   a. Written materials (at approximately sixth-grade reading level)
   b. Patient Advisory Form
   c. Videos

3. Encourage individuals to have a plan and to review/rehearse it periodically (Patient Advisory Form)

---

Name:

Physicians now have treatments that can stop heart attacks and lessen damage to the heart. To make sure you can benefit from these treatments, you need to act promptly if you begin to experience symptoms that might signal a heart attack.

1. You may feel:
   - Chest pain, discomfort, or pressure
   - Left arm pain or discomfort
   - Pain radiating to neck or jaw
   - Shortness of breath
   - Sweating
   - Upset stomach
   - Discomfort in the area between breastbone and navel
   - A sense of dread
   - Other

2. Medication instructions:
   - Chew one 325 mg tablet of uncated adult aspirin
   - Place 1 tablet of nitroglycerin under your tongue as soon as you feel discomfort. Take a second tablet if the discomfort does not go away in 5 minutes. Take a third tablet after 5 more minutes if the discomfort does not go away.
   - Other

3. If the symptoms stop, call your physician at:

4. If symptoms continue for more than 15 minutes, call the emergency medical services phone number below immediately. (Often, this is 911, but you should check to make sure.) Never wait longer than 15 minutes.
   - At home, the emergency phone number is:
   - At work, the emergency phone number is:
   - At ____________________________, the emergency phone number is: ____________________________

5. Know the location of the nearest 24-hour emergency department:
   - At home, the closest emergency department is:
   - At work, the closest emergency department is:
   - At ____________________________, the closest emergency department is:

Place this form next to the phone, near your other emergency numbers!

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Figure 27 Example of educational material on prompt presentation for chest

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Heart Attack? Act now. Question later.
Get to hospital fast. Delay can be fatal.

The warning signs
- Squeezing, discomfort, pressure or pain in the centre of the chest or behind the breastbone lasting more than 10 to 15 minutes.
- Pain spreading to the shoulders, neck, jaw and/or arms.

These symptoms may be accompanied by:
- Sweating, shortness of breath
- A sick feeling in the stomach
- Dizziness

Regard these symptoms as an emergency. Do not waste vital moments.

Rather than attending your doctor’s clinic, take the following steps:
1. Dial 000.
2. Ask for ambulance service.
4. If available, an aspirin should be taken unless it is known that the person has been advised not to take aspirin.
5. The affected person should rest quietly while waiting for transport or assistance.

*Note:* In particular circumstances when an ambulance is not readily available, such as in a rural environment:
- quickly notify the nearest hospital, health clinic or the person’s usual doctor for advice;
- it may be appropriate to arrange for someone to drive the person suffering a suspected heart attack to hospital.

Sudden pain or discomfort in the chest can be a frightening experience not just for the person concerned, but also for any family, friends or workmates who may be present.

It is natural for all those involved to hope that the pain is not being caused by a heart attack, but by some other less serious condition such as indigestion, or a pulled chest muscle. Do not let this delay life-saving action.

With heart attack, every minute counts. If you have any of the warning signs, do not waste vital moments wondering whether it is a heart attack or not. Take immediate action!

What is a heart attack?
The heart is a muscular pump that needs a continuous supply of oxygen. It obtains oxygen from the blood, which flows to the heart muscle through arteries on the heart’s surface. These arteries are called the coronary arteries.

‘Heart attack’ is the term used when a coronary artery is suddenly blocked by a blood clot and the part of the heart muscle supplied by that artery is damaged because it is starved of oxygen. The main symptom is chest pain or discomfort. The medical term for this sudden blockage by a blood clot (thrombus) in a heart artery is coronary thrombosis or coronary occlusion (blockage). The medical term for permanent damage to the heart muscle is myocardial infarction.

**Figure 28** Excerpt from ‘Heart Attack, available in 10 languages from the National Heart Foundation of Australia’s website.
5.4.2 Stroke

What is a transient ischaemic attack (TIA)?

What is a Transient Ischaemic Attack?
A Transient Ischaemic Attack (TIA) happens when the blood supply to the brain is interrupted for a short period of time. It is often called a "mini-stroke". The signs are the same as those of a stroke, but they do not last as long. The signs of a TIA may disappear in a few minutes and last no longer than 24 hours. They are often a warning of impending stroke.

What are the signs of a TIA?
The signs of a TIA depend on which part of the brain is not getting enough blood. They are the same as the signs of stroke and may include one or all of the following:
- Weakness, numbness or paralysis of the face, arm or leg on either or both sides of the body
- Difficulty speaking or understanding
- Dizziness, loss of balance or an unexplained fall
- Loss of vision, sudden blurred or decreased vision in one or both eyes
- Headache, usually severe and of abrupt onset or unexplained change in the pattern of headaches
- Difficulty swallowing

What should I do if I think I am having a TIA?

A TIA should never be ignored
If you, or someone you know, have any of the signs of a TIA, seek medical attention immediately. Though the signs may be due to something quite different from a TIA, such as a migraine or an epileptic seizure, the sooner you seek help the more likely the doctor will be able to say whether or not it was a TIA.

What should I do if the signs go away?
You should see your doctor even if the signs go away and you feel completely better. A TIA is a strong warning that a stroke may happen. Stroke can lead to death or long term disability. It can be prevented with changes to your lifestyle or with medication. Your doctor will talk to you about your treatment options.

What causes a TIA?
A TIA happens when blood going to the brain is stopped and then starts again. Blood is carried to the brain by blood vessels called arteries. Blood may stop moving through an artery because the artery is blocked by a blood clot. In some cases, a TIA may be caused by a small bleed in the brain.

When blood is stopped, the brain cannot get the oxygen and food it needs and brain cells in the area start to die. These cells usually die within minutes to a few hours after the blood flow is stopped. Once blood flow starts again, the brain once again gets the oxygen and food it needs and the signs of TIA may disappear. Further clots may block blood flow to the brain for a short time (causing another TIA) or permanently (causing a stroke).

What will the doctor do?
The doctor will want to know about your signs - what they were, how long they lasted and whether they have happened before. This will help distinguish between a TIA and other possible causes.

Figure 29 Excerpt from ‘Transient Ischaemic Attack’, available from the Stroke Foundation’s website (www.strokefoundation.com.au)
Figure 30  Example of an educational poster suitable for display in community pharmacy (from the Stroke Foundation’s website).
6. Elements of the Pharmacy Cardiovascular Health Care Model:

**Continuum of care**
- transfer of medication-related information,
- follow-up post-discharge

**GUIDING PRINCIPLES AND EXISTING FRAMEWORK**

**NATIONAL CHRONIC DISEASE STRATEGY:**
- Key direction 26: Promote the development of standard procedures for referral, pre-admission, discharge, and other transfer arrangements between services and sectors.
- Key direction 31: Support appropriate use of medicines to maximise health outcomes and quality of life.

**NATIONAL SERVICE IMPROVEMENT FRAMEWORK FOR HEART, STROKE AND VASCULAR DISEASE**

**Critical intervention points:**
- Develop and implement strategies to support a multi-disciplinary team approach which promotes continuity of care.
- Implement policies to encourage the safe and quality use of medicines.

“Particularly important are transition points across the health system. The transition that has received the most focus is the transfer from hospital care to the community. Effective discharge planning that integrates care pathways into the community is imperative to reorienting practice from discrete and isolated interventions toward integrated and continuous care.”

“Poor compliance with management plans, and errors with medication plans, are major contributors to re-hospitalisation rates in people with long term heart disease. Further, poor continuity in the use of medicines between episodes of care, have been linked with excess morbidity for the person with chronic disease. As people with heart, stroke and vascular disease may require up to 10 medications, improving understanding of their treatments, and ensuring continuity in the flow of information about a person's medication requirements between providers, are key requirements to reducing the burden of re-hospitalisation in people with heart, stroke and vascular disease.

People are often not aware of what medicines they are taking, and GPs are not consistently made aware of changes to treatment plans. A lack of medication information provided to out-of-hospital professionals is associated with an increased likelihood of the person suffering an adverse event related to their medication.”

"22
6.2 **TRANSFER OF MEDICATION RELATED INFORMATION AND FOLLOW-UP OF PATIENTS POST-DISCHARGE**

A major contributor to inadvertent polypharmacy and drug-related problems in the elderly appears to be hospitalisation and the consequent changes in medication (drugs or brands of drugs) at the transition from out-patient to in-patient care and back.\(^{126-133}\) Discharge from hospital represents a period of high-risk for adverse drug events in elderly patients.\(^{134-137}\) These patients have often experienced a recent change in health state and have frequently had several prescription changes. There may also be incomplete communication with community care providers reflecting these changes.\(^{137}\) Some of the problems that can arise were recently listed by Forster *et al.* (Figure 31).\(^{135}\) In their study, which evaluated all types of adverse events affecting patients following discharge, it was determined that 19% of patients experience an adverse event within 5 weeks of discharge. One third of these were preventable, that is, they were caused by an error in management. Another third were ameliorable, that is, their severity could have been significantly reduced if health care delivery had been optimal. Adverse drug events were the most common type of adverse event and accounted for almost two thirds of them.

![Figure 31](image)

**Figure 31** Deficits in the delivery of care at the hospital-community interface\(^{135}\)

Significant alterations in a patient’s medication regimen (drugs or dosages) may occur during hospitalisation. Also, medications may not be taken appropriately after hospitalisation.
Documented medication errors include continuation of medications that were discontinued at discharge, failure to start new medications, taking the incorrect dosage, and a lack of understanding of directions for medication use.\textsuperscript{134-137}

In a study of elderly patients receiving home health services, Gray et al.\textsuperscript{129} determined that self-reported adverse drug events were common during the month following hospital discharge.

The Second National Report on Patient Safety of the Australian Council for Safety and Quality in Health Care (‘Improving Medication Safety’) concluded the following.\textsuperscript{138}

“Patients can leave hospital with a particular medicine, but may experience a breakdown in communication between their specialist and regular GP leading to inappropriate medicines being used. Patients and their carers may be confused by complex instructions, particularly when taking multiple drugs.”

A review of discharge prescriptions for 68 patients at one Australian hospital found that 15% of the regular medications intended to be continued were omitted at discharge.\textsuperscript{139} Similarly, Stowasser et al. reported that, on average, one medicine was omitted from the discharge prescription.\textsuperscript{140} There were also problems with the medication history on admission, with medications frequently not being documented.

It has been noted by ourselves and others that the management of prescribed medications among chronically ill patients recently discharged from acute hospital care is often sub-optimal, and that an assessment of medication management in the home provides an invaluable opportunity to detect and address problems likely to result in poorer health outcomes.\textsuperscript{127, 141-148} For instance, patients may be confused after discharge despite comprehensive counselling by pharmacists or other hospital staff.

Stewart and Pearson studied 342 chronically ill patients discharged from acute care at the Queen Elizabeth Hospital, Adelaide.\textsuperscript{127} At one-week post-discharge a home visit was performed by a nurse and a pharmacist during which medication management (including compliance and medication-related knowledge) was assessed. During the majority of home visits, at least one medication-related problem was detected and approximately half of the cohort was found to be poorly compliant. Other previously unknown problems detected during the home visit included hoarding of previously prescribed medication (35%) and reducing medication intake to minimise costs (21%).
Unplanned readmissions to hospital have a substantial impact on health care costs.\textsuperscript{149-151} Approximately 5\% to 29\% of adults are readmitted within 30 days of a medical or surgical stay.\textsuperscript{152} About 15\% of older patients have an unplanned readmission.\textsuperscript{149} Every tenth patient discharged from a medical department at a general hospital in Sweden during the period, 1992-1994, required emergency readmission within 14 days.\textsuperscript{153} Another study reported a 30-day readmission rate of 20.9\% following cardiac surgery.\textsuperscript{154}

One of the Project Team (GP) was involved in a follow-up study of over 500 medical patients (aged over 60 years and taking two or more regular drugs) discharged from the Royal Hobart Hospital.\textsuperscript{155} The unplanned admission rate within 6 months of initial discharge was 33.8\%, and 8.4\% of these readmissions were noted in the medical record as being drug-related.

Between 9\% to 48\% of all readmissions have been judged to be preventable because they were associated with indicators of substandard care during the index hospitalisation, such as poor resolution of the main problem, unstable therapy at discharge, and inadequate post discharge care.\textsuperscript{156} Many studies have attempted to identify precise factors that may lead to patient readmission. Problems with drug therapy have previously been identified as a major cause of readmission to hospital.\textsuperscript{126, 149, 150, 157-162} Several studies have reported that patients who had changes in their medication regimen before discharge were more likely to be readmitted within a month or less.\textsuperscript{163} Studies of geriatric patients have found a drug-related readmission rate of up to 7\% within six months of discharge.\textsuperscript{126, 157}

A retrospective case study analysis was conducted at the Monash Medical Centre, Melbourne.\textsuperscript{162} Patient data stored by the medical information system were searched to identify patients readmitted within 60 days of discharge. This information was then linked with appropriate medical record ICD-9 discharge codes to identify patients re-admitted with drug-related diagnoses. Over one-third (35\%) of the unplanned readmissions during the 4-month study period were documented as being caused by problems related to drug therapy. There was a significant trend of increased incidence of drug-related readmission in elderly and very young patients. The annual cost of drug-related unplanned readmissions to the hospital was estimated by extrapolation to be $650,000.

The majority of the drug-related problems identified in readmission studies are potentially preventable and the types of problems found have indicated that interventions
should be focused on both hospital staff and patients. Randomised prospective trials have shown that 12% to 75% of all readmissions can be prevented by patient education, pre-discharge assessment, and domiciliary aftercare.

Poor compliance with therapy has frequently been identified as one cause of hospital readmission, resulting in 17 to 48% of all drug-related readmissions. It has been suggested that patient compliance with medication prescriptions after hospital discharge should be a major concern of all hospital staff, who need to play a role in determining whether discharge medications are used as ordered, whether complications which could lead to readmission are likely to result from poor compliance, and whether adequate measures have been instituted to maximise compliance.

Two studies by Stewart et al. have also examined interventions to improve outcomes following hospitalisation. The first study looked at the effect of a home-based intervention on readmission and death among a small sample of ‘high-risk’ patients with congestive heart failure discharged home from acute hospital care. Home-based intervention comprised a single home visit (by a nurse and pharmacist) at one week after discharge to optimise medication management, identify early clinical deterioration, and intensify medical follow-up and caregiver vigilance as needed. The home-based intervention was associated with reduced frequency of unplanned readmissions plus out-of-hospital deaths within 6 months of discharge from hospital.

The second study was directed at a range of medical and surgical patients. Home-based intervention consisted of counselling of all patients before discharge followed by a single home visit (by a nurse and pharmacist) to those patients considered to be at high risk of readmission in order to optimise compliance with and knowledge of the treatment regimen, identify early clinical deterioration, and intensify follow-up of such patients where appropriate. Again, home-based intervention was beneficial in significantly limiting unplanned readmissions and reducing risk of out-of-hospital death. However, there was no involvement of community pharmacists, and the effect of the intervention on the quality of medication use was not assessed directly in these studies.

A recently conducted study at the Royal Hobart Hospital by the Project Team examined medication management amongst a cohort of older, chronically ill patients discharged from hospital. This was a randomised, controlled study, in which consenting medical patients...
admitted to hospital and fulfilling the high-risk criteria, including being aged 60 years or older and taking four or more regular medications were randomly assigned to an intervention or control group. Intervention group patients were visited at home 5 days after discharge from hospital by a pharmacist, who educated patients on their drug therapy, promoted compliance with therapy, assessed patients for drug-related problems and intervened when appropriate, and communicated all relevant findings to community-based health professionals. Patients in the control group received standard medical care and did not undergo review by the pharmacist but, like the intervention group patients, were visited at 90 days after initial discharge from hospital to assess outcomes.

Overall, the quality of medication usage was relatively poor (despite the counselling provided to most patients prior to discharge), with many previously undiscovered and potentially serious problems unearthed during the home visits. There was a median of 3 drug-related problems identified per patient in the intervention group at 5 days post-discharge. Almost 39% of patients in the intervention group in this study had either taken more or omitted some of their medication (as determined by pill counts) within 5 days of their hospital discharge.

It was demonstrated that a pharmacist-conducted follow-up of hospitalised high-risk patients at home is valuable in identifying and addressing drug-related problems in high-risk medical patients, and significantly reducing the risk of unplanned readmission to hospital within 90 days. The unplanned readmission rate at 90 days after initial discharge from hospital was 45% in the control group and 28% in the intervention group.\textsuperscript{141}

Two relevant findings of major concern were: (i) over 20% of patients had experienced difficulty obtaining a continued supply of discharge medication when visited at 5 days post-discharge, and (ii) conversely, over 10% of patients were found to be taking discontinued medications at 5 days post-discharge. It was common for local general practitioners to mention to the study pharmacist that there was poor communication from the hospital. Without prompting or questioning, approximately 20% of the patients’ general practitioners made direct comments stating they were unhappy with the current discharge arrangements and appreciated the pharmacist contacting them to inform them of changes in their patient’s drug therapy.
Another recent study of 200 elderly patients undergoing surgery at the Royal Hobart Hospital revealed inconsistencies between the medication history (drug therapy being taken prior to presenting to hospital) obtained by the admitting doctor and that obtained after a thorough review by a clinical pharmacist, in over half the patients (57%).\textsuperscript{167} Similarly, a project at the Royal Perth Hospital by Jeff Hughes showed that inaccurate drug histories within the emergency department are common and are a potential cause of unplanned changes to patients’ medication on hospital admission.\textsuperscript{168}

Cornish \textit{et al.} recently studied unintended medication discrepancies at the time of hospital admission in patients taking at least 4 regular prescription medications who were admitted to general internal medicine wards at a Toronto hospital.\textsuperscript{169} The primary outcome was unintended discrepancies (errors) between the physicians’ admission medication orders and a comprehensive medication history obtained through interview. Of 151 included admissions, 81 patients (54\%) had at least 1 unintended discrepancy. The most common error (46.4\%) was omission of a regularly used medication. Most (61.4\%) of the discrepancies were judged to have no potential to cause serious harm. However, 38.6\% of the discrepancies had the potential to cause moderate to severe discomfort or clinical deterioration.

The Second National Report on Patient Safety of the Australian Council for Safety and Quality in Health Care\textsuperscript{138} (‘Improving Medication Safety’) stated:

“It is essential for patient care that information about a patient’s medicines is communicated to the hospital when the patient is admitted and back to their community health professionals when they are discharged. Poor communication at the time of discharge from hospital or errors in prescribing or transcribing at discharge can contribute to medication incidents. ……….. Accurate, well-timed transfer of information between hospital and community settings is important for ensuring appropriate medication use. This includes information about a patient’s current medicines, any changes that were made in hospital and why, as well as allergies and relevant medical history. This information needs to be transferred between hospital and community pharmacies, as well as between hospitals and general medical practices.”

Apart from local data, it is also well-documented in the Australian literature that many patients have a poorly planned discharge and their general practitioner is not fully informed of their patient’s admission.\textsuperscript{170-176} Wilson \textit{et al.}\textsuperscript{177} found that general practitioners in the Macarthur Health Sector of New South Wales only received summaries from the hospital for 27.1\% of 569 discharged patients. Of more concern was that 36.4\% of discharge summaries
contained information that did not reflect the information recorded in the hospital notes. These inaccuracies included medication (17.5%), clinical (17.3%), follow-up (14.4%) and clerical (2.5%) inconsistencies. Medication errors included incorrect medications recorded, medications omitted from the summary, and omission of dose or frequency.

The same study showed that the recording rate of medications on discharge was 79.3%. This indicated that 21% of the summaries contained no indication of whether there were any variations in the existing medications or indeed any medications at all. Wilson et al.\textsuperscript{177} suggested that perhaps junior medical officers may not be the ideal authors for writing the summaries due to their high turnover and that nursing and allied health professionals could contribute to the partial or total production of the summary, which may improve the quality and accuracy of the information.

Mant et al.\textsuperscript{176} studied how hospital discharge information was communicated to general practitioners. General practitioners (n = 106) answered questionnaires about the type of information they had received from the hospital about 203 of their patients. In only 22% of cases did the hospital directly notify the general practitioner of the patient’s admission. In 27% of cases the patient notified the general practitioner, while in the remaining 52% of cases there was no notification given to the general practitioner. A change to the patient’s medicines was made in hospital in 87% of the cases, with the patient’s medicine at discharge differing from what the general practitioner understood the patient to be taking before they went to hospital in 72% of cases. Consultation with the general practitioner about the patient’s medication during the hospital stay occurred for only 11% of all patients. The mean time taken for general practitioners to receive the discharge summary from the hospital was 3 days, with a maximum of 21 days.

Stowasser et al.\textsuperscript{178} demonstrated that when a pharmacist communicated within 24 hours of discharge to patients’ general practitioners, with a detailed summary of medication issues, there was a tendency for a reduction in readmissions within 30 days of discharge and there was a significant decrease in community healthcare professional visits (e.g. general practitioner, domiciliary nurse, community pharmacist, medical specialist).

Discharge liaison services are an effective mechanism for improving transfer of information and reducing medication-related problems when patients move from hospitals back to the community.\textsuperscript{138, 175} However, it appears that this service is still under-developed in
Australia. The 1995 survey of Australian hospital pharmacy departments (by Jeff Hughes and Peter Tenni) found that only 18% of the responding departments were offering a discharge liaison service.\textsuperscript{179} An American study found that community pharmacists who received information from hospital pharmacists about patients being discharged from the hospital reported that the information aided in patient care.\textsuperscript{180}

The Brigham and Women’s Hospital, Boston, the institution of Dr. David Bates, a world leader in the prevention of medication errors,\textsuperscript{135, 137, 181, 182, 183} has introduced a secure Internet site (Patient Gateway at http://www.patientgateway.org/ptgw/logBWH.htm) for patients and health care professionals to improve the flow of communication and facilitate seamless care upon hospital admission and discharge. Patients are able to access comprehensive health information, details of their own prescribed medications and email questions to health care providers. Electronic communication between hospitals and general practitioners and between hospitals and patients has been utilised overseas,\textsuperscript{184, 185} but does not appear to have gained significant attention in Australia to date.

UMORE at the University of Tasmania is presently coordinating a multi-centre randomised controlled trial of a comprehensive program (Mede Support) [Facilitating Quality use of Medicines (QUM) between hospital and community (RFT 2003-03)] to improve medication management at the community and hospital interface. Mede Support utilises information and communications technology solutions and include (i) an electronic communication pathway for medication profiles between community and hospital pharmacies, (ii) supply of a comprehensive medication information sheet to the patient/carer at discharge, (iii) automated faxing of a medication information sheet to the general practitioner at discharge, (iv) a model whereby suitable patients are promptly referred for a medicines review after discharge from hospital, and (v) follow-up education and monitoring of the International Normalised Ratio for patients initiated on warfarin during hospitalisation. The final report for Mede Support will be submitted in January 2006.
7. Elements of the Pharmacy Cardiovascular Health Care Model:  

**High-risk patients**  

- pharmacy-based risk factor screening and referral for assessment

### 7.1 GUIDING PRINCIPLES AND EXISTING FRAMEWORK

<table>
<thead>
<tr>
<th>NATIONAL CHRONIC DISEASE STRATEGY:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Key direction 11: Encourage all health services to identify opportunities to promote health and identify and address risk factors for chronic disease.</td>
</tr>
<tr>
<td>- Key direction 13: Encourage primary care to engage in early intervention, through appropriate opportunistic screening, use of approaches such as the SNAP Framework to identify and address the risk factors for chronic disease, and support for self-management.</td>
</tr>
<tr>
<td>- Key direction 14: Improve screening and early detection opportunities and uptake for high-risk population groups, such as older Australians and Aboriginal and Torres Strait Islander peoples.</td>
</tr>
<tr>
<td>- Key direction 16: Investigate emerging evidence for early detection and treatment, and implementation mechanisms including evidence-based guidelines for effective practice.</td>
</tr>
<tr>
<td>- Key direction 17: Improve the public’s awareness and understanding of the risk factors for chronic disease and opportunities for early detection, particularly among high-risk population groups.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NATIONAL SERVICE IMPROVEMENT FRAMEWORK FOR HEART, STROKE AND VASCULAR DISEASE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Critical intervention points:</strong></td>
</tr>
<tr>
<td>- Establish and encourage the development of systems and tools enable absolute risk estimation in people without overt cardiovascular disease (including early detection and management of high blood pressure and dyslipidaemia)(^{21})</td>
</tr>
</tbody>
</table>
“Early detection and early treatment: Early detection supports early treatment, which can improve health outcomes by reducing premature mortality, delaying the progression and complications of disease, improving quality of life and the ability to self-manage, and preventing or delaying admission to residential care. Early detection and treatment can also avoid unnecessary hospital admissions and the high cost of complex treatments.

Identifying and effectively implementing evidence-based and cost-effective approaches to early detection and early treatment will significantly improve the health outcomes and quality of life of people with chronic disease.” 19

7.2 Pharmacy-based risk factor screening and referral for assessment

One major impediment to tackling the prevention of CVD is that individuals, particularly those from the lower socioeconomic groups, are often unaware of CVD risk factors, their own risk profile and action to take or self-care behaviours to implement to reduce their risk of cardiovascular disease.186-188 There is widespread agreement that programs are needed to support the identification and treatment of the 10% of the population who have 10-year coronary risks of 30% or more - these individuals need to be identified and should be treated immediately, since the benefits greatly outweigh the harms.

“Community pharmacists are in an ideal position to help these individuals who make less use of the health care system…. For example, community pharmacists can play a major role in detecting and referring people with undiagnosed diabetes. These individuals may not seek advice from their general practitioner but they may access screening services provided by the pharmacist and may then (if appropriate) be encouraged by the pharmacist to visit a general practitioner.”189

According to a report published by the Australian Institute of Health and Welfare, around 21% of problems that general practitioners manage are cardiovascular-related conditions and diabetes.190 However, almost all the medical attention is directed at treating the consequences of CVD rather than preventive measures such as assessing and modifying CVD risk factors. It was noted that while consultations with general practitioners provide opportunities for prevention by raising awareness of the risks associated with certain behaviours (e.g. being overweight, having high blood pressure, blood lipid disorders or smoking cigarettes) and helping to modify them, the proportion of consultations in which general practitioners manage these problems is quite low.190

A metropolitan and rural Australian study determined that while preventive activities are
being undertaken in general practice, performance of these activities is less than ideal. Doctors identified only 66% of self-reported smokers, 40% of heavy drinkers, and 59% of overweight patients. Screening and/or counselling of patients in the consultation were highest for blood pressure (47%) and smoking (34%), and considerably lower for overweight (22%), alcohol (19%), and cholesterol (6%).

Community pharmacists are ideally placed to assist in the detection, education and referral of individuals at elevated risk of CVD. Providing a CVD risk factor screening service is one way in which pharmacists can make a very major contribution to health promotion and health education. Counselling of patients with the objective of providing CVD risk-management information or of improving compliance with prescribed medication are viewed as tasks particularly well suited to community pharmacists. Because they are recognised as credible sources of information and because of their accessibility, availability, and frequent contact with the public, community pharmacists could provide an important channel for delivery of these kinds of activities.

A Canadian study determined that cardiovascular mass screening activity in a rural environment could be effective in motivating a population to adopt heart health-related behaviours (e.g. a higher intention to participate regularly in physical activities and a higher intention to reduce their fat consumption). Similarly, from 1974 to 1994, a comprehensive, nurse-mediated community cardiovascular health program in rural Maine, USA was associated with significant time-dependent and dose-dependent reductions in cardiovascular and total mortality. The community program provided education, screening, counselling, referral, tracking, and follow-up for CVD risk factors.

Members of this Project Team have been assessing the suitability of Australian community pharmacies as CVD risk profile screening centres, in a study involving opportunistic CVD risk profiling for members of the public in 14 community pharmacy sites across Tasmania and Northern Queensland. Absolute risk assessment included the use of a
Reflotron® benchtop analyser and using the New Zealand risk assessment chart (www.nzgg.org.nz).

The project included a follow-up of screened individuals to determine actions taken and changes in knowledge of CVD risk factors.

**Figure 32** Pharmacy-based Heart Assessment and Referral Methodology: a program to tackle coronary heart disease in the Australian community (Pharmacy Guild of Australia/Government, Third Community Pharmacy Agreement Research and Development Grants Program. Project 196

Six hundred and fifty-five subjects (71.4% female) were screened for CVD risk factors in the 14 community pharmacies. Fifteen individuals were excluded as after further questioning they did not meet inclusion criteria (age greater than 30 years, and no existing heart disease), leaving 640 eligible screened individuals.

More than one-quarter of the subjects were considered to be at high risk of cardiovascular events, with males and increasing age being associated with increased level of risk. Almost half the males were categorised as being at high risk.
### Table 21 Summary of subject details from Pharmacy-based Heart Assessment and Referral Methodology: a program to tackle coronary heart disease in the Australian community

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Measure</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Female</td>
<td>71.4%</td>
</tr>
<tr>
<td>Age - median (range)</td>
<td>54 years (30 - 90 years)</td>
<td></td>
</tr>
<tr>
<td>10-year risk of CVD</td>
<td>&gt; 15% (high risk)</td>
<td>28.1%</td>
</tr>
<tr>
<td></td>
<td>Median risk (range)</td>
<td>9.5% (0.2% - 61.0%)</td>
</tr>
<tr>
<td>Systolic BP</td>
<td>&gt; 140 mmHg</td>
<td>30%</td>
</tr>
<tr>
<td>Diastolic BP</td>
<td>&gt; 90 mmHg</td>
<td>34%</td>
</tr>
<tr>
<td>Total Cholesterol</td>
<td>&gt; 5.5 mmol/L</td>
<td>40%</td>
</tr>
<tr>
<td>HDL-cholesterol</td>
<td>&lt; 1.00 mmol/L</td>
<td>18.8%</td>
</tr>
<tr>
<td>Smokers</td>
<td></td>
<td>14.2%</td>
</tr>
<tr>
<td>BSL (random)</td>
<td>&gt; 8 mmol/L</td>
<td>5.5%</td>
</tr>
<tr>
<td>BMI</td>
<td>&gt; 25 kg/m²</td>
<td>64.4%</td>
</tr>
</tbody>
</table>

There was a significant improvement in the knowledge of cardiovascular risk factors at follow-up compared with prior to screening, as assessed with a multiple choice 20-item questionnaire (paired t = 6.5, df = 297, p < 0.0001).

At follow-up, almost half (45%) of contacted participants whose 10-year risk was greater than 15% or who had at least one elevated risk factor indicated that they had either instituted lifestyle changes or started drug therapy following re-testing by their general practitioner.

We reported an economic evaluation, including the benefits and costs of a 5-year pharmacy-based cardiovascular risk factor screening program, coupled with 5 years of lipid-lowering therapy for referred individuals requiring intervention. The analysis takes a health care perspective and focuses on costs to the Federal Government. It excludes non-medical
costs such as patient time and transportation, and indirect costs, including loss of income and/or productivity. The methodology is based around a recent New Zealand economic assessment of cardiovascular risk screening. There have not been any similar in-depth Australian analyses.

It is assumed that equal numbers of individuals are identified each year over the 5-year period. It is also assumed that the results of the pharmacy-based lipid tests for referred individuals will need to be confirmed by a general practitioner. As in the project, cardiovascular risk is estimated using a standard Framingham Heart Study risk equation that predicts the risk of ‘any incident cardiovascular event’ including myocardial infarction, stroke, angina, transient ischaemic attack, peripheral vascular disease or congestive heart failure. This equation predicts first cardiovascular admissions and deaths reasonably accurately at a population level. Individuals are referred to their general practitioner when their 10-year risk of CVD exceeds 15%. Treatment (if required) is given for 5 years commencing from the date of screening, and the benefits of this therapy are assessed over the remaining lifetime of the cohort, based on life expectancy tables. Benefits in terms of life years gained over a lifetime (LYG) and quality adjusted life years (QALY) for averted cardiovascular events are those used by Milne and Gamble in the New Zealand analysis based on Framingham data.

Based on this project, it is assumed that cardiovascular risk screening requires 15 minutes of pharmacist time and 2 minutes of pharmacy assistant time. The principal fixed cost is for an analyser for cholesterol and glucose (in this case a Reflotron), while there are miscellaneous consumables (Table 22). It is assumed that referral of each identified high-risk individual will require one standard general practitioner consultation plus a full lipid profile (total and HDL-cholesterol and triglycerides) and one blood glucose test. Individuals confirmed as requiring an intervention (approximately 45% of those who were referred in our cohort) are treated for 5 years with simvastatin 40 mg per day (at a cost of $77.37 per month; 1 April 2005 Pharmaceutical Benefits Schedule). After therapy is instigated, full lipid profiles are obtained quarterly each year, and the patients visit their general practitioner quarterly for a standard consultation. An annual discount rate was not applied to future costs and effects, given the relatively short timeframe of the extrapolation.
Table 22: Main unit costs for pharmacy-based cardiovascular risk profiling

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit cost A$ 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PHARMACY-BASED COSTS</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Cost of consumables per test</strong></td>
<td></td>
</tr>
<tr>
<td>Referral forms</td>
<td>$1.00</td>
</tr>
<tr>
<td>Educational material</td>
<td>$0.95</td>
</tr>
<tr>
<td>Disposable lancets, tubes</td>
<td>$0.30</td>
</tr>
<tr>
<td>Rubber gloves</td>
<td>$0.20</td>
</tr>
<tr>
<td>Cotton balls</td>
<td>$0.10</td>
</tr>
<tr>
<td>Band aids &amp; alcohol wipes</td>
<td>$0.05</td>
</tr>
<tr>
<td>Test strips and controls</td>
<td>$8.00</td>
</tr>
<tr>
<td>Pharmacist’s time (15 min @ $40/h)</td>
<td>$10.00</td>
</tr>
<tr>
<td>Pharmacy assistant’s time (2 min @ $20/h)</td>
<td>$0.70</td>
</tr>
<tr>
<td><strong>Total variable costs</strong></td>
<td><strong>$21.30</strong></td>
</tr>
<tr>
<td><strong>Fixed Costs</strong></td>
<td></td>
</tr>
<tr>
<td>Counter display unit</td>
<td>$10.00</td>
</tr>
<tr>
<td>Poster/Banner</td>
<td>$100.00</td>
</tr>
<tr>
<td>Sharps disposal unit</td>
<td>$4.00</td>
</tr>
<tr>
<td>Reflotron meter, scales, digital blood pressure monitor</td>
<td>$9500.00</td>
</tr>
<tr>
<td><strong>Total fixed costs</strong></td>
<td><strong>$9614.00</strong></td>
</tr>
<tr>
<td><strong>COST OF SUBSEQUENT VISIT TO GP AND SCREENING</strong> (Nov 1 2004 MBS schedule)**</td>
<td></td>
</tr>
<tr>
<td>GP visit Level B (Standard consultation)</td>
<td><strong>$26.25</strong></td>
</tr>
<tr>
<td>Total cholesterol, triglycerides and glucose test</td>
<td><strong>$13.75</strong></td>
</tr>
<tr>
<td>HDL-cholesterol test</td>
<td><strong>$11.25</strong></td>
</tr>
<tr>
<td><strong>Total cost of initial GP review of referred subject</strong></td>
<td><strong>$51.25</strong></td>
</tr>
</tbody>
</table>
Assuming approximately 10 subjects per pharmacy would be screened per week (500 per year), this program in one community pharmacy over 5 years would screen 2,500 people at a cost to the pharmacy of $62,864. The flow-on medical costs would total approximately $1.8M, primarily as drug costs ($1.5M with simvastatin 40 mg daily and full compliance). The mean 10-year cardiovascular risk in our referred patients (those with risks above 15%) was 25.8% (or approximately 12.5% over 5 years). At this level of risk, the number needed to treat for 5 years to prevent one cardiovascular event is 33. This is based on the conservative estimate that each of the major forms of therapeutic intervention (low-dose aspirin, blood pressure treatment decreasing systolic blood pressure by 10 mmHg or lipid modification lowering LDL-cholesterol by 20%) reduces cardiovascular risk by about 25% over 5 years. Based on these figures, one pharmacy screening 2,500 individuals, of whom 700 (with risk of CVD exceeding 15% over 10 years) would be referred and 315 would receive an intervention, would potentially avert 10 cardiovascular events over 5 years.

The summary table (Table 23) shows the 5-year costs, lifetime health benefits and cost utility of the pharmacy-based screening strategy. Sensitivity analysis includes the effects of poor patient compliance with drug therapy (50%) and variation in the dosage of simvastatin.

In one community pharmacy, the screening program would prevent 3 premature deaths during 5 years. Over the lifetime of the tested cohort this provides 25 life years and 32 QALYs. The cost-effectiveness ratios are highly dependent on the dosage of simvastatin and the compliance of the patient, and range from $57-90,000 per life year gained and $45-70,000 per QALY gained. The cost-effectiveness improves slightly if only males are screened, with 49% requiring referral; with the 40mg simvastatin and 100% compliance approach, the cost becomes $55,687 per QALY gained.
Table 23  Summary table of benefits, costs and cost-effectiveness of a pharmacy-based cardiovascular risk screening program

<table>
<thead>
<tr>
<th>Benefits (for 315 patients with intervention)</th>
<th>Events averted</th>
<th>Deaths delayed</th>
<th>LYG</th>
<th>QALYs gained</th>
<th>NNT (events)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simvastatin therapy, 100% compliance</td>
<td>10</td>
<td>3</td>
<td>25</td>
<td>32</td>
<td>33</td>
</tr>
<tr>
<td>Simvastatin therapy, 50% compliance</td>
<td>5</td>
<td>1.5</td>
<td>12.5</td>
<td>16</td>
<td>66</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5-year Costs ($m)</th>
<th>Screening costs</th>
<th>Drugs</th>
<th>Pathology</th>
<th>GP</th>
<th>Total cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simvastatin 40mg, 100% compliance</td>
<td>$62,864</td>
<td>$1,462,293</td>
<td>$162,400</td>
<td>$183,750</td>
<td>$1,871,307</td>
</tr>
<tr>
<td>Simvastatin 40mg, 50% compliance</td>
<td>$62,864</td>
<td>$731,147</td>
<td>$162,400</td>
<td>$183,750</td>
<td>$1,140,161</td>
</tr>
<tr>
<td>Simvastatin 40mg for one-half and 20mg for one-half, 100% compliance</td>
<td>$62,864</td>
<td>$1,252,692</td>
<td>$162,400</td>
<td>$183,750</td>
<td>$1,661,706</td>
</tr>
<tr>
<td>Simvastatin 40mg for one-half and 20mg for one-half, 50% compliance</td>
<td>$62,864</td>
<td>$626,346</td>
<td>$162,400</td>
<td>$183,750</td>
<td>$1,035,360</td>
</tr>
<tr>
<td>Simvastatin 20mg, 100% compliance</td>
<td>$62,864</td>
<td>$1,043,091</td>
<td>$162,400</td>
<td>$183,750</td>
<td>$1,452,105</td>
</tr>
<tr>
<td>Simvastatin 20mg, 50% compliance</td>
<td>$62,864</td>
<td>$521,546</td>
<td>$162,400</td>
<td>$183,750</td>
<td>$930,560</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cost-effectiveness</th>
<th>Cost per event averted</th>
<th>Cost per premature death averted</th>
<th>Cost per life year gained</th>
<th>Cost per QALY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simvastatin 40mg, 100% compliance</td>
<td>$187,131</td>
<td>$623,769</td>
<td>$74,258</td>
<td>$58,115</td>
</tr>
<tr>
<td>Simvastatin 40mg, 50% compliance</td>
<td>$228,032</td>
<td>$760,107</td>
<td>$90,489</td>
<td>$70,817</td>
</tr>
<tr>
<td>Simvastatin 40mg for one-half and 20mg for one-half, 100% compliance</td>
<td>$166,171</td>
<td>$553,903</td>
<td>$65,941</td>
<td>$51,606</td>
</tr>
<tr>
<td>Simvastatin 40mg for one-half and 20mg for one-half, 50% compliance</td>
<td>$207,072</td>
<td>$690,240</td>
<td>$82,171</td>
<td>$64,308</td>
</tr>
<tr>
<td>Simvastatin 20mg, 100% compliance</td>
<td>$145,211</td>
<td>$484,035</td>
<td>$57,623</td>
<td>$45,096</td>
</tr>
<tr>
<td>Simvastatin 20mg, 50% compliance</td>
<td>$186,112</td>
<td>$620,373</td>
<td>$73,854</td>
<td>$57,799</td>
</tr>
</tbody>
</table>
There are limitations with these analyses.\textsuperscript{198, 199} Few studies on the economic evaluation of CVD prevention and treatment programs have been undertaken in Australia, with most being from the United States and Europe. Assumptions about the specification, measurement and valuation of costs, and the epidemiological evidence on program effectiveness have varied.\textsuperscript{198} The estimation of costs is, by definition, subject to uncertainties and future changes.\textsuperscript{199}

Many commonly used screening tests and procedures are relatively inexpensive, yet the total cost of a screening program includes not only the initial screening test, but all the costs induced by the actions that follow a test result. The per-person cost of such testing is quite modest. However, individuals found to have an undesirably high blood cholesterol level, for instance, would undergo further testing, detailed evaluation and, for those deemed to be at high risk, treatment with drugs. Although each step of this cascade of management involves fewer and fewer people, the costs typically risk. Thus, even though every participant in a screening program generates costs from the initial screening tests, the costs of treating the minority who need drug treatment account for most of the costs of the screening program.\textsuperscript{199} As shown here, the cost-effectiveness of cholesterol screening is likely to be similar to the cost-effectiveness of its treatment because treatment, not testing, is responsible for most of the costs of cholesterol screening programs.\textsuperscript{198}

The cost-effectiveness ratio of approximately $57-90,000 per life year gained and $45-70,000 per QALY gained is within the range of those that have been apparently accepted by the Pharmaceutical Benefits Advisory Committee (PBAC) when approving drugs for listing on the Pharmaceutical Benefits Schedule (PBS). Society and its decision makers must determine what is a tolerable cost for a year of life by allocating resources to some interventions and not to others.\textsuperscript{200} For example, coronary artery bypass grafting (with cost per life year gained generally below US$30,000) is considered cost-effective, while heart transplantation for patients older than 50 years with terminal heart disease (cost per life year gained of US$100,000) is not.\textsuperscript{200} While there is no consensus on the value of human life, some researchers have argued that treatments that cost less than US$40,000 per life year gained (roughly the cost of renal dialysis) are cost-effective, while those costing more than US$75,000 per life year gained are expensive.\textsuperscript{200} A benchmark for cost per life-year saved is in the range of US$20,000 to US$100,000.\textsuperscript{200, 201} In the UK, a figure of £20,000 is popularly reported as the cost-effectiveness cut-off point.\textsuperscript{201}
A review of all 355 submissions made to the PBAC between 1991 and June 1996 revealed that the cost-effectiveness threshold range lay between $37,000 and $69,000 per extra life year gained, in order to be approved for listing on PBS. Some drugs with an incremental cost per extra life year gained less than this were not recommended for listing. Other factors considered include the quality of life years gained, the quality of the evidence, the nature of the condition and the availability of substitute therapies, and the financial implications to government. It is widely accepted that the PBAC presently works on a cost-effectiveness ratio of $40-50,000 per life year gained, and that there has been strong downward pressure on this threshold. The threshold used by PBAC does not appear to have been updated for at least 8 years.

For a number of reasons, the economic analysis most likely presents a worst case scenario.

- The analysis does not include hospital and Medicare savings from prevented cardiovascular events. For instance, in the New Zealand analysis, hospital costs avoided over 5 years (including incident and recurrent medical and surgical cardiovascular admissions) offset about two-thirds of the net cost of lipid-lowering drug therapy.

- The analysis does not consider the significant life-long impact of stroke and other cardiovascular events.

- The analysis does not include patient co-payments towards costs (e.g. for biochemical testing or prescriptions).

- A relatively high dosage of simvastatin was initially examined (40 mg daily for all patients).

- Subjects determined to be at high-risk could have been more actively encouraged to discuss the screening results with their general practitioner.

- A conservative estimate of the likely benefit of the therapeutic intervention (reducing cardiovascular risk by about 25% over 5 years) was used.

- The analysis could have examined a less expensive therapeutic intervention (e.g. low-dose aspirin or antihypertensive treatment).
A single intervention was examined. In practice, it is likely that multiple interventions (e.g. lipid-lowering drug therapy and low-dose aspirin) would be often introduced simultaneously, with enhanced cost-effectiveness.

A smaller study, screening a limited range of parameters and not including a follow-up of tested individuals, was recently performed in several rural community pharmacies in the Upper Hunter Valley, New South Wales. The mean age of the 204 participants was 44 years. Over half (54%) had a Body Mass Index above 25, 54% had a total cholesterol above 5.0 mmol/L and 18% a systolic BP > or = 140 mmHg and/or diastolic BP > or = 90 mmHg.

Numerous local and international studies have previously evaluated community pharmacies as blood pressure and stroke risk screening centres. Community pharmacists are in a strong position to identify patients at risk for cardiovascular and cerebrovascular disease through simple hypertension and stroke screening programs.


OBJECTIVE: To demonstrate whether a community pharmacist can be successful in identifying and referring patients with elevated blood pressure and/or increased risk of stroke. SETTING: An independent community pharmacy and well-elderly housing facility in rural Iowa. PRACTICE DESCRIPTION: The pharmacy had dedicated space for patient care activities, had a community pharmacy practice resident, and served as a clerks chip site for a local school of pharmacy. One of three well-elderly housing facilities in the same community was used as a screening site for the stroke prevention program. PRACTICE INNOVATION: All adults entering the pharmacy during the time the blood pressure project was underway were offered a free blood pressure screening. If readings were elevated, patients were referred to their primary care provider. For stroke prevention, a screening using the American Heart Association stroke risk assessment protocol was held at the pharmacy and the well-elderly housing facility. MAIN OUTCOME MEASURES: Blood pressure categories and stroke risk (normal, mild, moderate, and high) categories obtained during the screening. RESULTS: A total of 351 patients were screened for hypertension. Of these, 216 (62%) had readings greater than 140/90 mm Hg. Of the 121 patients referred to their physician, 43 (36%) had a regimen change. A total of 50 patients were screened for stroke risk. Results of the risk assessments for patients screened were normal, 4%; mild, 26%; moderate, 32%; high, 38%. CONCLUSION: These projects demonstrated that, through ongoing screening programs, community pharmacists are in an ideal position to screen patients at risk for cardiovascular and cerebrovascular disease and refer patients to their physicians for further evaluation.

Although studies have shown that pharmacists can perform cardiovascular risk assessments and these programs might be cost-effective, there are a number of barriers to their widespread implantation in Australia at this time. These include the need for extensive training and quality assurance procedures to be in place, lack of funding, and resistance from
the medical profession. Many of these considerations are addressed in several recent papers in the *Pharmaceutical Journal* (see pages 168-172). Pharmacy-based CVD risk assessment might have a higher priority in rural and remote regions of Australia, where access to medical and pathology services is more limited than in metropolitan areas.

At present, a more practical approach is for community pharmacists to identify patients who might be at high risk and refer them, as appropriate, for absolute risk assessments to be conducted by their general practitioner. The stereotypical cases would be middle-aged males who are smokers and overweight. High-risk patients can frequently be identified from their medication history and through questioning, as noted by Bungard *et al* (below).

**Identifying Very High-Risk Patients**

In general, patients taking medications on an ongoing basis see their pharmacist much more frequently than their physician. Pharmacists have a unique opportunity to intervene and empower patients to become proactively involved in their own care. There are several readily available resources that pharmacists can use to identify patients at very high risk for future cardiovascular events. A quick review of the medication profile serves as an important guide to aid the community pharmacist in the identification of these patients. Patients who should automatically be classified as being at very high risk for CVD include those who are receiving oral hypoglycaemics or insulin therapy (who are older than 30 years of age), a nitrate preparation, short-term clopidogrel (following coronary stent insertion) or long-term aspirin, dipyridamole or clopidogrel (likely for transient ischemic attacks [TIA] or stroke prophylaxis). By simply speaking with patients, and obtaining a history of MI, CABG, PTCA, angina (appropriately diagnosed), pharmacists can identify those patients at very high risk CAD.
Table 24 Individuals at increased risk of CVD

<table>
<thead>
<tr>
<th>Established disease</th>
<th>Biological risk factors</th>
<th>Lifestyle risk factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Known macrovascular disease</td>
<td>Hypertension</td>
<td>Smoking</td>
</tr>
<tr>
<td>Diabetes/IGT/IFG*</td>
<td>Dyslipidaemia</td>
<td>Physical inactivity</td>
</tr>
<tr>
<td>Renal insufficiency</td>
<td>Proteinuria</td>
<td>Overweight/obesity</td>
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<tr>
<td></td>
<td>Atrial fibrillation</td>
<td>Poor nutrition</td>
</tr>
<tr>
<td></td>
<td>Age &gt; 50**</td>
<td>Lower socioeconomic status and psychosocial factors</td>
</tr>
<tr>
<td></td>
<td>Male gender</td>
<td>Excessive alcohol consumption</td>
</tr>
</tbody>
</table>

* IGT: impaired glucose tolerance IFG: impaired fasting glucose
** Risk occurs at lower age in indigenous Australians
Near-patient testing in the pharmacy

In the final article in our series on clinical testing, Pamela Mason discusses near-patient tests and the role of pharmacists in providing such services.

According to the British In Vitro Diagnostics Association, near-patient tests are those that can be carried out in a few minutes, without the need for complex instruments or equipment. Community pharmacies are in an ideal position to perform such tests. Indeed, several already do so. Most pharmacies also sell testing kits designed to be used at home. Pregnancy and ovulation test kits have been available for many years, but changes in technology are making a much wider range of tests available, including tests for cholesterol and HIV compared with phlebotomy.

Accessibility is a key reason for people to visit their pharmacy for a test. Those who decide on the spur of the moment to have a health check can be seen without a long delay — it might be several days before there is an appointment at the local surgery. Near-patient testing in the pharmacy can be used for three main purposes:

- To assess the risk of a disease
- To screen for the presence of disease
- To manage disease

Screening and risk assessment

Various tests can be used to screen for the early signs of disease or to assess the risk of a disease. For example, fasting blood glucose can be used to screen for diabetes mellitus, and systolic blood pressure and the ratio of serum total cholesterol to high density lipoprotein can be measured to help assess the risk of coronary heart disease.

It is sometimes a difficult distinction to draw, but diagnosis is the role of doctor. If disease is suspected, the patient should be referred to his or her GP. Pharmacists can, however, use the results of screening and risk assessment tests to advise patients about diet, exercise, weight management, smoking cessation and other lifestyle issues.

Disease and medicines management

In the context of medicines management, repeat dispensing and supplementary prescribing, near-patient testing offers an opportunity for pharmacists to enhance their services. Blood pressure and lipid profiles can be measured to check disease progression and how patients are responding to cardiovascular drug therapy. Monitoring of international normalised ratio (INR) can be used in the management of anticoagulant therapy. Several pharmacists are already involved in anticoagulant clinics in GP surgeries and, increasingly, in pharmacies. Home tests to manage anticoagulant therapy are also available.

Drugs with narrow therapeutic margins, such as carbamazepine, digoxin, phenytoin and theophylline should be monitored regularly. There could be scope for therapeutic drug monitoring in pharmacies in the future, particularly as part of supplementary prescribing.

Practical issues in providing a service

The Royal Pharmaceutical Society gives guidance on diagnostic testing and health screening. This includes the following requirements:

- All staff should be trained to ensure their competence with the equipment and procedures to be used in the interpretation of results — manufacturers of testing equipment sometimes provide training
- Pharmacists and their staff should keep up to date with developments in health screening and other tests
- Pharmacists should be aware of current advice on the therapeutic area in question, any local guidelines and when to refer the patient to the GP
- The pharmacy must have a designated area, not in the dispensary, with suitable facilities to conduct the tests and provide counselling.
- An appropriate quality assurance programme must be in place and any equipment must be well maintained
- Patients should give their consent to the test, have the procedure explained to them and the significance of the results communicated to them in a way that they can fully understand
- There should be adequate documentation in place to allow for audit

The methods and equipment chosen should take into account the number of tests likely to be performed each day, how results compare with those from local laboratories and the availability of support from local laboratories. Other factors, such as providing seating for people who might feel faint after a blood test, should also be considered.

It is important to keep records of any tests performed and results can be recorded in the patient’s medication record. Ideally, a copy of the result should also be given to the patient.

Centralisation of patient records in the NHS would facilitate the recording of test results. Patients could also be given better access to their information if smart cards are used. Standard operating procedures (eg, what to do in the case of an adverse reaction to a test) should be put in place.

The local primary care organisation (PCO) and other stakeholders should be involved in the establishment of the service. Issues, such as whom to target and whom to refer, need to be considered collaboratively and the service must be fully integrated with local health care services. In addition, the issue of cholesterol screening is likely to be reviewed in light of the availability of statins over the counter.

Procedures involving patients and testing of body fluids demand strict adherence to health and hygiene and safety standards. Pharmacists should ensure that they, their staff and their premises are insured with respect to performing tests where appropriate. The Control of Substances Hazardous to Health (COSHH) regulations also apply because body fluids are a potential source of infection (eg, hepatitis B and human immunodeficiency virus). It is advisable for pharmacists and any staff handling body fluids to be immunised against hepatitis B. Safety standards in relation to collection, storage, labelling, segregation, transportation and disposal of samples and other waste must be followed. Full practice guidance for pharmacists on these issues can be found in ‘Practice guidance on testing of body fluids’ available on the Society’s website (www.rpharm.org.uk/practice). Other Society guidance on relevance to providing testing services is listed in Panel 1 (p709).

Funding is a continuing difficulty for pharmacists wanting to provide testing services. Some patients concerned about their
health might be willing to pay for health screening, but disease management testing is currently provided free by the NHS.

The new model framework published by the Department of Health opens the door to the provision of new pharmacy services (eg, health checks), which could be funded by PCOs.

**Home testing**

Many home-testing kits exist and deciding which to stock or recommend can be a challenge. Testing procedures and kit concerns can vary, but the mechanism of action for each category of test is, usually, the same. The Society’s technical information service has produced a bibliography of articles on diagnostic testing in community pharmacy, which also provides details of commonly available test kits.

The main criteria to consider when selecting a home testing kit include:

- **How complex is the test to perform?**
- **The ease of reading results.**
- **The presence of a control (to ensure that the test is functioning properly).**
- **Cost.**

Each step required in a test is a potential source of error, so simplicity of use is important. Some tests involve the use of only one reagent, whereas others require multiple reagents. Pharmacists must ensure that the user understands the importance of following the instructions exactly and in sequence, noting the time of day the test is to be conducted and the length of time each step requires, where appropriate. The instructions should be read carefully before the test is attempted.

For many home test kits, results are indicated by a change in colour or colour intensity. This is easily discernible on some products (eg, a plus sign or check mark) but people with colour defective vision or other visual impairments can find other tests difficult to use.

**Cholesterol**

There are several cholesterol test kits that allow patients to measure their total blood cholesterol levels at home. The cholesterol present in a blood sample reacts with a dye to produce colour. Colour intensity is measured using a visual scale or a photometer (with LCD display), depending on the kit.

Good finger prickling technique is essential to obtain the blood sample. Excessive squashing of the finger can negatively affect the quality of the blood sample by contaminating it with tissue fluids. Too little blood, trained in the technique and given guidelines on result interpretation.

Blood glucose tests only give an idea of what the blood glucose level has been in the past few hours and not what it is currently. However, they can be useful for patients who cannot measure their blood glucose. Diabetes UK recommends that people with diabetes aim to keep preprandial blood glucose between 4 and 7mmol/L and postprandial blood glucose no higher than 10mmol/L.

Tests for the amount of glycated haemoglobin (HbA1c) in a blood sample give an indication of blood glucose concentration over the previous three to four months. Haemoglobin becomes glycated when it joins with a glucose molecule. HbA1c is increased in people who have diabetes and is a useful test to monitor diabetes control. HbA1c levels should be kept below 7.5 mmol/L. People without diabetes will have values between 4 and 6 mmol/L.

If a patient with diabetes asks for advice about a high blood glucose or an HbA1c result, pharmacists should discuss treatment options and any dietary changes with the patient. They should also check for interactions with over-the-counter products and lifestyle changes.

**Helicobacter pylori**

**Helicobacter pylori** is implicated in peptic ulcer disease and its eradication can lead to ulcer healing. However, **H. pylori** testing does not detect patients with **H. pylori** related disease. The gold standard **H. pylori** test performed in hospital or in GP surgeries is a carbon-14 breath test which requires the patient to swallow a radiolabelled carbon isotope. However, **H. pylori** is commonly detected by taking a biopsy of the stomach lining and testing for the enzyme urease. Home tests detect **H. pylori** antibodies in the blood, but concerns have been raised about their accuracy. Breath tests are more accurate, with higher sensitivity and specificity than either laboratory-based or near-patient serological tests. stool antigen tests are also available. These appear to be accurate, but are not widely used.
Clariﬁcation

The section on positron emission tomography (PET) is a union of the practice of diagnostic nuclear medicine. Diagnostic nuclear medicine studies the decay of a gamma-emitting radionuclide that has been incorporated into a pharmaceutical to form a radiopharmaceutical. Following intravenous injection of the radiopharmaceutical, a digital image or scan is acquired using a gamma camera linked to a computer system. This shows the 2-D biodistribution of the radiopharmaceutical and is used to measure the function of an organ or tissue as well as revealing information on size and shape. 3-D images can be acquired using the technique of tomography. In nuclear medicine this is called SPECT (single photon emission computed tomography). A further specialist application called PET (positron emission tomography), where the decay of positrons is plotted, is also available in a few specialist centres. Abnormalities are usually demonstrated as either increased (“hot spots”) or decreased (“cold spots”) uptake in areas of otherwise uniform distribution.

The most commonly used radionuclide in nuclear medicine is technetium (99mTc). This has a short half-life of six hours, so the radiation dose to the patient is low. Investigations undertaken include bone scans for the detection and monitoring of metastatic and metastatic disease, lung scans to detect pulmonary emboli, myocardial perfusion scans to determine the extent of coronary artery disease and thyroid scans to assess thyrotoxicosis.

Diagnostic radiopharmaceuticals have minimal pharmacological effects due to the small quantities used. Adverse reactions are rare, however, the uptake of radiopharmaceuticals can be considerably altered by other medicines. Some drugs can be used purposefully to achieve this. For example, sodium and dobutamine are given to increase myocardial uptake. Drugs can also be given to alter the pharmacokinetics of the radiopharmaceutical and thus enable disease differentiation.

As a consequence of possible interactions, patients may well be asked to refrain from taking a medicine before scintigraphic imaging: contributed by Paul Mather, radiopharmacy department, Royal Liverpool University Hospital.
Providing a lipid measuring service

In the second article in our series on cholesterol, Steve Ohlsen and David Rogers consider what is needed in order to provide cholesterol testing

Offering a cholesterol measuring service will not be mandatory for the sale of over-the-counter simvastatin (as a 10mg tablet), but it will be deemed to be good practice by the Royal Pharmaceutical Society. It could be argued that providing such a service will improve public perception of pharmacists as health professionals in addition to benefiting individuals. However, providing such a service in a pharmacy setting requires significant resources and these need to be considered carefully.

Basic requirements

Before offering a service, consider whether or not you have enough space to allocate a designated area to it. You will also need to devote time to providing the necessary support to both clients and staff.

Before undertaking testing, pharmacists should ensure they are adequately covered by insurance with respect to themselves, their staff and the clients being tested. All members of staff coming into direct contact with any blood sampling procedure should be inoculated against hepatitis B. In the first instance, individuals should ask their own GPs, if the GP provides an occupational health vaccination service, the hepatitis B vaccine should be free. However, this is not an essential GP service. Alternatively, go to a travel clinic or contact your primary care organisation.

If the task of measuring cholesterol is to be assigned to a member of staff, the pharmacist in charge must make sure that he or she is properly trained. In addition, all staff must be made aware of the following:

- The importance of professional conduct
- The confidential nature of personal health information
- Standards for the designated area (eg, no food or drink to be consumed)
- Counter-infection measures, for example, prevention of accidental puncture wounds and correct disposal of clinical waste
- How to deal with emergency situations, such as fainting
- The importance of accurate information reporting and documentation

Marketing the service

Pharmacists should consider how best to target the people most in need of the service. Attention must be paid to the Code of Ethics governing the publicity and promotion of services, as detailed in ‘Medicine, ethics and practice’ ideas include:
- Putting leaflets through doors or in shopping and prescription bags
- Displaying posters in the pharmacy, surgery, community centre, post office or library
- Local newspaper, television or radio interviews to highlight the service — this is often less expensive than you might imagine and could be jointly funded by a group of pharmacies and the primary care trust, local health board or local pharmaceutical committee
- Patient selection either by surgeries involved or from patient medication records to identify likely users of the service (if PPRMs are used to contact individuals directly, prior consent is needed)
- Special campaigns in local businesses or health clubs
- Co-ordination with the local NHS organisations

It is also important to liaise with your local GPs before setting up a service so that a policy for referrals can be agreed.

Measuring cholesterol

A variety of devices are available to measure cholesterol levels, including portable and desktop analysers, but you should choose one with a satisfactory full Medicines and Healthcare products Regulatory Agency evaluation. There is a brief guide to available blood cholesterol analysers in MIMS.

Examples of common devices include: Accu-Test GC, CardioChek (portable meters that use test strips and Cholestech LDX (desktop machine). Non-invasive tests, measuring cholesterol in the skin, have become available, but results have not been validated in the UK so, as yet, we cannot recommend them.

Note that some devices are only able to measure total cholesterol (TC) but, as discussed in a previous article [P 16 July p57], the testing of cholesterol in isolation is not always helpful in predicting coronary risk. Calculations to predict coronary risk require TC to high-density lipoprotein (HDL) cholesterol ratio.

Testing equipment represents a significant investment (they can cost from a couple of hundred to several thousand pounds) so make sure you do your research thoroughly. Your research should include a review of accuracy because some devices are less accurate than others. Consider all of your requirements, both now and in the future. For example, it is important to consider whether or not you might want to offer other tests, such as blood glucose or liver function tests, and if your chosen device will support this. You could also think about the likelihood of future tests becoming more readily available (eg, high sensitivity C-reactive protein).

Other considerations include:
- How easily a test can be performed
- The time taken for a result
- Whether or not training is included
- Whether calibration is manual or automatic
- Whether there is the option to print out results or just view a visual display

Some companies may offer the option of leasing testing equipment.

Quality assurance: Whichever device is chosen, regular quality assurance will be essential to keep the machine in calibration and offer a consistent, high quality service. Accurate and precise measurements are critical for the classification and referral of individuals. Internal quality control procedures (regular analysis of known standards) and external quality assessment (comparative analysis of
Cutting a good quality blood sample When obtaining whole blood fingertip samples for lipid measurement, it is important to follow a protocol to help you consistently collect good samples, with no contamination with fats from soaps, make up etc. The panel above suggests a protocol. The client does not need to fast of only TC and HDL cholesterol are measured. If a more complete lipoprotein profile is required (eg, including triglyceride levels), the individual should fast for between nine and 12 hours. This means that it is probably best to do a full lipid profile in the morning.

Feedback When discussing test results with patients, care and sensitivity are needed. All information should be delivered in a way that individuals will understand so try to avoid unnecessary technical terms and jargon. Patients should also be provided with their results in a written form. Any lifestyle advice must be supported by information that the patient can take away to read. It is particularly important to make lifestyle changes manageable (eg, divide them into achievable increments). All advice given should be documented for clinical governance.

If cholesterol levels are not within the desired range the patient's consent must be sought for this information to be sent to his or her GP. Patients should be given their own copy of the referral. If patients do not consent they must be advised to seek medical advice.

Calculating coronary heart disease risk

The indication for the sale of simvastatin is for the prevention of a first coronary event in people likely to be at a moderate risk of coronary heart disease (CHD). Risk of CHD is usually expressed in terms of the probability (absolute risk) of a non-fatal MI or coronary death over 10 years. In this case, "moderate" means a 10 to 15 per cent risk. It would therefore, make sense for pharmacists to be able to calculate CHD risk as well as measuring cholesterol.

However, according to the manufacturers of Zocor Heart-Pom, moderate risk does not have to be calculated as such. Pharmacists will be able to sell the product based on individual reported risk factors, such as age and smoking status. Full details will be available in Society practice guidance, which will be sent out with The Journal shortly.

For pharmacists who do wish to calculate coronary risk for people, this can be done using a computer program or coronary risk prediction charts for primary prevention, which are all based on the Framingham heart study (see practice point 3). Both methods require further information about the individual including:

- Sex
- Age
- Systolic blood pressure (mmHg)
- TC to HDL cholesterol ratio
- Whether or not the person is a smoker or has smoked in the past five years
- Whether or not the person has diabetes
- If left ventricular hypertrophy is present (detected by electrocardiogram)

It is important not to omit any of these factors so that the risk is not over- or underestimated. To offer a complete service, pharmacists could, therefore, consider providing a service to measure blood pressure. Practice guidance on blood pressure testing is available from the Society.

Other factors that can be useful to record include:

- Family history of CHD (heart attack in father or brother before 55 years of age or in mother or sister before 65 years)
- Ethnicity
- Body mass index
- Waist size
- Use of oral contraceptive or hormone replacement therapy

These factors can increase risk, but are not part of the probability calculation (eg, family history was not included in the Framingham study). Any discussion about lifestyle could also be documented.

People identified as being at high risk of CHD (over 30 per cent) should be referred to their GP for treatment immediately.

Summary

Considering the new general medical services contract (where GPs are rewarded for meeting targets and are able to subcontract services to other providers, such as pharmacies or pharmacists) and the future pharmacy contract, a cholesterol measuring service could well be offered to primary care organisations.

An excellent example of a successful lifestyle project, which included a full blood lipid and glucose profile, and assessments of blood pressure, height, weight, smoking status, diet, alcohol consumption and degree of physical activity is that started in Neyland Pharmacy in Pembrokeshire (P, 8 May, p572). Funding came from the local health board's pot for targeting areas with high rates of CHD (“‘revolution in health’ boost”).

Pharmacists are uniquely placed to improve the health of the nation by providing tests and advice. They should be aware that other health care professionals are also looking to provide these kinds of service. It would be a pity if pharmacists miss out.

References


Resources

- Practice guidance on blood pressure testing is available from the Royal Pharmaceutical Society at www.rphs.org.
- The Joint British Recommendations suggest use of a computer program, whatever possible, to calculate CHD risk. One such program can be downloaded from www.heartuk.org.uk.
- Coronary risk prediction charts for primary prevention are at the back of the British National Formulary.
- The Wellcome Trust, based at the Queen Elizabeth Medical Centre in Birmingham, offers an independent national external quality assessment scheme for cholesterol measuring devices. Contact 021 414 7900.

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www.pjonline.com
One of the critical intervention points identified in the National Service Improvement Framework for Heart, Stroke and Vascular Disease was:

“Establish and encourage the development of systems and tools enable absolute risk estimation in people without overt cardiovascular disease (including early detection and management of high blood pressure and dyslipidaemia)”

This needs to therefore include point of care screening (when shown to be as accurate and reliable as pathology testing) by GPs and other health professionals. Current arrangements, in our view, seem to unnecessarily protect pathology providers, despite proven performance of many point of care devices. Also, where appropriate training and quality assurance procedures are in place, absolute risk assessment could be performed by pharmacists and other non-medical health professionals. This is not recommended as a routine service offered by all community pharmacies, but could be utilised in those areas which are otherwise underserviced.
8. Elements of the Pharmacy Cardiovascular Health Care Model:

Compliance with therapy

➢ drugs, diet, exercise

8.1 GUIDING PRINCIPLES AND EXISTING FRAMEWORK

<table>
<thead>
<tr>
<th>NATIONAL CHRONIC DISEASE STRATEGY:</th>
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<td>• Key direction 31: Support appropriate use of medicines to maximise health outcomes and quality of life.</td>
</tr>
<tr>
<td>• Key direction 34: Encourage health care entry points to identify opportunities to actively promote self-management.</td>
</tr>
<tr>
<td>• Key direction 35: Develop education and training strategies for health care providers to gain knowledge and skills to support self-management, so that self-management becomes part of routine clinical practice.</td>
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<tr>
<td>• Key direction 36: Ensure that self-management is incorporated into clinical practice through its inclusion in multi-disciplinary care planning with the patient and their family and carers.</td>
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<tr>
<th>NATIONAL SERVICE IMPROVEMENT FRAMEWORK FOR HEART, STROKE AND VASCULAR DISEASE</th>
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<tr>
<td>Critical intervention points:</td>
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<tr>
<td>• Implement policies to encourage the safe and quality use of medicines.</td>
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“Poor compliance with management plans, and errors with medication plans, are major contributors to re-hospitalisation rates in people with long term heart disease.”

“It is important to monitor and support adherence to lifestyle advice and medications on an ongoing basis, and where appropriate consider using ancillary measures, such as special clinics or telephone support services.”

8.2 PROMOTING PATIENT COMPLIANCE WITH DRUGS, DIET AND EXERCISE

Much of CVD can now be treated on the basis of the results of large clinical trials and can be considered ‘evidence-based’. There has been an intense focus on the application of evidence-
based medicine in the management of CVD, with the resulting achievement of major therapeutic advances in the treatment of conditions including hyperlipidaemia, heart failure, atrial fibrillation, and hypertension. In contrast, the everyday practical use of medications (including the critical importance of patient compliance) for preventing and treating CVD has received relatively little attention. In effect, we have had a vast number of trials, conducted at huge expense, showing the potential benefits of many pharmacological agents, but only if patients take them regularly. This applies to all the cardiovascular drugs; they are possibly worthless if compliance is poor.206
In viewing all aspects of patient care, it may be argued that efforts to understand and address issues of non-compliance are equally as important as generating evidence of efficacy.
through randomised controlled trials, as patients cannot benefit from efficacious therapies unless they take them.\textsuperscript{207-209}

Two cardiovascular conditions where compliance is particularly problematic are hyperlipidaemia and hypertension - commonly occurring together and both asymptomatic conditions where drug therapy is used to prevent long-term complications.\textsuperscript{208} Like hypertension and smoking, hypercholesterolaemia is a chronic, painless condition that is usually perceived by the patient as having deleterious health consequences that are far in the future.

Chapman and colleagues recently examined compliance with concomitant antihypertensive and lipid-lowering drug therapy in 8,406 enrollees in a US managed care plan who had initiated treatment with both forms of therapy within a 90-day period.\textsuperscript{210} Adherence was measured as the proportion of days covered in each 3-month interval following initiation of concomitant therapy, with patients considered adherent if they had filled prescriptions sufficient to cover at least 80\% of days with both classes of medications. Less than half of patients (44.7\%) were adherent with both therapies 3 months after medication initiation, a figure that decreased to 35.8\% at 12 months. Adherence with antihypertensive drugs was, on average, approximately 10\% to 15\% greater than with lipid-lowering medications over time. Patients were more likely to be adherent if they had initiated both treatments together, had a history of coronary heart disease or congestive heart failure, or took fewer other medications.

“If hypertension, hyperlipidaemia, and diabetes are the three main risk factors for cardiovascular disease, poor treatment compliance and persistence can be considered to be the fourth risk factor.” \textsuperscript{211}
8.2.1 Hyperlipidaemia

There is extensive epidemiological evidence, from a number of large-scale studies, that relates elevation of blood total cholesterol levels to increased coronary heart disease incidence.\(^{212-215}\) In addition, many studies have now clearly demonstrated the benefits of cholesterol lowering in patients with or without established CVD, including in patients with only average cholesterol levels for westernised societies.\(^{200, 212, 214, 216, 217}\)

Long-term HMG-CoA reductase inhibitor (statin) use achieves a significant reduction in mortality (24% to 42%) for patients with coronary artery disease that is equal to or greater than that seen with other secondary prevention medications, including aspirin, β-blockers, and angiotensin-converting enzyme (ACE) inhibitors.\(^{218}\)

The Heart Protection Study, with over 20,500 subjects aged 40-80 years, was the largest trial of statin therapy ever conducted.\(^{219-221}\) It was a prospective double-blind randomised controlled trial investigating prolonged use (> 5 years) of simvastatin 40 mg daily and a cocktail of antioxidant vitamins (650 mg vitamin E, 250 mg vitamin C and 20 mg beta-carotene daily) in patients with coronary disease, other occlusive arterial disease, or diabetes and a blood total cholesterol concentration of at least 3.5 mmol/L. Simvastatin treatment produced benefit across all patient groups regardless of age, gender or baseline cholesterol
value. Results showed a 12% reduction in total mortality, a 17% reduction in vascular mortality, a 24% reduction in CVD events, a 27% reduction in all strokes and a 16% reduction in non-coronary revascularisations. The antioxidant vitamin cocktail was not beneficial.

However, the translation of the clinical trial benefits of statin therapy in CVD into practice has not been easy. Under diagnosis, under use of statin drugs and inadequate control of dyslipidaemia appear to be common worldwide.\textsuperscript{222-230} Despite international clinical guidelines recommending lipid-lowering treatment in patients with clinically evident atherosclerotic vascular disease, study after study has documented low treatment rates in this high-risk patient population, thereby creating a clinical practice and public health dilemma.\textsuperscript{231}

Only about 30% of patients with established CVD and raised serum lipids, and fewer than 10% of individuals eligible for primary prevention, receive lipid-lowering therapy. Target total cholesterol concentrations are then achieved in fewer than 50% of patients who do receive such treatment.\textsuperscript{222}

Poor patient compliance to medication regimen is a major factor in the lack of success in treating hyperlipidaemia.\textsuperscript{232} All of the lipid-lowering drugs must be continued indefinitely; when they are stopped, plasma cholesterol concentrations generally return to pre-treatment levels.\textsuperscript{233} The benefits of lipid-lowering therapy will only accrue if patients comply with their medication.\textsuperscript{208} The discontinuation rates with lipid-lowering therapy reported in randomised clinical trials may not reflect the rates actually observed in primary care settings.\textsuperscript{234, 235} This may be a major barrier to translating the beneficial effects seen in clinical trials into everyday practice. Long-term compliance with hyperlipidaemia drugs is especially important since the major beneficial effects are seen after 1-1.5 years of continuous therapy.\textsuperscript{11}

A study by Simons \textit{et al.}\textsuperscript{236} determined that in Australian general practice, 60% of patients newly prescribed lipid-lowering drugs discontinue them within 12 months (half of these discontinuations occur within 3 months of initiating therapy). In a larger, Australia-wide assessment of discontinuation rates in 32,384 patients who commenced a lipid-lowering drug (statins in 92%), 30% had stopped taking the drug by 6-7 months.\textsuperscript{237} Discontinuation rates were broadly similar with all the statin drugs. The significant predictors of discontinuation were age (patients below the median age of 68 years had higher discontinuation rates) and not living in a capital city.
In a large elderly US population, only 25% of patients maintained a compliance rate of at least 80% with statin treatment after 5 years. In a Canadian study of patients aged over 65 years, 25% had discontinued statin therapy within 6 months of initiation. In a prospective study of hyperlipidaemic Korean patients, at six months nearly 20% of the 1,019 patients enrolled had discontinued treatment.

In a study of almost 14,000 patients admitted to hospital for an acute coronary syndrome, Eagle et al. reported that discontinuation of drug therapy was observed at a 6-month follow-up in 8% of those taking aspirin on discharge, 12% of those taking beta-blockers, 20% of those taking ACE inhibitors, and 13% of those taking statins.

Patient compliance with lipid-lowering drug therapy has even been a problem in some of the major clinical trials. Six percent to 30% of subjects enrolled in randomised controlled trials assessing the efficacy of lipid-lowering agents discontinued the study drugs.

In the Heart Protection Study, 82% of patients who received simvastatin 40 mg daily were compliant after 5 years, with compliance defined as at least 80% of the scheduled tablets having been taken since the previous follow-up. In the West of Scotland Coronary Prevention Study (WOSCOPS) trial, almost 30% of patients discontinued pravastatin.
over almost 5 years. Patients who took 75% or more of their prescribed pravastatin had only one third the risk of death from any cause compared with patients taking less than 75% of the therapy.\textsuperscript{242-245}

In a Scottish study, good compliance with statin therapy following a first myocardial infarction was associated with reduced risk of recurrence of myocardial infarction and all cause mortality.\textsuperscript{246} There is also evidence that discontinuation of statins during acute coronary syndromes may impair vascular function independent of lipid-lowering effects. Heeschen \textit{et al.}\textsuperscript{247} investigated the effects of statins on the cardiac event rate in 1616 patients of the Platelet Receptor Inhibition in Ischaemic Syndrome Management (PRISM) study who had coronary artery disease and chest pain in the previous 24 hours. Baseline clinical characteristics did not differ among 1,249 patients without statin therapy, 379 patients with continued statin therapy, and 86 patients with discontinued statin therapy after hospitalisation. If the statin therapy was withdrawn after admission, cardiac risk increased significantly compared with patients who continued to receive statins. This was related to an increased event rate during the first week after onset of symptoms and was independent of cholesterol levels.

Given the high cost of therapy with statins (for instance, consuming almost one-quarter of the total Australian Pharmaceutical Benefits Scheme budget) and the obvious limit to society’s health care resources, it is critical that the outcomes of lipid-lowering drug therapy are maximised.\textsuperscript{248} The reasons for poor compliance with lipid-lowering drug therapy appear to be poorly characterised and require further study.\textsuperscript{207} Given the efforts of randomised controlled trials to establish the efficacy of these therapies, it is surprising that so little effort has been focused on determining compliance in clinical practice and even less in developing approaches to improve it.\textsuperscript{207}

The dominant reason for non-compliance with lipid-lowering therapy in Australian patients appears to be a lack of conviction that treatment is necessary or beneficial.\textsuperscript{236} According to Simons, the problem might be at least partially solved if both doctors and pharmacists assumed increased responsibility for convincing patients about the need for and benefits of ongoing lipid-lowering treatment.\textsuperscript{249}

Not surprisingly, patients who have experienced major cardiac events tend to be well motivated to comply with statin treatment. Larsen \textit{et al.}\textsuperscript{250} reported generally good
compliance with statin therapy in a Danish population, although it was noted that a high percentage of the younger patients (below 45 years of age) without drug indicators of CVD or diabetes discontinued treatment before obtaining the full benefit in terms of decreased risk of CVD morbidity and mortality. Kiortsis et al. also reported that younger patients were less compliant with lipid-lowering drug treatment. In their assessment of discontinuation rates in 32,384 Australian patients who commenced lipid-lowering drug therapy, Simons et al. reported that one of the significant predictors of discontinuation was age (patients below the median age of 68 years had higher discontinuation rates). The results of a comparative study between Funen, Denmark and Bologna, Italy indicated that compliance with lipid-lowering drug treatment appeared to be higher when used for secondary prevention. Together, these studies suggest that the presence of pre-existing CVD is a potent stimulus for compliance with lipid-lowering drug therapy.

Although generally well-tolerated, the occurrence of adverse reactions with lipid-lowering drug therapy may also pose a barrier to compliance. The cost of therapy can also present a major barrier. In a study within a managed care organisation in the mid-western United States, Ellis et al. observed a profound predictive effect of higher prescription co-payment levels on non-compliance and discontinuation of statin therapy. On average, patients receiving statins went without medication approximately 20% of the time. The level of patient co-payment was an independent factor for statin discontinuation. Compared to those who had less than a $10 co-payment, patients who paid greater than or equal to $20 were more than 4 times more likely to discontinue their statin. In a Veterans Administration system incorporating a low patient co-payment and streamlined prescription refill procedures, persistence with the use of statins exceeded 70% after 18 months of follow-up. Unfortunately, the cost of medicines to patients is likely to steadily increase as governments worldwide struggle to meet the demand of growing elderly populations for expensive therapies.

Members of the Project Team have performed a prospective, randomised, controlled evaluation of a pharmacist-conducted educational and monitoring program for hypercholesterolaemic patients, designed to promote patient compliance with lipid-lowering drug therapy and dietary/lifestyle modifications (GU 602: Community Pharmacy Agreement: Improving the outcomes of lipid-lowering drug therapy: an evaluation of the potential role of community pharmacists). The participants were 94 adults, with 81 completing the study.
(39 intervention; 42 control), with a cardiovascular-related diagnosis and discharged from hospital on lipid-lowering drug therapy. Patients in the intervention group were visited at home monthly by a community pharmacist, who educated patients on the goals of lipid-lowering treatment and the importance of lifestyle issues in dyslipidaemia and compliance with therapy, assessed patients for drug-related problems, and measured total blood cholesterol levels using point-of-care testing. Patients in the control group received standard medical care. The main outcome measure was total blood cholesterol levels after six months, as well as an evaluation of patient and general practitioner satisfaction with the program.

The reduction over the course of the study in mean cholesterol levels within the intervention group was statistically significant (4.9 ± 0.7 mmol/L to 4.4 ± 0.6 mmol/L, \( P < 0.005 \)), while there was no change within the control group (\( P = 0.26 \)). At follow-up, 44% of the intervention group patients and 24% of the control group patients had cholesterol levels below 4.0 mmol/L (\( P = 0.06 \)). The reduction in total cholesterol in the intervention group should translate to an expected 21% reduction in cardiovascular mortality risk and a 16% reduction in total mortality risk - more than twice the risk reduction achieved in the control group. In addition, the program was very well received by the patients and their general practitioners. It was concluded that a pharmacist-conducted educational and monitoring intervention improved the outcomes of lipid-lowering drug therapy. An ongoing program incorporating monitoring repeat intervals for patients’ lipid-lowering medication and providing reminders, educating and providing support to patients, and regular near-patient monitoring of blood lipids would be relatively easy to implement in community pharmacy practice.

Other recent community pharmacy studies in the United States and Canada have suggested that pharmaceutical care may improve CVD prevention considerably by optimising adherence to pharmacotherapy. In the Project ImPACT (Improved Persistence and Compliance with Therapy) study, 397 patients were exposed to pharmaceutical care.256 The pharmacists took blood cholesterol readings, family and medication history, discussed the goals of therapy, modification of risk factors and diet and exercise programs. Blood cholesterol continued to be monitored at regular intervals. After an average of 2 years of follow-up, 94% of participants were still taking a lipid-lowering drug, and the average adherence to treatment was 90%. Overall, 63% of patients reached target lipid goals. Unfortunately, there was no control group, making the study’s results difficult to interpret.
The landmark SCRIP study (Study of Cardiovascular Risk Intervention by Pharmacists) was a randomised controlled trial conducted in 54 community pharmacies in Canada to determine the effect of a program of community pharmacist intervention on the process of cholesterol risk management in patients at high risk for cardiovascular events. Patients randomised to pharmacist intervention received education and a brochure on risk factors, point-of-care cholesterol measurement, referral to their physician, and regular follow-up for 16 weeks. Pharmacists faxed a simple form to the primary care physician identifying risk factors and any suggestions. Usual care patients received the same brochure and general advice only, with minimal follow-up. The primary end point was a composite of performance of a fasting cholesterol panel by the physician or addition or increase in dose of cholesterol-lowering medication.

The external monitoring committee recommended early study termination owing to benefit. The primary end point was reached in 57% of intervention patients vs. 31% in usual care (odds ratio, 3.0; 95% confidence interval, 2.2-4.1; p < 0.001). It was concluded that a community-based intervention program improved the process of cholesterol management in high-risk patients. The program demonstrated the value of community pharmacists working in collaboration with patients and physicians.

A follow-up study (SCRIP-plus) enrolled patients who were at “very high” risk of cardiovascular events, defined as a history of coronary artery disease, coronary revascularisation procedures, peripheral vascular disease, or cerebrovascular disease; presence of diabetes, or a 10-year Framingham risk score >30%. The study focused on LDL cholesterol levels and only patients with an LDL cholesterol level >2.5 mmol/L were enrolled in the study and followed for 6 months. Subjects were invited to attend a baseline (screening) visit held at the pharmacy, during which the pharmacist performed two fasting cholesterol measurements. Pharmacists completed intervention forms detailing the results of the lipid measurements, risk factors assessed, and recommendations for therapeutic interventions (including lifestyle changes), and faxed these forms to the patients’ doctor.

The pharmacist contacted the patients by telephone at weeks 2 and 4 after enrolment, and at the 3- and 6-month (in-person) follow-up visits. Follow-up visits assessed progress with the intervention(s) recommended at the baseline visit, medication adherence, adverse effects or drug interactions, and patient education.
In the 359 patients with follow-up data, the primary endpoint of mean change in LDL cholesterol level from baseline to 6-months was −0.5 mmol/L (95% confidence interval [CI]: −0.4 to −0.6), a relative reduction of 13.4% (p < 0.0001). There was no control group; due to the early termination of SCRIP, randomisation to “usual care” was deemed unethical.

“In conclusion, our study demonstrated that an enhanced pharmacist care program was associated with a reduction in LDL cholesterol levels. In the context of primary health care reform, programs such as this should be strongly considered, as they are community based, accessible, multidisciplinary, and effective. It is hoped that health policymakers and payers will recognise the benefits of such programs, and encourage their use on a more widespread basis.”

In a planned subgroup analysis of the SCRIP data, Simpson et al. examined the effect of enhanced pharmacist care on cholesterol management in patients with and without diabetes mellitus. Of the 675 patients enrolled in the SCRIP study, 294 (44%) had diabetes. Enhanced pharmacist care had a more beneficial effect on cholesterol management in those with diabetes (odds ratio [OR] 4.8) than without diabetes (OR 2.1), p = 0.01. Secondary end points showed similar trends, and reduction in Framingham CVD risk was greater in patients with diabetes than without. Hence, pharmacist intervention for dyslipidaemia appeared to have a greater impact in patients with diabetes. The investigators suggested that pharmacists should target this patient group for interventions in cholesterol risk management.

A primary care practice in the West of Scotland developed a heart disease prevention clinic, run jointly by a practice nurse and pharmacist, to target patients with existing heart disease. Patients identified by the practice pharmacist were offered a full health screen. Their clinical parameters were assessed and appropriate disease modifying drug therapy and lifestyle advice was offered in a review clinic with the practice nurse and pharmacist. The pharmacist identified over 212 patients over a 30-month period. A majority demonstrated hypertension (91%) and angina (89%), while over half (57%) had suffered a heart attack. Statin therapy was modified in a large number of patients (47%) and the number of patients with satisfactory total cholesterol levels has increased from 30% to 57% (P < 0.001). Aspirin and beta-blocker therapy has been initiated in a significant number of patients (53% and 26%, respectively). Twelve patients (6%) stopped smoking. The doctors who demonstrated a change in their own practice readily accepted changes to therapy recommended by the practice nurse and pharmacist. It was concluded that the inclusion of a pharmacist in a secondary heart disease clinic conferred clinical and economic benefits.
Table 25  Some roles for the pharmacist in the care of the patient with dyslipidaemia (modified from Luxford\textsuperscript{260})

<table>
<thead>
<tr>
<th>Role</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Providing pharmaceutical advice</td>
<td>For instance, the timing of administration of lipid-lowering therapy, identification of drug interactions and adverse drug reactions</td>
</tr>
<tr>
<td>Providing dietary advice</td>
<td></td>
</tr>
<tr>
<td>Providing printed educational material</td>
<td></td>
</tr>
<tr>
<td>Identifying other sources of information and advice</td>
<td>E.g. the National Heart Foundation</td>
</tr>
<tr>
<td>Patients often modify or stop lifestyle changes or drug therapy</td>
<td>Without their doctor's knowledge. Community pharmacists are in an ideal position to identify these problems and to talk with the patient about them. When patients forget to take their medication, or decide to stop taking their medication, pharmacists can offer the following information and advice.</td>
</tr>
<tr>
<td>Ensure the patient understands how the benefit of treatment</td>
<td>(e.g. prevention of CVD, TIAs, stroke etc.) outweighs the inconvenience of the treatment (e.g. cost, alteration of lifestyle)</td>
</tr>
<tr>
<td>Help set a goal (lipid target level) to work towards</td>
<td></td>
</tr>
<tr>
<td>Ensure the patient is aware that the effects of lifestyle changes</td>
<td>and lipid-lowering drugs will take at least eight weeks to be achieved</td>
</tr>
<tr>
<td>Explain to the patient how they can manage any medication side-effects</td>
<td></td>
</tr>
<tr>
<td>Suggest the patient involve their family members in their care</td>
<td>Particularly the lifestyle changes</td>
</tr>
<tr>
<td>The use of calendars or diaries to remind them to take their medication</td>
<td></td>
</tr>
<tr>
<td>The use of blister packs or dosette boxes for ease in remembering</td>
<td>to take medication</td>
</tr>
<tr>
<td>Pharmacists can also participate in compliance programs:</td>
<td></td>
</tr>
<tr>
<td>Remind patients of prescription repeat dates before they leave the pharmacy</td>
<td></td>
</tr>
<tr>
<td>Call patients a few days before the prescription repeat is due as a reminder</td>
<td></td>
</tr>
</tbody>
</table>
8.2.2 Hypertension

Hypertension is the most frequently managed problem in general practice in Australia, accounting for almost 9% of encounters and 8% of prescriptions in general practice.\textsuperscript{6} Hypertension is a major risk factor in the development of cardiovascular disease and poses a significant public health problem. Randomised clinical trials have demonstrated that the treatment of mild-to-moderate hypertension can reduce the risk of stroke by 30 to 43% and of myocardial infarction by approximately 15%.\textsuperscript{261-263}

Despite the availability of effective treatments, the control of high blood pressure in the community is far from optimal.\textsuperscript{261-264} Worldwide, less than one quarter of hypertensive patients are adequately controlled for hypertension.\textsuperscript{265} The lack of blood pressure control could be due to a wide array of possibilities including under-diagnosis of hypertension, under-treatment of hypertension, non-compliance to lifestyle modifications, and non-compliance to medications. However, the main reason for inadequate control of hypertension is poor compliance with the treatment regimen, both pharmacological and behavioural (e.g., weight reduction, sodium intake restriction, and exercise).\textsuperscript{266}

Poor compliance to antihypertensive drug therapy in asymptomatic patients has long been recognised as a major problem,\textsuperscript{261-269} with 20 to 80% of patients receiving treatment for hypertension in real-life situations considered to be “good compliers”.\textsuperscript{261} Up to half of the patients being treated for hypertension drop out of care entirely within a year of diagnosis.\textsuperscript{261, 268} Consequently, approximately 75% of patients with a diagnosis of hypertension do not achieve optimum blood pressure control.\textsuperscript{261, 267, 268} Good compliance has been associated with improved blood pressure control and reduced complications of hypertension.\textsuperscript{261}
Figure 35  Treatment persistence with antihypertensive medications. Data from Jones et al.\textsuperscript{270}

8.3  \textit{PRACTICAL STRATEGIES TO PROMOTE COMPLIANCE IN CARDIOVASCULAR DISEASE}

A key issue is that the patient must decide to control their CVD risk factors, having understood the rationale and importance of commitment to the therapy. The healthcare provider should provide clear, direct messages about the importance of a behaviour or therapy, providing verbal and written instruction, including rationale for treatments. Good communication skills are essential when involving the patient in decisions about treatment, utilising active listening and anticipating barriers to compliance and discussing solutions.\textsuperscript{208, 214, 253 271} To help improve compliance, it is essential that pharmacists, like doctors and nurses, provide ongoing support and use every opportunity to re- emphasise the importance of taking prescribed treatment.\textsuperscript{7}
Identify poor adherence
   Look for markers of nonadherence: missed appointments ("no-shows"), lack of response to medication, missed refills
   Ask about barriers to adherence without being confrontational

Emphasize the value of the regimen and the effect of adherence

Elicit patient’s feelings about his or her ability to follow the regimen, and if necessary, design supports to promote adherence

Provide simple, clear instructions and simplify the regimen as much as possible

Encourage the use of a medication-taking system

Listen to the patient, and customize the regimen in accordance with the patient’s wishes

Obtain the help from family members, friends, and community services when needed

Reinforce desirable behavior and results when appropriate

Consider more “forgiving” medications when adherence appears unlikely
   Medications with long half-lives
   Depot (extended-release) medications
   Transdermal medications

Figure 36  General strategies to improve compliance with medication

The American Heart Association expert panel on compliance recommended a multilevel approach, involving patients, healthcare providers and healthcare organisations, and requiring educational and behavioural strategies. Actions that enhance compliance with prevention and treatment recommendations to reduce risk include (i) providing clear, direct messages about importance of a behaviour or therapy; (ii) including patients in decisions about prevention and treatment goals and related strategies; (iii) incorporating behavioural strategies into counselling; (iv) an evidence-based practice; (v) assessing patient compliance at each visit; and (vi) developing reminder systems to ensure identification and follow-up of patient status (e.g. telephone follow-up).
Figure 37  General approach to enhancing patient compliance with lipid-lowering drug therapy\textsuperscript{271}

In a study of 19,422 enrollees in a US managed care plan who initiated treatment with a statin, Benner et al. concluded that early and frequent follow-up by physicians, especially with lipid testing, was associated with improved compliance to lipid-lowering therapy.\textsuperscript{272} A randomised prospective study is needed to determine whether this relationship is causal. “Coaching” patients to adhere to both dietary advice and the drug treatment prescribed has been successfully utilised in patients with dyslipidaemia,\textsuperscript{147, 273} and may be an appropriate method to reduce the treatment gap in applying evidence-based medicine to the “real world”.\textsuperscript{273}

Whereas a number of reasons for poor compliance with lipid-lowering therapy have been described, most evaluations were unsystematic, varied in content, and did not allow
assessments of the relative importance of the many contributing factors. In general, interventions designed to improve compliance are centred on educating patients. Until the actual mechanisms of poor compliance are known, interventions are unlikely to be focused and ultimately have a reduced likelihood of improving the problem. Separate Cochrane reviews of strategies to improve compliance with lipid-lowering and antihypertensive drug regimens both concluded that at this stage no specific intervention can be recommended. Other reviews of compliance with lipid-lowering drugs and antihypertensive therapy have drawn the same conclusion.

The following steps have often been proposed to promote compliance with drugs used for CVD:

- Ensure the patient understands how the proven benefits of the treatment (e.g. prevention of myocardial infarction, stroke etc.) and possible ancillary benefits (e.g. perhaps helping to prevent dementia or osteoporosis with statins) outweigh the inconvenience of the treatment (e.g. cost, alteration of lifestyle).
- Involving the patient as a partner in all treatment decisions.
- Suggest the patient involve their family members in their care - particularly the lifestyle changes.
- Utilise nurses or pharmacists to educate and monitor the patient (a number of nurse- or pharmacist-managed programs have been very successful).
- Tailor the drug regimen to the patient’s individual schedule or lifestyle and for other medications.
- Prescribe once-a-day regimens whenever possible.
- Help set goals (e.g. target lipid levels or blood pressure) to work towards.
- The use of self-monitoring (e.g. blood pressure) to promote compliance.
- Explain to the patient how they can manage any medication side-effects.
- The use of calendars or diaries to remind them to take their medication.
- The use of blister packs or dosette boxes for ease in remembering to take medication.
- Reminding patients of due dates for prescription repeat dates.

A German study is examining the clinical and economic outcomes of a compliance-enhancing program (including standardised contacts between the study centre and patients,
mailings, telephone calls, and access to a Web page and hotline) in almost 8,000 patients receiving rosuvastatin.275

Hypertensive patients may fail to take their medication because of the long duration of therapy, the symptomless nature of the condition, side effects of medication, complicated drug regimens, lack of understanding about hypertension management, and lack of motivation. Using tailored combinations of strategies that include simpler dosage regimens, patient motivation, and involvement of other health professionals in a patient-centred approach are most likely to reduce the should the potential barriers to compliance.262, 263, 274

A Cochrane review indicated that reducing the number of daily doses appears to be effective in increasing compliance to blood pressure lowering medication and should be tried as a first-line strategy, although there is less evidence of an effect on blood pressure reduction.263 Some motivational strategies and complex interventions appear promising, but more evidence is needed from randomised controlled trials.

There is now reasonable evidence that the use of new antihypertensive agents, such as the ACE inhibitors/angiotensin receptor blockers and calcium channel blockers, that are generally well-tolerated results in improved compliance rates.264, 265, 268, 269, 276, 277 Similarly, compliance may be higher with the use of low-dose combination therapy of two complementary antihypertensive agents, as opposed to high-dose monotherapy (with the same drugs).265

Until better insight into compliance is obtained, multifaceted measures to assist patients to follow treatment with antihypertensives have to be adopted. The drug selected should be available, affordable, have a simple dosing regimen, and ideally, should not interfere with the quality of life of the patient. Wherever feasible, patients should be taught to measure and monitor their own blood pressure and to assess their own compliance. Patients need to understand the importance of maintaining blood pressure control. Furthermore, they need to learn how to deal with missed doses, how to identify adverse events and what to do when they occur.261
Several studies have shown that pharmaceutical care in community pharmacies can improve adherence with therapy and the control of hypertension. The pharmacist is uniquely positioned in the health care system to assist with improving blood pressure control by utilising strategies to solve medication-related problems. Studies within integrated health systems have demonstrated that when pharmacists are included as members of health care teams, control rates for hypertension increase. In addition, drug interactions, non-adherence, and costs can be reduced.

In the US, community pharmacists have begun to assist physicians with monitoring of hypertensive patients through improving medication compliance, reducing adverse reactions, and improving blood pressure control. Many community pharmacists screen for new or inadequately controlled hypertension and refer patients to their physicians. It is becoming more common for some community pharmacists to develop collaborative relationships with
specific physicians. These physicians often refer appropriate patients to a pharmacist for additional follow-up between physician office visits. The pharmacist may measure blood pressure, adjust dosages, and later the antihypertensive regimen via protocols approved by the physician. In these relationships, pharmacists maintain close communication with the primary physician.

Community pharmacists can serve as an important link between the physician and patient. Despite the common perception, most patients utilise only one pharmacy. The pharmacist is often the only member of the health care team who has access to information about all of the patient’s medications. Importantly, a physician may be unaware of concomitant therapies prescribed by another physician for a given patient. The physician and pharmacist can work together so that the physician’s goals are achieved. The pharmacist can give the provide information on the number of prescription refills during the last year, which can be a useful surrogate for medication adherence. Physicians may use this information to make future treatment decisions. Also, pharmacists are very knowledgeable about medication costs to patients. 284

An ongoing program incorporating monitoring repeat intervals for patients’ antihypertensive medication and providing reminders, educating and providing support to patients, and regular blood pressure monitoring would be relatively easy to implement in community pharmacy practice.

The promotion of compliance with medications for CVD should be a major priority for governments, pharmacists and other health professionals, and the pharmaceutical industry. As noted by Elliott, 285 improving medication compliance would be a simple way to make antihypertensive drug therapies much more cost-effective. In high-risk patients, even small improvements in blood pressure control are associated with large reductions in cardiovascular risk. 264 Any improvement in compliance with antihypertensive and lipid-lowering medications is likely to be associated with substantial public health care benefits. 210

Improved compliance brings benefit to the patient by improving treatment efficacy, benefit to the prescriber who no longer needs to keep switching medicines to try to find an effective treatment, and net benefit to the health care system by potentially leading to fewer cardiovascular events. 211