

REVIEW OF CARDIOLOGY SERVICES IN N IRELAND

REPORT OF THE CARDIOLOGY
REVIEW GROUP

March 1999

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INTRODUCTION

1. Cardiovascular disease, primarily coronary heart disease (ischaemic heart disease) has been a major cause of death in Northern Ireland for many decades and remains the major cause of death today. Significant efforts to prevent disease and to treat established disease have however resulted in a decrease in the death rates from coronary heart disease over the past 2 decades.
2. Much has changed in the treatment of patients with coronary heart disease since the last regional review of cardiology in 1979. For example, the scope of therapy and the development of technology has expanded considerably in the past number of years.
3. Advances in treatments are taking place in tandem with demographic changes. The number of older people in Northern Ireland has been increasing and will continue to do so. This will undoubtedly result in increasing pressures on cardiology services.
4. Recent policy developments point in the direction of a future service where co-operation and collaboration will be encouraged across the region in the context of providing a more clinically and cost effective service accessible to those who require it.
5. These developments, along with possible organisational changes at all levels in the HPSS, have indicated a need to review adult cardiology services in Northern Ireland.
6. The goal of the Regional Cardiology Services Review was to help shape the strategic direction of future services for Northern Ireland, including clarification of standards of care with regard to treatment, location of facilities and maximisation of professional skills.

CARDIOLOGY REVIEW GROUP: Terms of Reference

7. The Regional Review Group were asked:

- to review the current provision of Cardiology Services in Northern Ireland;
- to assess the implications of the recent change in Government philosophy for Health and Personal Social Services from one of competition to one of co-operation;
- to examine existing, new and emerging cardiology procedures and techniques, the evidence regarding their effectiveness and benefits and the resource implications;
- to consider the role of research and development within adult cardiology and its impact on the provision of services;
- to provide advice to the Department on strategic direction for the organisation of adult hospital services for the treatment of patients with coronary heart disease taking into consideration:
 - equity of access for all to high quality appropriate treatments and investigations, including appropriate referral to acute and tertiary coronary care;
 - the resource implications in terms of staffing, skills and finance of any recommendations made;
 - relevant aspects of commonality with the paediatric cardiology service, cardiac surgery and other related specialties;
 - appropriate models for the delivery of out of hospital acute coronary care;
 - primary and secondary prevention of coronary heart disease.

Method of Working

8. The Review Group met on 5 occasions to agree a project plan, monitor progress, address specific issues through group discussion and advise the Chief Medical Officer on the strategic needs for the cardiology service in Northern Ireland. Membership of the Review Group is contained in Appendix A.
9. The Review Group established a number of subgroups to review current and future needs in relation to non-invasive cardiology investigations, interventional cardiology, mobile coronary care, rehabilitation, and drug therapy.
10. Additionally, a subgroup was formed to address models of service delivery and propose a model for the future delivery of cardiology services. All subgroups included cardiologists, a public health professional, and, where possible, a general practitioner. Subgroups were chaired by a member of the Review Group. A workshop was held providing an opportunity for subgroups to inform the Review Group and an invited audience.
11. In addition to Review Group members, a number of individuals and organisations were invited to contribute by either attending meetings, the workshop or through individual interviews. A list of contributors is attached [Appendix B].
12. In addressing the current provision of cardiology service and future needs Working Groups agreed the following guiding principles:
 - a patient-centred service;
 - a multidisciplinary, multi-professional team approach;
 - services which are evidence-based and assessed regarding clinical and cost effectiveness;
 - the provision of a service based on the philosophy of co-operation;
 - services directed at both preventive and therapeutic measures;
 - acknowledgment of the role of intervention at primary, secondary and tertiary care level.

STRATEGIC CONTEXT

13. The last regional review of cardiology was conducted in 1979. Since then there has been a review of cardiology within the Eastern Health and Social Services Board (1988) and in 1991, a regional review of cardiac surgery. In 1996 the Committee of Public Accounts completed a Report on Coronary Heart Disease in Northern Ireland in which it emphasised the need to develop treatment protocols, reduce waiting time, reduce hospital stay and review the extent of cardiology cover.
14. A National Service Framework is currently being developed for Cardiology. Its goal is to improve the quality and consistency of services in a number of key areas including prevention, identification of risk, emergency cardiology services, the structure of hospital services and rehabilitation. Emerging findings were published in November 1998.
15. Previous cardiology reviews highlighted the need to identify clear roles and responsibilities for each part of the service. The need to concentrate greater efforts on the prevention of heart disease has also been emphasised.
16. This Review of Cardiology Services took place at a time of recognition that both external and internal forces would influence the nature of medical care and the organisational structure within which it is provided. The following factors were acknowledged as significant:
 - the increasing emphasis on preventive measures;
 - the increasing profile of evidence based medicine;
 - recent improvements in the treatment of coronary heart disease;
 - the changing environment of acute services in Northern Ireland;
 - the new structural arrangements as suggested within *Fit for the Future*;
 - Primary care led commissioning;
 - recognition that within finite resources there is a need to ensure cost-effectiveness;
 - expected organisational changes resulting from the Review of the Ambulance Service.

17. Cardiology services in Northern Ireland have changed dramatically since the last comprehensive regional review of services in 1979. However there are several issues that have been acknowledged during the course of previous reviews and that remain pertinent to this review. These include:
 - the need to ensure equity of access to high quality care;
 - the need to ensure that a comprehensive system of emergency care is in place across Northern Ireland;
 - the need to plan for the development of expensive technology and make the best use of the highly skilled people providing the service.
18. The Regional Strategy emphasises the expectation of specialised services being concentrated on fewer sites. In recent years the four Health Boards have reviewed the provision of their acute services and are in the process of determining the location of acute medical services for their resident populations. The outcome of the Acute Services Reviews will therefore alter the current pattern of acute services in Northern Ireland. It remains the Department's policy that quality and safety of care should have primacy over geographical accessibility.
19. The Government's philosophy for the Health and Personal Social Services is one of co-operation rather than competition. The Acute Services Review (Scotland) and more recently Fit for the Future (DHSS, N. Ireland) emphasise the need for a more integrated service for the future.
20. The Review Group has embraced these principles and proposes a more integrated cardiology service for Northern Ireland. The development of local cardiac networks which would function within a clinical system of care is proposed as a mechanism for integrating services whilst enhancing quality and efficiency.
21. Current demographic changes will have an impact on the demand for cardiology services. The number of older people in Northern Ireland is rising and will continue to do so over the next decade. As the most important risk factor for coronary heart disease is age, the prevalence of disease can be expected to increase.

22. Treatments, both pharmacological and interventional, are now available that were not possible 10 or 20 years ago. While most available treatments are not curative, they significantly improve symptoms and quality of life. Improvements in interventional techniques now permit procedures to be performed on older patients who would previously have been considered as too high a risk for surgery.
23. New developments in cardiology may change the management of cardiac disease. The science of genetics now permits some diseases (e.g. familial hyperlipidaemia) to be diagnosed before clinically evident. When mapping of the human genome is complete there will be potential to develop new drugs that can treat or prevent the development of coronary heart disease. The possibility of being able to cure or prevent coronary heart disease may ultimately be realised.
24. The development of Information Technology has already played an important role in the management of patient care within cardiology. As further developments emerge, the possibilities of providing patients with specialist cardiology advice, regardless of their geographical location is significant.
25. The shift in balance between primary and secondary care, the ratio of senior to junior medical staff and the changing role of nursing will affect workload, staffing of cardiology wards, and the delivery of services.
26. Patient expectations have changed. The realisation that effective medical and surgical interventions are available for the treatment of cardiac disease has increased expectations of an improved quality of life despite the co-existence of heart disease.

EPIDEMIOLOGY

27. Cardiovascular disease accounted for 24.5% of deaths in developed countries in 1996. Among the causes of cardiovascular mortality, coronary heart disease (CHD) ranked first.
28. In Northern Ireland, heart disease, primarily coronary artery disease, is the single most common cause of death and is responsible for 1 in 3 male and 1 in 4 female deaths. Although deaths from coronary heart disease among 15-75 year olds have been declining steadily over the past 15 years, deaths from CHD in Northern Ireland remain higher than most other European countries. The total cost to the health services in Northern Ireland of preventative measures and treatment for coronary heart disease is difficult to establish but in 1994-95 over £28 million was spent on cardiology and cardiac services and almost £26 million was spent on cardiovascular drugs.

TABLE 1: TOTAL MORTALITY, CIRCULATORY, IHD AND STROKE MORTALITY IN EUROPEAN COUNTRIES.
(Age-Standardised to European Standard Population)

1994/95 - per 100,000 inhabitants

	MALES				FEMALES			
	TOTAL	CIRCULATORY	IHD	STROKE	TOTAL	CIRCULATORY	IHD	STROKE
Switzerland	847	322	145	56	486	198	68	44
Sweden	875	420	247	73	546	242	114	60
France	909	254	86	60	475	149	37	43
Italy	921	354	129	98	542	237	60	78
Spain	923	316	106	90	517	222	47	75
England & Wales	950	408	260	76	604	242	122	68
Netherlands	953	361	166	71	567	207	73	58
Germany	1028	452	219	94	610	287	109	75
N Ireland	1055	477	314	93	668	298	161	87
Scotland	1119	495	316	110	720	310	156	101
Russia	2291	1131	599	356	1099	667	291	263

29. Northern Ireland rivals Scotland for the highest mortality in western and northern European countries and borders on the strongly elevated levels found in central and eastern European countries and in Russia. However our mortality rates have improved over the past few decades. Between

1987 and 1995 the mortality from ischaemic heart disease (IHD) declined by 29% in men and 24% in women.

30. When compared to age-standardised death rates for England, Northern Ireland exhibits a dramatically different profile. For example in South East England the age-standardised death rate is 150.7 per 100,000 for men and 54.2 per 100,000 for women. Northern Ireland data reveals rates of 187.9 per 100,000 and 71.9 per 100,000 for men and women respectively.
31. Within Northern Ireland there is considerable local variation in death rates from CHD which range from 152.5 per 100,000 in North Down Borough Council to 221.9 in Omagh District Council for men and 52.8 in Magherafelt District Council to 90.2 in Derry City Council for women. (British Heart Foundation Statistics Database 1998).
32. IHD shows an exponential rise in mortality with age, and the future population projections show a large increase in the population over 75 by the year 2010. As the single most important risk factor for IHD is age, we can expect this population increase to result in higher morbidity levels. Table 2 indicates the projected population changes.

TABLE 2: PROJECTED POPULATION CHANGES IN NORTHERN IRELAND BY 2024

	TOTAL	0-14 years (%)	75+ years (%)
1994	1,641,700	393,100 (23.9)	85,900 (5.2)
2009	1,695,000	334,000 (19.7)	104,000 (6.1)
2024	1,741,000	306,000 (17.6)	137,000 (7.9)

33. Major therapeutic advances in the treatment of CHD have occurred over the past 30 years and have improved the outlook for people with established disease. One major development was the introduction of the coronary care unit. Another advance was the introduction of the mobile coronary care unit in the 1960s, in which Northern Ireland had a pioneering role. Professor Pantridge, working at the Royal Victoria Hospital, developed a portable defibrillator and established the first cardiac ambulance. Subsequently many other countries introduced

mobile coronary care units, which now play an important role in the immediate management of patients suffering from a heart attack.

34. While many drug and interventional treatments for cardiovascular disease are available today, the majority of available treatments relieve symptoms but do not impact on the progression of the underlying atherosclerotic disease. For example most drug treatments relieve symptoms whereas only a minority of therapeutic interventions can improve the prognosis of heart disease. Included in the latter category are aspirin, B-blockers and lipid lowering drugs. Also, the introduction of thrombolytic drugs has significantly improved the outlook of patients suffering from a heart attack. Interventional treatments currently available include angioplasty, coronary artery stenting and coronary artery bypass surgery, all of which can improve blood flow in the coronary arteries and hence symptoms but do not alter the pathophysiology of coronary heart disease.
35. While new treatments have improved life for those with diagnosed disease, many people with heart disease are not aware of their problem. In 20% of those suffering from heart disease, sudden death is the first indication of disease. A further 20% suffer a silent myocardial infarction. While these individuals may not suffer classical chest pain and hence not receive treatment, they have the same prognosis as others who suffer heart attacks.
36. Because of the limited capacity to alter the prognosis of established coronary heart disease, primary prevention will be the most effective means of reducing the prevalence of disease. The most important risk factor is age, over which there is no control. Other important risk factors include smoking, inactivity, obesity, hypertension and high cholesterol levels.
37. In Northern Ireland almost one third (30%) of adults smoke and 18% of the population have high blood pressure although this is undoubtedly an underestimate of the disease prevalence as many people with hypertension are undiagnosed. In recent years the prevalence of obesity has increased from 8.3% to 16% among women and from 16% to 21% among men.
38. The international MONICA Project was established to test the hypothesis that changes in risk factors are directly related to secular trends in IHD

mortality. We still have to wait for the 10 year analysis of international data sets. However, preliminary 5 year data from studies in Glasgow and in Belfast indicate that between 60 and 70% of IHD deaths occur outside hospital. In the Glasgow study - confined to IHD deaths in the under 65s - 40% of deaths were unwitnessed, and ambulance or medical personnel were in attendance at a maximum of 5% of deaths. These findings emphasise the importance for primary prevention if we are to have a significant impact on overall mortality.

39. Both advances in medical care and changes in risk factors have contributed to the decline in deaths from heart disease. It is estimated that half of the decline can be attributed to advances in treatment and half to changes in population risk factors (smoking, blood pressure, cholesterol and deprivation). Further reductions in mortality are possible if risk factors can be further reduced. Joint British recommendations on prevention of coronary heart disease in clinical practice were published in December 1998 and emphasise the value of both lifestyle and therapeutic interventions in reducing coronary risk.
40. This review is conducted at a time when, despite improvements in treatment for coronary heart disease, the high level of risk among the population and the gradual shift to an aging population dictate that coronary heart disease will remain a major health problem for many years to come.
41. The Cardiology Review Group has acknowledged the overwhelming importance of an increased focus on the prevention of coronary artery disease if the prevalence of the disease is to be reduced. However, the remit of the Group was limited to addressing the provision of cardiology services. Discussion on the prevention of coronary heart disease in Northern Ireland has not been included within this Report.

CURRENT PROVISION OF SERVICE

Pre Hospital Intervention

42. Heart attacks typically present as either chest pain or cardiac arrest. The primary treatments are, respectively, pain relief, coronary reperfusion and early defibrillation. Treatment provided as early as possible in the course of a myocardial infarction can reduce both mortality and morbidity and bringing emergency services, in the form of a mobile coronary care unit, to the patient facilitates early treatment of.
43. A Mobile Coronary Care (MCU) was first introduced in Northern Ireland in 1966 with the provision of a doctor and nurse manned unit operating from the Royal Victoria Hospital. Since 1966 the concept of a Mobile Coronary Care Unit has been developed in many countries and is now well established in Northern Ireland.
44. Northern Ireland has a unique model of mobile coronary care led by a doctor. This model is considered as excellent by those providing and utilising the service. Centres elsewhere provide emergency treatment utilising other models, many being nurse or paramedic led.
45. Good evidence exists that early intervention in acute myocardial infarction can prevent myocardial necrosis. Specifically, if thrombolytic treatment is given within 1 hour of onset of pain, 70% of jeopardised myocardium can be salvaged. The benefit of thrombolysis decreases over time with little myocardial salvage if initiated 6 hours after onset of pain.
46. Despite the evidence supporting the role of MCCUs, of those who die from acute myocardial infarction, two thirds do so before reaching specialised care, most within the first hour after onset of acute symptoms. Regardless of the quality of MCC, recognition of symptoms, early calls for medical help, and good resuscitation skills within the community are vital if we are to improve the outcome of acute myocardial infarction.
47. Currently in Northern Ireland there are 12 MCCUs which collectively cover almost all of the province. The function of a MCC service is to bring an emergency cardiology service to a patient suffering an acute myocardial infarction with the minimum of delay. The specific clinical functions of a MCCU include:

- diagnosis of chest pain;
 - the administration of analgesia;
 - provision of general medical care as indicated;
 - defibrillation as indicated;
 - stabilising the patient prior to transfer to hospital;
 - administration of thrombolytic therapy where indicated;
 - treatment of arrhythmias as indicated;
 - admission to hospital as required.
48. The total activity of all mobile coronary care units in Northern Ireland amounts to over 4000 calls per year. The activity profile of individual MCCUs varies as a result of the different characteristics of the populations served and the differing catchment areas. The busiest MCCU attends almost 1300 calls per year. At the other end of the spectrum another MCCU attends approximately 135 calls per year.
49. Staffing and the type of vehicle used by each MCCU varies (Appendix C), The system in Northern Ireland differs from the rest of the UK in that most are doctor led. All but one of the 12 MCCUs operate a physician led service, while Craigavon Hospital operates a nurse led MCCU.
50. Maintaining a database of activity for MCCUs is complicated. Data are not collected in a uniform manner, nor are they computerised. Although individual units have published papers on the activity of their MCCU, there is no currently available systematic means of auditing outcomes on a regional basis. A profile of activity from units able to provide the necessary data is attached (Appendix D). Some units could not provide information on activity as they did not collect data in a manner that facilitated retrieval.
51. There are several different models of MCCU within Northern Ireland. Three hospitals use a dedicated car, 2 of which are driven by porters and 1 by a taxi-driver. Other hospitals use either a dedicated ambulance or the first available ambulance. There are several different sources of calls that may ultimately activate the MCCU. These include:
- 999 to Ambulance Control;
 - GP to Ambulance Control;
 - GP to Cardiac Unit;
 - Public to Cardiac Unit;
 - Ambulance crew to Ambulance Control;
 - Ambulance Control to Hospital Switchboard;

- Ambulance Control to Cardiac Unit;
 - Cardiac Unit to Ambulance Control.
52. The many different sources of calls combined with the lack of consistent activation protocols provides the potential for poor communication, lack of vehicle dispatch or duplication of vehicle dispatch. There is no agreed protocol for the hospital communication to Ambulance Control or on the decision to respond or not respond to an individual call. One approach to this difficulty has been for Ambulance Control to dispatch an emergency vehicle while also referring a cardiac call to the nearest hospital. In such circumstances both an emergency and cardiac vehicle attend the call. This is a common event. In the Eastern Area, 2 or more vehicles attended 69% of calls between April and June 1998. This is an inefficient use of resources.
53. Training and maintenance of skills and expertise of all professionals providing emergency medical services to cardiac patients is important. In particular, the difficulties for GPs in maintaining equipment, drugs, and skills if they attend patients with acute myocardial infarction on an occasional basis must be recognised.
54. The increasingly important role of Information Technology in transmitting data for analysis and interpretation at a central location is important. This advance could greatly enhance the quality of care provided in the emergency situation to a cardiac patient.
55. Pressures exist on the current system. These include the difficulty in providing a doctor to staff a MCCU outside normal working hours. During evenings and weekends the only medical SHO within the hospital or cardiology unit may be required to staff the MCCU, thus leaving a JHO in charge of inpatients, including those in the Coronary Care Unit. In such situations the lack of cover for inpatients may have serious consequences.
56. Maintaining a designated vehicle for MCC is expensive. The MCCU in the RVH has a designated vehicle available at all times and admits on average 3 patients per day, half of whom have had an acute myocardial infarction. However in units where a first available ambulance is utilised there is a theoretical risk that no vehicle will be immediately available when required. The Northern Ireland Ambulance Service act to ensure this risk is minimised.

57. The anticipated changes in the provision of acute services will also affect the provision of acute cardiology services. There are significant implications for the provision of out of hospital coronary care if smaller rural hospitals no longer provide acute services. A consequence in some rural areas will be the lack of proximity of a hospital dispatching a doctor-led mobile coronary care vehicle. In these circumstances, alternative staffing for mobile coronary care services will need to be considered, as will other models of out of hospital care for patients with acute chest pain.
58. A recent paper by Rawles (Health Bulletin 57, January 1999, Scottish Office, Department of Health) suggested that in Scotland, there is a major public health problem in providing timely thrombolytic treatment for patients living at least 30 minutes from a district general hospital. Rawles suggested this problem can be solved by pre hospital thrombolysis administered by general practitioners, but stressed that this requires concerted efforts from all professionals involved and support from management.
59. Rawles recommends that general practitioners working at least 30 minutes from a DGH should provide thrombolysis as a routine component of immediate coronary care for acute myocardial infarction.
60. In Northern Ireland if the anticipated delay is 1 hour or less, professional advice is to wait for a MCCU. In the event of longer delays consideration should be given to alternative means of bringing emergency care to patients where MCC cannot be accessed within 1 hour.
61. Consideration could be given to the possibility of paramedic staff administering thrombolytic therapy under direction of a physician, following interpretation of an ECG. If this were to be introduced the issues of professional liability would need to be clarified. There may be concerns regarding the complexity of some cases that paramedics may be required to manage.
62. In some rural areas, particularly where the anticipated delay to treatment is 1 hour or more, general practitioners may wish to provide emergency resuscitation and treatment. Appropriate education and training may need to be offered to GPs.

63. Cardiologists should be able to provide the necessary education, training and professional expertise to general practitioners who wish to be more actively involved in the emergency management of acute cardiac events.
64. Cardiologists and general practitioners should maximise on the potential benefits of information technology to ensure effective two way communication and digital transfer of ECG tracings during emergency management of patients.
65. A practical problem cited by general practitioners is that some thrombolytic preparations require storage under specific conditions (e.g. refrigeration) which may not be possible for the general practitioner to meet. Additionally maintaining defibrillation equipment that may be used very infrequently may pose problems for some general practitioners.
66. A possible solution to providing quality emergency care to patients suffering a myocardial infarction in the more remote rural parts of the province may involve a combination of factors, including:
 - The dispatch of an emergency vehicle equipped with a defibrillator, thrombolysis, and other drugs as determined necessary.
 - The attendance of the general practitioner to provide clinical expertise regarding diagnosis and treatment and to administer appropriate drug therapy.
 - The IT link with a Cardiac Unit to facilitate digital transfer of ECG for interpretation.
67. In conjunction with the provision of a Mobile Coronary Care Unit, an increased emphasis on the role of resuscitation within the community is seen as essential if we are to decrease the out of hospital mortality rates from coronary heart disease. A number of factors may play an important role in facilitating prompt and effective resuscitation of patients following cardiac arrest:
 - In responding to a cardiac arrest even an emergency ambulance dispatched immediately may incur a life-threatening delay before reaching the patient.

- Effective reduction of out-of-hospital deaths from coronary heart disease will depend on resuscitation or defibrillation being initiated by someone who can reach the patient within a few minutes.
- An increased emphasis on the benefits of bystander resuscitation will play an important role in public education. Recently most Trusts have appointed resuscitation officers, some of whom are conduct resuscitation classes in the community. This role will need to be expanded if resuscitation skills are to be cascaded to a sufficient number of people in the community.
- The role of the individual and family members in recognising the symptoms of a myocardial infarction and calling medical help without delay is fundamental to reducing out of hospital deaths.
- Early defibrillation may depend upon the availability of ‘smart defibrillators’ which can analyse an ECG and determine whether defibrillation is required. Hence, individuals without ECG training can use smart defibrillators effectively.
- Smart defibrillators could be located in a variety of locations for use by the public (Public Access Defibrillators). Examples include shopping centres, sports halls and workplaces. Recently some airlines have proposed locating them on planes.
- In Northern Ireland, paramedic staff, whose professional activities require that they respond to persons experiencing cardiac arrests, are trained and permitted to operate defibrillators.
- In addition to paramedics and ambulance personnel, the participation of other emergency services (eg police and fire authorities) as first responders could improve the resuscitation rate and reduce mortality.
- In conclusion, a number of complementary interventions may be necessary to reduce the number of out of hospital deaths from coronary heart disease. They include:
 - improvement of resuscitation skills in the community;
 - inclusion of an expanded group of emergency personnel to act as first responders;

- utilisation of smart defibrillators at strategic locations;

RECOMMENDATIONS: PRE-HOSPITAL INTERVENTION

Diagnosis, pain relief, defibrillation and thrombolysis should be available as quickly as possible to all patients suffering severe chest pain.

MCCUs should continue to provide a first line emergency medical service to patients with acute chest pain.

The relative benefits and drawbacks of dispatching medical staff on a MCCU while depleting available cover for inpatients must be analysed and evaluated.

Where staffing permits a doctor led model may continue.

The possibility of a nurse or paramedic led service should be considered if a doctor led model is not the preferred option.

Whatever staffing model is chosen, the service should be monitored, audited and evaluated.

The cost- effectiveness of providing mobile coronary care should be included in the evaluation programme.

The service provided by MCCUs should comply with regional guidelines.

All staff in MCCUs must have appropriate training in advanced life support.

New technology should be maximised to facilitate the transfer of information from peripheral locations to a CCU where cardiology expertise is available.

Administrative procedures for activating and dispatching ambulances should be simplified and consistent throughout Northern Ireland. A unified activation programme would represent the ideal.

Public education should alert people to the significance of chest pain and reinforce the message that emergency services should be called promptly.

The teaching of resuscitation skills within communities should be given priority.

HOSPITAL CARE

Non invasive investigations/Outpatient Care

68. Non-invasive investigations form a key element in the accurate diagnosis and management of all forms of cardiac disease and are therefore of critical importance. Almost all patients with a differential diagnosis of cardiac disease will undergo one or more non-invasive investigations.

69. The quality of diagnostic information that can be obtained non-invasively has improved steadily in recent decades to the extent that reliable assessment of regional and global function and myocardial perfusion is possible without recourse to invasive procedures. The vast majority of patients who undergo coronary intervention are initially assessed non-invasively. Availability of and access to non-invasive procedures is therefore an important determinant of the demand for invasive therapies and surgery.

70. For the purposes of this review, non-invasive investigations considered included:
 - Electrocardiography
 - Transthoracic Echocardiography (ECHO)
 - Transoesophageal Echocardiography (TOE)
 - Exercise Electrocardiography
 - Ambulatory Electrocardiography
 - Nuclear Perfusion Imaging
 - Stress Echocardiography
 - Gated Blood Pool Scanning
 - Tilt Testing
 - Ambulatory BP Monitoring

71. All hospitals providing acute services in Northern Ireland conduct a range of non-invasive cardiology investigations to inform diagnosis and patient management. Referral for diagnostic interventional cardiology is to the Royal Victoria or Belfast City Hospitals.

72. In recent years the demand for investigative procedures has increased dramatically as indicated in Table 3.

**TABLE 3: NON-INVASIVE CARDIOLOGY PROCEDURES
Increase in Number of Investigations 1995-1998**

INVESTIGATION	% CHANGE	NUMBER OF INVESTIGATION	
		95/96	97/98
ECG	+ 11.5%	131,000	146,000
ECHO	+ 18%	13,337	15,780
TOE	+ 54%	307	475
EXERCISE STRESS TEST	+ 11%	8,514	9,286
NUCLEAR IMAGING	+ 56%	963	1,505
STRESS ECHO	- 16.5%	164	137
GATED BLOOD POOL SCAN	- 25.4%	244	182
AMBULATORY ECG	+ 14%	5,026	5,719
TILT TABLE TESTING	+ 252%	38	134
EVENT RECORDING	+ 13%	396	447
24 HRS AMBULATORY BP	118%	720	1,569

73. Some investigations such as ECGs, ECHO and Exercise Stress Testing are critical in assisting the diagnosis of cardiac disease and are therefore considered essential equipment on all sites that provide an acute cardiology service.

74. Other investigations require more sophisticated equipment or specialised expertise to conduct the test. As such, their use should be concentrated in sites where a sufficient number of investigations are conducted and the clinical expertise is available to support the service.

75. Waiting times for non-invasive investigations vary between sites. For example, for transthoracic ECHO, the waiting time varies from 1 to 36 weeks as indicated in Appendix E.

76. New technology has had an enormous impact on the investigation of heart disease. Diagnostic sensitivity has improved as has the predictive

value of investigations. For example, the development of transoesophageal ECHO has enhanced the diagnostic capabilities of ECHO technology.

77. As equipment and its utilisation becomes more sophisticated there are some major issues to be addressed. Training of technical staff in the operational aspects and medical staff in the clinical and interpretive aspects is important. The extended periods of time necessary to conduct investigations and interpret the results need to be considered within the overall provision of service.
78. Some investigations, for example tilt table testing, are probably not utilised to their optimal extent. Specifically, the diagnosis of syncope can be enhanced, especially in the elderly, through the use of tilt table testing. This can be a very time consuming investigation that requires qualified staff to be available because of the risks inherent in the procedure.
79. Open access to investigations for general practitioners exists in most hospitals. The specific investigations that can be accessed differ between hospitals. The advantage of direct access for the general practitioner is that it can permit investigations to be conducted that inform decision on the necessity to refer to a cardiology clinic. In some cases it can result in unnecessary clinic attendances being averted.
80. Cardiologists vary in their support for open access clinics. Most agree that for routine treadmill testing open access is appropriate. For other investigations there are areas that are potentially problematic. Where open access for ECHO has been suggested, cardiologists are concerned that reading and interpreting an ECHO report without the benefit of a clinical examination of the patient denies the possibility of a complete evaluation. Also, a highly technical report provided to a general practitioner may require interpretation in terms of treatment options.
81. On balance, cardiologists in Northern Ireland express a preference for open access services to be developed within guidelines and protocols drawn up between locally based general practitioners and cardiologists. A preferred term for this service is Managed Direct Access. Demand for cardiology investigations is expected to continue to increase. Not all cardiology units currently providing acute services could sustain the skills, expertise or training to perform the full range of investigative procedures. Optimising the use of equipment, staff and professional skills

will necessitate that designated units conduct a full range of investigations to provide a quality service.

RECOMMENDATIONS : NON-INVASIVE/OUTPATIENT CARDIOLOGY

Clinical guidelines and protocols for cardiac investigations should be agreed, implemented and audited. Physicians, general practitioners and commissioners should participate in the development of guidelines.

The capacity for ECHOs should be increased to meet rising demands.

Only in designated locations should a full range of investigative facilities exist.

Direct Managed Access clinics should be available to GPs and physicians. Their use should be determined by locally agreed protocols.

A regional clinic for the investigation and management of syncope should be considered. This should operate as a tertiary referral service.

There should be adequate staffing levels of Medical Technical Officers to meet the demands of the service. The skills and expertise of staff conducting and reporting on investigations should be maximised.

Additional training should take place to ensure staff using new equipment or reporting on new tests have necessary skills. Accreditation and reaccréditation may be necessary to ensure that skills are maintained

The procurement of new and replacement equipment should be considered within the context of the population needs of the local area network (see Para 163).

New Drug Therapies in Cardiology

82. Numerous advances in drug therapy have changed the management of coronary heart disease in recent years. While the Review Group did not address this area in detail, several specific areas of development were highlighted as having important consequences both in terms of treatment outcomes and resource implications for cardiology services. In

particular, major therapeutic advances in antiplatelet drugs, anticoagulant drugs and lipid lowering drugs are worth mentioning.

83. Antiplatelet drugs, by preventing platelet aggregation, inhibit thrombus formation. Encouraging results have been demonstrated using aspirin (75-300 mg daily) for secondary prevention in coronary heart disease. Following coronary artery stenting, antiplatelet drugs have been shown to reduce the incidence of serious complications of stent thrombosis. However, few independent studies on the cost effectiveness of this type of therapy have been published.
84. Low molecular weight heparins (LMWH) are now available and are increasingly prescribed. They are as effective and safe as unfractionated heparin, have a longer duration of action and do not require monitoring. The place of LMWH is still under debate and there have been few published cost effectiveness studies. While LMWH is more expensive than unfractionated heparin, the once daily regime and absence of any monitoring requirement will affect its overall cost-effectiveness.
85. Lipid lowering drugs, including statins, can reduce the risk of mortality from ischaemic heart disease by around 25% and in patients at a high risk of events, the evidence of effectiveness is strong.
86. Some cardiac diseases can be diagnosed by genetic testing and thereafter closely monitored so that treatment can commence at the optimal time. Familial hypercholesterolaemia and familial cardiomyopathies are two examples of such conditions.
87. Data on prescribing rates of new cardiology preparations within individual trusts are not available in a format that is sufficiently accurate to be of benefit.
88. As new therapeutic measures become available, their use should be dictated by a credible evidence base demonstrating their effectiveness. Prior to such information being available, their use should ideally be within strict criteria e.g. within research studies or clinical protocols.

Recommendations: New drug treatments in cardiology

Consideration must be given to the clinical and cost effectiveness of all drug therapies.

Consideration should be given to the opportunity costs incurred as a result of new treatments.

New and emerging drugs should be prescribed within evidence based clinical guidelines. These guidelines should be developed by a representative group of clinical professionals and commissioners and should take account of the perspective of users where appropriate.

The use of all new cardiac drugs should be monitored and evaluated.

If a new drug's efficacy, relative to established therapies, is not fully established its use should be limited to controlled clinical trials

The information needs of both the patient and primary care professionals should be considered when patients are commenced on new drug treatments.

HOSPITAL CARE:

Inpatient Cardiology Care

89. Inpatient cardiology services are provided in all acute hospitals in Northern Ireland. The number of beds, staffing and facilities vary across the province. The facilities and services provided at each hospital are outlined in Appendix F.
90. The medical cardiology service is provided by 21 cardiologists, 3 paediatric cardiologists and a further 11 physicians with an interest in cardiology who each work between 4 and 8 sessions in cardiology. 1 academic appointment and several staff grade positions support the clinical service.
91. There are 261 designated cardiology beds but this does not reflect an accurate figure for the total number of beds used for cardiology patients in Northern Ireland as in smaller hospitals these patients are treated within the general medical bed allocation. The majority of patients in cardiology wards are admitted as urgent or emergency cases.
92. The medical coverage of cardiology services varies across Northern Ireland. In larger hospitals, a consultant cardiologist is always on call while in smaller hospitals the cardiology expertise is provided by one physician with a special interest in cardiology. In such circumstances, on call responsibilities are shared with general physicians.
93. Cardiovascular diseases have an enormous impact on the provision of services. They accounted for a total of 63,013 bed days during the year 1997/98 of which ischaemic heart disease accounted for 43,380,
94. Much of the non-elective cardiology workload is conducted outside the specialty of cardiology, usually within general medical wards. In hospitals where cardiology beds are considered as general medical beds it is not possible to quantify this division. Hospitals with designated cardiology beds show significant variations. For example the percentage of patients with ischaemic heart disease who are treated with the specialty of cardiology rather than general medicine varies from 6-48%.
95. Several reports from the MRC Clinical Research Initiative Scotland illustrate the increasing impact of heart failure on hospital admissions.

The authors noted that chronic heart failure accounted for about 5% of all adult medicine/care of the elderly admissions. Since the commonest cause of chronic heart failure is ischaemia, IHD tends to be reported as the underlying cause of death on death certificates which masks, at least in part, this changing natural history of ischaemic heart disease

96. All cardiology units have qualified nursing staff trained in advanced life support. Medical technical officers are employed in all units to conduct routine investigations. Their numbers, experience and skill mix varies across units.
97. Equipment required for the investigation of cardiac symptomatology varies. The larger hospitals have a comprehensive range of facilities while many of the smaller units have facilities that permit them to perform a more limited range of investigations.

Regional Services/Invasive Cardiology

Coronary Arteriography (Angiography)

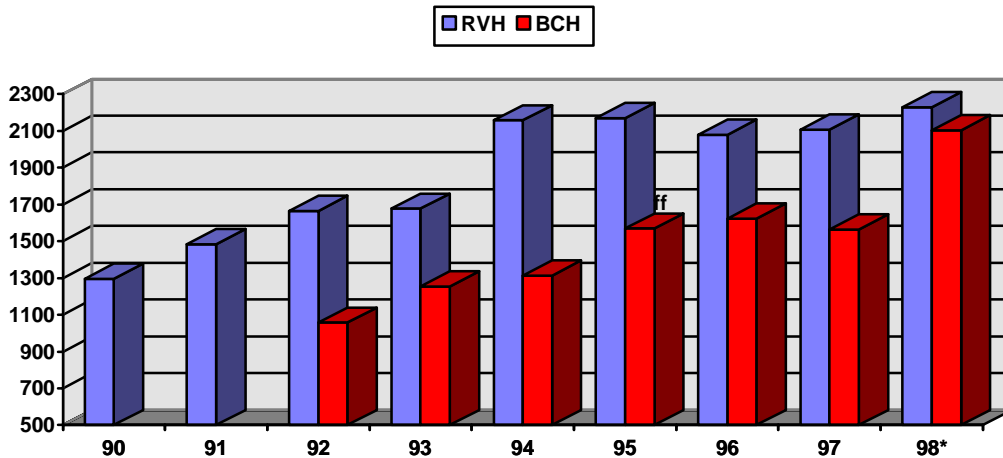
98. Coronary arteriography (cardiac catheterisation) is the method of imaging the blood flow through coronary arteries by injecting a radio-opaque dye via the femoral or brachial artery. The procedure enables coronary arteries and collateral circulation to be visualised and any obstructive lesions to be identified.
99. The role of the cardiac catheterisation laboratory has changed dramatically in recent decades and coronary artery angiography is now a recognised step in the evaluation of certain patients with angina. Angiography is conducted when revascularization is being considered, angina is refractory to medical therapy, in unstable angina, post-infarction angina, following a positive treadmill test and in coronary artery bypass patients in whom angina redevelops. It is also of benefit in assisting in the diagnosis of patients who have required numerous hospital admissions because of chest pain when there is doubt whether it is of cardiac origin.
100. Unstable angina covers a group of conditions intermediate between stable angina and acute myocardial infarction, including new onset

severe or accelerated angina, angina at rest and post myocardial infarction angina.

101. Unstable angina admissions within Northern Ireland form a very significant portion of the emergency medicine workload. Many patients are treated by general physicians rather than cardiologists. Most acute episodes of chest pain settle with appropriate medical treatment. Recent recognition of the adverse outcome for patients with unstable angina has led to increased demand for coronary arteriography and revascularisation.
102. Diagnostic cardiac catheterisation is performed in the RVH and BCH and both units accept referrals from throughout the province. A number of cardiologists working in hospitals other than the RVH and BCH have direct access to cardiac catheterisation facilities in these centres where they can perform angiography on their own patients.
103. The combined data from both units suggest an overall angiography rate of 2070 per million for 1997/98. It is difficult to obtain sufficiently accurate data to allow true comparison between geographical areas within NI. This should be addressed in future by the collation of standardised information on all patients undergoing invasive cardiology procedures on an annual basis.
104. There are no regionally agreed clinical guidelines or protocols for angiography. If such were in place they would promote equitable access to services and minimise geographical variation in angiography rates.
105. Activity in both the RVH and BCH has risen significantly over the past decade as shown in Figure 1A. Trends in the use of angiography from elsewhere would indicate that it will continue to rise in the immediate future.

Figure 1A

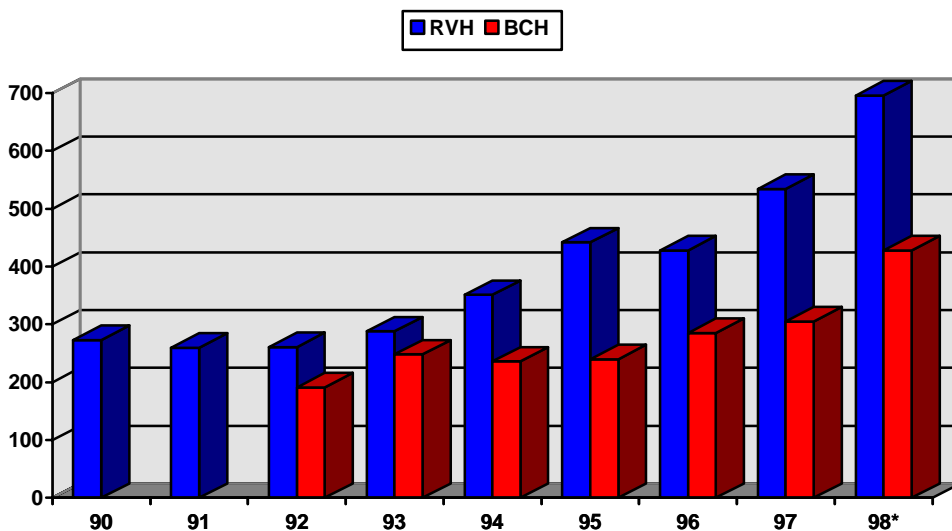
RVH & BCH Diagnostic cardiac catheterisations
 * 1998 projected from first 6 months [Source RVH/BCH]



There has also been a significant increase in the use of angioplasty on both sites as shown in Figure 1B.

Figure 1B

RVH & BCH PTCA procedures
 * 1998 projected [Source RVH/BCH]



106. Despite the marked increase in activity, waiting lists (which include those patients waiting for angiography and angioplasty) for inpatient and day cases have increased significantly, particularly in the RVH. There is a

considerable difference in waiting times for patients attending the RVH and BCH and this is a cause for concern (Table 3 and Figure 2).

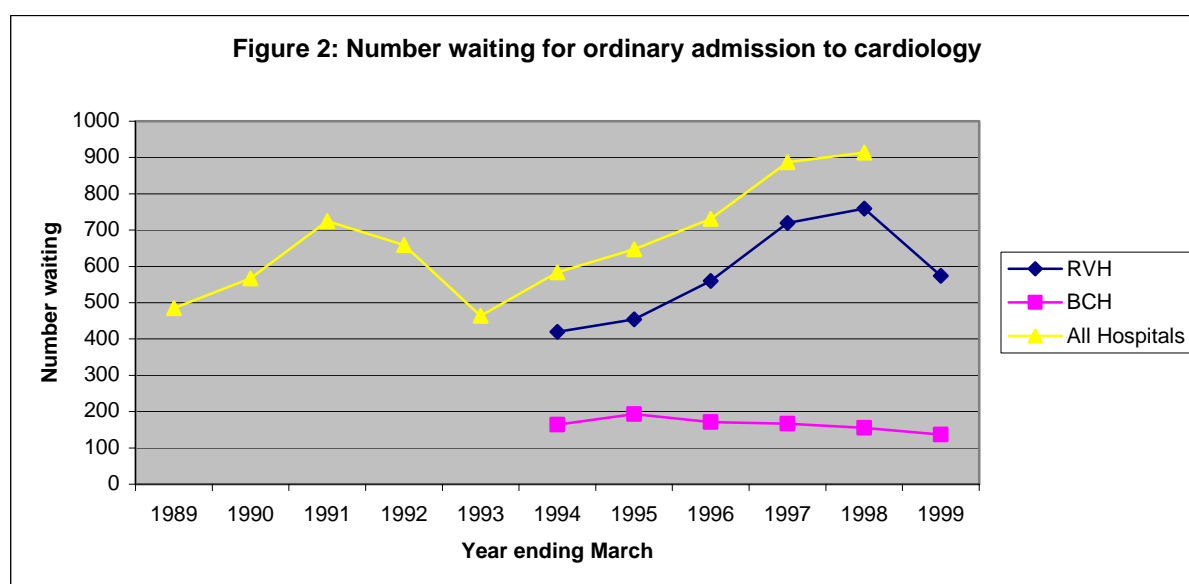
Possible reasons cited for this include the unique case-mix of patients at the RVH with a preponderance of urgent/emergency cases. However this does not fully explain the difference in waiting times which are probably the result of a number of coexisting factors.

Table 3: Cardiology Inpatient Waiting Times on 31 March 1999

	0-3 mths	3-6 mths	6-9 mths	9-12 mths	12 + mths	Total
RVH	173	121	93	66	121	574
BCH	126	11	0	0	0	137
Total	299	132	93	66	121	711

(The numbers included in the above table include those awaiting angiography, angioplasty and EPS studies.)

107. The 1998 British Cardiac Society standard for access to a consultant cardiologist is 2 weeks, to invasive investigations 6 weeks, and to intervention 3 months. While the Review Group recognise this as ideal it will be difficult to achieve in the short to medium term. As an interim target Patients Charter waiting times should be achieved.



108. In the medium to long term, a number of measures may need to be implemented to reduce waiting times to an acceptable level. In the short

term there is an urgent need to reduce the number of patients waiting long periods for investigation or intervention. Several options for reducing waiting times include:

- (i) Maximising the utilisation of current cardiac catheterisation facilities at both the BCH and RVH.
- (ii) Increasing the overall capacity for cardiac catheterisation within the province.
- (iii) Ensuring that waiting lists for individual cardiologists are capped at an agreed level.
- (iv) Patients on a long waiting list with one cardiologists could be offered a place on a shorter waiting list with another.

109. Although it would be more equitable if a common waiting list could be established between the RVH and BCH, experience from elsewhere has shown this to be difficult to operate. There are other ways in which equity could be achieved. These include the provision of regular information to GPs and referring physicians on the waiting times for each cardiologist who undertakes invasive work. Regular joint review of waiting times by RVH and BCH cardiologists, followed by cross referral of cases which exceed target waiting times, is also an option.
110. Increasing activity to reduce the investigative cardiology waiting times will result in an increase in the number of patients identified as requiring intervention. This will have important implications for the provision of both interventional cardiology and cardiac surgery.

Coronary Revascularisation

111. There are two indications for invasive coronary revascularisation therapy (coronary artery bypass graft surgery - CABG, percutaneous transluminal coronary angioplasty - PTCA); to control symptoms of myocardial ischaemia and in some circumstances to improve prognosis.
112. One of the greatest limitations of current data is the lack of large trials comparing outcome of all of the major types of coronary disease therapy. However, the recent publication of the RITA 1 trial sheds some light on the relative merits of coronary angioplasty and coronary artery bypass grafting. This UK trial included the cardiologists at Belfast City Hospital

and surgeons at the Royal Victoria Hospital amongst its participants. It compared clinical outcomes and health service costs between patients randomly assigned to either coronary angioplasty or coronary artery bypass. The majority of patients entered into the trial suffered from one or two vessel coronary artery disease.

113. The relevant findings of the RITA 1 trial at a median 6.5 years of follow-up were as follows:
 - There was no difference in the incidence of death or non-fatal myocardial infarction between the two treatment groups.
 - 45% of angioplasty patients required a further revascularisation procedure during the follow-up period.
 - The prevalence of angina in angioplasty patients was consistently higher than in surgical patients.
 - There was no significant difference in health service costs between the two groups over 5 years.

114. The RITA-2 trial in which patients with CHD were randomly assigned to receive medical treatment or PTCA found that in patients with CHD considered suitable for either PTCA or medical care, early intervention with PTCA was associated with greater symptomatic improvement, especially in patients with more severe angina. A small excess hazard due to procedure related complications was found in the PTCA group.

115. PTCA is appropriate treatment for patients with angina refractory to medical treatment. For patients with single vessel disease PTCA provides excellent symptomatic relief but repeat revascularisation procedures may be required. Double vessel disease can be treated by PTCA or CABG. For diabetic patients with multiple vessel disease CABG may be the treatment of choice, while for non-diabetics with multivessel disease both CABG and PTCA are acceptable alternatives.

116. The field of percutaneous interventional coronary revascularisation is evolving rapidly and the results of coronary stenting may significantly alter relative risk/benefits. Implantation of a coronary stent following conventional balloon angioplasty serves to provide an endovascular scaffold, thus reducing vascular recoil. Coronary stent deployment has been associated with improved acute results and less restenosis during follow-up.

117. The increase in PTCA procedures has been dramatic and continues to rise in Northern Ireland. Together the RVH and BCH performed 855 procedures from April 1997 to March 1998, a regional rate of 530 per million. The target rate set by the British Cardiac Society for 1996/97 was 400 PTCA procedures per million. The overall European average is 600/million population.
118. Current recommendations for angioplasty are for individual consultants to undertake a minimum of 60 procedures per year in a unit conducting at least 200 angioplasties per year.
119. The proportion of PCTA procedures involving stent insertion is currently 80% in RVH and 60% in BCH. The higher stenting rate in the RVH may reflect the different case-mix with a higher proportion of urgent/emergency patients coming for acute catheterisation/intervention. It is a relatively short time since stenting was first introduced and there is as yet a lack of published evidence to support its use on such a wide scale. Nevertheless it is strongly advocated by clinicians in NI and elsewhere.
120. Follow-on angioplasty, where the revascularisation procedure is performed in the same session immediately after the initial diagnostic session has advantages for patients. Two publications have estimated that performing combined angiography and angioplasty reduces the hospital stay by 30%, reduces costs by 15%, and reduces radiation exposure without compromising the safety of the procedure. However, there are logistical problems regarding theatre scheduling, which discourages its use particularly when waiting lists are long. In the RVH for the period January-July 1997, 104 patients had angiography and follow-on PTCA, while for the same period in 1998, 148 patients had one stop treatment. This remains a small proportion of overall angioplasty work in Northern Ireland. A review by the European Society of Cardiology of PTCA/stenting procedures in 4 European countries has shown that of a random sample, 56% were performed as follow-on ie. at the same time as the diagnostic catheterisation. This trend may have implications for the future planning of service developments.
121. All four cardiac catheterisation laboratories in Belfast are in use throughout the normal working week. Maximising the efficient use of current facilities will be a critical step in improving the existing capacity for interventional cardiology. Current estimates anticipate that the demand for interventional cardiology in Northern Ireland will continue to

increase in the immediate future. The need for additional angiograph and revascularisation capacity should be considered within the context of locally agreed guidelines, emerging evidence and national guidance. There are several possible options, not all of which are mutually exclusive. These include:

- Utilising existing facilities within normal working hours to their maximum capacity and efficiency.
- Relocation of non catheterisation workload (e.g. cardiac pacing and electrophysiological studies) from cardiac catheterisation laboratories, thus freeing up laboratory sessions for angiography and angioplasty.
- Investigating the possibility of out of hours elective sessions in one or both of the Belfast Hospitals.
- Additional static catheterisation laboratory facilities
- A mobile catheterisation laboratory for use throughout Northern Ireland.

122. Examination of ways to maximise the use of existing catheterisation laboratory facilities is already under way in both the RVH and BCH. Once this is complete it may be possible to predict to what extent any additional facility may be required in the medium term. There are limitations on the clinical conditions suitable for investigation at locations other than the RVH or BCH. These apply to both static and mobile facilities. Conditions such as suspected aortic dissection, mechanical problems of myocardial infarction and continuing recurrent ischaemia from unstable angina should be investigated in the tertiary centres. Firm organisational arrangements would be required to maintain the necessary close liaison between all investigative cardiologists and the cardiac surgeons.

123. Electrophysiology has developed progressively as a sub speciality within cardiology over many years with a corresponding steady increase in activity. With an increasingly elderly population the need for permanent pacing for bradyarrhythmias will continue to rise. New treatments for other arrhythmias are also being developed and the trend is moving away from drug treatment towards catheter based ablation and implantable devices for the treatment of both lethal and non-lethal arrhythmias. Electrophysiological investigation is complex and can require considerable catheterisation laboratory time. Developments in this field are potentially very costly. It will be important to keep this issue under regular review to ensure that the introduction of new treatments is

undertaken in a planned and controlled way.

124. The RVH and BCH cardiology units operate as two independent units each providing tertiary level care.
125. A single cardiological tertiary centre may represent an ideal model, but because of service demands at both the BCH and RVH, the high utilisation rate of existing facilities and logistical reasons, this is not currently possible. The Badenoch Report (1988) recommended that both units should operate as one reference centre for cardiology and cardiac surgery for Northern Ireland. Within the EHSSB several anticipated changes may make this change imperative. Specifically, the proposal to change the 'take-in' system and to close the A&E department at the BCH may alter the patient mix at the RVH and BCH. Ensuring an equitable share of acute, urgent and elective cardiology cases is important. This may be best achieved if the two units function as a single reference centre. There are also other important areas where closer collaboration would benefit patients, such as the management of waiting lists and the introduction of new technology and treatments.

THE IMPACT OF CONGENITAL HEART DISEASE ON CARDIOLOGY SERVICES

126. In recent years the number of children born with congenital heart disease who survive into adulthood has increased enormously. These patients (adults with congenital heart disease) have a significant impact on adult cardiology services. While the absolute number of patients may not be large, they may require repeated investigation and surgery over their lifetime.
127. In Northern Ireland approximately 250-300 babies are born each year with congenital heart disease. Of these, one third will have minor abnormalities which will resolve spontaneously, one third will require surgery in the first few months of life and a further third will have abnormalities diagnosed later in life. Of all births with congenital heart disease, approximately 150 will require surgical intervention.
128. Advances in surgical procedures and techniques have greatly improved the prognosis for an infant with congenital heart disease. For example 10 years ago there was no definitive surgery for infants born with a univentricular heart and they remained severely disabled. Today surgical treatment can greatly improve the quality of life for these children.
129. The increasing number of children and adults with congenital heart has created some specific demands on the service including the need for a joint paediatric/adult cardiology clinic, access to advanced investigative equipment and the need for complex and frequently repeat cardiac surgery. The majority of patients with congenital heart disease are investigated and treated at the RVH.
130. The success of cardiology techniques has improved both the quality and duration of life for those with congenital heart disease. In future years we can expect increasing numbers of adults with congenital heart disease who will have a significant and ongoing need for review, investigations and treatment.

CARDIAC SURGERY

131. Cardiac surgery in Northern Ireland is conducted on the RVH site only. Waiting times for cardiac surgery have reduced significantly since 1992 when waiting times were identified as problematic (Table 4). At that time a common waiting list for all cardiac surgeons was proposed. However a variety of factors including the means of purchasing services prevented the adoption of a common waiting list.
132. The cardiac surgeons are aware that, as a percentage of patients having cardiac catheterisation, referrals for cardiac surgery are decreasing. However in absolute terms the number of referrals are fairly constant. The average age at which a patient undergoes cardiac surgery is increasing and many patients undergoing surgery have had previous interventional cardiology procedures.

Table 4: TRENDS IN WAITING TIMES FOR CARDIAC SURGERY AT RVH

	0-2 mths	3-5 mths	6-11 mths	9-11 mths	12-24 mths	TOTAL
Mar 89	75	97	126	205	240	743
Mar 90	93	75	110	177	326	781
Mar 91	111	90	97	162	409	869
Mar 92	115	104	143	184	418	964
Mar 93	156	90	107	157	249	759
Mar 94	116	146	114	66	38	480
Mar 95	166	112	112	7	1	398
Mar 96	228	132	104	31	0	495
Mar 97	175	121	166	85	3	550
Mar 98	187	109	111	83	22	512

133. Patients awaiting cardiac surgery have their name placed on the waiting list after they have been seen by the cardiac surgeon, usually at an outpatient clinic. Therefore documented waiting times for cardiac surgery does not include the time waiting for investigation or awaiting a cardiac surgery outpatient appointment.
134. A 'total waiting time' has been suggested as a more appropriate means of assessing access to treatment. Total waiting time could commence when a general practitioner refers a patient to a cardiologist.

RECOMMENDATIONS: INTERVENTIONAL CARDIOLOGY

- *Regional guidelines for referral of patients for angiography should be drawn up and disseminated. Clinical practice should be audited to monitor the application of guidelines.*
- *Clinical care pathways for angioplasty, stenting and CABG should be agreed and implemented.*
- *Clinical care pathways for the diagnosis, investigation and management of patients with chest pain should be developed and disseminated to all GPs and physicians.*
- *A regional audit of angiography and angioplasty services should be conducted regularly.*
- *Consideration should be given to developing a chest pain clinic to facilitate the rapid assessment of patients.*
- *Decisions regarding treatment should be based on available evidence base. New and emerging treatments should be provided within clinical trials.*
- *The current inequities in access to invasive procedures need to be addressed. GPs, referring cardiologists and physicians with an interest in cardiology should be given details of waiting times. Patients should be given the opportunity to join the shortest waiting list.*
- *Clinicians and managers from the RVH and BCH should consider the options for reducing waiting times for interventional procedures as a matter of urgency and bring forward proposals [by July 1999] for joint working to resolve this inequity.*
- *The capacity for coronary angiography should be increased to meet the increased demand.*
- *The utilisation of existing coronary artery arteriography facilities should be maximised as a first step to increasing capacity.*
- *Additional arteriography facilities must be considered to meet future demands. This should include consideration of:*

- (i) *a mobile catheterisation facility.*
- (ii) *an additional cardiac catheterisation facility.*

POST-HOSPITAL CARE:

Cardiac Rehabilitation

135. Cardiac rehabilitation services have been defined by the World Health organisation as 'the sum of activities required to influence favourably the underlying cause of the disease, as well as to ensure the patients the best possible physical, mental and social conditions so that they may, by their own efforts, preserve or resume when lost, as normal a place as possible in the life of the community'. Cardiac rehabilitation services are aimed at patients with established heart disease, to facilitate physical psychological and emotional recovery and enable patients to achieve and maintain better health.
136. There are several phases of recovery following an acute cardiac event, and therefore several phases to rehabilitation:
 - The acute phase of illness in hospital.
 - Early post discharge phase. This period may vary from a few days to several weeks or months.
 - Medium term post discharge. This can start from 4 weeks after the event and may last up to a year. At present the length is most frequently 6-10 weeks.
 - Long term maintenance phase. This follows on from the third phase and reflects the achievement of the goals in the programme in phase three.
137. Comparison of the effectiveness of different cardiac rehabilitation programmes is difficult given the variety of programmes, and types of interventions used which are often part of a wider package of care.
138. As a sole intervention, exercise programmes have a positive effect on the physical aspects of recovery at no additional risk to the patient.
139. Psychological interventions have been shown to affect risk factors including blood pressure, cholesterol levels and produce significant improvements in psycho-social well-being.
140. Inpatient education has been shown to produce significant improvements in smoking behaviour, activity levels, and overall compliance with action to improve health. Involving both patients and their partners can result

in improved knowledge, decreased disability and changes in health behaviours.

141. The majority of cardiac rehabilitation programmes are multifaceted, combining an exercise programme with some form of patient education or counseling. In this form there is some evidence for improvements in cardiac risk factors, particularly reduced lipids and blood pressure. An intensive approach with specific anti smoking advice may also help improve smoking cessation rates.
142. Little research has been carried out into the optimum frequency and duration of cardiac rehabilitation programmes. Several studies have however demonstrated that personal health education or visits to a secondary prevention clinic every six months can be more effective than routine care from general practitioners. Home rehabilitation may be as effective and safe as hospital based programmes.

Cardiac Rehabilitation in Northern Ireland

143. The majority of Trusts in Northern Ireland offer cardiac rehabilitation to patients who have been admitted following an acute cardiac event. However, programmes vary in their nature, duration and the criteria for inclusion.
144. The success of many programmes may be due to the enthusiasm of the individuals responsible for their development. This is not always reflected in the strategic vision of the Trusts.
145. Not all programmes currently operating adopt a multi-disciplinary approach despite the fact that this is recognised as being an important component of a successful programme.
146. Rehabilitation is not being offered to all patients. In some trusts elderly patients or those considered 'unfit' are not being included. Some patients who could benefit are missing the opportunity to receive rehabilitation services, support and advice.

147. General practitioners are not adequately aware of rehabilitation programmes in their areas. The subgroup survey indicated that 46% of GPs did not know of a cardiac rehabilitation programme in their area.
148. Most programmes are hospital based and designed by medical and nursing staff. For patients attending hospital outside their area of residence there is a potential to miss the opportunity of rehabilitation. This may be particularly so when patients are treated at a tertiary centre and a suitable rehabilitation programme is not identified for them on discharge from hospital.
149. Traditionally rehabilitation has been considered for patients following acute myocardial infarction or cardiac surgery. The inclusion of patients following PCTA would be beneficial. Rehabilitation for patients suffering from cardiac failure is also being considered.
150. While most rehabilitation programmes are funded by the HPSS, significant funding for staff is received from the voluntary sector. This has been particularly so when programmes are being established.

RECOMMENDATIONS: CARDIAC REHABILITATION

Rehabilitation programmes in Northern Ireland should adopt a standardised approach and utilise similar protocols and guidelines.

All patients should, where possible, be offered cardiac rehabilitation. For each individual, consideration should be given to their age, risk stratification and level of fitness in recommending the nature of their programme.

Cardiac rehabilitation should become an integral part of discharge planning for all cardiac patients.

Cardiac rehabilitation programmes will usually commence in the hospital setting. The focus for ongoing rehabilitation should be within primary care.

Cardiac rehabilitation should adopt a multi-disciplinary approach incorporating nurses, psychologists and PAMs. The multi-disciplinary approach should be reflected in those involved in the design of the programmes.

Rehabilitation programmes should be evidence-based, audited and thoroughly evaluated.

The voluntary and statutory sector should co-ordinate their efforts where both are offering a service.

The use of information technology should be maximised to improve the efficiency of programmes.

A Directory of Rehabilitation Programmes should be developed. This will help to support discharge planning and communication between rehabilitation professionals and with primary care teams.

RESEARCH IN CARDIOLOGY

151. A considerable amount of research into cardiovascular disease is conducted in Northern Ireland. The school of Clinical Medicine within Queen's University of Belfast, cardiovascular disease is identified as one of 5 areas around which it is proposed to develop a research centre. The existing research base in cardiovascular medicine is considered to be an area of strength and potential.
152. Individual objectives focus on several areas within cardiovascular disease, including:
- Extensive participation within the WHO MONICA project (a multi-national population-based study of heart disease) which is led within Northern Ireland by the Division of Epidemiology and Public Health. Planning and co-ordination of the MONICA cohort component which will pool all the prospective data and produce a European risk score for cardiovascular disease is currently underway.
 - The investigation of genetic and environmental factors in the development of cardiovascular disease and in its tendency to exhibit a seasonal variation is another area being studied within two departments. Studies of endothelial function in cardiovascular disease is being led by the Department of Therapeutics as is the development of methods to quantify the effects of drug intervention on cardiovascular disease.
 - In addition to the many research projects being pursued within Queen's University, a number of trusts in Northern Ireland participate in multi-centre trials investigating the benefits of new cardiac treatments or drug therapies.
 - Basic cardiological research takes place between Queen's University Belfast, the University of Ulster, Jordanstown and the Regional Medical Cardiology Centre at the RVH.
153. The voluntary sector fund or support a number of research projects in Northern Ireland. In particular, The British Heart Foundation and the Northern Ireland Chest Heart and Stroke Association have an important role in funding local research, as does the Heart Trust Fund.

154. Research in the prevention and treatment of cardiovascular disease should remain a priority. The R&D office has an important role to play in strengthening the research base in Northern Ireland.
155. Currently there is no available database of cardiology research within Northern Ireland. With the advent of the R&D strategy and an increased emphasis on cardiovascular research within academic institutions, it should be possible to collate information on all cardiovascular research with the purpose of strengthening the research base and facilitating communication among those with a common interest.

RECOMMENDATIONS: RESEARCH IN CARDIOLOGY

A database on all cardiovascular research should be developed and held at a central location

The R&D office should put in place arrangements to coordinate and strengthen cardiovascular research in Northern Ireland.

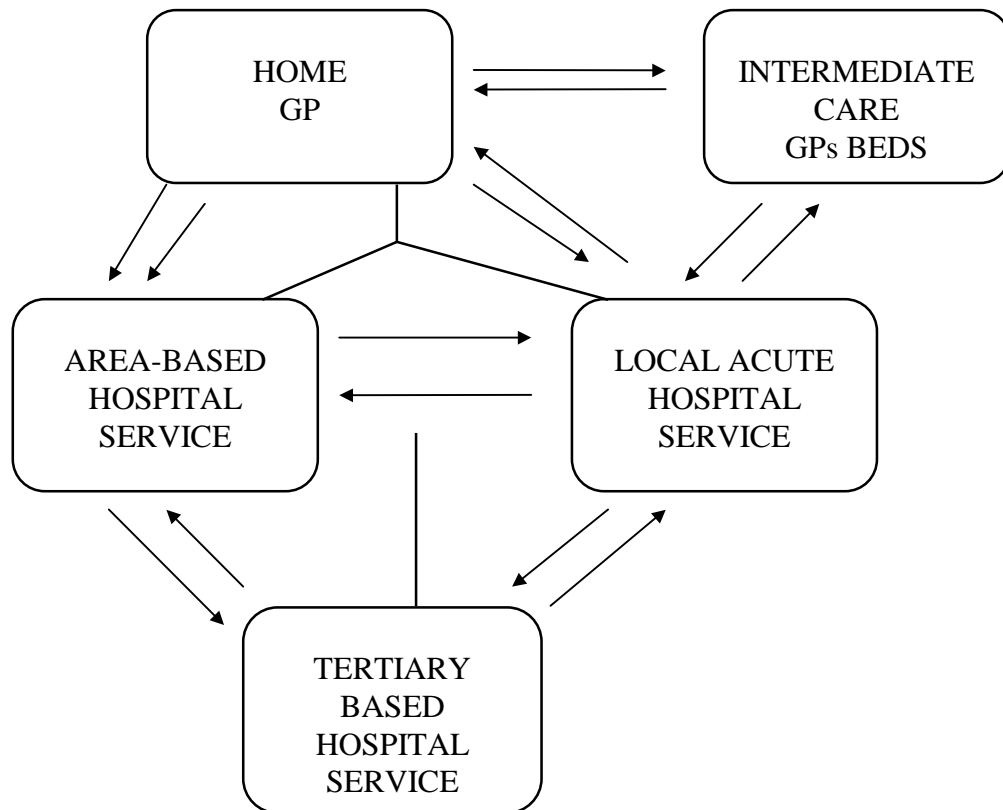
THE FUTURE OF CARDIOLOGY SERVICES IN NORTHERN IRELAND

Developing an Integrated Service

156. Within Northern Ireland acute services for cardiology have traditionally been delivered by a range of facilities structured in a hierarchical manner. The relationship between facilities largely depends on referral patterns and the extent of communication between individual cardiologists.
157. The term 'hub and spoke' has been applied to such a model of service delivery, the hub representing the tertiary level of care and spokes representing primary and secondary care. Unfortunately this model implies a subordinate status of the spoke and tends to understate the role of primary care in the delivery of services. An alternative to the 'hub and spoke' model is that of a Clinical System of Care.
158. The concept of a clinical system is one that may be described as an arrangement of clinical resources organised to provide medical care to a clinical group of patients in a way that represents the best balance between clinical-effectiveness, cost-effectiveness and accessibility. The goal is to provide high quality care efficiently and effectively in an accessible location.
159. A clinical system would ideally consist of:
- All hospitals providing cardiology services able to communicate on an ongoing basis with one another.
 - Effective IT links between all hospitals.
 - Clinicians with responsibility to the clinical system of care in addition to the institution with which they hold a contract.
 - The use of evidence-based clinical guidelines.
160. Within the system of care, a number of local area networks should be created. Local area networks could:
- Share investigative facilities
 - Collaborate to provide consultant cover 24 hours/day
 - Work collaboratively to provide out of hospital emergency cardiology services.
 - Provide support and advice to GPs and paramedic staff.
 - Develop a shared rehabilitation programme.

The advantages of an effective clinical system of care include the following:

- The provision of an integrated service between primary, secondary and tertiary care.
 - Specialists can work in teams or in collaboration with others rather than in isolation.
 - Communication between components within the system will be improved.
 - Specialised equipment can be located and utilised more efficiently.
 - Cardiologists at more remote sites can access support and advice from sites with more specialised expertise.
 - The use of common protocols will encourage equity of access for patients.
 - Improved training and development
 - Maximisation of skills among clinicians and support staff.
 - Progress towards achieving components of clinical governance as summarised by the Royal College of Physicians (1999).
161. Dynamic relationships between different levels of services can be considered as a vertical integration of services. Adjacent secondary or tertiary care hospitals operating collaboratively represent a horizontal integration of services. Both horizontal and vertical integration will be necessary if a clinical system of care is to operate effectively.
162. The strategic imperative underpinning a clinical system is the need to ensure clinical sustainability. The emphasis in a clinical system of care is on partnership, equitable distribution of resources and maximising benefits for all patients.
163. A clinical system of care may be diagrammatically represented as shown. It should not necessarily be limited by current management boundaries or physical structures. The optimum size of population served by a system of care may vary for different areas.



164. It is assumed that a clinical system of care will be supported by information technology. Developments in this area offer a huge potential to transmit patient data, via digital technology, for specialist opinion and advice without necessitating transfer of the patient. This will permit professionals working in one part of the system to readily access the expertise of those in another area and enhance the care provided to patients.
165. A clinical system of care should be facilitated, developed and supported by an Advisory Forum which would ensure that the goal of a quality service for patients takes primacy over the individual needs of organisational components. The Advisory Forum should be multi-disciplinary in nature.
166. The Advisory Forum could also play a vital role in promoting and advancing the Research and Development component of cardiology. Workforce planning for doctors, nurses and technicians within cardiology could be considered within a regional context by the Advisory Forum.

Local Cardiac Networks

167. Within a regional clinical system of care a number of local cardiac networks could exist. Local cardiac networks will provide the opportunity for a number of neighbouring units to work collaboratively in providing cardiology services. Each network should have one hospital equipped with a full range of non-invasive cardiology services.
168. Each local cardiac network could include the provision of cardiology services in primary care, local acute hospitals, and an area based hospital. Through the network effective communication would ensure that specialist advice and support is available to all components.
169. Cardiology services that can be provided locally should continue to be so provided. This should not only be preserved, but enhanced through the development of open communication channels and the use of IT to facilitate rapid information exchange.
170. The role of the primary care team in diagnosing heart disease and in treating both acute and chronic disease is acknowledged. As the GP is often the first point of contact for patients with cardiac symptoms their role in patient management and referral is critical. Within a local cardiac network GPs, working collaboratively with hospital cardiologists/physicians with an interest in cardiology will have the opportunity to strengthen their relationship with other clinicians and to participate more actively in the management of their patients with cardiac symptoms.
171. The development of local cardiac networks will help maximise the availability of clinical expertise and the efficient use of equipment. Specialised services will be available to all patients within the local area. Hospitals that may have difficulty justifying a comprehensive range of equipment will continue to have access at a neighbouring location.
172. Local cardiac networks will need appropriately trained staff to provide a comprehensive range of services. Maximising on the skills of nurses, professionals allied to medicine (PAMs) and medical technical officers MTOs will play a critical role in the efficient delivery of services.
173. In addition to providing a valuable cardiology service to a geographical area, local cardiac networks would interact closely with the tertiary centre.

174. One possibility is that 5-6 local cardiac networks could be developed within Northern Ireland. The development of networks would not necessarily need to observe current health board boundaries but should focus on the population and its distribution. A possible configuration could include a local cardiac network for each of the following areas: Belfast, the North, the South, the West and the North West of the Province.
175. Within a local cardiac network all hospitals providing acute medical care would be expected to provide acute cardiology services including:
- management of acute chest pain and AMI;
 - routine cardiac investigations including exercise stress testing and ECHO;
 - a dedicated coronary care unit with full monitoring facilities;
 - the appointment of a consultant cardiologist/physician with an interest in cardiology;
 - clinical staff adequately trained in advanced life support;
 - the capability of performing temporary pacing;
 - a multi-disciplinary rehabilitation programme;
 - adequately trained medical technical officers to support diagnostic component;
176. In addition to providing the above, one hospital within the local cardiac network should provide:
- a dedicated cardiology ward;
 - a minimum of 2 consultant cardiologists/physicians with an interest in cardiology and dedicated sessions in interventional cardiology;
 - the capacity to offer urgent cardiology opinions to local general practitioners;
 - telecommunication links with ambulances dealing with acute cardiology cases;
 - a comprehensive range of non-invasive diagnostic equipment;
 - clinical support and advice to all participants in the network.
177. The British Cardiac Society recommend one physician per 80,000 patients, hence a population of 160,000 may be required to provide the necessary critical mass for a hospital with 2 consultant cardiologists. In Northern Ireland consideration may need to be given to the geographic

distribution of the population in assessing an optimal patient base for local cardiac networks and within the networks for hospitals providing the comprehensive range of cardiology services.

178. New technology and equipment involves considerable capital expenditure. Cost effectiveness can be achieved when technology and equipment are utilised at an optimal level. A minimum population base will be necessary to ensure adequate and cost effective utilisation.
179. Maintaining and replacing old equipment and acquiring new equipment for a local cardiac network could be managed within a strategic framework that considers the acquisition and replacement of equipment in all cardiac networks on a regional basis.
180. When new procedures, technology and equipment become available a method of assessing and evaluating the relative benefits would be advantageous. Participation by local cardiac networks in a technology assessment programme may help validate modes of treatment.

RECOMMENDATIONS: AN INTEGRATED SERVICE

A Clinical System of Care should be developed for cardiology services in Northern Ireland.

A multi-disciplinary Advisory Forum should be formed to develop the system. The Advisory Forum should be supported by a project manager.

The Advisory Forum should embrace the issues of research and development within the parameter of the Managed Clinical Network.

Clinicians should have responsibilities to the clinical system of care in addition to the institution with which they hold a contract.

There should be sufficient investment in IT to facilitate network development.

Within a Clinical System of Care the RVH and BCH cardiology units should act functionally as a single tertiary reference centre This could include:

- *Development of digitalised information.*
- *Standardisation of patient information across sites.*
- *Development of telemedicine*

One possibility is to have 5 local cardiac networks covering the following areas: Belfast, the North, the South, the Northwest and the West of the province

Discussions should take place based on the population distribution and patient flow to determine the most effective configuration of local cardiac networks.

Hospitals providing acute medical services should also provide acute cardiology services.

Within a local cardiac network a comprehensive range of non-invasive cardiology services should be available at one designated unit.

This should include:

- *A comprehensive range of facilities for cardiac investigations.*
- *A coronary care unit with monitoring facilities.*
- *A well trained staff complement.*
- *A minimum of 2 cardiologists.*
- *IT links with other hospitals and with GPs to support information exchange*
- *A workload and patient base sufficient to justify and support all of the above.*

Medical, nursing and technical staff levels need to be enhanced in some units to meet demands.

Local cardiac networks should participate in a Technology Assessment Programme (nationally or in conjunction with another UK region).

Local cardiac networks should strive for recognition for higher specialist training.

Appendix A

Membership of the Cardiology Review Group

Project Sponsor	Dr H Campbell - Chief Medical Officer	
External Advisor	Professor A R Lorimer	
Project Review Board		
Cardiologists	Professor J A Adgey Dr K Balnave Dr G Dalzell Dr H Dunn Dr D Higginson Dr B McClements Dr G Richardson Dr C Wilson	RGH CAH RGH Altnagelvin UHD MIH BCH Antrim
Physicians with interest in Cardiology	Dr N C Chaturvedi Dr O Finnegan Dr C Russell	Mid Ulster Coleraine Tyrone County
Public Health Physicians	Professor F Kee Dr B McConnell	NHSSB WHSSB
Cardiology Technician	Ms V Hodgkinson	RGH
General Practitioners	Dr B Sweeney Dr P Sharkey	
Cardiology Nursing representatives	Sr H Knight Ms N Shannon Miss G Wells	RGH Mid Ulster BCH
Health Promotion	Dr B Gaffney	HPA
Board Chief Executive	Dr P Kilbane	EHSSB
Project Support	Dr D Corrigan Mrs M Callaghan Ms A Graham Mrs M Hinds Ms H Reid Dr D Stewart	DHSS/SHSSB DHSS EHSSB DHSS EHSSB EHSSB
Project Manager	Dr M McCarthy	DHSS

CONTRIBUTORS TO THE REVIEW

Dr J Courtney	General Practitioner, Hollywood
Dr P Crowe	Whiteabbey Hospital
Dr G Daly	Altnagelvin Hospital
Dr E Devlin	Daisy Hill Hospital
Miss J Dixon	DHSS
Mr G Dorrian	DHSS
Mr A Dougal,	NI Chest, Heart and Stroke Association
Ms Ashleigh Dunn	Provider Support Unit
Dr B Dunn	General Practitioner, Larne
Mr D Gladstone	RGH
Dr M Harbinson	Antrim Area Hospital
Mrs A Holland	British Heart Foundation
Dr C Jack	Downe Hospital
Professor G D Johnston	Dept of Therapeutics and Pharmacology, QUB
Dr M Kennedy	General Practitioner, Dungannon
Dr K Logan	Lagan Valley Hospital
Dr C Mulholland	RGH
Dr C Murtagh	BCH
Mr J McGrath	DHSS
Dr D McMahan	DHSS
Dr D McManus	NI Ambulance Service
Dr S McMeekin	RGH
Dr B McNamee	South Tyrone Hospital
Dr A McNeill	Altnagelvin Hospital
Dr P Nicholls	RGH
Ms C Peel	British Heart Foundation
Dr H G Russell	General Practitioner, Ballycastle
Dr E Shelley	Department of Health, Dublin
Sister Caroline Smyth	RGH
Dr J Stone	General Practitioner, Londonderry
Professor R W Stout	Dean of the Faculty of Medicine, QUB
Mr John Townson	DHSS
Dr M P S Varma	Erne Hospital
Dr J Yarnell	Dept of Epidemiology, QUB
HSS Trusts	All Nursing, Pharmacy, MTOs and PAMs staff
All General Practitioners	

CARDIOLOGY REVIEW QUESTIONNAIRE: MOBILE CORONARY CARE

* A = Ambulance, C = Car

CARDIOLOGY UNIT	MCCU	TYPE OF VEHICLE*	STAFFING					ACCESS				EQUIPMENT				DRUG RX	
			SHO	JHO	NURSE	PARAMED	OTHER (SPECIFY)	DIRECT LINE	999	GP	OTHER (SPECIFY)	FAX FACILITY	MOBILE PHONE	DEFIB	OTHER (SPECIFY)	TROMBOLYTICS	NARCOTIC ANALGESIA
R.V.H	✓	A	✓	✓	✓			✓	✓	✓			✓	✓	Full emergency equipment	✓	✓
MATER	CATCHMENT AREA COVERED BY R.V.H																
B.C.H	CATCHMENT AREA COVERED BY R.V.H																
U.H.D	✓	C	✓		✓		Taxi driver	✓	✓	✓			✓	✓	Full emergency equipment	✓	✓
LAGAN VALLEY	CATCHMENT AREA COVERED BY R.V.H																
DOWNE	✓	A	✓			✓			✓	✓	NIAS			✓	ECG	No	✓
ANTRIM	✓	C	✓		✓		Driver (Porter)		✓	✓	NIAS		✓	✓	Full emergency equipment	✓	✓
WHITEABBEY	CATCHMENT AREA COVERED BY R.V.H. OR ANTRIM HOSPITAL																
COLERAINE	✓	A	✓		✓				✓	✓	Self referral		✓	✓	Full emergency equipment	No	✓
MID ULSTER	✓	A	✓		✓		2 Amb Men		✓	✓	Self referral			✓	Monitor	No	✓
CRAIGAVON	✓	A			✓		Nurse led	✓	✓	✓	AS	✓	✓	✓	Pacing	Outside 1 hr from base	✓
S.TYRONE	✓	A	✓		✓			✓	✓	✓				✓	Full emergency equipment	No	✓
DAISY HILL	✓	A	✓		✓	✓			✓					✓	Full emergency equipment	✓	✓
ALTNAGELVIN	✓	A	✓	No	✓	✓	-	✓	✓	✓		No	✓	✓	Full emergency equipment	✓	✓
ERNE	✓	C	✓		✓		Medical Student	✓	✓	✓	RUC/Health Visitor		✓	✓	Full resus equipment Ext. pacing	✓	✓
TYRONE COUNTY	✓	A	✓		✓	✓		✓	✓	✓				✓	Oxygen Drugs ECG	✓	✓

MCCU - ACTIVITY PROFILE FOR PERIOD 01 JULY 1997 - 30 JUNE 1998

1	2	3	4	5	6	7	8	9	10	11	12	13	
	CARDIOLOGY UNIT	Total number of calls	Response time (minutes)	No. dead on ambulance arrival (%)	Total number received thrombolysis (%)	No. received thrombolysis - via MCCU (%)	No. received thrombolysis - in hospital (%)	No. requiring defibrillation (%)	No. admitted to CCU (%)	No. admitted via A & E (%)	No. transferred to other hospitals (%)	Other	
EHSSB	R.V.H**	1033	11.57	Data not available									
	U.H.D	1285	20.1	92 (7.16)	196* (16.43)	96* (8.05)	100* (8.38)	68* (5.70)	546 (45.77)	134 (11.23)	100 (8.38)		
	DOWNE		15.5	Data not available									
NHSSB	ANTRIM	332	25.0	34 (10.24)	46 (15.44)	10* (3.36)	36* (12.08)	Information not available	279 (93.62)	0	0		
	COLERAINE	280	14.0	4 (1.43)	35 (12.68)	0	35 (12.68)	5 (1.81)	275 (99.64)	1 (0.36)	0		
	MID ULSTER	236	23.0	5 (2.12)		-	17 (7.36)	1 (0.43)	231 (100)	N/App. All MCC (ambulance) patients brought to CCU	0	It is not current policy to give lysis in the community	
SHSSB	CRAIGAVON*	372	19	28 (7.53)		0	No data	14 (3.97)	No data	No data	No data	-	
	S.TYRONE	170	15.34	7 (4.12)		-	24 (14.72)	10 (6.13)	162 (99.39)	-	-		
	DAISY HILL	256	16.10	6 (2.34)		12 (4.8)	49 (19.6)	8 (3.2)	224 (89.6)	4 (1.6)	1 (0.4)	21 (unsuccessful resuscitation outside hospital)	
WHSSB	ALTNAGELVIN	565	10.6	58 (10.27)	83 (16.37)	77 (15.19)	6 (1.18)	29 (5.72)	334 (65.88)				
	ERNE	135	15.5	18 (13.04)	49 (40.8)	17 (14.16)	32 (26.66)	13 (10.83)	92 (76.67)	4 (3.33)	25 (20.83)		
	TYRONE COUNTY	135	17.46	10 (7.41)	55 (44)	25 (20)	30 (24)	12 (9.6)	125 (100)	0	4 (3.2)		

* Approximate figures (data extrapolated)

Percentages in Columns 6 – 12 based on number of live patients

** Percentage figures – provided by NIAS

SNAPSHOT OF WAITING TIMES FOR NON-INVASIVE CARDIOLOGICAL PROCEDURES

Number of patients waiting at 12 October 1998 (Average waiting time in weeks on 12 October 1998)

CARDIOLOGY UNIT	Transthoracic Echo	Exercise Stress Tests (non-pharmacological)	Nuclear Imaging Stress Studies	Ambulatory ECG Monitoring	Event Recording	Ambulatory Blood Pressure Monitoring
RGH	447 (20)	154 (19 -Doctor) (6 - Tech)	254 (20)	305 (20)	12 (2)	19 (4)
MIH	51 (13)	19 (9)	-	93 (36)	0	3 (2.5)
BCH						
UHD	56 (1-7 {out patient})	51 (2)	-	28 (2)	4 (2)	5 (2)
LAGAN VALLEY	-		-		-	-
DOWNE	(36)	9 (2)		40 (8)		0 (0)
ANTRIM	86 (4)	42 (3)	32 (20)	4 (1)	-	3 (1)
COLERAINE	13 (< 2)	20 (3)	-	14 (4)	9 (6)	7 (2)
MID ULSTER						
CRAIGAVON	279 (20)	222 (9)	24 (12)	35 (1.5)	10 (2.5)	13 (3)
S TYRONE	-	16 (2)	-	8 (2)	-	0 (1)
DAISY HILL	101 (6-8)	98 (16)	-	24 (4-6)	4 (4)	11 (4-6)
ALTNAGELVIN	291 (12)	52 (1-urgent) (6- routine)	-	38 (3/5 days urgent) (2 - routine)	32 (2 urgent) (28 routine)	36 (5-routine)
ERNE						
TYRONE COUNTY	47 (10)	32 (9)	-	6 (4)	4 (5)	8 (4)

HOSPITAL - ANTRIM

WARD ARRANGEMENTS:	1 designated cardiology ward. 8 centrally monitored beds, 27 ward beds, of which 12 have facility for telemetry and may be slave monitored in CCU.
STAFF:	2 consultant cardiologists. 1 SpR, 1 joint appointment research registrar. 5 SHOs and 1 JHO. Nursing staff: 23.6 WTE in CCU. 22.3 in cardiology ward. Most senior nurses have ALS certification. 7 full-time and 6 part time medical technicians.
COVER ARRANGEMENTS:	Consultants work a 1 in 2 rota. SHOs work a 1 in 5.
MCCU:	Antrim Hospital has 2 mobile coronary care vehicles, both cars leased from the NIAS. Staffed by SHO nurse and a porter. Thrombolysis administered when indicated.
REFERRAL PATHWAYS:	Referral via GP - (patients usually undergo assessment in ECG room), MCCU or A & E. Patients presenting at A & E are seen immediately by cardiology SHO. Direct access available to GPs for ECG service.
OUTPATIENT CLINICS:	Total of 2 new patient clinics per week and 4 review clinics. One of review clinics held in Ballymena. Waiting time: Referral letters screened and graded A if requiring appointment with 24 hours, B if during current week, C within 2-3 weeks and D if routine. Routine waiting time 5 months.
RANGE OF INVESTIGATIONS AND PROCEDURES:	Wide range of diagnostic tests: ECGs, ambulatory ECGs; ambulatory 24 hour blood pressure monitoring, cardiomonos, exercise stress tests (with and without isotope administration), pacemaker analysis, signal average ECGs, cardiac ultrasound, echocardiography and transoesophageal echo, tilt table testing.
LINKS WITH OTHER HOSPITALS:	One consultant has a weekly cardiac catheterisation session in the RVH. Usually sufficient to accommodate non-urgent patients. Urgent cases are referred direct to the RVH.
PROTOCOLS/ GUIDELINES:	Protocols available for treatment of AMI, postinfarction drug therapy, drug treatment of arrhythmias, thrombolytic therapy and assessment of outpatients seen on cardiology ward. Guidelines on angina and warfarin therapy are available to general practitioners.
AUDIT/ACADEMIC MEETINGS:	Weekly tutorial for junior staff, weekly ½ day education for junior staff. Monthly audit.
REHABILITATION:	Rehabilitation programme established 20 years ago. This has developed considerably in recent years. Dietitians, occupational therapists, nurses and physiotherapists involved.
OTHER:	Cardiologists at Antrim hospital are currently participating in several multicentre research studies. Staffing 15 inadequate to meet clinical needs.

HOSPITAL - BELFAST CITY HOSPITAL

WARD ARRANGEMENTS:	1.5 Dedicated cardiology floors. Level 10: 24 beds for cardiology (8 of which can be monitored) plus 6 CC beds with central monitoring. Level 9: 6 bed CCU with central monitoring, 14 bed acute ward with central monitoring (6 monitor beds) and telemetry (6 units) 24 bed investigation/intervention ward with central monitoring (2 monitor beds) and telemetry (6 units). Open Monday to Friday only for short-stay or day case patients.	
STAFF:	5 consultant cardiologists plus Dr Morton who is current Clinical Director (with no clinical commitment). Clinical Director role to be filled by one of the clinical cardiologists from 1/4/1999 (Dr Richardson).	
COVER ARRANGEMENTS:	1 staff grade doctor, 1 associate specialist, 2 SpR posts, 3 SHOs, 3 JHOs. Daytime cover is provided by JHO, SHO, SpR and consultant. Out of hours - consultants work 1 in 5.	
MCCU:	Belfast City Hospital does not have a Mobile Coronary Care Unit. The MCCU at the RVH covers Belfast City Hospital catchment area.	
REFERRAL PATHWAYS:	Admission is via A & E, outpatient clinics, GPs and transfers from other hospitals. GPs have direct access to: ECGs, exercise testing, 24 hour ambulatory ECG recording, 24 hour bp monitoring and echocardiography services.	
OUTPATIENT CLINICS:	Each consultant has 2 outpatient sessions per week.	
RANGE OF INVESTIGATIONS AND PROCEDURES:	Non invasive: ECGs, Exercise stress testing, Nuclear perfusion Gated blood pool scanning Echocardiography Basic imaging Stress echocardiography Transoesophageal echocardiography 24 hour BP monitoring 24 hour Holter ECG monitoring Patient activated arrhythmia event monitoring Tilt table testing	Invasive: Diagnostic coronary angiography Right heart catheterisation, Pulmonary angiography Coronary angioplasty and coronary artery stenting Percutaneous valvuloplasty Cardiac biopsy Pericardiocentesis Diagnostic electrophysiology Radiofrequency ablation Temporary and permanent cardiac pacing Implantation of defibrillator devices.
LINKS WITH OTHER HOSPITALS:	2 cardiac catheterisation labs are functional 8.30 am - 6.00 pm Monday - Friday. Each consultant has 2 catheterisation sessions per week. Cardiologists at the Ulster Hospital, Whiteabbey and Altnagelvin have cardiac catheterisation sessions at BCH. A fluoroscopy room will be operational in the summer of 1999 (work now commencing). BCH consultants have on average 3.5 sessions per week in the invasive setting. Also: the Ulster Hospital consultant has one angioplasty session in addition to a diagnostic session.	
PROTOCOLS/ GUIDELINES:	A range of guidelines and protocols have been agreed for common cardiac conditions.	
AUDIT/ACADEMIC MEETINGS:	Monthly audit meetings - medical and multi-disciplinary weekly journal club.	
REHABILITATION:	Active cardiac rehabilitation programme. Planning to expand this in near future.	
OTHER:		

HOSPITAL - COLERAINE HOSPITAL

WARD ARRANGEMENTS:	2 general medical wards with total of 48 beds. Additionally there is designated coronary care unit with 6 centrally monitored beds and 8 intermediate level beds with telemetry facilities.
STAFF:	4 consultant physicians, 1 having special interest in cardiology. Designated SpR. 1 staff grade. 8 SHOs. 2 SHOs – assigned medical wards. Nursing staff - complement of approximately 30, 2 full-time technicians. Resuscitation Training Officer.
COVER ARRANGEMENTS:	Consultants work a 1 in 4, SHO - 1 in 4, JHO rota (shared with SHOs) 1 in 4.
MCCU:	MCCU uses first available ambulance staffed with SHO and staff nurse. Thrombolytics drugs not administered.
REFERRAL PATHWAYS:	Patients admitted via A & E, GP or MCCU.
OUTPATIENT CLINICS:	1 cardiology clinic and 1 cardiology/medical clinic each week. Waiting time: non urgent - 3 months. Urgent: 1 week.
RANGE OF INVESTIGATIONS AND PROCEDURES:	Exercise stress testing. Transtelephonic ECG event recording. Echocardiography - including direct access for GP's. 24 blood pressure monitoring. 24 hour arrhythmia monitoring.
LINKS WITH OTHER HOSPITALS:	Transtelephonic pacemaker clinic with Belfast City Hospital. Referrals for interventional procedures to Belfast.
PROTOCOLS/ GUIDELINES:	Administration of Thrombolysis, DC conversion. Heart failure.
AUDIT/ACADEMIC MEETINGS:	Monthly physician meeting. Monthly coronary care meeting. Monthly medical audit. Hospital audit and medical education for junior staff
REHABILITATION:	Active rehabilitation programme for all patients, commencing on admission. Families involved and participation level high.
OTHER:	Plans in progress for nurse-led Cardiac Ambulance.

HOSPITAL - CRAIGAVON AREA HOSPITAL

WARD ARRANGEMENTS:	1 dedicated cardiology ward. 24 ward beds: 20 cardiology, 4 haematology. 8 coronary care cubicles, centrally monitored. 7 telemetry units available.
STAFF:	1 physician with a special interest in cardiology (Dr Balnave). 4 additional physicians cover cardiology after hours. 1 vacant position (physician with interest in care of the elderly). 1 SHO in lieu of Registrar, 1 SHO and 1 JHO in cardiology. 30 WTE nursing staff, 7.75 WTE auxillary staff. 3.5 WTE medical technicians and 1 assistant technical officer.
COVER ARRANGEMENTS:	Consultants operate a 1 in 5 rota. Cardiology cases as a rule admitted under Dr Balnave's care.
MCCU:	1 MCCU vehicle supplied by NIAS. Staffed by 2 ALS qualified nurses. Thrombolysis administered as indicated, when patient more than 1 hour journey from hospital.
REFERRAL PATHWAYS:	Admission route primarily via MCCU, directly via GP and via A & E. No formal direct access clinic. GPs requiring urgent investigations may call ward and make arrangements.
OUTPATIENT CLINICS:	2 Cardiology clinics per week at CAH, one at Armagh Hospital. Both a mix of new/review patients. Attended by consultant, staff grade and a SpR/SHO attends one clinic per week. SHO/Reg attends 1 clinic/week.
RANGE OF INVESTIGATIONS AND PROCEDURES:	ECGs, exercise testing, echocardiography, 24 hour ECG, 24 hour blood pressure monitoring, temporary pacing.
LINKS WITH OTHER HOSPITALS:	No interventional sessions at other hospitals. Patients requiring interventional cardiology usually referred to BCH.
PROTOCOLS/ GUIDELINES:	Protocol on use of drugs in cardiology. Ward Nursing protocol for MCCU. Nursing protocol for MCCU.
AUDIT/ACADEMIC MEETINGS:	Weekly lunchtime presentations by junior medical staff. Weekly academic meeting. Weekly X Ray/consultant presentation. Audit meeting x 2/yr. Area audit x 2/year. Monthly Audit by junior staff.
REHABILITATION:	Weekly rehabilitation session, run by physiotherapist and liaison nurse. Spouses encouraged to attend. Attendance 6-8 weeks.
OTHER:	Resuscitation liaison officer in appointment. Courses offered to many staff. Small resuscitation training room available. Consultant staffing a problem - inadequate cover for cardiology during holiday/sick leave. Business case for additional cardiologist has been submitted to SHSSB. Cardiology unit is small. Additional facilities and equipment are required.

HOSPITAL - DAISY HILL

WARD ARRANGEMENTS:	Cardiology incorporated into General Medicine. 60 general medical beds including 12 coronary care beds, 8 of which are centrally monitored.
STAFF:	4 full-time physicians, including 1 physician (Dr Devlin) with a special interest in cardiology, and 1 full time locum. Specialist registrar post exists. 5 SHOs, 4 JHOs. Full complement of nursing staff. One Cardiac Liaison Sister. 3 Technicians.
COVER ARRANGEMENTS:	Senior staff work a 1 in 4 rota.
MCCU:	Uses the first available emergency ambulance. Admits via A & E - fast tracked to ward. MCCU is staffed with junior doctor, and nurse. Thrombolysis is administered by MCC team.
REFERRAL PATHWAYS:	Patients admitted via - GP, A&E, MCCU
OUTPATIENT CLINICS:	Most cardiology patients are seen by Dr Devlin. 2 Outpatient clinics per week - new and review patients. Waiting time is 2/12. If urgent appointment requested patient can be seen within 1 week.
RANGE OF INVESTIGATIONS AND PROCEDURES:	ECGs, Exercise Testing, Echocardiography 24 hour ECG, 24 blood pressure monitoring, temporary pacing.
LINKS WITH OTHER HOSPITALS:	No formal links with other hospitals. Referrals for interventional procedures made to both BCH and RVH.
PROTOCOLS/ GUIDELINES:	For junior doctors - guidelines on various aspects of CCU.
AUDIT/ACADEMIC MEETINGS:	Weekly X Ray meeting. Weekly Journal Club. Monthly Audit. Area Group Audit Bimonthly.
REHABILITATION:	Programme available for past 10-12 years. Run by the cardiac liaison sister. Six week programme, individualised for each participant. High drop out rate.
OTHER:	Rehabilitation to be developed further. Interest in developing a nurse led model for MCCU.

HOSPITAL - DOWNE HOSPITAL

WARD ARRANGEMENTS:	Cardiology integrated within general medicine. Nine bedded coronary care unit with 6 monitored beds and 2 telemetry beds. 18 bedded general medical ward.
STAFF:	2.5 WTE consultant physicians, two of whom have a special interest in cardiology. 2 staff grades, 4 SHOs, 3 JHOs.
COVER ARRANGEMENTS:	CCU covered by JHO, SHO and consultant during normal hours. Outside normal hours JHO covers medicine and surgery, SHO s provide 1 in 4 cover to include medicine, cardiology and care of the elderly.
MCCU:	Fully equipped ambulance. Staffed by paramedic, ambulance personnel, SHO and nurse. If a second call received, patient brought to A & E.
REFERRAL PATHWAYS:	Admission via MCCU, A & E, GP's transfers from other hospitals.
OUTPATIENT CLINICS:	All consultants see patients with cardiac disease.
RANGE OF INVESTIGATIONS AND PROCEDURES:	Exercise stress testing. 24 ambulatory ECG recording. Ambulatory blood pressure monitoring. Temporary pacing.
LINKS WITH OTHER HOSPITALS:	No formal links with other hospitals. Good informal links.
PROTOCOLS/ GUIDELINES:	Management of acute myocardial infarction. Administration of thrombolysis. Indications for exercise stress testing.
AUDIT/ACADEMIC MEETINGS:	Cardiology topics for audit incorporated into general medical audit. Weekly postgraduate meeting. Weekly pharmacy meetings. Weekly clinical meetings.
REHABILITATION:	Rehabilitation programme in place.
OTHER:	

HOSPITAL - ERNE HOSPITAL

WARD ARRANGEMENTS:	Designated cardiology ward. 4 coronary care beds, 8 additional monitored beds.
MEDICAL STAFF:	3 consultant physicians. Dr Varma (cardiologists) attends all cardiology patients. 1 staff grade. 4 SHOs 3 JHOs
COVER ARRANGEMENTS:	
MCCU:	Mobile unit since 1984. Own vehicle car. Staffed by doctor and nurse.
REFERRAL PATHWAYS:	Thrombolysis given with indicated. Admission via MCCU, A & E, GP, Emergency Ambulance.
OUTPATIENT CLINICS:	1 cardiology clinic per week. 1 general medical clinic per week. 1 diabetic clinic per week.
RANGE OF INVESTIGATIONS AND PROCEDURES:	Exercise stress testing. Ambulatory blood pressure monitoring. ECHO. Colour ECHO. Holter monitoring.
LINKS WITH OTHER HOSPITALS:	No formal links with other hospitals. Good informal links.
PROTOCOLS/ GUIDELINES:	Protocols in place for MCCU.
AUDIT/ACADEMIC MEETINGS:	Annual academic conference held - attended by physicians and general practitioners.
REHABILITATION:	Rehabilitation programme in place.
OTHER:	Strong focus on research – recent presentations and publications on cardiology research. Successful HEART BUS programme in place since 1984.

HOSPITAL - LAGAN VALLEY

WARD ARRANGEMENTS:	Cardiology integrated within general medical services. 6 bedded coronary care unit. 2 high dependency beds. 2 general medical wards with total of 44 beds. 10 additional beds recently opened.
STAFF:	3 consultant physicians, 1 with special interest in cardiology. 4th consultant provides 5 sessions in care of the elderly and participates in rota. 7 non consultant grade staff. 1 staff grade, 3 SHOs and 3 JHOs who rotate 3 monthly from RVH.
COVER ARRANGEMENTS:	Consultants provide a 1 in 4 rota. CCU staffed by JHO, SHO and consultant during working hours. Out of hours, JHO covers medicine and surgery and SHO covers medicine, cardiology and care of the elderly.
MCCU:	MCC is provided by RVH vehicle.
REFERRAL PATHWAYS:	Direct admission by GP, via A & E. Transfer from other hospitals, via A & E.
OUTPATIENT CLINICS:	GPs have direct access to ECG's. Exercise stress testing. 24 ambulatory ECG records. Ambulatory blood pressure monitoring.
RANGE OF INVESTIGATIONS AND PROCEDURES:	Treadmill exercise stress testing. 24 hour ambulatory ECG recording. Ambulatory blood pressure monitoring . ECHO.
LINKS WITH OTHER HOSPITALS:	No formal links with other hospitals.
PROTOCOLS/ GUIDELINES:	Multidisciplinary care pathway for management of acute cardiac chest pain. Administration of thrombolysis. Treatment of arrhythmias.
AUDIT/ACADEMIC MEETINGS:	No recent audit projects. 2 weekly meeting for general medical staff. 1 weekly meeting for all hospital medical staff.
REHABILITATION:	
OTHER:	With increasing demand for cardiology services, Lagan Valley Hospital would like to appoint a second cardiologist.

HOSPITAL	- MATER HOSPITAL
WARD ARRANGEMENTS:	Cardiology beds integrated within general medicine. Cardiac care unit with 4 centrally monitored beds. New system with capacity to monitor 20 patients - due Easter 99. Coronary care and intensive care share a combined unit. 2 x 36 bedded general medical wards and a 13 bed admission unit.
STAFF:	1 full time consultant cardiologist. 1 full time staff grade cardiologist/physician. 3 consultant physicians, 1 locum physician and 1 staff grade. 13 non-consultant grade staff. 2 SpRs, 7 SHOs and 4 JHOs.
COVER ARRANGEMENTS:	Consultants work a 1 in 5 rota.
MCCU:	Mobile coronary care for the catchment area of the Mater Hospital is provided by the vehicle dispatched from the RVH.
REFERRAL PATHWAYS:	Admission via A & E, GPs, transfers from other hospitals, via domiciliary visits, outpatient clinics, GPs have direct access to ECHO and ECG service.
OUTPATIENT CLINICS:	2 cardiology clinics per week.
RANGE OF INVESTIGATIONS AND PROCEDURES:	Treadmill exercise stress testing. Transthoracic ECHO. Transoesophageal ECHO/dobutamine stress ECHO. Ambulatory blood pressure monitoring. 24 hrs ambulatory ECG recording. Event recording. Tilt table testing. Temporary transvenous pacing. Pericardiocentesis.
LINKS WITH OTHER HOSPITALS:	Consultant cardiologist has one cardiac catheterisation session per fortnight in RVH. The Mater Hospital is actively seeking to have this increased to a weekly session.
PROTOCOLS/ GUIDELINES:	Guidelines on: <ul style="list-style-type: none"> • administration of thrombolytic therapy • treatment of arrhythmias • post infarction management • DC conversion • treatment of unstable angina • care pathways developed for suspected myocardial ischaemia and acute myocardial infarction.
AUDIT/ACADEMIC MEETINGS:	Monthly audit. Weekly clinical meeting. Weekly x-ray meeting. Cardiology topic included within audit programme for general medicine. Recent topics: post infarction care, treadmill waiting times, administration of lytic therapy. Ongoing audit on cardiac arrest. M1 Register.
REHABILITATION:	A multi-disciplinary rehabilitation programme in place. A full time cardiac rehabilitation officer is in post.
OTHER:	Demand for inpatient and outpatient services have increased in recent years. The Mater Hospital would like to appoint a second cardiologist and to improve access to cardiac catheterisation laboratories. A full time resuscitation officer is in post. The unit is actively involved in multicentred trials and a research project in cardiac rehabilitation. There is one whole-time equivalent research officer.

HOSPITAL - MID-ULSTER

WARD ARRANGEMENTS:	Cardiology integrated with general medicine. 40-45 general medical beds of which 7 are cardiac beds, centrally monitored. There are 3 intermediate level beds with monitoring available in the medical ward.
MEDICAL STAFF:	3 physicians, 1 with special interest in cardiology. 1 staff grade. 5 medical SHOs, 4 JHOs covering medicine and surgery. Nursing staff complement - 13 WTE. Most of coronary care nurses have ALS Certificate. 1 technician - 40% of time assigned to cardiology.
COVER ARRANGEMENTS:	Consultants work 1 in 3 rota. SHO's usually work 1 in 3. JHO's work 1 in 4 to midnight.
MCCU:	MCCU uses the first available emergency ambulance. Staffed by 1 SHO and one nurse. Approx 300 calls per year. Thrombolytics are not administered by MCC team.
REFERRAL PATHWAYS:	Patients admitted via A & E and MCCU. Those presenting at A & E with chest pain are seen immediately by cardiology SHO.
OUTPATIENT CLINICS:	Weekly outpatient clinics. Waiting time: not urgent, 4-6 weeks, urgent, 1 week. Referral letters screened to determine priority.
RANGE OF INVESTIGATIONS AND PROCEDURES:	Treadmills; ECG; 24 hour BP monitoring; 24 hour arrhythmia tapes. No direct access services for GPs.
LINKS WITH OTHER HOSPITALS	Patients requiring interventional cardiology procedures are referred to Belfast or Antrim Hospital. Those requiring ECHOs usually referred to Antrim. Arrhythmia tapes analysed at Antrim.
PROTOCOLS/ GUIDELINES	Protocols in place for MCCU and coronary care. Protocols are amended versions of RVH/BCH/UHD standard protocols.
AUDIT/ACADEMIC MEETINGS	Weekly meetings, including a weekly teaching session for junior staff. X ray meeting and academic meeting. Monthly audit.
REHABILITATION:	Rehabilitation offered following admission.
OTHER:	Resuscitation training available to staff.

HOSPITAL - ROYAL VICTORIA HOSPITAL

WARD ARRANGEMENTS:	4 dedicated cardiology wards. Wards 5 and 6: 10 CC beds and 29 inpatient beds. Ward 7 - investigation ward: 15 for inpatient stay or day cases. Ward 44 - 12 cardiology beds.	
STAFF:	7 WTE consultant cardiologists. 1 academic appointee (no NHS clinical commitment). 2 staff grade doctors. 5 SpRs, 4 SHOs, 4 JHOs, 4 research fellows.	
COVER ARRANGEMENTS:	SpR covers CCU 8.30 am - 6.30 pm daily. Out of hours SpR, SHOs and JHOs cover wards, CCU and MCCU. Consultants work a 1 in 7 rota.	
MCCU:	1 dedicated MCCU, staffed by junior doctor and nurse. 2nd cardiac ambulance operates when first cardiac ambulance is out on a call and in addition covers as a second cardiac ambulance for the Ulster Hospital Dundonald.	
REFERRAL PATHWAYS:	Emergency admissions primarily via MCCU, A & E or via GP and tertiary referrals from other hospitals, urgent or emergency. Direct access services for GPs include: ECG, ECHO, exercise testing and ambulatory BP monitoring.	
OUTPATIENT CLINICS:	Each consultant does 1-3 outpatient clinics per week.	
RANGE OF INVESTIGATIONS AND PROCEDURES:	Non invasive: Echocardiography Transoesophageal ECHO Ambulatory BP monitoring Ambulatory ECG monitoring Signal averaged ECG and event recording SPEC Thallium stress testing, Pharmacological Stress testing, Gated blood pool scans and Myocardial function scans Exercise stress testing Tilt table testing Transtelephonic pacemaker	Invasive: Angiography Angioplasty Coronary Stenting Cardiac Pacing ICD implantation Valvuloplasty Electrophysiology studies and ablation
LINKS WITH OTHER HOSPITALS:	Cardiologists working in Mater Hospital, Altnagelvin and Antrim Hospital and Paediatric cardiologists from RBHSC have catheterisation sessions at RVH.	
PROTOCOLS/ GUIDELINES:	Protocols in place for clinical trials. Guidelines in place for clinical trials. Protocol for Direct Access Clinics. Management of chest pain, arrhythmias, complicated AMIs, pulmonary embolus.	
AUDIT/ACADEMIC MEETINGS:	Monthly audit meetings. 3 educational meetings per week: ECG meeting Case presentations Journal club Monthly echocardiographic meeting. Weekly cardiac catheterization meeting with Cardiac Surgeons.	
REHABILITATION:	1 Rehabilitation Sister. 1 Resuscitation Training Officer with active rehabilitation programmes. ACLS and CPR training.	
OTHER:	Basic cardiological research in conjunction with QUB and UUJ and clinical research programme.	

HOSPITAL - SOUTH TYRONE

WARD ARRANGEMENTS:	Cardiology beds integrated within general medicine. 8 coronary care beds plus 6 beds with telemetry facilities. 48 medical beds in total.
STAFF:	3.5 WTE consultants, 1 with a special interest in cardiology. 6 SHOs (including those covering care of the elderly). 2 JHOs. Junior staff rotate through CCU on 6 monthly basis.
COVER ARRANGEMENTS:	Consultants work in 1 in 4 rota.
MCCU:	MCCU staffed by SHO and staff nurse. Approximately 150 calls per year. Thrombolysis not administered by MCC Team.
REFERRAL PATHWAYS:	Admission via MCCU, A & E, GPs, outpatient clinics and transfer from another hospital.
OUTPATIENT CLINICS:	Cardiology clinics integrated within medicine. All consultants see their own patients at review clinics. Waiting time 2-3 weeks.
RANGE OF INVESTIGATIONS AND PROCEDURES:	Treadmill exercise testing. ECHOs. 24 hour holter monitoring. 24 hour BP monitoring. No open access services for general practitioners.
LINKS WITH OTHER HOSPITALS:	No formal links with other hospitals. Good informal links.
PROTOCOLS/ GUIDELINES:	Protocol for MCCU.
AUDIT/ACADEMIC MEETINGS:	2 teaching sessions per week. Regular audit meetings.
REHABILITATION:	Rehabilitation course commenced recently.
OTHER:	Resuscitation officer in appointment.

HOSPITAL - TYRONE COUNTY

WARD ARRANGEMENTS:	18 bedded cardiology ward with 8 centrally monitored beds.
MEDICAL STAFF:	4 consultant physicians, 2 with an interest in cardiology. 7 non consultant grade staff. 5 SHOs and 2 JHOs. All rotate through cardiac ward on 3 monthly basis. Approximately 22 WTE nursing staff.
COVER ARRANGEMENTS:	Consultants provide a 1 in 4 rota. SHOs work 1 in 5.
MCCU:	MCCU staffed with SHO and nurse. Thrombolysis given by medical staff of MCCU where indicated.
REFERRAL PATHWAYS:	Admission via MCCU, GP, outpatients, transfer from other hospitals. Currently no open access for ECGs. Open access for ECHO under consideration.
OUTPATIENT CLINICS:	2 cardiology clinics per week. 3 general medicine clinic per week. 1 chest clinic and 1 diabetic clinic. 1 renal clinic.
RANGE OF INVESTIGATIONS AND PROCEDURES:	Exercise stress testing. ECHO. 24 blood pressure monitoring. Ambulatory ECG monitoring. Pace maker clinic with BCH.
LINKS WITH OTHER HOSPITALS:	Forward link with BCH for referrals and monthly pacemakers clinic. Good informal links.
PROTOCOLS/ GUIDELINES:	Management of arrhythmias. Cardiopulmonary resuscitation. Myocardial infarction. Unstable angina.
AUDIT/ACADEMIC MEETINGS:	3 meetings per week for junior staff education. Monthly meeting for medical and nursing staff. Directorate meeting - 1 every 2 months.
REHABILITATION:	Active rehabilitation programme in place.
OTHER:	Since resuscitation officer appointed 1995 active resuscitation programme involving public and workplace training. Bid to commence radionucleotide studies 1999.

HOSPITAL - ULSTER HOSPITAL

WARD ARRANGEMENTS:	Cardiology is part of medical directorate. 2 adult cardiology wards, with a total of 32 beds. Ward 16 is a 20 bedded coronary care unit with central monitoring. Ward 20 has 12 cardiology beds with monitoring facilities and 8 general medical beds. The medical assessment Unit can also accommodate cardiac patients.
STAFF:	2 full-time consultant cardiologists. 1 associate specialist 4 SHOs and 1.5 JHOs who rotate through medicine and care of the elderly.
COVER ARRANGEMENTS:	Consultant cardiologists work a 1 in 2 rota.
MCCU:	Dedicated 4 wheel drive vehicle. Staffed by doctor, (SHO), nurse and driven by taxi driver. Approximately 1,300 calls per year.
REFERRAL PATHWAYS:	Admission via MCCU, A & E, Medical Assessment Unit, GP, outpatients. GPs have direct access to ECG and exercise stress testing. Approximately 1,000 admissions/year.
OUTPATIENT CLINICS:	Consultants do a minimum of 2 cardiology clinics each per week.
RANGE OF INVESTIGATIONS AND PROCEDURES:	ECGs, 2S4 hr ambulatory ECG recording, treadmill exercise stress testing, ambulatory blood pressure monitoring, pacemaker function testing. Echocardiographic investigation.
LINKS WITH OTHER HOSPITALS:	One cardiologist has coronary angiography sessions at both BCH and RVH. Two sessions per week in total.
PROTOCOLS/ GUIDELINES:	Care pathway for management of acute MI. Protocols: criteria for admission to CCU administration of thrombolytics, heparin and aspirin treatment of cardiac arrhythmias management of acute pulmonary oedema cardiogenic shock secondary prevention - B-blockade, ACE inhibitors, statins current research projects
AUDIT/ACADEMIC MEETINGS:	Monthly audit. Weekly multidisciplinary team/audit meeting.
REHABILITATION:	Cardiac rehabilitation course is in place.
OTHER:	Active resuscitation training coordinated by Resuscitation Training Officer. 3rd cardiologist required to share workload.

HOSPITAL - WHITEABBEY

WARD ARRANGEMENTS:	Cardiology is integrated within general medicine. There are 6 coronary care beds and 15 additional ward beds of which about 80% are occupied by cardiology patients.
STAFF:	3 consultant physicians, 1 having special interest in cardiology. 1 vacant position. 1 SPR, 2 SHOs on medical/cardiology ward. 1 JHO rotates 2 monthly. 23 nursing staff. Retaining staff a problem at present.
COVER ARRANGEMENTS:	Consultants work a 1 in 4 SpR works 1 in 5. SHOs 1 in 9. JHOs 1 in 6 to midnight 1 in 6 from midnight onwards
MCCU:	No MCCU. Whiteabbey area is covered by either the MCCU from Antrim or RVH.
REFERRAL PATHWAYS:	Referral primarily via 999 calls and via GP. Some patients admitted via A & E.
OUTPATIENT CLINICS:	3 consultant clinics per week. 1 SpR clinic per week. Waiting time 3/12 [approx]. Good relationship with other clinics especially diabetic clinic.
RANGE OF INVESTIGATIONS AND PROCEDURES:	Exercise testing, 24 hour event monitoring, echocardiography, tilt-table testing, temporary pacing. Direct access available for GPs to ECGs and treadmills. 24 hour BP monitoring.
LINKS WITH OTHER HOSPITALS:	Catheterisation sessions (2 per month) at BCH. CT scans, when required, done at Antrim Hospital.
PROTOCOLS/ GUIDELINES:	Protocols in place for: Thrombolysis AMI Arrhythmias
AUDIT/ACADEMIC MEETINGS:	Monthly medical meeting for GPs and physicians. Weekly lunchtime lectures. Weekly grand rounds.
REHABILITATION:	Rehabilitation programme since 1997. Between 10/97 and 10/98, 93 patients attended. Course completion 79%. Plans to extend programme in 1999.
OTHER:	Angiography sessions not sufficient to meet current needs. Additional referrals to BCH are common.