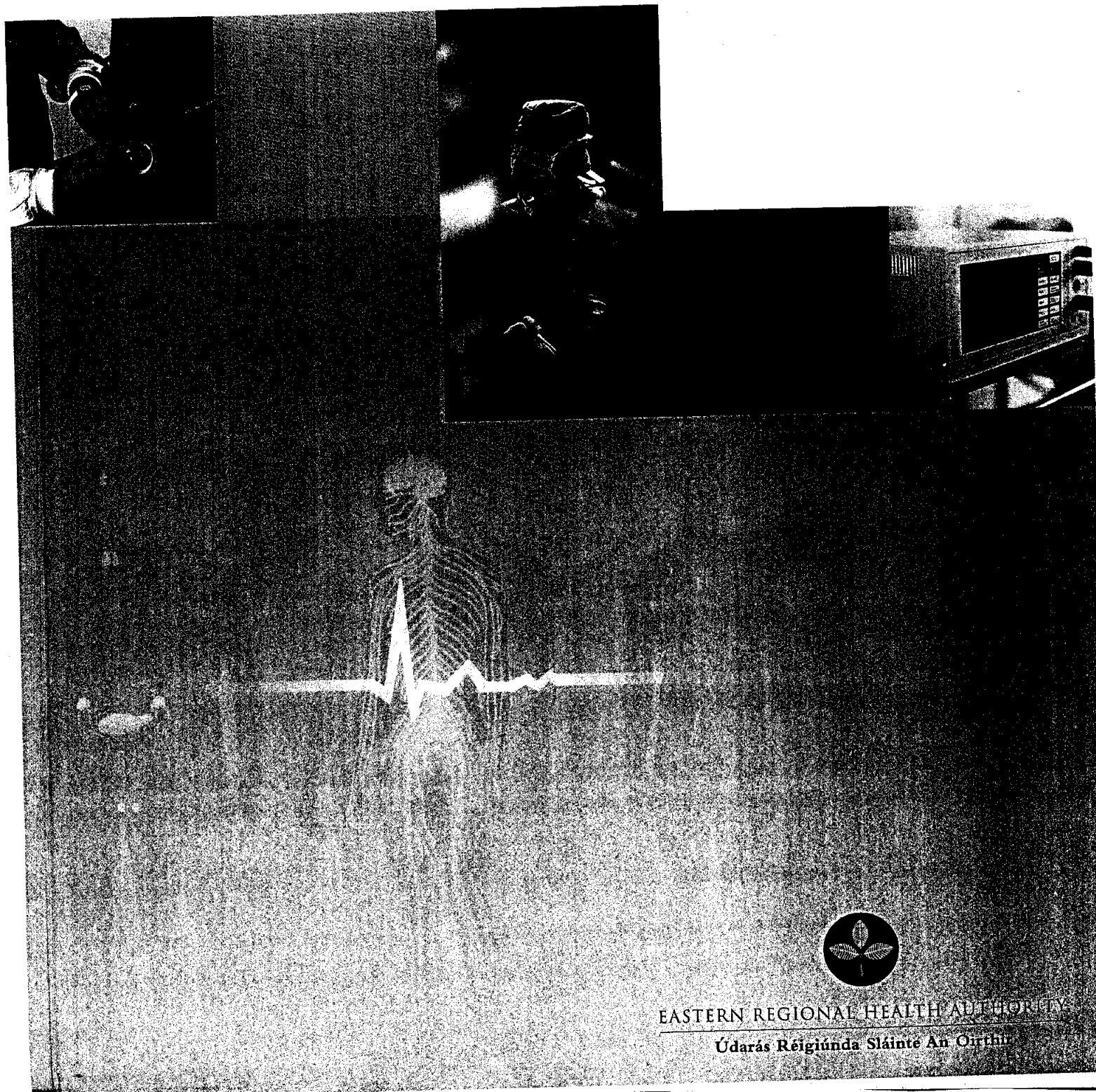


**A Review of
Cardiology Catheter Laboratory Services**
in the Eastern Region



EASTERN REGIONAL HEALTH AUTHORITY
Údarás Réigiúnda Sláinte An Oirthir

A Review of Cardiology Catheter Laboratory Services in the Eastern Region

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Executive summary

Introduction

The Cardiovascular Health Strategy, (Building Healthier Hearts) (BBH) sets out a strategic plan (211 recommendations) to reduce heart disease mortality and morbidity experienced by Irish people. One quarter of all deaths in the Eastern Region are caused by heart disease and Ireland has the highest premature mortality rate (under 65 years) from heart disease in the EU. While death rates are on the decline, hospital admissions and discharges are increasing slightly. Targeting effective interventions is an important factor in reducing the burden experienced by people from heart disease. Catheter laboratories offer a wide range of services from diagnosis such as angiography to treatment (angioplasty, electrophysiological work (EP)).

As part of the Eastern Regional Health Authority's overall strategy to improve the prevention and management of heart disease, the Cardiovascular Health Strategy Steering Group commissioned a review of cardiology catheter laboratory services. Following an open tendering process an outside consultancy firm, Public Health Direct, was selected to undertake this review. The terms of reference for the review are described in section 1 of the Report. The review has been carried out over a six-month period from March to September 2002 and has involved face-to-face contact with staff of the Authority, provider organisations, professional staff, professional organisations and the private sector. Developments in this field of cardiology in Europe and the United States have been incorporated.

The key question for the Region is whether the need for laboratory services, (both for the Region's own population and for those who are referred in), are being met by existing laboratory services and whether they have sufficient capacity to meet future needs over the next five years.

Current needs for catheter laboratory services

Although the Irish death rate from coronary heart disease in the under 65 year age group is the highest in the EU the Eastern Region has a significantly lower standardised mortality rate than Ireland as a whole.

In estimating 'need' Building Healthier Hearts set a national target of 1,200 angioplasties per million population by the year 2002, and projects that the European average will be 2,000 angioplasties per million by the year 2010. The current rate in the United States of America is 2,000 per million with an annual growth rate of 5% (American Health Association 2001)

Another important measure of need is the waiting list. Although strictly a measure of demand it does demonstrate that existing demand is not being fully met. While the overall numbers waiting for cardiology procedures in the Region has fallen from 1,365 in March 2001 to 1,076 in March 2002, waiting numbers and times remain an issue of concern.

Current supply of services

The Authority uses an accepted norm of 1.4 million population when planning for local services and 2.5 million when dealing with tertiary procedures. Within the Eastern Region cardiology catheter laboratory services are provided in five public hospitals, the DATHs, (The Mater, Beaumont, St James's (two laboratories), St Vincent's and Adelaide & Meath incorporating the National Children's Hospital, (AMNCH), and additionally in two private hospitals (the Mater Private (two laboratories) and Blackrock Clinic) giving a total of nine laboratories.

When analysing the activity in these hospitals, 2001 data gathered as part of this review shows that 16,564 procedures were carried out including 11,873 angiograms and 2,843 angioplasties. Taking the total figure of 2,843 angioplasties, carried out in both public and private sector, and applying it to an estimated referral population of 2.5 million this represents an angioplasty rate of 1,137 per million in 2001 which closely approximates to BHH target of 1,200 per million by 2002. Seventy percent of this work is carried out in the public hospitals and approximately half of these procedures were carried out on patients resident outside the Eastern Region. Activity and waiting list information indicates an inordinate load experienced at the one laboratory at the Mater hospital.

Table 1: Activity in Catheter Laboratories, 2001

Hospitals (Adults)	No. of Labs	Angio Grams	Angio plasties	Ratio of A'grams to A'plasties	Total of all Procedures
Mater	1	2,180	666	3.27	3,147
Beaumont	1	1,400	250	5.60	2,152
St James's	2	2,162	718	3.01	3,217
St Vincent's	1	1,254	190	6.60	1,689
AMNCH	1	1,200	157	7.64	1,488
DATHs	6	8,196	1,981	3.64	11,693
Total		69.03%	69.68%		70.6%
Private Hospitals					
Mater Private	2	2,215	617	3.59	3,107
Blackrock Clinic	1	1,462	245	5.97	1,724
Private Hospitals Total	3	3,677	862	4.27	4,831
		30.97%	30.32%		29.4%
All Adult Hospitals Total	9	11,873	2,843	3.81	16,564

Source: Public Health Direct

In addition to the current activity, estimates are given of the maximum capacity of existing laboratories and the total number of angioplasties that could be carried out when new laboratories come on stream. There are several caveats within the report including the uncertainty surrounding the plans to expand catheter laboratory facilities in the other regions of the country.

The five DATHs have very different histories regarding referral patterns. Both the Mater and St James's have on-site cardiac surgery and are major referral centers. The other three hospitals serve large local populations and also accept referrals from wider catchment areas. In planning future services, consideration would have to be given to the provision of services at these hospitals to the total population in their own area together with recognition, where appropriate, of those parts of the surrounding Health Boards, which naturally feed into them and other historical referral patterns from around the country. Planning should take into account the needs of this population base, the plans for developing catheter laboratory services around the county and whether it is desirable to establish twin laboratories in each major hospital.

Workforce Plan

There is a substantial variance within hospitals in terms of the length of the working day. This too may be caused by differences in establishment and availability of staff. Current staffing levels in this specialty need to be benchmarked, reviewed and a comprehensive workforce action plan be developed to ensure that there are appropriately trained staff in sufficient numbers to meet the Authority's strategic objectives both current and planned in this field.

Changes in practice and future needs

The main pressures that should influence the total planned future activity are:

Population Growth: The population base for planning purposes is of 1.4 million for local services and 2.5 million for highly specialised services and the population historically referred. Population projections from the Central Statistical Office show that over the period 1996 to 2030 the East will be the fastest growing area with increases of 56%. What is difficult to calculate is the extent to which catheter laboratory developments throughout Ireland may alter the referral patterns to the Eastern Region. What is likely to occur is a phased reduction in the referral of patients for diagnostic work and an increase in referral for treatment work (i.e. angioplasty, EP) and other complex procedures in this evolving branch of cardiac medicine.

Growth in repeat procedures: Although developments in this branch of medicine result in improvements in the outcome of treatment such procedures may not necessarily offer a permanent solution and many patients will return for further treatment procedures. Current best estimates are that within one year patients arteries may narrow (re-stenose) in 10% - 15% of cases and 40% - 50% over five years. Furthermore in the Electrophysiology (EP) area the need for regular follow up and assessment is clearer as well as the burden of replacement of treatments such as pacemakers and implantable defibrillators.

Incident prevalent issue: The natural history of cardiovascular disease in Ireland, the growth in aging population, the increasing survival with current treatments and the changing pattern of patient management suggests that there is likely to be a pool of cardiovascular disease that has not yet been treated. Before need is met by the current target rate (1,200 per million) there is therefore a need to catch up over a period of several years and this problem may result in high waiting lists in the short term. Addressing this issue will require an increase in the target rate of 1,200 per million procedures.

Other influencing factors

It is important that early warning systems are established so that innovations that may have a profound influence on practice can be taken account of at the earliest possible stage. However, predicting all significant influences on demand for catheter laboratory services would seem unlikely given the overall uncertainty regarding innovations.

Another pressure that relates to capacity is the need to accommodate emergency cases, i.e. primary angioplasty. Although laboratories may run at maximum capacity this may not be sustainable in the long term and especially in regard to accommodating primary angioplasty. Cardiologists refer to an ideal planned activity level that does not exceed 85% of full capacity.

What is most difficult to estimate is the impact of future developments in this branch of cardiology. Factors to be considered include:

EP (Electrophysiology): Historically a gap between EP services in Ireland and elsewhere is noted. If one were to accept the UK NICE recommendation of 50 implantable defibrillators per million this would be a five-fold increase on current practice. Although the numbers are relatively small based on complexity it is estimated that EP work alone will require additional capacity equivalent to approximately 68% of an efficient laboratory.

- ❖ **24 hour service:** In considering the future management of patients with acute myocardial infarction the review concludes that this is an appropriate development which will require appointment of adequate levels of staff to allow for an around-the-clock service availability within the region.

❖ **Recent and anticipated future developments:**

- ❖ New definitions for myocardial infarction (heart attack) mean that many more patients will be diagnosed and as these will be 'milder' myocardial infarction the survival rates will improve and a larger proportion will be eligible for treatment in a catheter laboratory.
- ❖ The more recent development is in early intervention treatment (i.e. primary angioplasty) for myocardial infarction and unstable angina. However, one should not ignore future possibilities of pharmacological thrombolysis. Consequently developments are anticipated in non-mechanical delivery that may contribute to reduction in use of catheterisation in the longer term.

❖ **Changes in Clinical Practice:**

- ❖ Another anticipated change in practice is an increasing intervention in patients with irregular heart beat (arrhythmias). This will put increasing demands on the electrophysiological service and is likely to lead to more pacemaker and implantable defibrillator insertions. Cardiological opinion is that while the numbers of laboratory procedures may not increase greatly, the complexity of the procedures is likely to create more pressure on time and space in the mid-term in the medium term.

Proposals to meet these activity targets

At the time of this report there are two approved capital hospital programmes. One at St Vincent's hospital, is part of the current major development at this site (due to open in 2004/5) and was envisaged as a replacement for the existing laboratory. However, it is proposed by the hospital that the existing laboratory will continue to function when the new laboratory is opened (although the formal application for recurrent funding to support a second laboratory has not yet been submitted).

The other approved scheme is part of the 2008 major capital development at the Mater hospital, which will give a total of three adult laboratories on this site.

In addition to the two capital schemes there are two submitted proposals under consideration by the Authority. One of these, at the Mater, is for the establishment of a second laboratory and is argued from the standpoint of reducing current unacceptable pressures, improving workload management and improving the electrophysiology services on the north side of the city. The other from St James's involves the development of an existing lead lined room into a third laboratory. This development would be a major improvement in electrophysiology services and further strengthen the collaborative arrangements on the south side of the city.

There are other opportunities for increasing activity in existing laboratories. This applies to St James's and more particularly at St Vincent's and AMNCH. Key to all the above developments is the appointment of additional staff.

Strategic options

The following are the criteria upon which the Steering Group agreed future investment decisions should be made:

- Investment should be based on meeting the estimated need set out in this report, which is based on Building Healthier Hearts, European and international projections.
- Existing capacity must be maximised.
- Investment in developing additional catheter laboratories must be linked with activity performance at existing sites and the emergence of capacity constraints.
- Nationally agreed referral patterns and working relationship between laboratories and other acute hospitals that are likely to sustain and grow demand for services at these laboratories in the future.
- Cognisance is taken of investment already in progress for which additional major capital is not required.
- The commissioning of new laboratories would be based on comparison of the relative cost submitted by providers.
- Funding availability to the Authority for commissioning additional activity.
- That investment of capital and revenue resources in EP facilities would be based on agreement on the concentration of specialist work from a number of sites in these facilities.

The Review sets out a menu of four options that differ in capacity level, timing of provision of catheter laboratory activity and in meeting population need. Commissioning of further catheter laboratories is dependent on the criteria outlined above. Consideration is also given to commissioning work from the private sector.

Option Menu

	2004	2007	2008	Costs Range	Related Capital
	Number of PTCAs & (rate per million)	Number of PTCAs & (rate per million)	Number of PTCAs & (rate per million)	€ million	€ million
Option 1	4,010 (1,604)	4,010 (1,604)	4,510 (1,804)	2.5 – 4.8	0.2
Option 2	4,510 (1,804)	4,510 (1,804)	5,010 (2,004)	5.4 – 8.6	1.4
Option 3	4,510 (1,804)	6,010 (2,404)	6,510 (2,604)	5.4 – 11.8	1.4
Option 4	4,010 (1,604)	5,510 (2,204)	6,510 (2,604)	2.5 – 9.1	0.2 – 1.2

Note: Activity in 2001 was 2,843 PTCAs (1,137 per million)

PTCA = angioplasty

In line with the comprehensive estimate of need as set out above, options three and four can deliver the capacity required over the medium term. These options support the immediate development of a 2nd laboratory at the Mater Hospital, maximise existing capacity, cater for phased growth in activity over the five year timeframe and increase the procedure rate for the population serviced in line with European targets with a range of costs outlined.

Other Relevant Findings

Equipment Replacement Fund

Based on experience to date it is appropriate to assume that equipment will need to be replaced after a ten-year period. In view of the high cost of equipment in cardiology catheter laboratories there is a case for provision of a fund for equipment replacement.

Estimates of equipment costs have come from three sources. A figure of €1,800,000 has been used to represent the cost of replacing equipment in a single laboratory. This has been multiplied by six to represent the possible cost of replacing the equipment in all six current laboratories (€10,800,000). An average equipment life of ten years has been assumed. This gives a possible annual equipment replacement budget of €1,080,000. To date it has not been possible for the Authority to address equipment replacement on a planned basis under the National Development Plan. If continuity of service and efficient workload management are to be maintained there is a need for dedicated equipment replacement funding over and above the existing National Development Plan.

Private sector role

In considering various options it is understood that within existing payment structures, as operated by the insurances companies, the current number of procedures, in the two private hospitals will remain relatively stable over the period from 2002 to 2008. The current total number of angioplasties in the two private hospitals is 862.

The Authority, in considering options to increase activity, is open to commissioning capacity from within the private sector as in previous waiting list initiatives.

Cardiology laboratory services for children

The issue of cardiology laboratory services for children is considered separately from adult services. Given the brevity of this children's review, the fact that there are different issues concerning children compared with adults, and that key stakeholders exist beyond the Eastern Region, it is important that a more detailed review take place.

Conclusion

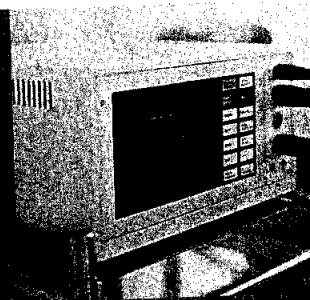
The target of 1,200 angioplasties per million by the year 2002 (as set out in BHH) is almost attained. Seventy per cent of activity is carried out in the public hospital sector with approximately half of these procedures being carried out on residents of other regions. Despite current levels of activity there is still a substantial waiting list for laboratory interventions.

In looking to the future it is expected that there will be an increase in demand and an increase in patients who will need to return for repeat angioplasty and repeat procedures following initial insertion of pacemakers and implantable defibrillators. Projections have been made of the number of procedures that could be carried out in existing laboratories and in those additional laboratories that are currently under consideration. The planned increase in laboratory capacity will be critically dependent on an expansion of professional staff. Not only will new posts need to be established but greater concern will have to be given to training, recruitment and retention of staff. This is one of several areas where the Authority should take the lead in ensuring a match between patient needs and the development of the workforce to meet those needs.

The Report makes the following recommendations.

- That the Authority, as a planning goal, supports the provision of the additional capacity, as outlined in strategic option four. This option will provide, over a phased basis, a level of activity that will meet local and national objectives.
- That decisions taken on current and future bids for hospital developments should fit within the Authority's strategic plan for catheter laboratories and investment in developing catheter laboratories on particular sites must be linked with activity performance.
- That, given the difficult financial climate for new capital developments and the competitive nature of future bids both at national and local level, future activity requirements should come, in the first instance, from existing laboratories.
- That current staffing levels in this specialty be reviewed and that a comprehensive workforce strategic plan be developed to ensure that there are appropriately trained staff in sufficient numbers to meet the Authority's strategic objectives in this field.
- That detailed discussions proceed with hospital providers to explain the apparently wide cost variance in procedures between hospitals.
- That estimating the current and future costs of the cardiology catheter laboratory services is problematic. In terms of current costs there is no agreed standard methodology for apportioning costs for a complex service that is currently funded across many different budget lines. This means that future costs are likely to be higher than those estimated based on current costs.
- That a model for a 24-hour service be developed.
- That, given the high cost of consumables, discussions should taken place with providers to ensure that maximum savings are achieved through central purchasing arrangements.
- Given the nature of the equipment it may be appropriate to assume that equipment will need to be replaced after a ten-year period. A figure of €1,800,000 has been used to represent the annual cost of replacing equipment in a single laboratory.
- That the Monitoring and Evaluation Directorate develop with provider hospitals a system of activity information that is more timely and more useful than the current systems. This would include waiting times for interventional cardiology catheter services.
- That an early warning system be developed concerning innovations and that appropriate measures are in place to assess the cost effectiveness of innovations prior to their being introduced.

Given the brevity of this children's review, the fact that there are different issues concerning children compared with adults, and as a national service that key stakeholders exist beyond the Eastern Region, it is important that a more detailed review take place.



Terms of reference

The purpose of the review was to ensure that existing cardiac catheter laboratories within the region were utilised to achieve maximum health and social gain and to plan an orderly development of diagnostic and interventional services, which required the infrastructure of a catheter laboratory. The assessment should have regard to factors such as:

- the existing services in the Region including current capacity use and service delivery patterns
- current patient flows to the Eastern Region for the range of procedures, which require catheter laboratory facilities
- future demographic trends
- the expanding nature of the service as envisaged in 'Building Healthier Hearts' aiming at 1,200 angioplasties per million population by 2002 and later a 24-hour emergency service
- emerging technology and related procedures.

Following a competitive tender Public Health Direct, a UK-based consultancy firm, was selected to carry out this work. The terms of reference for this review were set out in the original tender documents.

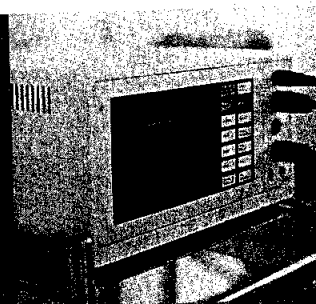
Methodology

The methodology was agreed at the first meeting of the Steering Group on March 22nd 2002 and was further described in the interim report that was considered by the Steering Group on 3rd May 2002. In summary, the review has involved extensive discussions with staff from the Authority, the Area Health Boards, the Dublin Academic Teaching Hospitals (DATHs), the Area Board hospitals, professional associations, general practitioners and hospital professional staff, including doctors, nurses, technicians and radiographers as well as private hospitals, the insurance industry and independent suppliers of catheter laboratory services. A list of these contacts is provided in Appendix 1. Public Health Direct has examined the documentation that describes the principles that govern the Authority's approach to the planning and delivery of services. These include the Report of the Cardiovascular Health Strategy Group, Building Healthier Hearts (1999), the health strategy document, 'Shaping a Healthier Future' (2001); the Cardiovascular Strategy (2000); the National Health Promotion Strategy; Children First; The Ten Year Action Plan for the Elderly; the National Alcohol Policy; Quality and Fairness Report (2001), A Health System for You; Primary Care, A New Direction and the list of relevant documents is given in Appendix 2.

In commissioning this review of cardiology laboratory services the Authority, is mindful of the wider issues concerning a reduction in heart disease as a whole. To this end the Authority is currently developing a five year Action Plan covering the whole range of available cardiovascular interventions. Throughout the review process it was acknowledged that the Eastern Region provides a very substantial service to patients referred from outside the Region and that attention needs to be given to any development plans for regional self-sufficiency in the remaining seven health boards when planning future service needs. Also underlying the review was the acceptance of a set of values that would influence future plans. They included the need for equity of access (between and within regions) and the balance between prevention and treatment of heart disease.

Structure of the Report

The Report is structured in the following way. Section 2 covers various aspects of need that underpin the national target of 1,200 angioplasties per million population by the year 2002. Reference is made to the average European level of 1,750 per million in 2000 and the likelihood that the average European figure in 2010 will be 2,000 per million. Sections 3 and 4 review current and future capacity in the Eastern Region and throughout Ireland. This is followed by factors that will influence future practice, which include the changing nature of the electrophysiology services, the development of a 24 hour service, innovations and the implication for future work load from patients who are returning for repeat and replacement procedures. There are also sub sections on staffing and training issues, working practices, the insurance industry and private sector roles. Section 6 describes the strategic vision for the development of cardiology catheter services. Section 7 provides a summary of current proposals. This is followed by a section that lays out the options facing the Authority and includes a provisional assessment of the budgetary implications. Section 9 considers the provision of laboratory services for children. Conclusions are outlined in section 10 together with a series of recommendations to the Authority. Several appendices (1-8) with supplementary details are available from the ERHA Cardiovascular Team, Tel 01 620 1833, on request.



There are several factors to take into account when estimating the need for cardiac catheter laboratory services. They include the underlying incidence and prevalence of cardiovascular disease; demographic trends; changing patterns of referral from outside the Eastern Region; changing patterns of referral regarding age and sex; waiting lists, national targets and comparisons with other countries, and the number of patients returning for repeat procedures. This final factor is considered in section 5.5.

Epidemiology

Estimates of incidence and prevalence are affected by definitions (for example, what constitutes angina, numbers of vessels occluded and degree of occlusion) and how these are measured. When discussing coronary heart disease, some authors include those with identified risk factors or those with asymptomatic mild coronary occlusion; others restrict their definition to those with chronic stable angina, unstable angina, acute coronary syndrome or myocardial infarction. One measure that has been widely used to represent incidence is ischaemic heart disease mortality. In 1999, the age standardised mortality for Ireland was approximately 2 per thousand for men and 1.5 per thousand for women (Irish Heart Foundation, 2001). Although rates have been falling during the last 15 years, Irish men have the third highest mortality rates and Irish women the 6th highest rates when compared with 31 other countries.

The British Cardiac Society guidelines for the management of chronic stable angina noted a range of estimates of prevalence depending on questionnaire assessment, anti-anginal medication or use of GP services (de Bono, 1999). Estimates of incidence amongst men range from 0.44 per thousand for those aged 31-40 to 2.32 per thousand for those aged 61-70. The corresponding figures for women are from 0.08 per thousand to 1.01 per thousand respectively. This suggests that the incidence in men aged 31-40 was approximately 5.5 times that in women of the same age. In the 61-70 age-range the male incidence was approximately 2.9 times that in women. More reliable estimates are anticipated in the WHO MONICA project. This will give 'event rates' in Glasgow and Belfast, the two nearest centres (Kuulasmaa, 2000). Ireland coronary artery disease mortality is now the highest in Western Europe (WHO, 2001; Irish Heart Foundation, 2001). Comparison of age standardised rates in Ireland with those for the UK would suggest a standardised mortality ratio (SMR) (Ireland to UK) of approximately 117 for men and 110 for women. Although the Irish death rate for coronary heart disease in those under 65 is the highest in the EU, within Ireland the Eastern Region has a significantly lower mortality rate than Ireland as a whole. In Wales models of need have adjusted upwards for SMR (Hamilton Kirkwood, 1999). More refined models of need have estimated the relative size of the pool of waiting and potentially waiting patients. One proposal has been to over-provide for five to ten years to reduce the pool to that comparable to other countries (West, 1999). The way in which coronary disease is managed differs substantially and different countries show wide variation in thresholds for referral, diagnosis and treatment. These are influenced by definition of incidence and prevalence as well as the provision, access and availability of services (Stevens, 1994).

Demography

In relation to demographic change, population projections have been estimated by the Department of Public Health ERHA, based on data made available from the Central Statistical Office. Although based on the census of 1996, the projections cover the period from 2001-2031 (CSO, 2001). In summary, they show that over the 35-year period from 1996 to 2030 the population

of Dublin will grow by 56%. The earlier projections based on the 1996 census for the period to 2010 showed the total population of the Eastern Region was set to increase by 300,000. The highest users of the health services (those aged over 45) were set to surge in the coming years. In the east itself, the numbers aged between 45 and 64 will increase by 25%, while the number aged over 65 will go up by 13% between 1996 and 2006. Those aged over 85 years are projected to increase by 40% by 2011. Although there has been some reduction in the incidence of myocardial infarction this has not been observed in other categories of cardiovascular disease. Confidence in such long-term projections will be influenced by data from the 2002 census. A preliminary report has just been published (CSO, 2002). This shows that the Eastern Regional population is currently 1.4 million which represents 36% of the total Irish population of 3.9 million. More detailed figures will be available in Spring 2003 showing the breakdown by age and sex. Nevertheless, the existing figures are of great importance in predicting the need for cardiology services. There is clearly a demographic bulge and this will influence the future need for services. By modelling this and other factors the Report will show how future supply will meet the projected future need.

The delivery of services in the Eastern Region to out-of-region residents

Detailed work has been carried out by the Department of Public Health ERHA on the area of residence of those treated in the Eastern Region. The work was based on figures for 1999 from PHIS version 4. Calculations were made of the minimum and maximum population base for each of the three Area Health Boards. The figures were based on the 1996 census population. Taking the whole of the area covered by the Eastern Regional Health Authority this showed a catchment population of a minimum of 1.6 million and a maximum of 2.45 million. Hence the Authority uses an accepted norm of 1.4 million population when planning for local services and 2.5 million when dealing with tertiary procedures.

The following table shows the number of Percutaneous Transluminal Coronary Angioplasties (PTCAs) carried out by Dublin Academic Teaching Hospitals (DATs) in the Eastern Region by Health Board of residence for the years 1998, 1999 and 2000 (ERHA, 2001). It excludes the private hospitals.

Authority/Health Board	1998	1999	2000	Activity % change between 1998 and 2000 figures
Eastern Regional Health Authority	622	800	727	+14.4%
Midland Health Board	109	101	119	+8.4%
Mid-Western Health Board	27	19	45	+40.0%
North Eastern Health Board	144	169	181	+20.4%
North-Western Health Board	73	93	85	+14.0%
South-Eastern Health Board	116	102	172	+32.5%
Southern Health Board	9	5	8	-11.0%
Western Health Board	42	54	49	+14.2%
Non-Nationals	2	7	5	+60.0%
Total	1,144	1,350	1,391	+17.7%
% Non-Eastern Residents	46%	41%	47.7%	

Source: HIPE data analysed by Department of Public Health, ERHA.

The figures presented are as close to patient-based as possible and exclude double counting from the insertion of more than one stent. There was an overall increase from 1144 to 1391. The figures for residents of the Eastern Region went up from 622 to 727. Of all procedures carried out in the DAT hospitals in the Eastern Region in 2000, 47.7% were carried out on non-residents. What is of

considerable interest from this table is the number of patients treated in the Eastern Region who were not resident in the Eastern Region. This showed that there were 522 non-residents treated in 1998, 550 in 1999 and 664 in 2000. Over this period the number of angiograms and PCTAs treated outside the Eastern Region increased. Although not too much should be inferred from comparisons between one year and the next it does suggest that even where there is expansion of facilities outside the Eastern Region the number of patients referred into the Eastern Regional actually increased. Table 2 shows the figures for Eastern Region residents by Area Health Board. The largest increase was for residents in the South Western Area Health Board.

Area Health Board	1998	1999	2000
East Coast	102	118	126
South Western	207	266	283
Northern	313	415	318
Total	622	799	727

Source: Department of Public Health, ERHA.

The following table shows the estimates of the number of PCTAs that would need to be carried out in Ireland to meet the recommendations in Building Healthier Hearts (BHH, 1999) based on 1200 per million by the year 2002. It uses the published population figures based on the 1996 census. Calculations have been made of the numbers expected to be treated in the Eastern Region from each of the Health Boards of residence based on current referral patterns. The percentage of residents in any one Health Board who were treated in the Eastern Region varied from about 2% in the Southern Board to over 99% in MHB, NEHB and NWHB.

Authority/ Health Board	Population 1996 Census	No. of PTCAs carried out in the Eastern Region 2000	Total No. of PTCAs recommended by BHH by 2002 throughout Ireland	No. expected to be carried out in the Eastern Region in the short term**
ERHA	1,295,939	727	1,555	1,555
MHB	205,542	119	246	245
MWHB	317,069	45	380	Nil
NEHB	306,155	181	367	363
NWHB	210,872	85	253	245
SEHB	391,517	172	470	404
SHB	546,640	8	656	26
WHB	352,353	49	423	135
Total	3,626,087	1,391*	4,350	2,973

Source: Department of Public Health, ERHA.

* This figure excludes private provision. A further table that analyses activity in the Eastern Region by county of residence is provided in Appendix 3.

** Based on % of PTCAs in the Health Board's currently referred to Dublin tertiary hospitals.

Changing patterns of referral regarding age and sex

In section 2.1 incidence figures were quoted for men and women based on mortality data and the data from stable angina. They suggested that the incidence in men aged 31-40 was approximately

5.5 times that in women of the same age and in the age range 55-64 was 3.9 to 1. In the 61-70 age range the male incidence was approximately 2.9 times that in women and in the age range 65-74 was 2.5 to 1. The following tables based on an analysis of returns as part of the Hospital Inpatient Enquiry (HIPE) for the year 2000 show the numbers of procedures and the male:female ratio. In the case of angiograms, the male:female ratios show no evidence of male bias (Table 4). In the case of angioplasties (Table 5) the male:female ratio was higher than the expected epidemiological ratio (13 against 5.5) in those aged under 45 years. Without more detailed information on the clinical cases it is difficult to conclude that there is currently a bias towards men and one cannot therefore infer that the future need for catheter laboratory services should be influenced by a requirement to redress a gender imbalance.

Age	Male	Female	M:F ratio	Total
<45	541	288	1.88	829
45-64	2,420	1,038	2.33	3,456
65+	1,465	877	1.67	2,342
Total	4,426	2,199	2.01	6,625

Source: HIPE data analysed by Department of Public Health.

Age Group	Male	Female	M:F ratio	Total
<45	78	6	13.0	84
45-64	559	136	4.11	695
65+	341	190	1.79	531
Total	978	332	2.95	1310*

Source: Department of Public Health based on HIPE returns, ERHA.

* This total differs by 81 from the 1391 shown in Table 3 due to incomplete information on gender.

Socio-economic factors

The recording of socio-economic status of patients is limited in the health service. Nevertheless, it is possible to use General Medical Services (GMS) status as a proxy. The following table shows the numbers of people who were discharged from hospitals in the Eastern Region in the year 2000 by GMS status with a diagnosis of acute myocardial infarction and those who received angiograms and angioplasties.

	Acute myocardial infarction	Angiograms	Angioplasties
GMS	(42%) 616	(38%) 1,465	(39%) 285
Non-GMS	(58%) 855	(62%) 2,430	(61%) 442
Total	1,471	3,895	727

Source: Department of Public Health, ERHA.

Discharge with a diagnosis of acute myocardial infarction is a relatively good indicator of need and actual admission to hospital through Accident and Emergency Department is less likely to suffer from referral bias than some other conditions. Of those discharged with this diagnosis 42% were GMS patients. One might therefore expect the same percentage to be seen in those receiving angiograms and angioplasties. The figures of 38% and 39% do not suggest any substantial bias.

Another approach to assessing inequity of access involves an analysis of public and private mix. The following table shows the public private mix within public hospitals in the Eastern Region for the year 2000 for the same condition as above.

	<i>Acute myocardial infarction</i>	<i>Angiograms</i>	<i>Angioplasties</i>
Public patients	(76%) 1,117	(81%) 3,137	(75%) 528
Private patients	(24%) 354	(19%) 758	(25%) 199
Total	1,471	3,895	727

Source: Department of Public Health, ERHA.

In trying to assess whether there is any bias towards treating private patients the percentage figures from the above table have been applied to the 2001 activity data that are available from both public and private hospitals. Table 8 shows the public-private split in public hospitals and the use of private hospitals.

	<i>Hospital type</i>	<i>Angiograms</i>	<i>Angioplasties</i>
Public patients	Public hospital	(81% of 8,196) 6,639	(75% of 1,981) 1,486
Private patients	Public hospitals	(19% of 8,196) 1,557	(25% of 1,981) 495
Total		8,196	1,981
Private patients	Private hospitals	3,677	862
Total in all hospitals	Both	11,873	2,843
Total private	Both	5,234	1,357

Source: Public Health Direct based on data supplied by Department of Public Health, ERHA.

A total of 8,196 angiograms and 1,981 angioplasties were carried out in the public hospitals and 3,677 angiograms and 862 angioplasties were carried out in private hospitals. If one assumes that the public private mix in public hospitals in 2001 was similar to 2000 (see figure above) then one can apply the 81% to 19% percent split for angiograms and the 75% to 25% split for angioplasties to the 2001 figures. This gives 6,639 angioplasties on public patients and 1,557 on private patients. If one then adds the 1,557 to 3,677, the number of angiograms to patients in private hospitals this gives a grand total of private angiograms of 5,234. As a percentage of all 11,873 angiograms this is 44.08% of the total. For angioplasties the percentage is 47.73 (1,357 of 2,843). These figures are approximate because those given for the private hospitals do contain a number of public patients treated under contract as part of the waiting list initiative.

A recent publication from the Central Statistics Office gives a figure of 51.4% for private health insurance in the Eastern Region (CSO, 2002). It would be reasonable therefore to use a figure of 50% for those living in the Eastern Region when calculating the likely demand for private investigation and treatment and when trying to calculate the relationship between need and demand for public services.

The benefits offered vary by individual health plans and information is not available on the detailed breakdown of these plans. It is clear from the description of the benefits that only those holding plans D or E would have full cover for treatment in either of the two private hospitals with cardiology catheter laboratory facilities. Those with plan C would be covered only at 40% for accommodation and 90% for procedures. Those with plan B and those with plan A would be covered at 45% and 90% and at 35% and 35% respectively. Without detailed knowledge of the numbers of individuals holding different plans it is not possible to draw conclusions on the equity issue. Although it is likely that there are differences in morbidity between those with and without health plans and between those with different plans this information is not available. Nevertheless, the tentative analysis presented above does suggest that the socio-economic circumstances of individuals do not play a large part in determining the method of treatment. The view held by clinicians is that there is no bias in terms of method of investigation and treatment towards those with health insurance. This may determine where the patient is treated but not how. The question of when the patient is treated is addressed below.

Waiting lists

Information on waiting lists is collected regularly from hospitals and submitted by the Authority to the Department of Health and Children. It is a useful reference source for comparing hospitals and for reviewing trends over time. However, until recently comparable waiting list information across the region was only available to the Authority at specialty level. The Authority has been working with providers to make available more comprehensive waiting list information on a routine basis. Specific catheter laboratory activity is not available and so cardiology activity has to be used as a proxy. In relation to cardiology, information includes length of time patients are waiting at procedure level, area of residence by Health Board and length of time on waiting list. Hospitals are at different stages in their capacity to provide this information on a routine basis and so at present comprehensive regional information at this level is not available.

From the information available in a comparable format there has been a reduction in overall numbers waiting for cardiology procedures in the region from 1,365 patients in March 2001 to 1,076 patients in March 2002. However both numbers waiting and waiting times remain an issue of concern. Of the 1,076 patients awaiting cardiology procedures 384 patients had been waiting more than 12 months (218 patients have been waiting over 12 months for cardiology inpatient procedures and 166 patients waiting over 12 months for cardiology day procedures). Waiting list returns for March 2002 indicate that 52 patients have been waiting over four years for cardiology procedures. Where area of residence breakdown of the waiting list is available indications are that over 25% of those on cardiology waiting lists reside outside the Eastern region (31% of those awaiting an in-patient cardiology procedure and 15% of those awaiting a day case cardiology procedure reside outside the region). Not only are there long waiting times for investigation and treatment, there are long waits for patients to be seen in outpatients by a consultant cardiologist. The comments from General Practitioners confirm the length of these delays. It is likely that lengthy waiting lists lead to increased numbers of patients using A & E services as a gateway to treatment. Waiting lists and waiting times are important indicators of unmet demand. In the past waiting list initiatives have led to the public sector contracting with the private sector to carry out elective procedures. This has happened both at the Mater Private Hospital and Blackrock Clinic in relation to cardiac surgery.

In October 2001 a cardiology questionnaire survey was carried out by the Authority's Public Health Department. The following table shows the then current number of patients on the waiting list for angiography and the average waiting times of October 2001.

<i>Hospital</i>	<i>Number on waiting list</i>	<i>Average waiting time</i>
Mater	700	Not given
Beaumont	62	Not given
St James's	11	Three weeks
St Vincent's	28	Six days
AMNCH	32	Less than one month

Source: Department of Public Health, ERHA.

Hospitals without catheter facilities were also asked how long it took for a patient to be admitted by one of the above hospitals for angiography. The results were as follows:

<i>Hospital</i>	<i>Waiting time</i>
Naas General	Two to fourteen days
Blanchardstown (JCMH)	Twelve days
St Michaels	Seven days
St Columcille's	Eight to twenty eight days

Source: Department of Public Health, ERHA.

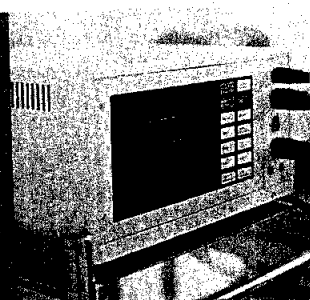
Even when waiting list figures are up-to-date it is well to remember that they can change quite rapidly if there are unplanned staff shortages or other exigencies in individual hospitals. In one hospital, nurse shortages, together with a winter vomiting epidemic, led to bed closures and the rapid increase in the number on the waiting list from in that hospital from 28 to 125.

National targets

The Irish target for angioplasties (PTCA) (BHH, 1999) is 1,200 per million per annum by the year 2000. The Building Healthier Hearts report went further by referring to the current and future European average. It stated that it expected the European average in 2000 to be 1,750 per million and in 2010, 2,000 per million. There does not appear to be a target for total revascularisations, that is angioplasties and coronary artery bypass grafts (CABGs). If one were to use the UK Department of Health figure for CABG of 750 per million (Dept Health 2000) this might suggest a figure of approximately 2,000 per million revascularisations in Ireland. In fact the English National Service Framework has set a target of 1,500 revascularisations per million (750 CABG + 750 PTCA) by 2010 (Dept Health 2000). This level of activity falls short of what is currently provided in many Western European countries. Scotland anticipates the PTCA/CABG ratio increasing to 3:2 rather than the 1:1 rate in England.

Although the UK may be an inappropriate model for Ireland, the system has been well described by the British Cardiac Society. In considering the number of diagnostic angiograms that would be needed in the United Kingdom one can apply the usual guide ratio for investigations to revascularisation of 2:1. Fifteen hundred revascularisations would require 3,000 investigations and adding for valve disease and grown up congenital heart disease gives a target figure of approximately 3,300 diagnostic cardiac catheterisations per million per annum would be recommended (Brit Cardiac Soc, 2002). The fifth report from the British Cardiac Society was presented to their Annual General Meeting in May 2002. In Wales, taking account of their higher Standardised Mortality Ratios and a pool of waiting patients/potential patients arising from years

of under-provision (compared with England), a target has been set at 4,000 angiograms with a longer-term objective of 5,000 angiograms (Todd, 1999). Applying the median Welsh figure of 4,500 angiograms per million population to Ireland this would suggest a diagnostic angiogram figure of over 16,300 for Ireland as a whole and 11,250 in the Eastern Region. If one applies the English figures to the whole of Ireland the number of diagnostic angiograms would be approximately 12,000 and for the Eastern Region, 8,250. It is noteworthy that in contrast to the rate at which the number of PTCA's are increasing, the number of CABGs seem to be increasing at a reduced rate. This will lead to a greater proportion of all revascularisations being carried out as PTCA's and will increase the PTCA:CABG ratio.



Activity levels have been assessed by the Authority through three systems. The first is the regular HIPE returns and these have been analysed up to and including the year 2000. The second was a survey carried out by the Authority's Department of Public Health for the year 2000. The third has resulted from individual enquiries at each DAT Hospital by Public Health Direct during the review period in 2002. Not only has it been possible to trace the trends in activity over the last five years it has also been possible to compare the HIPE figures with those of the survey. Despite some limitations in the HIPE figures, they are sufficiently close to the survey figures to be able to use them with some confidence in describing broad changes in activity levels.

Current activity in the Eastern Region

The following table (Table 11) shows the activity figures for the five DATHs and the two private hospitals in the Eastern Region for the year 2001. The information was collected by inviting each hospital to provide its own figures and these have been confirmed by the respective hospital Chief Executives. It is still possible that different hospitals have used different definitions. For example, if a patient has a diagnostic angiogram and proceeds to angioplasty it may be that this is recorded as two procedures in one hospital (one angiogram and one angioplasty) and one in another hospital (angioplasty). This may depend on whether the procedures follow immediately one after the other or with an overnight gap. This possible discrepancy is not important when assessing the number of angioplasties but could be a factor when estimating angiogram to angioplasty ratios. The Authority may wish to enter into further discussions with hospitals with catheter laboratories in order to ensure the future reliability and validity of coding, in relation to angiograms, in patients who proceed to angioplasty.

Table 11 shows that approximately 30% of procedures carried out in catheter laboratories in Dublin were carried out in the two private hospitals. It also shows that in terms of activity per laboratory there are very substantial differences between the activity levels of different hospitals; differences between 1,488 and 3,147 total procedures and 157 and 666 angioplasties.

<i>Hospitals (Adults)</i>	<i>No. of Labs</i>	<i>A'grams</i>	<i>A'plasties</i>	<i>Ratio of A'grams to A'plasties</i>	<i>Total of all Procedures</i>
Mater	1	2,180	666	3.27	3,147
Beaumont	1	1,400	250	5.60	2,152
St James's	2	2,162	718	3.01	3,217
St Vincent's	1	1,254	190	6.60	1,689
AMNCH	1	1,200	157	7.64	1,488
DATHs Total	6	8,196 69.03%	1,981 69.68%	3.64	11,693 70.6%
<i>Private Hospitals</i>					
Mater Private	2	2,215	617	3.59	3,107
Blackrock Clinic	1	1,462	245	5.97	1,724
Private Hospitals Total	3	3,677 30.97%	862 30.32%	4.27	4,831 29.4%
All Adult Hospitals Total	9	11,873	2,843	3.81	16,564

Source: Public Health Direct

	Angiograms			Angioplasties		
	2000	2001	Projected 2002	2000	2001	Projected 2002
MWHB	na	1,136	na	na	154	na
NWHB	0	328	400	0	0	0
SHB	1,290	1,402	na	405	410	na
WHB	c1,000	1,014	1,600	c200	247	300
Total	c2,290	3,880		c605	811	

Source: Public Health Direct.

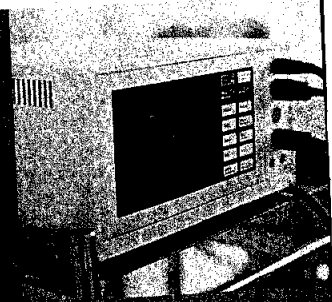
The figures shown for 2002 were provided by the respective Health Boards and are estimates of their full year position.

Existing capacity

When visiting each hospital attempts were made to assess whether the hospital could increase its activity by maximising the potential of its existing infrastructure. If this were possible discussions took place concerning the barriers that would need to be overcome to take on additional cases. Some of these barriers are financial, others relate to absolute staff numbers, others to problems associated with increasing the length of the working day. It is difficult to escape the conclusion that there is some unused capacity in six of the seven hospitals in the Region, that is all with the exception of the Mater. The capacity issue is largely one of staff. There is a substantial variation in the length of the working day between hospitals and in the length of shifts. The average number of procedures per day varies between six per day and twelve per day based on a fifty-week year. There are differing opinions concerning the length of the working day in terms of safety, and efficiency. There is a strongly held view amongst some clinicians that no technical, nursing or medical staff should have to be present physically in a laboratory for more than six hours per day and that the working day, including unplanned cases, should not exceed eight hours for any single individual. If laboratories are to provide a service in excess of six hours per day, the adequacy of current staffing levels needs to be assessed from a health & safety point of view. A system in which any staff are required to work more than eight hours a day without relief is potentially dangerous. If laboratories are to be used for very long periods they have to be staffed appropriately. Attention also has to be given to the demands that are placed on sophisticated equipment and the likelihood that this may lead to down time due to mechanical failure. Added to this is the fact that up to two weeks routine servicing is required per annum. Holidays have to be taken into account. In a single laboratory, emergencies, unplanned and unscheduled angioplasties and unplanned complex pacemaker insertions can lead to a substantial extension of hours. In order to cope with these factors it will be necessary to reduce the number of planned procedures per day. It may also be prudent to reduce the number of weeks available in the year that can be worked to 47 rather than 50.

A more recent development has been problems with hospital-acquired infections such as MRSA and the need to clean and disinfect laboratories after such cases have been dealt with. This results in the loss of up to one hour's time for each case. These problems are of course considerably lessened by the provision of twin laboratories.

Many issues are raised in the presentations from each hospital concerning barriers to expansion. Some of these are to do with the appointment of consultants, some to the need to establish additional posts, some to the availability of staff. Some are structural in terms of the proximity of day beds or ward beds, others are to do with prioritisation, for example, the availability of porters.



Future expansion possibilities in the Eastern Region

One of the observations that has emerged from the review has been the many examples of good collaborative relationships between organisations. This applies to the relationships between the Area Board Hospitals and the DATHs; between the DATHs themselves and between hospitals in the public and private sector.

Capital approved projects

At present there are two capital approved schemes that have implications for future cardiology laboratory capacity. The first of these is the hospital development at St Vincent's where a new wing is due to open in 2004. The new building will contain a cardiac catheter laboratory and a new vascular suite. The new laboratory is described as a replacement for the existing laboratory. It is understood that the cost of equipment for the new catheter laboratory has been included in the costs of the capital scheme. The new hospital development at St Vincent's allows for the provision of a second cardiology laboratory. This has been confirmed by the Hospital's Chief Executive, although the formal application for recurrent funding to support a second laboratory has not yet been submitted. It is proposed by the hospital that the existing laboratory will continue to function when the new laboratory is opened. The possibility of providing these laboratories back to back is being explored and has been accepted as a preferred solution. Such a development would be accompanied by the provision of a reception area, a recovery area and with day beds in the vicinity of the laboratory. Many of the problems of throughput at St Vincent's have arisen because of the difficulty in getting bed access for patients. They should be resolved by the proposed measures.

St. Vincent's is about to change with the establishment of common governance between the University Hospital and the Private Hospital. This brings an extra 168 beds onstream to the campus. Proposals to develop a catheter laboratory in the Private Hospital are being re-examined in light of these developments and a partnership between the two institutions is likely to lead to a significant increase in the workload. It is envisaged that the governance issue will have been finalised by the end of 2002.

The second capital approved scheme is at the Mater and it relates to a major hospital building programme to be opened in 2008. This scheme has three adult laboratories within the new wing and it is understood that the new facility would replace the existing laboratory facility.

It is worth noting that there is great uncertainty about the availability of capital in the future and hospitals that have not yet secured approval may find that their schemes are substantially delayed.

Firm proposals

In addition to the two approved capital schemes there are two proposals that have been submitted to the Authority by provider hospitals for consideration for next year's budget. The first of these is at the Mater where there is a proposal to open a second laboratory in order to relieve some of the pressure in their one existing laboratory. The space they have in mind is small and would be suitable for some but not all procedures. It would allow some of the EP work to be moved to the second laboratory and this would ease the current situation. It is extremely difficult at present to manage the day's list if one EP procedure takes over four hours. The costs of equipping and running this second laboratory have been submitted. If this second laboratory were operational in 2003 this would allow an increase in the number of procedures at the Mater by an estimated 930 a year.

A further proposal is at St James's where they propose opening a third laboratory alongside the two existing laboratories. This development involves the equipping of the new laboratory and would require the appointment of additional consultant cardiologists. The plan to develop St James's as an EP centre is supported by the South Dublin Group of cardiologists. This proposal could result in a further 1,200 procedures per year.

Preliminary outlines

In Public Health Direct's consultation with providers it emerged that a provisional proposal, developed by the cardiologists at JCMH, was being considered by the Northern Area Health Board. It has not yet been submitted to the Authority. This proposal is for a capital building scheme at JCMH to include a new catheter laboratory. It is supported by the wider national group of electrophysiologists. Further preliminary outlines were submitted by the other DATHs to the Authority as part of their 2002 cardiovascular bids. Appendix 4 provides further details of the situation in individual hospitals in the Eastern Region.

Future expansion possibilities throughout Ireland

Information has been provided by each of the Health Boards on their plans for the development of interventional cardiology services over and above the Eastern Region. These were submitted in 2001 as part of the background to bids for increased cardiology consultants. Table 15 presents the catheter laboratory development plans. Below the table there are specific notes explaining the status of the proposals.

<i>Health Board</i>	<i>Labs</i>	<i>Proposed labs</i>	<i>Approval status</i>
MHB	0	1 at Tullamore	Capital approved
MWHB	1	0	
NEHB	0	1 at Drogheda	No approval to date
NWHB	Mobile	0	
SEHB	0	1	Unclear see below
SHB	1	4 at Cork	Capital approved
WVHB	2	0	

MHB

The MHB has agreed that the Regional Cardiology Centre should be at Tullamore. Construction tenders have been received by the Department of Health and Children and this new development may be open in 2005. The design does include a laboratory but at this stage the detailed specification of the equipment for the laboratory has not yet been agreed. This will determine, to some extent, the suitability of the laboratory for interventional cardiology.

NEHB

The NEHB plans to develop Our Lady of Lourdes Hospital, Drogheda as the Regional Cardiology Centre. Although consideration may be being given to the inclusion of a cardiology catheter laboratory proposals have not yet been received by the Department of Health and Children for the establishment of a cardiac catheter laboratory on this site.

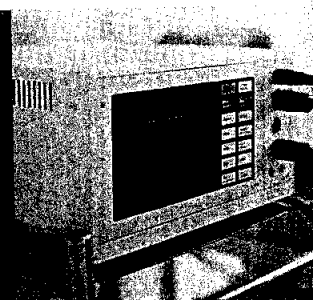
SEHB

SEHB will soon be opening a new facility at Waterford (2002). The original specification was for a new laboratory within the X-ray Department. The plans and specifications have been proposed by the interventional radiologist at Waterford. It is unclear at this point whether the laboratory will be used for cardiac catheterisations and if so what level of activity will be achieved.

SHB

SHB has approval for a major new cardiac and renal centre in Cork. This not plans for five cardiac labs of which one is earmarked for electrophysiology. The timing of this development is not certain but the new facility is unlikely to open before 2005.

Appendix 5 provides a brief description of the submission made by each Board to the National Cardiology Manpower Committee. Each Health Board stressed the need to establish further consultant cardiology posts and each discussed the possible future development of local catheter laboratory facilities.



Electrophysiology services

Development of electrophysiology services in Ireland

Historically Ireland has been slow to introduce specialist electrophysiology (EP) services. Although the current review has not attempted to provide a detailed analysis of the development of the service our view supports the general view of cardiologists that this service remains significantly underprovided when compared with services in Europe and North America and may be as much as ten years behind developments elsewhere. Part of the recognition of under provision has come with the appointment of specialists in this field but they are few in number. Public Health Direct has received a submission from the six cardiologists in Ireland with a special interest in electrophysiology (Appendix 6). What is included here is a brief description of the procedures themselves and the need for these procedures.

The procedures themselves

Electrophysiologists commonly perform four types of invasive procedure. Studies that assess the risk of sudden death provide information on the mechanisms for supraventricular and ventricular arrhythmias. They typically take one to two hours and involve the placement of three or four pacing catheters in the heart. Radiofrequency ablation is the therapeutic component of EP studies. This would be performed after the above studies have been completed. Typically ablation is carried out at the same sitting as the EP study, prolonging the procedure by two to four hours. Conventional pacemakers for the treatment of slow heart rhythms are implanted by both general cardiologists and electrophysiologists. They take about one hour to perform. Battery life is about seven years. Biventricular pacing is a new form of pacing used to treat patients with heart failure. The procedure is more complex, requires an additional lead and is carried out by electrophysiologists. The implantation of cardioverter defibrillators (ICDs) is another specialist procedure. The battery typically lasts about five years. ICD follow up should involve three monthly visits to an ICD clinic.

Need for these procedures

It is estimated that, of those with supraventricular tachycardia, approximately 333 per million (1,240 patients in Ireland), would be candidates for EP ablation treatment; of patients with syncope approximately 300 per million may benefit from diagnostic EP studies. In estimating future need, changes in the management of atrial fibrillation may increase the number of ablation studies to 3,600 patients per year. About 1,000 pacemakers are currently implanted annually in Ireland. Given the evidence for their effectiveness this number is likely to increase.

Approximately 5,000 people in Ireland die suddenly each year of myocardial infarction. It is estimated that 10% of these patients have identifiable risk factors that could lead to ICD implantation. Current ICD implant rates in Ireland are approximately 20 per million population compared with 37 per million in the UK, 67 per million in Germany and 175 per million in the USA. Recent recommendations from the National Institute of Clinical Excellence (NICE) in the UK are for annual implant rates of 50 per million. Recently published data from the MADIT II trial suggest an implant rate of 200 per million.