Evaluation of Coronary Heart Attack Ireland Register (CHAIR) – Final Report

A Report from Capita Consulting, commissioned by the Department of Health and Children

1st November 2005
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EXECUTIVE SUMMARY

A. Capita Consulting was appointed by the Department of Health and Children in September 2004 to undertake an evaluation of the CHAIR (Coronary Heart Attack Ireland Register) pilot initiative currently in operation in Counties Cork and Kerry. We were required by the Department to review the CHAIR pilot project’s working methods and processes, its stakeholder satisfaction, its database and data management arrangements, and the value for money and governance aspects of CHAIR, and to make recommendations for its future.

B. As part of the recommendations of the 1999 Report of the Cardiovascular Health Strategy ‘Building Healthier Hearts’, the then Southern Health Board (SHB) agreed to pilot a comprehensive national coronary care register, the Coronary Heart Attack Ireland Register (CHAIR). The CHAIR initiative was recommended in ‘Building Healthier Hearts’ as follows:

“A pilot study for the development of a hospital based register should proceed immediately... The lessons from this should be used to establish a national hospital based register of coronary care.”

C. The aim of CHAIR is to gather information on hospital patients admitted with suspected or confirmed acute coronary syndromes (ACS) in order to improve the delivery of health care and to improve patient outcomes. Its objectives were defined as:

- to record, describe and analyse registered patient demographics, diagnostic and treatment details and hospital outcomes;
- to facilitate the development of strategies to improve the quality of ACS patient care;
- to contribute towards the development of a national plan for the in-patient and community management of patients with ACS.

D. CHAIR is managed full-time by a Pilot Project Manager based at the Health Service Executive – Southern Area in Cork, and employs 6.5 whole time equivalent (WTE) Registration Officers (9 staff members, full and part-time) across eight hospital sites as follows:

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<tr>
<th>Hospital</th>
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<td><strong>Total</strong></td>
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</table>
E. From its inauguration in 2002 until the end of April 2005, over 9,400 CHAIR admissions were recorded.

F. The annual running cost of CHAIR is just over €400k.

G. The CHAIR pilot was implemented in 2002/03, with the first hospital going live in October 2002 and the final hospital in April 2003. At the start of the pilot, much time was invested in getting the project off the ground, recruiting and training the CHAIR Registration Officers (CROs), and establishing the pilot infrastructure (i.e., office facilities, ICT etc.) at each hospital site. In addition, the processes for the operation of CHAIR differ across sites and initially an investment of time was required to establish appropriate hospital-specific processes.

H. For the most part, the operational/administrative aspects of running CHAIR appear to be working as planned: ACS patient details are recorded on data sheets and the relevant data is input to CHAIR, regular reports are generated from CHAIR and circulated to appropriate hospital stakeholders, and a data quality audit of CHAIR has demonstrated a relatively high level of data accuracy. Each of the CROs applies the CHAIR procedures as outlined in the Procedure Manual and operates according to the CHAIR Data Standards.

I. At a generic level, the key processes associated with CHAIR involve the recording of data relating to both suspected and confirmed ACS patients, using a data sheet. This is followed by transferring the data sheet information to the CHAIR IT system. System reports are then generated periodically and/or on request and are circulated to relevant stakeholders (i.e., consultants, cardiac rehabilitation nurses, etc.).

J. In broad terms, patients whose details are entered into CHAIR must have a confirmed or suspected Acute Coronary Syndrome as an admission diagnosis, must be over 18, and must not have an ACS that has been precipitated or accompanied by a significant co-morbidity.

K. Information recorded by the CROs and held on CHAIR includes:

- patient and general demographics;
- admission details;
- thrombolysis details;
- risk factors (behavioural and physiological):
  - smoking
  - lack of physical activity or exercise
  - history of coronary heart disease
  - hypertension (high blood pressure)
  - high cholesterol
  - diabetes
- clinical investigations and procedures;
- medications (on discharge);
- discharge details;

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L. DMF, a Dublin-based software supplier, operates MediBRIDGE (MedSERVE) in Ireland, which supports the data gathering and processing for CHAIR. MediBRIDGE provides a safe, secure electronic transport service for healthcare information, and is used as the communications infrastructure in the eight CHAIR sites across Cork and Kerry. The tool manages the connection, security and the transmission audit for interchange of health information between the CHAIR sites and DMF. It provides automatic operations for transmission and reception of CHAIR files.

M. It is quite evident that many aspects of CHAIR are similar to the processes used in Euro Heart Survey (EHS) exercises, particularly in terms of the preparatory and data collection stages. However, CHAIR continues to run (as a pilot) more than 2½ years after its inauguration in the first of the eight hospitals, and minimal resources have been allocated to undertake detailed analysis and reporting of the results from the initiative, whereas the EHS methodology involves the allocation of dedicated resources to undertake substantial work in analysis and reporting.

N. Equally, although CHAIR bears many similarities with other European cardiac treatment databases such as MINAP (UK) and RIKS-HIA (Sweden), it would not appear that CHAIR has assumed the central role which its UK and Swedish counterparts have achieved in terms of acting as a catalyst for improving patient care and treatment in all hospitals dealing with ACS patients, either through participation by all relevant clinicians in using the information to improve care, or by having a transparent basis for recording and publishing performance figures for each hospital.

O. Some examples of good clinical practice and development are evident in connection with CHAIR. For example, in one hospital, CHAIR data was used to identify the need for a new Chest Pain Clinic at the hospital, which is now operational. In most of the other hospitals, a number of consultant cardiologists and physicians were acting to “champion” CHAIR and were able to demonstrate to us that they were making active use of the performance reports in order to highlight the areas where improvement in clinical practice was required, and to convince colleagues of the need to embrace change.

P. However, despite the substantial effort invested in the “mechanical” aspects of CHAIR, the initiative has failed to deliver significant benefits in terms of the objectives articulated by the European Society of Cardiology for EHS, namely helping to produce improvements in:

- Clinical practice in relation to existing guidelines in cardiology (implementation of European Society of Cardiology guidelines, as adopted by the Irish Cardiac Society, has been variable across topics and service locations in Ireland);
- Applicability of results of major clinical trials;
- Outcome of different strategies for patient management (we recognise that CHAIR was not designed on its own to produce improved outcomes, but can
provide some of the information infrastructure to facilitate this, which it does achieve satisfactorily).

Q. From our discussions with CHAIR personnel and with consultants in the eight hospitals, we are of the opinion that CHAIR has in many cases failed to become a fully integrated component in the delivery and development of clinical care for ACS patients. Although some cardiologists and consultant physicians are actively involved in using the data from CHAIR to improve their clinical practice, it would seem that a larger number are not involved and have largely failed to engage with the project. As a result, CHAIR’s ability to deliver real benefits is hampered, and the situation will not be rectified until the vast majority of clinicians engage with CHAIR more effectively and begin to use its outputs in a much more constructive way than is currently the case.

R. In order to evaluate CHAIR, and to reach a conclusion on the merits and limitations of the pilot initiative, we have opted to use a “balanced scorecard” approach. This method is particularly suited to more complex analyses, as it breaks down the organisation or process under review into four discrete components: service, costs, administration, and customers/service users. Our key findings and recommendations are as follows:

<table>
<thead>
<tr>
<th>Scorecard Evaluation</th>
<th>Recommendations</th>
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<tbody>
<tr>
<td>1) CHAIR has been a useful experiment to date in that proof of concept has been satisfactorily achieved: as a data-gathering exercise, the CHAIR pilot project has shown that it is possible to collect and manage, using ICT facilities, a substantial body of data relating to patients who have suffered an ACS.</td>
<td>a) At an absolute level, we do not see any real benefit to be derived from CHAIR being continued in its present format. Evidence from other countries has shown that clinical data from registers such as CHAIR does not necessarily have to be collected on a continuous basis, but may be gathered within a defined timeframe (for example, one quarter each year) to track progress, to provide sufficient information to assist research and to inform the debate on clinical audit. As stated above, the CHAIR pilot has proven that the methodology can work, although the extent to which the data has subsequently been put to use for the improvement of clinical practice is limited and is somewhat disappointing.</td>
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<tr>
<td>2) Despite the best efforts of the CHAIR Registration Officers, very little use in practice is generally made by consultants of the reports available from CHAIR, mostly due to workload pressures.</td>
<td>b) On the question of whether CHAIR should be maintained, our view is that this is difficult to justify in its current situation. However, it should be recognised that the option also exists to continue to operate CHAIR in a modified format, as part of a wider initiative such as NCIS, and we believe that this is a more valid issue to address. Our further consideration of this option is presented below.</td>
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| 3) Key ingredients, which are not currently present in CHAIR in sufficient measure, would be required to ensure that it delivers sustainable results:  
  • A clinical champion with power and authority who can maximise the involvement of colleagues;  
  • A commitment to uniformity from the sponsoring organisation(s);  
  • A dedicated research capability focused exclusively on CHAIR.  
  • A commitment to, clinical audit amongst medical and nursing staff caring for ACS patients. | c) Further consideration should be given to the practicalities involved in CHAIR being subsumed within NCIS, including issues related to staffing, infrastructure, timescales. |
| 4) The NCIS project is well under way at present, and the ACS/CCU module of NCIS would appear to cover similar areas of functionality to that which is currently included in CHAIR. | |

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Although there are significant issues concerning the resourcing of the ACS/CCU module, it would nonetheless appear to be sensible for the approaches and resources involved in CHAIR to be included in NCIS, rather than continuing as a stand-alone project.

**Costs/Value for Money**

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<td>5) Administrative costs of CHAIR are reasonable in the context of current operations and available cost comparators, with minimal scope for savings.</td>
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<td>6) CHAIR has delivered modest value for a modest investment to date, as it has achieved proof of concept for the pilot.</td>
<td>CHAIR should not be continued in its present format as a stand-alone project.</td>
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<tr>
<td>7) CHAIR is likely to deliver poor value for money in the future as a result of its failure to become fully integrated in mainstream clinical practice for ACS patient care.</td>
<td>CHAIR should not be continued in its present format as a stand-alone project.</td>
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**Information and Administration Issues**

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<td>8) Arrangements for data collection within the CHAIR pilot project work effectively, but are outmoded and far from efficient.</td>
<td>More efficient arrangements would include: use of hand-held data capture devices; Creation of interface links between CHAIR and other &quot;feeder&quot; systems; General streamlining of business processes and working arrangements.</td>
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<tr>
<td>9) We are surprised that there are no links between the PAS and CHAIR in most of the hospitals. However, the trial at Malrow General Hospital has been encouraging, and indicates that the creation and effective running of such a link can be made to work effectively.</td>
<td>CHAIR should be incorporated within NCIS, effective links between it and hospital PAS products must be established.</td>
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<td>10) The refusal by IT staff at the two voluntary hospitals in Cork to connect CHAIR to their hospital networks creates inefficiencies and a waste of resources. We feel that the policy adopted is overly restrictive, particularly when CRUs in other hospitals which are just as vulnerable to virus infection, do have the capacity to access both CHAIR and other hospital systems from a single PC.</td>
<td>The forthcoming replacement of hospital information systems nationally with a new iSOF software product will require further work to rebuild such an interface.</td>
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<tr>
<td>11) We are satisfied that the organisational and governance arrangements which currently apply to CHAIR are fit for its purpose and work effectively.</td>
<td>We recommend that this position be examined in more detail from a technical perspective, to identify a suitable resolution to the satisfaction of all parties.</td>
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#### Service User Perspectives

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<td>12) CHAIR stakeholder perspectives are confined to those actively participating in the project, and do not include patients, GPs or other hospital-based clinicians currently uninvolved in CHAIR.</td>
<td>j) Any future continuation of CHAIR, or inclusion of CHAIR within a wider project such as NCIS, must include a much wider base of participants than we have observed under the present circumstances, and should ideally reach out to patients whose details are held in CHAIR.</td>
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<tr>
<td>13) It is accepted by many stakeholders currently involved in CHAIR that the pilot has reached a natural stage in its development where further change is required. We endorse this view as it tends to accept that there is limited advantage in proceeding with CHAIR under current circumstances, and that inclusion in a more broadly-based project such as NCIS makes sense.</td>
<td>k) The specific steps required to incorporate CHAIR within NCIS should be examined and a detailed project plan developed.</td>
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S. In relation to national policies and strategies, CHAIR conforms well with the national health strategy “Quality and Fairness”, published in 2001, and the 2004 document “Health Information – A National Strategy”. In both respects, many of the principles underpinning CHAIR are in line with those which form part of national policy and strategy for patient care, service development, and use of information and ICT.

T. Overall, our evaluation of CHAIR has shown that it has been a good and well-managed project, which has achieved much of what it set out to do in terms of proving that data collection and management for ACS patients can be organised effectively through the use of a dedicated ICT system and the deployment of registration staff with sound clinical understanding. However, we must also conclude that CHAIR is of limited use without significant clinical engagement in quality improvement processes, and that its continuation in its present guise would be of very limited benefit.

U. Our conclusion is that if CHAIR were to remain unaltered and its future position were to be that of a stand-alone project, it would be extremely difficult to justify the continued level of public investment in the project, bearing in mind the limited extent of qualitative benefit obtained to date. Our recommendation in that regard would be to terminate the pilot.

V. However, we are very cognisant of the fact that CHAIR is now in a transitional phase, and that its status is likely to alter radically as a result of the implementation of NCIS. Under this scenario, CHAIR moves from being a relatively stand-alone project to a position wherein it is part of a much wider, more integrated initiative dealing with a broader range of cardiovascular information at a national level. Importantly, NCIS will be a central element in the accreditation process for hospital cardiology departments, giving it a higher profile with greater national attention than has been possible with CHAIR.
Our conclusion on this issue is that there are sufficient, positive signs that CHAIR (as part of NCIS) will be capable of delivering substantial benefits in the near future (i.e. within the next 12 – 18 months), to the extent that continued investment will be justifiable. In particular, it can help to play a key role in the quality agenda to be pursued by HIQA, and can form a basis for effective clinical audit, service planning, and the design of highly effective services to meet proven clinical need. That said, we remain firmly of the belief that these improvements stand little chance of success unless the following components are added to CHAIR as part of NCIS:

- A champion with power and authority who can maximise the involvement of clinical colleagues;
- A commitment to uniformity from the sponsoring organisation(s);
- A dedicated operational research capability focused exclusively on CHAIR, with the capacity to generate routine and occasional reports;
- A commitment to clinical audit amongst medical and nursing staff caring for ACS patients.

If these components are added, then we see no reason why CHAIR (as part of NCIS) should not be very successful in improving the care provided to ACS patients.

CORE RECOMMENDATION:
We are therefore happy to recommend the continuation of CHAIR within NCIS, with the specific proviso that major attention is devoted to ensuring that the above four key components are built into CHAIR/the NCIS ACS module at an early opportunity.

We also believe that it would be prudent for the Department to re-evaluate the impact of CHAIR (as part of NCIS) around 12 – 18 months after it has become subsumed within NCIS (i.e. around mid-2007). In order to facilitate this process, it would be advisable for clear performance indicators to be established for CHAIR as soon as possible, so that firm benchmarks may be used for the purposes of comparison and to identify measurable improvements.
1 INTRODUCTION

1.1 General Introduction

Capita Consulting was appointed by the Department of Health and Children in September 2004 to undertake an evaluation of the CHAIR (Coronary Heart Attack Ireland Register) pilot initiative currently in operation in Counties Cork and Kerry.

This document details our findings gathered over the course of the evaluation process. The document is intended to provide the Department with a considered view of the issues and matters arising from the evaluation of CHAIR, with the associated provision of conclusions and recommendations as to the future of this pilot initiative.

1.2 Terms of Reference

At the outset of the project, Capita agreed with the Department the five main elements of work to be undertaken:

- **Stage 1: CHAIR Pilot Review** – an overview of CHAIR’s working methods and processes, analysis of administrative systems and analysis of data systems;
- **Stage 2: Stakeholder Satisfaction** – a comprehensive series of interviews with various stakeholders with an interest in CHAIR;
- **Stage 3: Database and Its Management** – a review of how the information involved in CHAIR is managed and used from both a business and technology perspective, including focus on data quality issues;
- **Stage 4: VFM and Governance** – an assessment of whether CHAIR is providing value for money to the public purse (in terms of both data gathering/analysis and impact upon patient care), and how effective its governance arrangements are in practice;
- **Stage 5: Recommendations for the Future** – a review of how CHAIR fits within the strategic objective of the Irish health services and the reform programme currently under way within the health services.

The full terms of reference for the evaluation are presented in Appendix 4, and are cross-referred to the sections of this Final Report.

1.3 Methodology

The Evaluation Team adopted the following approach to carry out the evaluation exercise:

- Project Initiation;
- Review of relevant desktop information in respect of CHAIR;
• Review of systems and processes of CHAIR through interviews via site visits to each hospital in which CHAIR operates and consultations with staff involved in the running of CHAIR;
• Examination of the collection, dissemination, analysis and use of CHAIR data and management of same;
• Assessment of VFM and Governance Arrangements;
• Stakeholder Consultation;
• Development of draft and final reports.

The evaluation team consulted over the period of the evaluation exercise with the individuals and organisations listed below:

- Brendan Cavanagh CHAIR Pilot Project Manager, HSE Southern Area
- Wendy Keena Strategy & Planning Manager, HSE Southern Area
- CHAIR Officers:
  - Kathleen Twomey Cork University Hospital (CUH)
  - Linda Evans Cork University Hospital (CUH)
  - Rosita Foley Mercy University Hospital
  - Yvonne McConnon-Bourgeois South Infirmary Victoria University Hospital
  - Deirdre Filen Bon Secours Hospital, Cork
  - Elaine Bucke Mallow General Hospital
  - Joan Mulgrew Bantry General Hospital
  - Mary Keane Kerry General Hospital
  - Fiona Barton Bon Secours Hospital, Tralee
- Dr Peter Kearney Consultant Cardiologist, CUH, and also representing the Irish Cardiac Society/NCIS
- Dr William Fennell Consultant Cardiologist, CUH
- Dr Pat Sullivan Consultant Physician, Mallow General Hospital
- Dr Peter Weineke Consultant Physician, Bantry General Hospital
- Dr Brian Carey Consultant Physician, Bantry General Hospital
- Dr Niall Colwell Consultant Clinical Pharmacologist, Mercy University Hospital
- Declan Fitzgerald DMF Software
- Dr Fiona Ryan Public Health Dept, HSE Southern Area
- Michael O’Shea Irish Heart Foundation
- Chris Fitzgerald Department of Health and Children
- Dr Emer Shelley Department of Health and Children
- Dr Moira Lonergan NCIS
- Rachel Flynn Royal College of Surgeons in Ireland
- Dr Patricia Kearney University College Cork
- Ger Maloney IT Officer, CUH
- Peter O’Callaghan IT Manager, Mercy University Hospital
- Valerie O’Sullivan Cardiac Rehabilitation Co-ordinator, CUH

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In addition, during the course of the study, the evaluation team met and conversed briefly with a wide range of other staff in the eight hospitals currently running CHAIR, including managers, nurses, NCHDs, IT staff and administrators. As these interactions were typically informal and not specifically recorded, we have not named these individuals in the above consultation list, although we are grateful for their assistance and observations during our visits.

1.4 Content of the Report

This Final Report is structured as follows:

- **Section 2** outlines the background to the inception of CHAIR, the general rationale behind CHAIR and the development of CHAIR to date;
- **Section 3** details the findings from the Service/Process Review: the administration of CHAIR, its IT and system issues and CHAIR's fit within the healthcare sector;
- **Section 4** contains the clinical assessment of the benefits of CHAIR;
- **Section 5** contains Stakeholder Feedback from key stakeholders;
- **Section 6** details the Scorecard Evaluation of CHAIR in respect of the following measures: Clinical Benefits/Risk Reduction, Costs, Information and Administration Issues and Stakeholder Perspectives;
- **Section 7** puts forward conclusions on the evaluation of the CHAIR Pilot, and summarises our recommendations for the future of CHAIR.

This Final Report has been prepared following the issue of two draft versions of the report to the Department of Health and Children on 25 May 2005 and 25 July 2005, and our receipt of a number of suggested additions and clarifications sought by the Department. Following final discussion on the content of this final report with the Department on 1 November 2005, this version has been formally signed off with the Department to denote the conclusion of this evaluation project.
2 BACKGROUND TO CHAIR

2.1 Inception of the CHAIR Pilot

As part of the recommendations of the 1999 Report of the Cardiovascular Health Strategy 'Building Healthier Hearts', the then Southern Health Board (SHB)\(^1\) agreed to pilot a comprehensive national coronary care register, the Coronary Heart Attack Ireland Register (CHAIR). The CHAIR initiative was recommended in 'Building Healthier Hearts' as follows:

"A pilot study for the development of a hospital based register should proceed immediately...The lessons from this should be used to establish a national hospital based register of coronary care."

The importance of such developments as CHAIR should not be overlooked, as the 2001 national health strategy, "Quality and Fairness" identified that:

"cardiovascular disease, which includes coronary heart disease, stroke, and disorders of blood vessels, is the single most important cause of mortality in this country and a major cause of premature mortality for many."

The aim of CHAIR is to gather information on hospital patients admitted with suspected or confirmed acute coronary syndromes (ACS) in order to improve the delivery of health care and to improve patient outcomes. Its objectives were defined as:

- to record, describe and analyse registered patient demographics, diagnostic and treatment details and hospital outcomes;
- to facilitate the development of strategies to improve the quality of ACS patient care;
- to contribute towards the development of a national plan for the in-patient and community management of patients with ACS.

Against these objectives, CHAIR was implemented on a pilot basis in the eight hospitals with coronary care facilities in Cork and Kerry, namely:

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From 1 January 2005, the former Health Boards and Eastern Regional Health Authority have been superseded by the Health Service Executive (HSE) and its Areas. This includes the former SHB, which is now HSE Southern Area. As the new arrangements are in transition, and as we refer on occasion to aspects of the history of CHAIR, this report refers variously to both the former Health Boards / ERHA and the new HSE structures.
The purpose of the CHAIR pilot in these hospitals was initially defined as:

- To assess the feasibility and scope of implementing a similar project on a national basis;
- To test and refine the data collection procedures and pilot CHAIR software and hardware to effectively and efficiently record relevant data and provide relevant analysis.

2.2 Governance and Oversight Arrangements

An informal Steering Committee to oversee the implementation of CHAIR and its subsequent operation was established in January 1998. This Committee was formed to include representation from all interested parties, including the Department of Health and Children, the Southern Health Board, the relevant Voluntary Hospital Boards, the Irish Heart Foundation, the Irish Cardiac Society, the Association for Internal Medicine, and the Nurses Cardiovascular Association. Committee meetings took place on a regular basis and the issues discussed included CHAIR ownership, software ownership, data confidentiality, phasing in of CHAIR on a regional basis, access to and publication of CHAIR data, location of CHAIR core centre, integration of CHAIR software with existing local hospital network systems, adaptation of software to accommodate HIPE patient demographic data, and so forth.

In October 2001, the then Minister for Health and Children announced the establishment of a National Steering Committee for CHAIR, with responsibility for the management of the CHAIR project at national level. This committee, chaired by Dr Peter Kearney, effectively replaced the previous informal group, and its terms of reference included:

- Agreeing the scope of the data to be gathered;
- Agreeing the mechanism for the collection of this data;
- Agreeing the terms of monitoring outcomes and criteria for evaluating the pilot project;
- Taking account of appropriate international data sets and developments relevant to the CHAIR project;
- Advising on the national roll-out of the CHAIR project to all health boards, assuming its successful implementation according to agreed criteria in the Southern Health Board during the pilot phase.

In January 2002 the committee's remit was expanded to include:

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• to advise on the implementation of cardiovascular health information systems, as set out in the Cardiovascular Health Strategy Report “Building Healthier Hearts” (a priority in this context being to oversee a review of national and international data sets); and
• to establish formal links with the implementation structures of the Cardiovascular Health Strategy, including the Advisory Forum on Cardiovascular Health.

The committee was then known as the National Cardiovascular Information Systems (NCIS) Steering Committee.

2.3 **Project Management and Administration**

The CHAIR pilot project is managed by a full-time project manager based in the HSE Southern Area, and the funding for CHAIR is provided by the Department of Health and Children. CHAIR is administered by Registration Officers (full and part-time) in each of the eight hospital sites, who collect and record the relevant CHAIR data. Each hospital provides office facilities for the CHAIR Registration Officers. A specialist researcher is also currently funded for one day per week to assist the CHAIR Pilot.

2.4 **General Rationale Behind CHAIR**

CHAIR is a computerised register which allows for input of information on hospital patients admitted with a suspected or confirmed acute coronary syndrome (ACS), in order to improve the delivery of health care and to improve patient outcomes. Acute coronary syndromes are heart attack (myocardial infarction) and unstable angina. Registration criteria govern the patients who are registered and recorded on CHAIR.

The objectives of CHAIR are to:
• Record, describe and analyse registered patient demographics (e.g., gender and age), diagnosis and treatment details and hospital outcomes;
• Facilitate the development of strategies to improve the quality of ACS patient care; and
• Contribute towards the development of a national plan for the in-patient and community management of patients with ACS.

Included within the implementation of CHAIR was the plan for an independent external evaluation of the pilot, which is the subject of this report.

2.5 **Development of CHAIR To Date**

Key metrics for CHAIR at present include:
From its inauguration in 2002 until the end of April 2005, over 9,400 CHAIR admissions were recorded;  
A full-time Pilot Project Manager is employed within CHAIR, based at HSE South Area in Cork;  
CHAIR employs 6.5 whole time equivalent (WTE) Registration Officers (9 staff members, full and part-time) across the eight hospital sites as follows:

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<tr>
<td>Kerry General Hospital, Tralee</td>
<td>1.0</td>
</tr>
<tr>
<td>Mercy University Hospital, Cork</td>
<td>1.0</td>
</tr>
<tr>
<td>South Infirmary Victoria University Hospital, Cork</td>
<td>1.0</td>
</tr>
<tr>
<td>Bon Secours Hospital, Cork</td>
<td>0.5</td>
</tr>
<tr>
<td>Bon Secours Hospital, Tralee</td>
<td>0.25</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6.5</strong></td>
</tr>
</tbody>
</table>

A part-time researcher provides around one day per week of her time to CHAIR for research and analysis purposes (this has been the case since early in the implementation period of CHAIR);  
The annual running cost of CHAIR is just over €400k;  
CHAIR operates to documented procedures (CHAIR Pilot Procedures Manual and CHAIR Data Standards) which have been updated and refined as the pilot has progressed;  
The CHAIR software has been updated and refined during the lifetime of the pilot; and  
A data quality audit was performed of a sample of records in each hospital in September 2003. The results of the audit demonstrated a high level of data accuracy.

In Section 3 below, we present our detailed findings of CHAIR as a result of our site visits and documentary analysis, including more detailed metrics and descriptive information relating to its progress to date.
3 FINDINGS FROM THE EVALUATION – SERVICE/PROCESS REVIEW

3.1 Overview

This section of our report presents the findings from the evaluation in respect of the processes associated with CHAIR. Firstly, we outline the general processes associated with the administration of the CHAIR pilot, including more detailed description of the processes employed and the inclusion of ACS patient details in CHAIR. This is followed by our critique of hospital-specific findings. Lastly, we summarise our findings in respect of the information management and ICT system issues associated with CHAIR and the ‘fit’ of the pilot programme within the overall healthcare sector.

3.2 General Findings – Administration of the CHAIR Pilot

3.2.1 Operation of CHAIR

The CHAIR pilot was implemented in 2002/03, with the first hospital going live in October 2002 and the final hospital in April 2003. At the start of the pilot, much time was invested in getting the project off the ground, recruiting and training the CHAIR Registration Officers (CROs), and establishing the pilot infrastructure (i.e., office facilities, ICT etc.) at each hospital site. In addition, the processes for the operation of CHAIR differ across sites and initially an investment of time was required to establish appropriate hospital-specific processes.

For the most part, the operational/administrative aspects of running CHAIR appear to be working as planned. ACS patient details are recorded on data sheets and the relevant data is input to CHAIR, regular reports are generated from CHAIR and circulated to appropriate hospital stakeholders, and a data quality audit of CHAIR has demonstrated a relatively high level of data accuracy. Each of the CROs applies the CHAIR procedures as outlined in the Procedure Manual and operates according to the CHAIR Data Standards.

At a generic level, the key processes associated with CHAIR involve the recording of data relating to both suspected and confirmed ACS patients, using a data sheet. This is followed by transferring the data sheet information to the CHAIR IT system. System reports are then generated periodically and/or on request and are circulated to relevant stakeholders (i.e., consultants, cardiac rehabilitation nurses, etc.).

The criteria for registering a patient on CHAIR in all eight hospitals are that the patient:

- Must have a confirmed or suspected Acute Coronary Syndrome as an admission diagnosis (in cases where there is doubt, CROs are advised to discuss the diagnosis with medical staff, and if not satisfied with the response, to raise the issue with the CHAIR Pilot Project Manager);
• Must be \( \geq 18 \) years old;
• Must be alive at the time of hospital presentation;
• Must not have an ACS that has been precipitated or accompanied by a significant co-morbidity such as a motor vehicle accident, trauma, severe gastro-intestinal bleeding, operation, or procedure. Inpatients who are hospitalised, for any reason, when they develop ACS symptoms are not eligible for registration in CHAIR;
• If transferred out of a CHAIR registry hospital, will have the data collection end with the transfer. 2 (Where patients are transferred between CHAIR hospitals, recording will continue at the new hospital and the only data to be passed to the originating hospital would be with regard to angiograms, angioplasties and coronary artery bypass grafts [CABGs]);
• May be re-registered at the same hospital – in which case CHAIR will register a second event (admission) for the same patient.

There was broad acceptance by stakeholders that these criteria were appropriate. 3

Whilst a generic process of registration and recording of patients on CHAIR is applied across the eight hospital sites, there are ‘hospital-specific’ variations in the application of the registration and recording activities. These hospital-specific processes are documented in Section 3.3. Many such variations relate to CHAIR data gathering having to fit around existing processes and information sources within hospitals, and therefore do not represent major differences in approach or policy.

It is clear from our consultations with CHAIR Registration Officers and other key stakeholders that a substantial amount of work has gone into CHAIR since 2002. Stakeholders expressed the view that a basic information recording system has been required for some time for cardiovascular disease, and it is only now that sufficient information is available to help influence clinical practice. However, there are a number of issues associated with the specific hospital processes applied to the administration of CHAIR which mean that the current processes are time-consuming and unlikely to be cost-effective in the longer-term. We address these issues as they relate to each hospital site in Section 3.3.

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2 We understand that very few patients registered in CHAIR are transferred out of the current network of participating hospitals in HSE South Area.
3 The minutes of the NCIS Steering Committee meeting of 1 March 2002 state ‘It was agreed that data on patients admitted to a hospital bed with suspected coronary disease and diagnosed coronary disease be collected.’ It should be noted that ‘patients admitted to a hospital bed’ do not include those discharged from A&E. In regard to ‘scope of data’ in minutes of the NCIS Steering Committee meeting of 26 April 2002, it was stated ‘It was agreed that GRACE was very accessible and had very tight definitions.’ CHAIR registration criteria are based on the Global Register of Acute Coronary Events (GRACE) register.

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EVALUATION OF CHAIR –
FINAL REPORT TO THE DEPARTMENT OF HEALTH AND CHILDREN
3.2.2 Breakdown of Activity Volumes for CHAIR

Appendix 3 of this report presents detailed statistics in respect of the number and types of CHAIR admissions, and the trends observed across all eight participating hospitals during the lifetime of the pilot to date. (We are indebted to the CHAIR Pilot Project Manager for the provision of this information.)

Some key features of the data presented in Appendix 3 include the following:

- Up to the end of April 2005, 38% of admissions were diagnosed ACS (MI and unstable angina) at discharge, of whom 67% were male (mean age 65.3) and 33% female (mean age 71.9);

- Up to the end of April 2005, 62% of admissions were diagnosed non-ACS at discharge, of whom 62% were male (mean age 60.3) and 38% female (mean age 63.5);

- From May 2003 onwards (i.e., immediately after the final hospital went “live”), between 36% and 43% of all CHAIR registrations (in each quarterly period) have been diagnosed on discharge as ACS, with a consistent and stable pattern seen over this period;

- From May 2003 onwards, ACS discharges have seen a consistent and stable pattern in terms of the breakdown across diagnosis types, calculated as a percentage of all ACS discharges in each of seven quarterly periods as follows:

<table>
<thead>
<tr>
<th>Diagnosis type as % of all ACS discharges</th>
<th>Lowest quarterly % in period</th>
<th>Highest quarterly % in period</th>
<th>Mean quarterly %</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEMI</td>
<td>20.5%</td>
<td>30.1%</td>
<td>24.5%</td>
</tr>
<tr>
<td>Non-STEMI</td>
<td>43.8%</td>
<td>50.4%</td>
<td>48.1%</td>
</tr>
<tr>
<td>Unstable Angina</td>
<td>22.9%</td>
<td>29.0%</td>
<td>27.4%</td>
</tr>
</tbody>
</table>

- A similar situation is repeated for non-ACS discharges, with results recorded as follows:

<table>
<thead>
<tr>
<th>Diagnosis type as % of all non-ACS discharges</th>
<th>Lowest quarterly % in period</th>
<th>Highest quarterly % in period</th>
<th>Mean quarterly %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angina</td>
<td>20.7%</td>
<td>27.3%</td>
<td>23.2%</td>
</tr>
<tr>
<td>Other cardiac</td>
<td>10.2%</td>
<td>16.3%</td>
<td>13.0%</td>
</tr>
<tr>
<td>Chest pain non-cardiac</td>
<td>43.2%</td>
<td>52.0%</td>
<td>46.9%</td>
</tr>
<tr>
<td>Other non-cardiac</td>
<td>12.9%</td>
<td>21.7%</td>
<td>16.9%</td>
</tr>
</tbody>
</table>

- For the period up to 30 April 2005, comparison of admission and discharge diagnoses for CHAIR admissions is as follows (a note of caution should be sounded as there is not exact like-for-like comparison between the two sets of data, but it nonetheless shows some interesting features illustrating the dynamic and evolving nature of the process of diagnosis):
### Diagnosis type

<table>
<thead>
<tr>
<th>Diagnosis type</th>
<th>% at admission</th>
<th>% at discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unstable Angina</td>
<td>28%</td>
<td>11%</td>
</tr>
<tr>
<td>Angina</td>
<td>5%</td>
<td>13%</td>
</tr>
<tr>
<td>Chest pain cardiac query</td>
<td>44%</td>
<td>n/a</td>
</tr>
<tr>
<td>Other</td>
<td>1%</td>
<td>11%</td>
</tr>
<tr>
<td>Other cardiac</td>
<td>n/a</td>
<td>8%</td>
</tr>
<tr>
<td>Definite MI</td>
<td>15%</td>
<td>n/a</td>
</tr>
<tr>
<td>Probable MI</td>
<td>7%</td>
<td>n/a</td>
</tr>
<tr>
<td>STEMI</td>
<td>n/a</td>
<td>10%</td>
</tr>
<tr>
<td>Non-STEMI</td>
<td>n/a</td>
<td>19%</td>
</tr>
<tr>
<td>Chest pain non-cardiac</td>
<td>n/a</td>
<td>28%</td>
</tr>
</tbody>
</table>

- In the same period, 25% of ACS discharges were STEMI, 46% non-STEMI, and 29% Unstable Angina;
- Between September 2003 and April 2005, the CHAIR statistics show a small percentage increase in the number of STEMI patients who were thrombolysed, from 62% to 64%. For the 36% of STEMI patients who were not thrombolysed in the period ending April 2005, a variety of reasons were given, the most frequently cited of which was time delay (comprising 37% of STEMI patients who were not thrombolysed);
- Over the lifetime of CHAIR, minimal change has been shown in discharge medications prescribed to MI patients, with the percentage of patients given antiplatelets, beta blockers, lipid lowering drugs and/or ACE inhibitors varying by no more than 3% in each case (i.e., not statistically relevant).

We provide some further comment on the data from CHAIR, and what the data suggest to us, in Section 3.4.7 below.

### 3.2.3 Management and Oversight of CHAIR

The structures involved in the management, administration and oversight of CHAIR are outlined below:

**CHAIR/NCIS National Steering Committee** - to oversee the implementation of CHAIR and its subsequent operation, this Committee was established informally in January 1998, later becoming the CHAIR National Steering Committee on a formalised basis followed by the NCIS Steering Committee (as detailed in Section 2.2 above). This Committee has representation from all interested parties including the Department of Health and Children, the Southern Health Board, the relevant Voluntary Hospital Boards, the Irish Heart Foundation, the Irish Cardiac Society, the Association for Internal Medicine, and the Nurses Cardiovascular Association.

**CHAIR Local Steering Group** – originally formed with representatives from various disciplines in all the hospitals to contribute towards the concept and implementation of the CHAIR Pilot. The work of this group is currently being done in meetings/workshops led by the CHAIR Pilot Project Manager and...
attended by the Registration Officers. These meetings/workshops take place on a quarterly basis and provide a forum for the Pilot Project Manager, each of the CHAIR officers, and other stakeholders to update colleagues on progress, discuss common issues, and agree software enhancements, procedural changes etc.

CHAIR’s resource comprises nine full and part-time Registration Officers (6.5 WTEs), all of whom are from a nursing background, one full-time Pilot Project Manager, and access to a Researcher one day per week.

3.2.4 Involvement of Software Suppliers

DMF, a Dublin-based software supplier, operates MediBRIDGE (MedSERVE) in Ireland, which supports the data gathering and processing for CHAIR. MediBRIDGE provides a safe, secure electronic transport service for healthcare information, and is used as the communications infrastructure in the eight CHAIR sites across Cork and Kerry. The tool manages the connection, security and the transmission audit for interchange of health information between the CHAIR sites and DMF. It provides automatic operations for transmission and reception of CHAIR files.

The system developed by DMF, used for gathering patient information with actual or suspected ACS, is CCU Management System (CCU v1). Diagnostic contact details are exported via an export file which automatically updates the CHAIR Server Database managed by DMF and located on their premises. The system records, describes and analyses patient demographics, diagnostic and treatment details and hospital outcomes. Every message is secured using an algorithm of irreversible asymmetric data encryption and a digital signature, which makes it impossible for an unauthorised person to read.

DMF has developed the central repository and software to support the CHAIR programme in conjunction with the Department of Health and Children, the Irish Heart Foundation (IHF), and the Health Service Executive – South Area (formerly the SHB). DMF has eight full-time employees and is based in Mulhuddart, Co. Dublin. Its main functional areas are support, implementation, development, marketing and hardware.

DMF defined the dataset with the assistance of the IHF. The PCI Register for the Mater Hospital was used as the basis for CHAIR software from which the prototype for CHAIR was developed.

In 1999, DMF released MediBRIDGE Version III with an upgrade to MediBRIDGE Version IV in 2005. The two major releases have been:

- Central & Local Reporting;
- Intercommunications (Information Sharing).
3.2.5 Costs of Running CHAIR

The cost of running CHAIR in 2004 is set out in Table 3.2.5 below:

<table>
<thead>
<tr>
<th>Description</th>
<th>Costs 2004 (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pay &amp; PRSI: Project Manager</td>
<td>55,800</td>
</tr>
<tr>
<td>Pay &amp; PRSI: Registration Officers</td>
<td>281,000</td>
</tr>
<tr>
<td>Transport and Travel</td>
<td>11,100</td>
</tr>
<tr>
<td>Administrative Expenses</td>
<td>462</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>1,603</td>
</tr>
<tr>
<td>Computers</td>
<td>26,599</td>
</tr>
<tr>
<td>Training</td>
<td>3,739</td>
</tr>
<tr>
<td>Miscellaneous – Consultancy</td>
<td>16,000</td>
</tr>
<tr>
<td>Miscellaneous – Rent</td>
<td>10,200</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>406,503</strong></td>
</tr>
</tbody>
</table>

Table 3.2.5a: CHAIR Running Costs

Of the above costs, the largest single amount relates to salaries. Although CHAIR has a small project management function within HSE Southern Area, which incurs less than 14% of the total costs, almost 70% of the total costs of CHAIR relate to the pay and PRSI of the nine CROs.

Almost all of the 2004 costs presented above relate to revenue, with around €27k (i.e., around 6.5%) attributable to capital items such as laptops, docking stations and other aspects of ICT infrastructure. Much of the capital costs incurred by CHAIR relate to expenditure in its first full year, 2002, when €63.5k out of a total actual spend of €410.2k (i.e., 15.5%) related to the purchase of hardware, software, and office and telecommunications equipment. Overall, CHAIR is not heavily reliant on capital expenditure and by far the greatest cost item has been on staff salaries, from the commencement of the project until the present.

Other costs incurred by CHAIR are, in our opinion, relatively modest and not out of line with standard business infrastructure and project administrative costs. CHAIR staff occupy desk/office space provided by the eight hospitals, and a notional cost of €10.2k has been included within the budget to denote this cost attribution.

3.2.6 CHAIR Data Collection and Recording Processes

Under current arrangements, data recorded in respect of ACS patients at each hospital are captured by the CROs, using a variety of methods and processes. Typically, each CRO will keep a close eye on the throughput of patients within the A&E and/or CCU, regularly checking both computerised records and manual files/admission lists to identify those patients who may have suffered an ACS. The CRO will then generally consult the detailed patient file and review the medical notes in order to determine whether the patient meets the criteria for inclusion within CHAIR. In this regard, the clinical background of the CROs plays an
important part in helping to identify the eligibility of the patient for inclusion in the register, and it is unlikely that a registration officer without a medical nursing background would be able to reach the necessary judgements.

Data from the medical record/patient chart must then be transferred into the CHAIR system, along with other information which may need to be collected specifically from the patient and from medical or nursing personnel. This process differs between hospitals. In one location where the CRO and the CHAIR terminal are based in an administrative building several hundred yards from the main hospital, the CRO must manually transcribe the relevant data onto a data recording form within or close to the ward or Intensive Care Unit/Coronary Care Unit in which the patient is being cared for, and then bring this material back to her office in order to input the data onto the system, as it is not permitted to remove medical records/patient charts from the ward. In other locations, where the CRO is based much closer to the wards, it is possible for medical record/patient charts to be taken directly to the CRO's office to allow direct transcription onto the system.

Information recorded by the CROs and held on CHAIR includes:

- patient and general demographics;
- admission details;
- thrombolysis details;
- risk factors (behavioural and physiological):
  - smoking
  - lack of physical activity or exercise
  - history of coronary heart disease
  - hypertension (high blood pressure)
  - high cholesterol
  - diabetes
- clinical investigations and procedures;
- medications (on discharge);
- discharge details;
- follow-up data.

Examples of the registration screens used in the pilot version of the CHAIR software are displayed in Appendix 1.

3.2.7 Infrastructure Investment

CHAIR required only a modest investment in infrastructure, mainly the purchase of desktop computers for use by the CROs. Office facilities for each CRO are provided by the appropriate hospital, and access to their IT network is also made available. However, as reported below, current working arrangements for some of the CROs are not particularly adequate, and problems exist in some hospitals regarding fears amongst IT staff of virus infection of hospital networks via the
CHAIR data link, which have led to some hospitals requiring CHAIR to be housed on stand-alone terminals not connected to the network.

3.3 Hospital-Specific Issues

3.3.1 Overview

During the evaluation, members of our team conducted fieldwork visits to each hospital site during late 2004 and early 2005. The purpose of the visit was to comprehensively 'walk through' the processes associated with the administration of CHAIR and to interview the CROs and other relevant hospital stakeholders i.e., cardiac rehabilitation nurses, consultant cardiologists, ICT support staff, and others. The specific issues associated with the processes of CHAIR as they related to each hospital at the time of the site visits are tabulated overleaf.
Cork University Hospital

- Two CROs (one full-time and one part-time [working 17.5 hrs/week]), supplemented by one day per week from the CRO in the Mercy University Hospital, to support with backdating the transfers in from other hospitals (transfers in are currently back loaded to CHAIR)
- The CROs have their own office accommodation
- The main data sources accessed to complete the datasheet are the admissions book, the patient chart, A&E admissions book, Chest Pain Clinic, Cath. Lab., CCU admissions book and cardiology lists
- The CROs advised that the quality of the patient charts in CUH is not generally of high standard (i.e., chart content may often not be filed, or filed in the inappropriate order and not readily accessible)
- Initial patient data is recorded on the datasheet, with the remaining information recorded on patient discharge. Datasheet information is not input to CHAIR until patient discharge
- One full-time CRO primarily dedicated to CHAIR at the Mercy, with some support also provided to CROs at CUH
- The CRO has her own dedicated office within an annex to the main hospital building (close to wards)
- The CRO accesses admissions data from the Patient Administration System (PAS) on a separate PC to identify possible CHAIR patients; data generally of good quality
- The CRO then visits A&E around three times a week, and the Admissions Office once or twice a fortnight, to check patient eligibility for CHAIR in more detail
- The CRO then visits the wards to access patient charts and other source data, from which patient details are extracted for inclusion in CHAIR
- The CRO will typically access patient charts in the wards, or bring medical records for discharged patients back to her office for a short period, to write up the details onto the datasheet; these details are then entered into CHAIR at time of discharge
- The CROs supply a list of the required patient charts to medical records staff, who subsequently ‘pull’ the charts

Mercy University Hospital, Cork

The PAS is accessed via a separate PC networked in to the main Mercy University Hospital systems, but not linked to the PC on which CHAIR is installed, due to fears by the Mercy IT Manager of virus contamination
- The Mercy operate Keogh software as the hospital information system
- No system interface exists between Keogh software and CHAIR

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## EVALUATION OF CHAIR – FINAL REPORT TO THE DEPARTMENT OF HEALTH AND CHILDREN

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Staffing &amp; Accommodation</th>
<th>Data Sources</th>
<th>Process Issues</th>
</tr>
</thead>
</table>
| South Infirmary Victoria University Hospital, Cork | • One full-time CRO  
• The CRO shares office accommodation with a senior member of the nursing staff. This accommodation is also used as a general area for stationery storage and a relatives' room | • A range of data sources is accessed to complete the datasheet, including the A&E admission records, the ambulance record, the admissions book, patient chart, etc.  
• The CRO visits the wards every day to collect and record datasheet information  
• Initial datasheet information is input to CHAIR with further information recorded and input to the system as it becomes available  
• The CRO advised that the quality of the patient charts in SIVUH is of a reasonably high standard (i.e., chart content is filed in the appropriate order, etc.) | • SIVH operate Keogh software as the hospital information system  
• No system interface exists between Keogh software and CHAIR  
• The electronic record transfer processes to support the transfer of CHAIR patients from SIVH to other hospitals are now in operation from Jan 2005  
• The CRO ‘pulls’ the medical records as required for CHAIR patients  
• The CRO maintains close liaison with the Cardiac Rehabilitation Nurse to ensure that all CHAIR patients have been referred as appropriate |
| Bon Secours Hospital, Cork | • One part-time CRO (working 17.5 hrs/week)  
• The CRO shares office accommodation with a member of the nursing staff | • The main data sources accessed to complete the datasheet are the admissions book, the patient chart and the nursing notes  
• The CRO visits the wards every day to collect and record datasheet information  
• The CRO advised that the quality of the patient charts in the Bon Secours is of a high standard (i.e., chart content is filed in the appropriate order and readily accessible)  
• Initial datasheet information is input to CHAIR with further information recorded and input to the system as it becomes available | • The CRO supplies a list of the required patient charts to medical records staff, who subsequently ‘pull’ the charts  
• A Cardiac Rehabilitation service has recently been established, and the CHAIR officer hopes to establish a close working relationship with the Cardiac Rehabilitation Nurse  
• The CRO is currently backdating CHAIR "transfers in" to the Bon Secours from other hospitals |
<table>
<thead>
<tr>
<th>Hospital</th>
<th>Staffing &amp; Accommodation</th>
<th>Data Sources</th>
<th>Process Issues</th>
</tr>
</thead>
</table>
| Mallow General Hospital | • One full-time CRO spending 4 days per week in Mallow, and visiting the Bon Secours Hospital in Cork every other week to assist with data input  
  • The CRO has an office (in the main hospital building) which is available for her exclusive use most of the time, but is also used for patient consultations (a weekly warfarin clinic) and stress tests, etc., on occasions | • The CRO works through the admissions list to identify possible ACS patients and notes these patients in a book  
  • The CRO also accesses the Patient Administration System (PAS) from her PC  
  • The CRO then visits the wards and ICU/CCU to examine the patient charts  
  • The CRO will typically access patient charts in the wards, or bring medical records for discharged patients back to her office for a short period, to write up the details onto the datasheet  
  • The CRO inputs data onto CHAIR gradually, as it becomes available; generally, she tends to enter core patient details, and some data such as ECG results and risk factors, as soon as possible, with other data such as serial test results left until closer to patient discharge as this information may change during the patient's stay in hospital  
  • Source data (patient charts etc.) generally good quality | • Mallow General Hospital operates Keogh software as the hospital information system  
  • A single PC is used for access to both the PAS and CHAIR, with the proviso that the PC is not simultaneously dialled in to CHAIR and with a live network connection (i.e., the network is disconnected when CHAIR uploads are taking place)  
  • Uniquely, an interface exists at Mallow between CHAIR and the Keogh PAS |
| Bantry General Hospital | • One part-time CRO spending approx. 1 – 1.5 days per week on CHAIR (0.25 WTE), with the rest of her time spent as Cardiac Rehabilitation Nurse  
  • The CRO has use of a dedicated Cardiac Rehabilitation office in the main hospital building | • The CRO works through the admissions list to identify possible ACS patients and notes these patients in a book  
  • The CRO then visits the wards and ICU/CCU to examine the patient charts  
  • The CRO will typically access patient charts in the wards, or bring medical records for discharged patients back to her office for a short period, to write up the details onto the datasheet  
  • The CRO inputs data onto CHAIR gradually, as it becomes available  
  • Source data (patient charts, etc.) generally good quality | • Bantry General Hospital operates PIMS as the hospital information system  
  • At present, no interface between the PIMS and CHAIR is in place at Bantry |

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The CRO shares a small office with several colleagues in the hospital's Education Centre. The office is in a different building several hundred metres from the CCU and hospital wards resulting in considerable time spent in walking around the hospital complex; and precluding the temporary transfer of records from the main building to the CRO's office for data entry purposes.

The CRO takes information off the patient chart and diagnosis information from the A&E Book and ward 'Rounds Book' i.e., admission criteria, admission time, risk factors etc. If the secondary data sources are lacking in the requisite clarity the Cardiac Team Registrar/Cardiac Rehabilitation Sister is consulted for a verbal update on the case.

The CRO checks data sources every second day as there can be discrepancies in initial admission diagnosis (not included in PIMS) and discharge chart reading i.e., patient could be admitted with angina but be discharged with ACS diagnosis. Laboratory information i.e., blood sample results, is online, as is PIMS.

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Staffing &amp; Accommodation</th>
<th>Data Sources</th>
<th>Process Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kerry General Hospital, Tralee</td>
<td>• One full-time CRO</td>
<td>• The CRO takes information off the patient chart and diagnosis information from the A&amp;E Book and ward 'Rounds Book' i.e., admission criteria, admission time, risk factors etc. If the secondary data sources are lacking in the requisite clarity the Cardiac Team Registrar/Cardiac Rehabilitation Sister is consulted for a verbal update on the case. The CRO checks data sources every second day as there can be discrepancies in initial admission diagnosis (not included in PIMS) and discharge chart reading i.e., patient could be admitted with angina but be discharged with ACS diagnosis. Laboratory information i.e., blood sample results, is online, as is PIMS.</td>
<td>• The CRO cannot take charts from CCU/Cardiac Wards to her office because there is a risk that blood sample results will be separated from the main files. There is no CHAIR-dedicated computer in the cardiac ward for the CRO to more easily input data 'on-site'. There would be insufficient space and privacy for a PC to be located in CCU. The transcription of charts to written notes and then entry onto CHAIR dataset 'drop down' data-entry boxes could potentially lead to inaccuracy in data entry and hence results. The CRO ideally would need easier access to patient charts to better discharge her registration duties.</td>
</tr>
<tr>
<td>Hospital</td>
<td>Staffing &amp; Accommodation</td>
<td>Data Sources</td>
<td>Process Issues</td>
</tr>
<tr>
<td>---------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Bon Secours Hospital, Tralee | • One part-time CRO (working 8.75 hrs/week) = 0.25 WTE. The rest of the CRO's time is spent as Resuscitation Training Officer  
• The CRO shares office accommodation but the office is in close proximity to the CCU, it is spacious and conducive to the conduct of data-gathering, data-entry onto CHAIR and analysis of findings | • There is no A&E unit at the hospital so ACS-related information sources mainly taken from the hospital admissions records  
• The CRO will check admission records for any references to chest pains and where this is detected will enter the patient onto CHAIR  
• Admissions for CHAIR are collected by checking:  
  o CHAIR book in ICU  
  o ICU admissions book  
  o Troponin bedside machine record book in ICU  
  o Telemetry names on monitor in ICU/CCU  
  o Bed Manager/Admissions  
• Additionally, the patient will occasionally be requested to agree to a follow-up visit after 30 days with the CRO (majority of patients consent to this)  
• The CRO has permission to take primary data i.e., patient notes, from the coronary unit to her office which fosters greater accuracy in transcription straight from notes to entry into computer dataset | • A significant proportion of ACS patients originating in the hospital are referred to Bon Secours Cork and CUH – data transfer reliability between the two Cork hospitals the Bon Secours in Tralee is high  
• At unit level the requirement of CHAIR to input Troponin levels led to the purchase of a bedside troponin machine which has been very useful clinically |

**EVALUATION OF CHAIR – FINAL REPORT TO THE DEPARTMENT OF HEALTH AND CHILDREN**
3.3.2 Common Issues

Our consultations during the site visits indicated that a number of the concerns identified by CROs are commonly held across most of the eight hospitals. These included the following:

- in all but one of the hospitals, no interface exists between the CHAIR system and the patient administration system;
- the electronic transfer of patient records within CHAIR now works well, having overcome some operational difficulties at SIVUH which were remedied in January 2005 (this process is required when an ACS patient is transferred from one hospital to another);
- as with other parts of the Irish health system, there is no unique patient identifier to facilitate the transfer and sharing of CHAIR data between sites or between individual hospitals and the central CHAIR database;
- in the majority of hospitals, the quality of information held on patient charts is high, although in some locations material may be filed in the wrong order, may be difficult or take some weeks to locate, or there may be gaps with regard to certain items of data;
- during holiday periods, CROs absent on leave are generally not formally covered (although there are arrangements in place for CROs to cover each other, or for trained agency staff to be brought in, during emergencies, periods of extended absence, or abnormal peaks in workload), with the result that a backlog of information may need to be loaded onto the system upon the CRO's return from holiday;
- in several cases, temporary agency staff have been trained in the use of CHAIR and deployed to cover for maternity leave or holiday absence of the CRO, and supplementary assistance has been provided by other CROs and by the CHAIR Pilot Project Manager to ensure that there is minimal disruption to the programme;
- in all hospitals, much of the data transcription is of an ad hoc nature and must be undertaken in busy environments; for example, many CROs must regularly access patient charts in the ward or in an area immediately adjacent to it, which can include corridors and other public areas, and it is necessary for the CRO to attempt to transcribe often detailed information from the patient chart to a notebook or data entry sheet despite the inappropriateness of the surroundings;
- many CROs reported that the socio-economic information which must be recorded on CHAIR is difficult to determine with any degree of accuracy, and a combination of guesswork, anecdotal knowledge and other general "intelligence" must be used.\(^4\)

We understand that NCIS, in consultation with the National Anti-Poverty Strategy (NAPS) and the Central Statistics Office (CSO), have recently decided to 'pilot' patient demographic data items to be collected during registration on certain cardiovascular information systems, including CHAIR. This comprises more data items than currently contained within CHAIR. Given the reported issues involved in collecting a smaller data set for CHAIR, we believe that a clear method should be devised whereby this data can be gathered easily and correctly, with minimal invasion of patient
• in all hospitals, CROs reported that the involvement of medical staff, and in particular consultants, in CHAIR was highly variable, with the majority of doctors involved in caring for ACS patients having little involvement with, or apparent interest in, CHAIR, and with suspicion expressed by some doctors that CHAIR is part of a performance monitoring system for medical staff.

3.4 Information Management and IT System Issues

3.4.1 Overview

The Evaluation Team consulted with stakeholders in respect of issues related to information management and the IT system which supports CHAIR. Our findings with regard to these issues are documented in the sub-sections which follow.

3.4.2 Data Collection and Recording

All of the hospital sites apply the use of a standard datasheet (see Appendix 2) to record the necessary information in respect of ACS/potential ACS patients. In order to complete the information required by the datasheet, each CRO applies a tailored process which relates to her own working arrangements and preferences, and to the working practices of each hospital. Naturally, there are reasonably significant differences between hospitals as a result. The range of information sources accessed to capture the datasheet information include:

• A range of books including:
  o Hospital Admissions Book
  o A&E Admissions Book
  o Coronary Care Admissions Book
  o Telemetry Book
  o Cath. Lab. Book
  o Diary
• Patient’s Chart;
• Ambulance Chart;
• Laboratory Reports from ward;
• Laboratory IT System;
• Cath. Lab Report;
• Electronic Discharge Letter Systems;
• Patient Administration System (PAS) or Patient Information Management System (PIMS).
Not all information required to complete the datasheet will be available on admission. CROs therefore each operate their own 'holding system' of datasheets for patients until such times as the rest of the data is available, for example laboratory results, discharge information, and so forth.

Each CRO also maintains their own diary in which they record basic information associated with each patient recorded on the datasheet.

Some CROs record patient details on the CHAIR system from the datasheet as information becomes available. Other CROs defer recording of any details on the CHAIR system until such times as the datasheet information is complete. CHAIR data is recorded on a standalone PC and is not accessed by medical or nursing staff during the provision of patient care.

Once the datasheet is complete and all patient information is recorded on the CHAIR system, the datasheets are filed by the CROs in their own filing systems.

The processes associated with locating and interpreting the necessary information for CHAIR patients is time-consuming and cumbersome. A significant amount of time is spent collecting the necessary information for the datasheet, writing up the datasheet and then transferring the datasheet information to the CHAIR system. In some cases, the patient's chart is not sufficiently organised and it can be difficult to locate the necessary information, particularly if the information is not filed in the correct order. Furthermore, the data collection processes of CHAIR rely on the nursing/clinical knowledge and background of the CROs in order to interpret the medical terminology, handwritten nursing/medical notes and other similar material in the patient's chart.

3.4.3 Information Management and Analysis

The central repository of CHAIR information is managed by DMF. Typically, each CRO creates a folder on the dataset for each patient record and then dials into MediBRIDGE which is the CHAIR central server.

Patient data is typically transmitted to MediBRIDGE on a twice-weekly basis, and the CRO can transmit patient record without all of the requisite information on the dataset. The missing information can then be transmitted at a later stage.

CHAIR data is essentially in two forms:
- personal data in the local database (within the hospital);
- "anonymised" data (no name and no address) in the central database (located in DMF's premises in Dublin).

The personal data in the hospital database is information from the patient medical record and can be used to inform the debate on how best to enhance patient care. This data will only be available to the CRO and to certain staff members within the hospital. It has protection from public use by way of unique user IDs, passwords and physical access to the system.
The anonymised data is used for planning and research purposes and the data subject cannot be recognised from this data. Unique identifiers (such as the patient’s name and address) are removed from data prior to transmission to the central CHAIR database. This ensures the confidentiality of patients’ information.

The CRO can also create a folder and transmit records between hospitals, in cases where the patient is transferred. The data is transmitted to the central repository housed at DMF from where it is transferred to the hospital requested. There is no unique patient identifier across the hospital estate while there is little commonality in the discrete hospital databases.

Some CROs access the internet using a standard dial-up connection; this method of access is not ideal and limits the potential to utilise a web-based solution for CHAIR information transmission. (We understand that this issue is now being looked at by NCIS. ³)

DMF extract anonymised data from the hospitals and provide aggregate reports which do not incorporate the name of the patient, consultant or GP, nor do they include the patient’s date of birth or address. As the patient data is anonymised, there is no mandatory requirement to get the patient’s consent.

### 3.4.4 Network Access for PCs Hosting CHAIR

All of the participating hospitals use a dial-in link. The hospitals transmit data using ISDN or a dial-up connection: these are supported remotely by DMF using the PC-Anywhere tool. An anonymous file is sent to the CHAIR Central Server via MediBRIDGE using 128 bit encryption.

DMF have plans to facilitate the transmission of data to MediBRIDGE via handheld, mobile devices such as PDAs or Tablet PCs.

A significant issue for CHAIR – and, at a wider level, the HSE – is the variation in operating systems and policies/protocols, with some hospital IT departments being fearful of viruses infecting their IT systems as a result of a dial-up line feeding into a networked PC, or that an external firm such as DMF could potentially access hospital IT systems. This viewpoint is particularly prevalent in the two voluntary hospitals in Cork City, and we are somewhat surprised at the emphatic nature of their policies regarding network connection and CHAIR dial-up lines. Although our terms of reference do not include a detailed technical examination of their networks, we would be quite surprised if the use of an effective firewall and the deployment of strict policies regarding usage of the dial-up line (i.e., no connections being made other than to DMF) did not provide the necessary

³ A detailed description of the National Cardiovascular Information Systems (NCIS) project is included in Section 6.2.4 below.
assurances that the hospitals' networks would not become infected with viruses. We suggest that further technical analysis be conducted in this area.\(^6\)

A more significant issue is the fact that in most locations, there is no current interface functionality between the hospitals' Patient Administration Systems (PAS) and the CHAIR dataset. At a practical level, this means that core patient data which is held on the PAS and which is required for entry on CHAIR must be physically transcribed from one system to another. In Mallow General Hospital, where (uniquely) an interface exists between the Keogh PAS and CHAIR, it is possible for the CRO to copy data across from one system to the other, thus avoiding the duplicate data entry processes seen in other hospitals, which are unnecessarily time-consuming and inefficient, and which can lead to error (albeit that it can also help with quality assurance of the data).

3.4.5 **ACS Patient Transfers/Readmissions and Implications for CHAIR**

ACS patients admitted to some of the eight CHAIR Pilot hospitals may require transfer to other hospitals for specialist interventions. In order to facilitate this process, the CHAIR Pilot Project Manager worked with DMF to develop an appropriate record transfer process. The record transfer process is operated by selecting the appropriate records for transfer and then accessing the transfer option on the CHAIR system. The outcome of the process is the transfer of the relevant records to the appropriate hospital. The transfer process is now in operation for all the pilot hospitals, with the South Infirmary the last to be included from January 2005.

The absence of a unique patient identifier also means that it is currently not possible to identify former CHAIR patients who may be subsequently re-admitted for ACS to another CHAIR hospital. This means that the previous CHAIR history of the patient will not be available to the hospital of the new admission.

3.4.6 **CHAIR Standard Reports**

CHAIR is capable of generating a range of standard reports and ad hoc analysis. Generally, the CROs generate standard reports on a regular basis (usually quarterly). These reports are circulated to the appropriate medical staff, and include both detailed performance results for their own hospital, and anonymised comparative data for the other CHAIR hospitals. Ad hoc reports can be generated on request from DMF or by accessing the specialist expertise of the researcher.

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\(^6\) The issue at SIVUH was resolved in Jan 2005 by purchase of a laptop (and docking station) with CHAIR software transferred to the laptop. The laptop is then connected to a dedicated phone line to DMF's Medibridge. There is still a local SIVUH networked PC in the CHAIR office to access patient information. To save space (and necessity to look at two screens - laptop and PC) a single PC monitor is used with a video-splitter. The SIVUH issue became an urgent problem when the transfer process came into operation. Prior to that CHAIR data files were emailed to DMF via the SIVUH IT department. At the Mercy, there has always been a dedicated phone line to Medibridge: the issue there is that the CRO does not have access to a local Mercy networked PC in the CHAIR office but does have access via PCs throughout the hospital.
funded one day per week to provide research/analytical support to the CHAIR pilot project.

The typical content of CHAIR reports includes:

- **Door-to-needle time:**
  - number of CHAIR ACS admissions
  - number of MI as discharge diagnosis
  - number thrombolysed
  - number thrombolysed (door to needle times available)
  - number/percentage of patients thrombolysed within 30 minutes of arrival to hospital/A&E

- **Call-to-needle time:**
  - number of CHAIR ACS admissions
  - number of MI as discharge diagnosis
  - number thrombolysed
  - number thrombolysed (times available)
  - number/percentage of patients thrombolysed within 90 minutes of call for professional help

- **Suspected ACS CCU stay report:**
  - number of CHAIR ACS admissions
  - total suspected ACS admissions
  - number/percentage of CHAIR ACS admissions who spent time in CCU
  - average number of days per suspected ACS admission spent in CCU

- **Confirmed ACS CCU stay report:**
  - number of CHAIR ACS admissions
  - total confirmed ACS admissions
  - number/percentage of CHAIR ACS admissions who spent time in CCU
  - average number of days per confirmed ACS admission spent in CCU

- **AMIs discharged on beta blocker:**
  - number of CHAIR admissions
  - number of CHAIR admissions with discharge diagnosis of AMI (ST elevation or non ST elevation), and number/percentage of those who were discharged on a beta blocker

- **AMIs discharged on anti-platelet (aspirin and/or other):**
  - number of CHAIR admissions
  - number of CHAIR admissions with discharge diagnosis of AMI (ST elevation or non ST elevation), and number/percentage of those who were discharged on an anti-platelet

- **AMIs discharged on lipid-lowering drug:**
  - number of CHAIR admissions
number of CHAIR admissions with discharge diagnosis of AMI (ST elevation or non ST elevation), and number/percentage of those who were discharged on a lipid-lowering drug

- **AMIs discharged on an ACE inhibitor:**
  - number of CHAIR admissions
  - number of CHAIR admissions with discharge diagnosis of AMI (ST elevation or non ST elevation), and number/percentage of those who were discharged on an ACE inhibitor

- **Echocardiography:**
  - number of CHAIR admissions
  - number/percentage of admissions that had an echocardiography investigation

- **Angiography:**
  - number of CHAIR admissions
  - number/percentage of admissions that had an angiography investigation

- **Discharged ACS Patients Referred for Cardiac Rehabilitation:**
  - number of CHAIR admissions
  - number of CHAIR admissions with discharge diagnosis of confirmed ACS, and number/percentage of those who were referred for cardiac rehabilitation

Typically, the above reports present statistics within the defined period for each hospital along with the composite figures for all hospitals. Within the report, hospitals are not identified but are referred to by number. Although the intention is to have an anonymised basis of comparison and to avoid inter-hospital rivalry, in practice we found that many of the CROs were aware of the identity of other hospitals and that some sharing of data was taking place. It is also worth pointing out that we did not find any significant evidence of rivalry or of comparisons being used for negative purposes, but rather that the spirit expressed by both CROs and consultants was one of healthy competition.

Other general statistics reports are produced as part of the CHAIR project, including the following data:

- admission diagnosis and comparison with discharge diagnosis;
- discharge diagnosis and comparison against risk factors and outcomes;
- ACS medications on discharge related to discharge diagnosis.

Some CROs have also facilitated presentations to medical staff on the analysis of CHAIR data, with particular focus on key performance data for their hospital (e.g., door-to-needle times) and comparison against the aggregate of all eight hospitals.

The findings of our evaluation also indicate that in the absence of a ‘user friendly’ query interface tool, the processes to undertake ad hoc analysis or research from the CHAIR data can be cumbersome and requires the specialist skills of the
CHAIR researcher or DMF. This does not present a cost-effective option in respect of data analysis. In addition, the technical nature of the CHAIR system prevents reports being exported to any other software product (eg. Microsoft Excel), making further manipulation of reports cumbersome.

3.4.7 What the CHAIR Data Tell Us

It is clear from our analysis that CHAIR provides a significant ability for staff within the eight hospitals to track how clinical care is provided to ACS patients, albeit that there are sometimes gaps or other limitations in the data which may render some of the statistics slightly suspect (for example, response times are not always recorded on hospital records and are therefore unavailable to CHAIR). Notwithstanding the patchy level of interest shown by clinicians to CHAIR in many of the hospitals, a formidable tool exists which could be used to better effect in the tracking of performance overall.

In order to see what changes might be shown by CHAIR, we have taken one of the anonymised hospitals and have presented in the table below the data recorded for the period ending 30 June 2004, compared with the same data set for the period ending 1 February 2005 (i.e., in both cases, using patient data from the commencement of CHAIR). The results for one unidentified hospital (Hospital 1) are shown in contrast with those for all eight locations:

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Period to 30/6/04</th>
<th>Period to 1/2/05</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hosp 1</td>
<td>All 8</td>
</tr>
<tr>
<td>Door to Needle Time: Thrombolysed with 30 mins arrival to hospital/A&amp;E</td>
<td>40.0%</td>
<td>25.0%</td>
</tr>
<tr>
<td>Call to Needle Time: Thrombolysed with 90 mins of call for professional help</td>
<td>75.0%</td>
<td>68.7%</td>
</tr>
<tr>
<td>Average number of days per suspected ACS admission spent in CCU</td>
<td>5.0</td>
<td>3.8</td>
</tr>
<tr>
<td>Average number of days per confirmed ACS admission spent in CCU</td>
<td>4.0</td>
<td>4.2</td>
</tr>
<tr>
<td>AMls discharged on beta blocker</td>
<td>82.0%</td>
<td>82.8%</td>
</tr>
<tr>
<td>AMIs discharged on anti platelet</td>
<td>84.0%</td>
<td>92.0%</td>
</tr>
<tr>
<td>AMIs discharged on lipid lowering drug</td>
<td>73.0%</td>
<td>76.3%</td>
</tr>
<tr>
<td>AMIs discharged on ACE inhibitor</td>
<td>57.0%</td>
<td>64.3%</td>
</tr>
<tr>
<td>Admissions that had an Echocardiography investigation</td>
<td>10.5%</td>
<td>24.2%</td>
</tr>
<tr>
<td>Admissions that had an angiography investigation</td>
<td>14.4%</td>
<td>25.0%</td>
</tr>
</tbody>
</table>

The data presented above is, of course, somewhat selective, and provides a snapshot of activity within the relevant periods. What is interesting is that the performance of Hospital 1 over time appears to have improved in some areas, with significantly better door-to-needle and call-to-needle times, whereas other aspects of the treatment of ACS patients – for instance, prescription of drugs or use of investigations – have altered only marginally. (There may indeed be minimal scope for increasing the use of medications above current levels, for good clinical reasons.) Whether or not the positive changes are in any way attributable to CHAIR cannot be proven, although some anecdotal evidence would suggest that
the availability of these statistics has encouraged some doctors involved in ACS treatment to aim for better performance.

3.4.8 Hospital-Specific ICT Issues

Each of the CROs utilises the network capabilities of the individual hospitals. In the majority of cases, CROs experienced a period of 'settling in' to each hospital. This involved discussions and agreements in respect of network access, access to laboratory systems, email connections, etc. The majority of these issues have since been resolved, although, as reported above, there remains some reluctance about provision of access to hospital networks. Until early 2005, there was an outstanding matter with regard to the data transfer of patients out from the South Infirmary. Whilst the infrastructure existed to manage the data transfer process, the IT Manager at the South Infirmary was reluctant to facilitate the use of a modem to support the data transfer. As a result, other CHAIR Pilot hospitals receiving transfers in from South Infirmary did not receive the CHAIR recorded data for patients transferred. This position has now been resolved and data transfer from this hospital has moved into line with that of the other seven hospitals.

There was an intention to develop an interface between CHAIR and other appropriate hospital information systems. Keogh Software were tasked with developing the interface between their PAS and CHAIR. To date, the interface is only operational in Mallow General Hospital. Some of the CHAIR pilot hospitals operate PIMS as their hospital information system (iSOFT are the suppliers of PIMS). To date, no substantial work has been undertaken to develop an interface between PIMS and CHAIR. Such an interface is unlikely to be developed, given the forthcoming replacement of hospital information systems nationally with a separate iSOFT product. The absence of an interface between CHAIR and the main hospital information system in most locations results in duplication of information, with the CROs having to record on CHAIR all appropriate patient related information (some of which may already be recorded on the PAS or other hospital information systems).

3.4.9 The CHAIR Dataset

The CHAIR dataset was developed at the outset of the pilot project, in conjunction with cardiologists, epidemiologists and DMF. The dataset includes 90 elements and is closely aligned with the CARDS dataset which records 100 elements. The datasheet and CHAIR software were developed in line with the dataset. A set of Data Standards and a Procedure Manual underpin the CHAIR dataset. Subsequent to the launch of the CHAIR pilot, significant work was undertaken on a European-wide basis to develop priority modules for cardiovascular information systems with specific reference to ACS patients, during Ireland’s presidency of the EU in

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We understand that in CUH, the link can be made by routing data from PIMS through the Keogh Accounts system to CHAIR, but that work remains outstanding to complete this. In any case, it would not appear to us to offer a robust route for interface and data transfer, with a direct link between PIMS and CHAIR being preferable.
2004. Those involved in leading the CHAIR pilot project have expressed interest in having the CHAIR software adapted to be compliant with CARDS.

3.4.10 Data Quality

Individual CROs also run periodic reports to verify and update missing patient data, for example diagnosis information. An internal audit of 57 records was conducted on the CHAIR system in 2003. The audit compared the content of the patient record with the data recorded on CHAIR. The findings of the audit indicated a high correlation between the patient chart data and the CHAIR data. The data quality of CHAIR is also underpinned by the system data validation rules, drop down menus and Data Standards for the system.
4 CLINICAL ASSESSMENT OF THE BENEFITS FROM CHAIR

4.1 International Context

As part of this project, we undertook a short review of the international literature pertaining to the treatment of ACS patients and to data gathering and analysis projects within this field. In general, it is accepted within the literature that considerable benefit can be obtained from gathering data relating to the treatment provided to ACS patients with acute hospitals, and from analysing the data to identify better means of treatment and improvements in service provision.

Foremost within our assessment of international comparators for CHAIR was the Euro Heart Survey, which is managed by the European Society of Cardiology (ESC). As a European institution specialising in various aspects of cardiology, the ESC seeks to understand differences in the prevalence of cardiovascular diseases throughout the EU member states, as well as differences in the availability and use of cardiovascular diagnostic and therapeutic procedures. In order to address these differences, the Euro Heart Survey (EHS) aims to assess:

- Clinical practice in relation to existing guidelines in cardiology;
- Applicability of results of major clinical trials;
- Outcome of different strategies for patient management. 8

This is performed via surveys on specific cardiovascular diseases. Each survey is conducted under the guidance of a committee composed of eminent professionals on the subject under study. From the information provided by the surveys, the ESC then develops guidelines, educational programmes and products. The data collected also determines if guidelines are followed, which may lead to further improvement of guidelines and/or improvement of educational programmes. The data is of broad interest to many European audiences, including the medical community, hospital management, pharmaceutical and device industries, health care providers and governments.

4.2 Typical Process for Euro Heart Survey Exercises

Data is obtained by the EHS through systematic surveys in hospitals throughout Europe. Each survey is designed to collect detailed, representative, cross-sectional and prospective information on large samples of patients (4,500 - 13,000 per survey), within given time frames. (Other surveys such as Euro ASPIRE collect data six months after a cardiac event.) University hospitals as well as large general hospitals and smaller practices are invited to participate to account for differences in management strategies and profiles of care.

The average duration of one survey is two years, and each survey is typically divided into five different tasks and periods, as follows:

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8 The information presented in Sections 4.1 and 4.2 has been sourced directly from EHS.
The questionnaires used within the typical EHS process consist of general (demographic) and issue-specific (topic-oriented) data elements. Each questionnaire contains 100 to 400 items (5 - 20 pages per questionnaire), and will be tested in two to ten hospitals. Questionnaires will be modified if necessary according to observations made during the pilot study.

Remote data entry is used to transfer the data to the central database at the European Heart House via secured connections over the Internet. Each centre has personalised access to the EHS website and may view its own progress as well as global survey progress. For centres without stable Internet connection, an off-line data entry system is available. Only an occasional Internet connection is required for the purpose of transferring data to the centralised database.

The EHS intends to move to continuous data collection using CARDS standards, where available, and indeed has already commenced this process for PCI patients.
4.3 Comparable Initiatives in the UK and Sweden

4.3.1 Overview

Internationally, a number of other projects operate in similar fashion to CHAIR, with data being collected to monitor the application and effectiveness of various clinical interventions for cardiac patients. In the following paragraphs, we outline two such initiatives which are worthy of note: the Myocardial Infarction National Audit Project (MINAP) in the UK, and the Register of Information and Knowledge about Swedish Heart Intensive care Admissions (RIKS-HIA) in Sweden.

4.3.2 MINAP (UK)

The National Service Framework (NSF) for coronary heart disease is a 10-year programme published by the UK Department of Health in March 2000, which set standards of care for patients with coronary heart disease in England. The NSF helps the NHS to plan and deliver the service changes needed to raise standards of care, to improve clinical outcomes and to monitor progress. In addition, it promotes equal care for all people with coronary heart disease. To make this happen, the NSF has set 12 standards covering areas from prevention to rehabilitation.

In October 2002 the Department of Health commissioned a review of thrombolysis services. The report, ‘Review of Early Thrombolysis’, was published in June 2003 and identified best practice and made recommendations for the delivery of faster thrombolysis. There have also been two Department of Health reports on progress towards achievement of the NSF standards, which included treatment of heart attack patients, ‘Delivering better heart services’ in March 2003 and ‘Winning the War on Heart Disease’ in March 2004.

As part of this process, the Myocardial Infarction National Audit Project (MINAP) was developed to show how hospitals in England (and, from 2004, Wales) are performing against the NSF standard and goals for patients with heart attacks (myocardial infarction). Annual reports from MINAP concentrate on the time taken to give clot busting drugs (thrombolytic therapy) to suitable patients and the use of drugs to reduce the risk of another heart attack (secondary prevention). There is good evidence that both these treatments are highly effective in saving lives.

MINAP began in late 1998 when a broadly based steering group developed a data set for acute myocardial infarction. This allowed clinicians to examine the management of myocardial infarction within their hospitals against targets specified by the NSF.

The project uses a highly secure electronic system of data entry, transmission and analysis developed by the Central Cardiac Audit Database (CCAD). The system uses encryption of patient identifiers to allow secure transfer of data between...
hospitals and central servers. In 2002, the dataset was revised to cover acute coronary syndromes and align with other coronary disease data sets.

Continuous online data analysis is available to hospitals, showing their performance against NSF targets for delays to thrombolysis and use of secondary prevention medication in comparison to aggregate data. Quarterly reports are available for hospitals, Strategic Health Authorities, the Healthcare Commission and the Department of Health. MINAP is the first national audit to release annual reports showing hospital performance against NSF targets in the public domain.

The concept behind MINAP is one of transparency and performance management, with the performance of each participating hospital shown in the annual audit report in respect of five key indicators (also recorded in CHAIR):

- Door to needle time (target = within 30 minutes)
- Call to needle time (target = within 60 minutes)
- Administration of aspirin
- Administration of beta-blockers
- Administration of statins.

All hospitals in England that admit patients with AMI and 17/18 of hospitals in Wales are now contributing data. Sustained improvement of performance against the NSF targets for thrombolysis and use of secondary prevention medication has been demonstrated for each quarter since the end of 2000. The percentage of eligible patients receiving thrombolysis within 30 minutes of hospital arrival has doubled between the first quarter of 2000 and the first quarter of 2004.

Some of the benefits recorded in the 2005 MINAP Fourth Public Report include:

- Patients receive thrombolytic treatment faster:
  - 86% of eligible patients in England received thrombolytic treatment within 30 minutes of arrival at hospital compared with 44% during early 2001.
  - 71% of eligible patients in Wales received thrombolytic treatment within 30 minutes of arrival at hospital, compared to 65% in 2003/4 when the Welsh hospitals were first included in the Public Report.
  - 55% of patients received thrombolytic treatment within 60 minutes of calling for professional help in England compared with only 22% in early 2001 (29% in Wales, compared to 22% in 2003/4).
  - The percentage of hospitals in England providing thrombolytic treatment to 75% of their eligible patients within 30 minutes of the patient's arrival at hospital has increased from 80% to 89% since the last report in June 2004. In Wales the percentage has increased from 24% to 36%.

- More ambulance personnel can diagnose heart attack and give thrombolytic treatment before the patient arrives at hospital:
  - 27 of the 31 ambulance services in England and the Welsh ambulance service can now give thrombolytic treatment to patients before they reach hospital (prehospital thrombolysis).
  - In 2004/5, 1,374 patients received pre-hospital thrombolytic treatment compared with 314 patients in 2003/4.
• More patients are being treated by primary angioplasty:
  o More hospitals are now using angioplasty as an emergency treatment for heart attack. This is known as primary angioplasty.
  o In 2004/5, 1,087 patients were treated with primary angioplasty in preference to thrombolytic treatment, compared with 390 in 2003/4.

• Prescription of secondary prevention medication continues to increase:
  o The proportion of heart attack patients prescribed secondary prevention medication on discharge from hospital continues to exceed the targets and has increased to 97% for aspirin, 91% for beta-blockers and 95% for statins in England, with a corresponding increase to 96%, 89% and 92% in Wales.

MINAP has much positive experience which can be relayed to other countries, although it should be noted that the existence of clear national guidelines and targets within the NSF provides a firm foundation upon which to build such an initiative, and a more performance-oriented culture (originating from the commercialisation of NHS Trusts in the 1990s and the focus on competition) has probably made it easier to implement MINAP. Equally, we note that many NHS Trusts use their achievement of MINAP standards and their year-on-year performance improvements as a basis for seeking further investment in cardiac services or to justify current service configurations.

4.3.3 RIKS-HIA (Sweden)

The Register of Information and Knowledge about Swedish Heart Intensive care Admissions (RIKS-HIA) is the Swedish Register for Cardiac Intensive Care. The aim of RIKS-HIA is to promote acute cardiac care through the continuous collection of information on care needs, interventions, and treatment outcomes, and the development of these services internally and in comparison to other hospitals. The long term goal of the initiative is to reduce mortality and morbidity among the treated patients and make the care as cost efficient as possible.

All patients admitted for cardiac intensive care at hospitals participating in continuous reporting are included in the register. The analysis mainly concerns the 50%-60% of patients presenting with acute MI or unstable angina pectoris (impending myocardial infarction). The care of these conditions consumes 350,000 inpatient days annually in Sweden, at a cost of US$200 million, plus a further US$200 million for the cost of other interventions such as coronary bypass grafting. RIKS-HIA was inaugurated after scientific studies showed that improved emergency care in the home, during transportation, and in the Coronary Care Units with new, rapid diagnostics and monitoring, new drugs, and access to early coronary vessel procedures, improve both survival and quality of life, shorten hospitalisation and accelerate the rehabilitation to work. Implementation of new knowledge and new methods, and access to new technologies are unequally distributed across Sweden, and hence there is a major need for quality improvement so all patients can be offered good, effective cardiac care on equal terms.
RIKS-HIA has been in use in a few hospitals since 1991, and is being implemented rapidly throughout the country. Twenty-one hospitals reported data in 1995 when it became an official national quality register in Sweden. During succeeding years, additional hospitals joined RIKS-HIA so that in 2003, 77 out of the 81 hospitals that manage acute cardiac patients were participating in the initiative, giving the register 95% coverage of acute MI patients in Sweden.

Information is reported on standardised forms with a minimum of 100 variables:
- upon admission and CCU care, one page maximum, reported by a nurse;
- upon discharge, 0.5 page maximum, reported by a physician

The register covers background factors such as age, sex, risk factors, previous diseases, and drugs used, which provides the opportunity to adjust for differences in the composition of patient groups at different times and at different hospitals, when comparing over time or among hospitals.

Other factors registered are the most significant methods of diagnosis, monitoring, and pharmacological or interventional therapy, and the complications that occur during the hospital stay. Information registered upon discharge, apart from the final outcome, includes risk assessment and long-term treatment interventions.

Data is either recorded directly over the Internet into the national database (which is licensed from the SAS Institute), or hospitals with computerised patient records can export the predefined variables to RIKS-HIA. Data is available on-line for analyses of each hospital’s therapy profile and outcome in comparison with the national average.

The register offers an increased report form for those hospitals that want to do more thorough reporting and/or use the register as a computerised chart. The computer can generate admission record, CCU report, and discharge notes, in plain text. It is also possible to add optional local variables, and generate mail questionnaires to selected patient groups for long-term follow-up.

By participating in the register, the participating units have:
- immediate access to computerised information on previously hospitalised patients;
- immediate access to reports, lists for selected patient groups;
- immediate access to tables and graphic statistics for selected time intervals and patient groups regarding the registered variables;
- possibility to export all, or parts of, the database to other programs for processing of text or numbers and more advanced statistical analysis;
- possibilities for local reporting and production of annual reports;
- time related presentations of interventions and results, to assess internal trends concerning various interventions over time.

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• regional comparisons of care needs and interventions, treatment outcomes, resources, and costs, and trends over time with all other participating hospitals.

Hospitals that have participated in RIKS-HIA have the possibility to obtain local statistics concerning trends in new treatment forms and treatment outcomes, which has reportedly had a considerable impact on the development of acute cardiac care in these hospitals. The first comparisons of interventions which might affect quality of life and length of life show considerable variation among the different hospitals, which may be due to differences in the hospitals' human, technical, and economic resources. Analysis has already identified common weaknesses in the continuum of care, such as the time between the onset of chest pain and the initiation of lifesaving thrombolytic treatment, and related delay time both before and after arrival to the hospital. Analysis of the data can also dismiss fears of sex discrimination in acute coronary care.

4.4 CHAIR and International Comparators

It is quite evident that many aspects of CHAIR are similar to the processes used in the EHS exercises, particularly in terms of the preparatory and data collection stages. However, CHAIR continues to run (as a pilot) more than 2½ years after its inauguration in the first of the eight hospitals, and minimal resources have been allocated to undertake detailed analysis and reporting of the results from the initiative, whereas the EHS methodology involves the allocation of dedicated resources to undertake substantial work in analysis and reporting.

Equally, although CHAIR bears many similarities with other European cardiac treatment databases such as MINAP and RIKS-HIA, it would not appear that CHAIR has assumed the central role which its UK and Swedish counterparts have achieved in terms of acting as a catalyst for improving patient care and treatment in all hospitals dealing with ACS patients, either through participation by all relevant clinicians in using the information to improve care, or by having a transparent basis for recording and publishing performance figures for each hospital.

4.5 CHAIR's Delivery of Benefits

Our study has produced some positive examples of CHAIR influencing clinical practice. For example, in the South Infirmary, CHAIR data was used to identify the need for a new Chest Pain Clinic at the hospital (which commenced in the first half of 2005). In most of the other hospitals, a number of consultant cardiologists and physicians were acting to “champion” CHAIR and were able to demonstrate to us that they were making active use of the performance reports in order to highlight the areas where improvement in clinical practice was required, and to convince colleagues of the need to embrace change.
Whilst outputs from CHAIR are circulated/presented to medical staff by the CROs, our evaluation has identified that the data collected by CHAIR is not being maximised to inform needs assessment, service planning and delivery, clinical practice or clinical governance/audit, at both hospital and HSE area levels.

Our research strongly suggests that whilst significant effort has gone into the data collection elements of CHAIR over the last two to three years, and whilst useful reports and presentations have been produced by CHAIR staff and by DMF, the initiative has failed to deliver significant benefits in terms of the objectives articulated by the European Society of Cardiology for EHS, namely helping to produce improvements in:

- Clinical practice in relation to existing guidelines in cardiology (implementation of European Society of Cardiology guidelines, as adopted by the Irish Cardiac Society, has been variable across topics and service locations in Ireland);
- Applicability of results of major clinical trials;
- Outcome of different strategies for patient management.

From our discussions with CHAIR personnel and with consultants in the eight hospitals, we are of the opinion that CHAIR has in many cases failed to become a fully integrated component in the delivery and development of clinical care for ACS patients. Although some cardiologists and consultant physicians are actively involved in using the data from CHAIR to improve their clinical practice, it would seem that a larger number are not involved and have largely failed to engage with the project. As a result, CHAIR’s ability to deliver real benefits is hampered, and the situation will not be rectified until the vast majority of clinicians engage with CHAIR more effectively and begin to use its outputs in a much more constructive way than is currently the case.

In relation to CHAIR’s impact upon the improvement of outcomes for patient management, we recognise that CHAIR on its own cannot produce such improvements, and indeed that CHAIR was not designed to do so. It can, however, contribute to outcome improvements through its recording of data relating to patients, their diagnostic tests, treatments and outcomes, and through comparisons of actual treatments against guidelines. CHAIR can also help to identify priorities for improvement and can track trends over time. In this regard, the existence of an initiative such as CHAIR – particularly as part of the wider NCIS project – is helpful and provides some of the information infrastructure to facilitate other change in treatment and the achievement of improved outcomes.

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9. It has been suggested that this finding reflects current culture within the Irish health services, and that one of the main functions of the new Health Information and Quality Authority will be to improve that culture, with a system such as CHAIR forming an important component in the infrastructure for quality improvement.Whilst we do not disagree with such views, our finding in respect of the relative failure of many consultants to engage in CHAIR remains valid and requires significant attention.

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Overall, therefore, there appears to be a somewhat mixed picture with regard to CHAIR's delivery of benefits by contrast with some of its international comparators. Whilst CHAIR has clearly helped to establish an effective information base to facilitate the delivery of better care for ACS patients against ESC guidelines, the fact that it is largely ignored by many consultants treating such patients within the eight hospitals means that it is operating in something of a vacuum, and that it will not be in a position to maximise its available benefits until it becomes more effectively integrated into the mainstream of cardiology practice for all relevant medical staff, covering all ACS patients.
5 STAKEHOLDER FEEDBACK

5.1 Perspectives on CHAIR

CHAIR is quite unlike many other initiatives operating as part of the implementation of the 1999 Cardiovascular Health Strategy, and indeed other clinically-based projects running within the Irish healthcare sector, as knowledge about CHAIR is almost exclusively confined to clinicians within the eight participating acute hospitals. It would appear to be the case that very few, if any, patients are aware that their details are being entered into the CHAIR system. Indeed, from a small number of consultations which we have had with General Practitioners in the HSE Southern Area (as part of our separate evaluation of Heartwatch), it can also be said that there is probably a very low level of awareness of CHAIR amongst GPs who already have an interest in improving the cardiovascular health of their patients. In many ways, given the nature of CHAIR and its development to date, this is not surprising, although it must be said that CHAIR’s stand-alone existence indicates something of a lost opportunity, considering the number of other cardiovascular initiatives which are currently in progress, and the potential for achieving closer integration to provide for better patient care and to realise economies of scale.

In this respect, the stakeholder feedback which we report in this section is necessarily limited to those clinicians and other staff at the eight hospitals who are substantially involved in CHAIR, and who therefore may be said to have a vested interest in its present makeup and potential future development. No worthwhile perspective on CHAIR could be offered by patients or by their GPs, for the reasons outlined above.

5.2 General Feedback from Stakeholders

5.2.1 Introduction

The Evaluation Team consulted with a range of stakeholders, who are listed in Section 1.3 above. The issues raised by stakeholders during consultation sessions with the Evaluation Team are set out in the following paragraphs under generic headings.

5.2.2 Induction, Training, Initial Set-up of CHAIR Pilot and Ongoing Support

Each of the CROs expressed the view that they had received adequate induction and training prior to taking up post. This consisted of training related to the CHAIR Procedure Manual and Data Standards as well as the CHAIR system software. Initially, resource efforts were directed at establishing the infrastructure and office premises for the CROs. In addition, each of the CROs had to establish their own internal processes – based upon the Procedure Manual – to access the necessary information required for CHAIR patients. All the CROs commented favourably on the good support network established between them and the positive support and assistance which they receive from the CHAIR Pilot Project Manager.
5.2.3 Data Collection and Data Recording

As indicated in Section 3, the current data collection and recording processes associated with CHAIR are outmoded, cumbersome and time consuming. In particular, it was felt by the CROs generally that the arrangements for data collection and input into the system, which frequently involve significant amounts of data (including name, address, date of birth, sex, marital status and health cover) having to be physically transcribed from another IT system before being entered onto CHAIR, are wasteful and inefficient. In those hospitals where anti-virus policies dictate that PCs used for CHAIR cannot be connected to the hospital network, it was felt that an undue level of concern amongst IT staff was leading to very ineffective use of data and systems, and creating much additional administrative work.

5.2.4 Information Analysis and Use

In Sections 3 and 4, we identified that there is a wealth of information collected and record on CHAIR, but that the potential for using this information to enhance clinical practice is not being maximised. All the stakeholders consulted during this evaluation expressed the view that greater potential exists to capitalise on the investment in CHAIR by using the information collected to support epidemiology studies, needs assessment and service planning, and clinical governance and audit. One consultant who has been involved in CHAIR for a considerable period suggested that CHAIR had run its course as a pilot, and that some serious work and dedicated resources were now required to extract the full benefit from the high-quality data which has been recorded to date.

5.2.5 The Future of CHAIR

It would not be unfair to characterise CHAIR as an initiative which is held in very high regard by all of the medical, nursing and support personnel who are involved with CHAIR on a day-to-day basis, or who have taken the interest to make best use of the data to enhance clinical practice and patient care in their hospitals. Equally, CHAIR is not a regular feature of the average working day for those who – for whatever reason – are not currently involved with it, including cardiologists, consultant physicians, nurses, General Practitioners, pre-hospital emergency care providers, rehabilitation staff and others caring for patients who have suffered an ACS.

As a consequence, those who are supportive of CHAIR typically expressed the view that it should be continued in some form, although there was a strong suggestion from many – including those involved in its inception – that CHAIR now needs to move to the next stage of its evolution, either as an independent initiative or as part of a wider project such as NCIS. One consultant cardiologist

10 We understand that these issues are now being addressed with NCIS for all modules, including ACS.

11 Also planned for future attention within the scope of NCIS.

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indicated that similar projects in other countries often tend to be time-limited for the period of data collection, and suggested that it would not be unreasonable for similar arrangements to apply to CHAIR, given that the pilot has now proven that the concept is workable.

By contrast, those who are not involved with CHAIR were typically unable to offer a view on its future prospects, given their lack of knowledge of the present arrangements. Interestingly, this included the public health department of HSE Southern Area, which has had little involvement to date in the development of CHAIR, although public health staff were kept informed of progress. We would expect that the data available from CHAIR would be of considerable benefit to public health staff involved in assessing the needs of the population regarding the treatment of cardiovascular disease and related conditions.
6 SCORECARD EVALUATION OF CHAIR

6.1 Preamble

In order to evaluate CHAIR, and to reach a conclusion on the merits and limitations of the pilot initiative, we have opted to use a "balanced scorecard" approach. This method is particularly suited to more complex analyses, as it breaks down the organisation or process under review into four discrete components: service, costs, administration; and customers/service users. On this basis, the following sections set out our analysis under each of these headings, and conclude with the overall scorecard evaluation and set of recommendations or suggested actions.

6.2 Service Provision, Clinical Benefits and Risk Reduction

6.2.1 Overview

In Section 4 of this report, we set out our assessment of the benefits arising from CHAIR. In summary, CHAIR has been a useful experiment to date in that proof of concept has been satisfactorily achieved: as a data-gathering exercise, the CHAIR pilot project has shown that it is possible to collect and manage, using ICT facilities, a substantial body of data relating to patients who have suffered an ACS.

6.2.2 Limitations of CHAIR

The major area where we believe that CHAIR is problematic relates to the extent to which the data have been put to effective use. From our discussions with CHAIR staff and with consultant cardiologists, physicians and others employed at the eight hospitals, it would appear that although the CHAIR Registration Officers are diligent in their dissemination of statistics to clinical colleagues, very little use in practice is generally made of the collected data. Many medical staff within the hospitals complained that they simply did not have enough time to deal with the CHAIR report, whilst other anecdotal evidence suggests that little feedback is received from doctors on foot of the reports being distributed.

Only in a small number of instances did we encounter anything close to the type of response to the CHAIR statistics which might have been expected of the pilot project at the outset. For example, in one hospital, two members of the consultant staff indicated that they have integrated the CHAIR data within their own clinical practice, and that they regularly discuss between themselves how treatment methods and protocols might be altered in order to improve their hospital's performance in respect of door-to-needle times and other key measures. In that case, major drivers appeared to include the desire to reform clinical practice and some degree of (healthy) competitive rivalry with other hospitals in the region.

In an ideal situation, we might have expected that the CHAIR data would be distributed widely within the eight hospitals, and used as live data to help inform the development, refinement and evaluation of clinical practice for ACS patients.
on an ongoing basis. That this is not happening is not for any want of effort on the part of the CROs, nor is it a negative reflection upon the medical and nursing staff involved in treating ACS patients; rather, it is a reflection of the general workload pressures facing staff in acute hospitals, and also of the fact that much of the effort involved in the design of CHAIR went into the data collection and management elements of the project, with less attention given to developing and implementing a structured basis of monitoring designed to enhance service delivery (much less performance assessment or enforcement).

6.2.3 Should CHAIR be Maintained?

As an initiative which has been largely stand-alone for most of the time since its inception (notwithstanding the fact that the implementation of NCIS now gives CHAIR a more prominent role within a much wider project), CHAIR does not appear to have delivered sufficient improvements to date to justify its continued existence. If a decision needed to be taken solely on the basis on the evidence to date, and if CHAIR was intended to remain stand-alone, we would find it difficult to recommend anything other than discontinuation of the pilot.

To date, there has been very little evidence to support the thesis that the CHAIR pilot project should be maintained (setting aside the prospect of its extension nationally). Only in a small number of instances has CHAIR been ostensibly used to help redesign or otherwise improve care delivery, although it is undoubtedly the case that an actively-managed register such as CHAIR could become the cornerstone of an overall system of clinical performance monitoring and continuous service improvement.

In our view, the CHAIR pilot has proven that such a concept can work, but has also shown clearly that certain additional ingredients are required to ensure that it delivers sustainable results – ingredients which are not currently present in sufficient measure. These are:

- A **clinical champion** with sufficient power and authority to galvanise the efforts of colleagues so as to maximise their involvement in the maintenance and use of CHAIR data. Although a small number of consultants involved in CHAIR from the outset have put very substantial amounts of effort into the development of CHAIR, there is an underlying sense that these have been “solo missions” undertaken without the backing of their clinical colleagues (as evidenced by the relative lack of interest from most other consultants).

- A **commitment** from the sponsoring organisation(s) – in this instance, the HSE and Department of Health and Children – that CHAIR is to be rolled out and applied as a single, uniform, national system which is to be used by all healthcare professionals based in acute hospitals and who deal with ACS patients (i.e. CHAIR is the default, with no opt-outs, and is to be run as a permanent programme rather than as a pilot).

- A **dedicated analytical capability** focused exclusively on CHAIR, enabling high-quality reports to be produced on service trends, performance, outcomes and other features of CHAIR, typically on a monthly basis. Although some
good work has been done in this area by the CHAIR Project Manager and CROs, it is not their main role, nor are they specialists in data analysis or epidemiology.

- A **commitment to multidisciplinary clinical audit** amongst medical and nursing staff caring for ACS patients, which would enable the results of the analysis to be considered within each hospital, and for clinical practice to be refined/improved as a result of this analysis. Where necessary, other care providers – such as Ambulance / EMT personnel – should be involved.

At an absolute level, we do not see any significant further benefit to be derived from CHAIR being continued in its present format. Evidence from other countries has shown that clinical data from registers such as CHAIR does not necessarily have to be collected on a continuous basis, but might be gathered within a defined timeframe (for example, one quarter each year) to provide sufficient information to assist research, to track progress, and to inform the debate on clinical audit.  

As stated above, the CHAIR pilot has proven that the methodology can work, although the extent to which the data has subsequently been put to use for the improvement of clinical practice is limited and is somewhat disappointing. On that basis, there is no need for CHAIR to be continued in its present format.

However, the key concepts involved in CHAIR form a central part of the National Cardiovascular Information System (NCIS), which is currently being developed. Given what has been achieved with CHAIR to date – and particularly the putting in place of a workable methodology and functioning infrastructure – we believe that there may be considerable merit in CHAIR becoming subsumed within NCIS, as discussed in Section 6.2.4 below.

Returning to the original question of whether CHAIR should be maintained, our view is that this is difficult to justify in its current situation. However, it should be recognised that the option also exists to continue to operate CHAIR in a modified format, as part of a wider initiative such as NCIS, and we believe that this is a more valid issue to address. Our further consideration of this option is presented in Section 7 below.

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12 Ideally – in the absence of resource-related and other constraints – information might be collected on a continuous basis, but the question may be posed legitimately whether this absolutely needs to be the case. As an alternative, data collection could either take place on a randomised selection basis (for example, every fifth record) or within a defined period each year, and would provide a sufficient body of information for analysis, provided that any sample were statistically valid and that no skewing of data were to take place (for example, by conducting a survey over the Christmas holiday period). Opinion appears to be divided between medical experts on the appropriateness and accuracy of these alternative approaches. A dominant view would appear to be that if a continuous survey of information is possible, then that is the best approach as it eradicates any potential imbalance. Other considerations include the availability of trained staff to conduct periodic data collection exercises – what work are they assigned to when not conducting data collection, and how can the organisation ensure that they are available from one collection period to the next?
6.2.4 CHAIR and NCIS – Background and Current Position

In October 2001, the Minister for Health and Children appointed a National Cardiovascular Information System (NCIS) Committee which was requested to advise on the implementation of a comprehensive cardiac surveillance system.

Following intensive research and consultation, the NCIS Steering Committee and the Irish Heart Foundation commissioned a software company to instigate the design, development and delivery of an integrated national system.

It is planned that modules of NCIS will be delivered into approximately 35 acute public hospitals in Ireland, and to some private hospitals. (We understand that, in future, it is planned that the use of NCIS will be a requirement for accreditation of hospital cardiology departments by HIQA.) NCIS will allow the collection and forwarding of coronary care data to a central server. Data collected at a local and central level will enable:

- The support of clinical audit that will assist in the ongoing development of guidelines for the clinical care of cardiac patients;
- The collection of epidemiological information of cardiovascular disease in Ireland that will allow it to be set against an international context;
- The provision of information that will support service planning and evaluation of associated resource requirements.

NCIS is broken down into three phases. The first phase, which is currently underway, entails the design of the system, the identification of hardware and software, the installation of hardware in priority locations, and the implementation of the five priority modules (as shown below). Subsequent phases entail the development and implementation of the remaining modules (Phase 2), and the final implementation across all sites (Phase 3).

The eight modules of NCIS and their relative prioritisation are as follows:

<table>
<thead>
<tr>
<th>NCIS Module / Prioritisation</th>
<th>Phase 1 – Priority</th>
<th>Phase 2 – Medium Term</th>
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<tbody>
<tr>
<td><strong>Acute coronary syndromes (ACS) and coronary care units (CCU): patients with acute myocardial infarction and unstable angina</strong></td>
<td>✓</td>
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<tr>
<td><strong>Percutaneous coronary intervention (PCI): patients who have treatment to relieve narrowed coronary arteries and usually involving coronary angioplasty and the implantation of a coronary stent</strong></td>
<td>✓</td>
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<tr>
<td><strong>Adult cardiac surgery: includes patients undergoing coronary artery bypass graft (CABG) surgery, cardiac valve surgery, surgery for congenital defects, and miscellaneous acquired cardiac conditions</strong></td>
<td>✓</td>
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</tbody>
</table>
**Electrophysiology (EP):** patients undergoing ablation treatment for irregular cardiac rhythms, patients fitted with cardiac pacemakers, and patients fitted with an implantable cardioverter defibrillator (ICD)

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<tr>
<th>Heart failure: patients suffering from congestive heart failure, a chronic disease which is generally managed by medication and lifestyle changes</th>
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<tbody>
<tr>
<td>Cardiac rehabilitation: patients entered in rehabilitation programmes, referred from many of the groups listed above</td>
</tr>
<tr>
<td>Paediatric cardiology: this module will provide information on children, mainly with congenital heart defects</td>
</tr>
<tr>
<td>Paediatric cardiac surgery: this module will provide information on operations carried out mainly for congenital heart defects</td>
</tr>
</tbody>
</table>

The approach being followed for NCIS is that a core specification is being produced for each of the modules, with software providers then being asked to demonstrate the compliance of their systems with NCIS standards and capacity to transmit data to NCIS Central. Conformance with CARDS will also be an essential requirement. This means that the NCIS project will not operate a standard procurement process as such, but that the compliance process will then allow individual customers either to have their existing systems become part of NCIS, or to procure new systems from those suppliers whose products have successfully been shown to comply.

For CHAIR, the implication of this approach is that if the current DMF system is shown to conform, it could theoretically become an NCIS module quite quickly, with perhaps some revision of the software being carried out. If it is non-conformant, this leaves a decision to be made by the HSE and the various voluntary and private hospitals regarding whether, and how quickly, they seek to replace the DMF CHAIR system with a compliant module from another supplier. (We offer no opinion on the likelihood of the DMF system being compliant with NCIS and CARDS standards.)

The conceptual design of NCIS is presented overleaf.
6.2.5 CHAIR, NCIS and Other Initiatives

CHAIR is recognised as one of a number of initiatives which have been conducted or are currently underway and which will greatly assist Phase 1 of NCIS. Other initiatives include:

- A comprehensive hardware audit of inventory in cardiac units within each health board area to determine any upgrades or additional hardware that might be required to support NCIS.
- A Schematic Representation that describes how modules of NCIS will be deployed across hospitals and what type of hardware each will require.
- CARDS (Cardiology Audit and Registration Data Standards). The European standardisation of data formats for use in three of the priority modules of NCIS, namely ACS/CCU, PCI and (EP).
- Two projects for the maintenance of Adult Cardiac Surgery data sets, namely the Irish Cardiac Surgery Register (ICSR) and Society of Cardiothoracic Surgeons (SCTS), have been operating at different levels.
- CRISP – Cardiac Rehabilitation Information Systems Project, developed by the Royal College of Surgeons, contains a national core data set for Cardiac Rehabilitation.
6.2.6 CHAIR and NCIS – Future Integration

Given our earlier assessment that there is little, if any, real additional benefit to be derived from CHAIR being continued in its present format, it is difficult to escape the conclusion that the approaches and resources involved in CHAIR would best be included in NCIS, rather than continuing as a stand-alone project.

We understand that the ACS/CCU module of NCIS, which most closely approximates to CHAIR, is one of the initial top priority areas of NCIS, and that compliance reviews of software products for this module are scheduled to take place by the end of September 2005. After this, the HSE will co-ordinate the local NCIS implementation work, in consultation with HIQA (when established). It will be a matter for individual voluntary or private hospitals to decide on their own course of action for the implementation of NCIS on a site-by-site basis.

From our discussions with the NCIS Project Manager, we believe that it should be relatively straightforward for the CHAIR project and resources to be subsumed within NCIS, either during late 2005 or at the start of 2006. This depends, to some extent, on the availability of a compliant software product to cover ACS patients (either the current DMF system, or a different system to replace it).

One additional issue which has not yet been resolved at national level is the question of resourcing data input, with a general expectation that clinicians involved in treating cardiac patients will have some role, but no agreement on the extent or nature of this. For the ACS module, we would expect that this will be less contentious within the HSE Southern Area, as CHAIR staff are already involved in undertaking data input and management duties, although the budget for their salary costs is currently met from within a time-limited pilot programme funded by the Department of Health and Children. Should it be decided to subsume CHAIR within NCIS, the matter of who funds the staff – and the implications for other HSE areas not part of the CHAIR pilot and therefore without an existing staff complement undertaking these tasks – would need to be resolved between the Department, the HSE and the voluntary and private hospitals participating within the NCIS programme.

6.2.7 Overall Conclusion Regarding CHAIR

Our general conclusion, therefore, is that whilst the CHAIR pilot has been a useful exercise in determining that a structured basis for recording ACS patient data can be made to work effectively, it does not present sufficient benefit to justify its continuation as it presently stands. However, as many elements of CHAIR are capable of being subsumed within NCIS in the near future, further consideration must be given to how this can be implemented effectively. We return to this topic in Section 7 below.
### 6.2.8 Overall Scorecard Evaluation And Recommendations

#### Service Provision, Clinical Benefits and Risk Reduction

<table>
<thead>
<tr>
<th>Scorecard Evaluation</th>
<th>Recommendations</th>
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<tbody>
<tr>
<td>1) CHAIR has been a useful experiment to date in that proof of concept has been satisfactorily achieved: as a data-gathering exercise, the CHAIR pilot project has shown that it is possible to collect and manage, using ICT facilities, a substantial body of data relating to patients who have suffered an ACS.</td>
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<tr>
<td>2) Despite the best efforts of the CHAIR Registration Officers, very little use in practice is generally made by consultants of the reports available from CHAIR, mostly due to workload pressures.</td>
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<tr>
<td>3) Key ingredients, which are not currently present in CHAIR in sufficient measure, would be required to ensure that it delivers sustainable results:</td>
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<tr>
<td>• A champion with power and authority who can maximise the involvement of clinical colleagues;</td>
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<tr>
<td>• A commitment to uniformity from the sponsoring organisation(s);</td>
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<tr>
<td>• A dedicated operational research capability focused exclusively on CHAIR, with the capacity to generate routine and occasional reports;</td>
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<tr>
<td>• A commitment to clinical audit amongst medical and nursing staff caring for ACS patients.</td>
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<tr>
<td>4) The NCIS project is well under way at present, and the ACS/CCU module of NCIS would appear to cover similar areas of functionality to that which is currently included in CHAIR. Although there are significant issues concerning the resourcing of the ACS/CCU module, it would nonetheless appear to be sensible for the approaches and resources involved in CHAIR to be included in NCIS, rather than continuing as a stand-alone project.</td>
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<tr>
<td>a) At an absolute level, we do not see any real benefit to be derived from CHAIR being continued in its present format. Evidence from other countries has shown that clinical data from registers such as CHAIR does not necessarily have to be collected on a continuous basis, but may be gathered within a defined timeframe (for example, one quarter each year) to track progress, to provide sufficient information to assist research and to inform the debate on clinical audit. As stated above, the CHAIR pilot has proven that the methodology can work, although the extent to which the data has subsequently been put to use for the improvement of clinical practice is limited and is somewhat disappointing.</td>
<td></td>
</tr>
<tr>
<td>b) On the question of whether CHAIR should be maintained, our view is that this is difficult to justify in its current situation. However, it should be recognised that the option also exists to continue to operate CHAIR in a modified format, as part of a wider initiative such as NCIS, and we believe that this is a more valid issue to address. Our further consideration of this option is presented in Section 7 below.</td>
<td></td>
</tr>
<tr>
<td>c) Further consideration should be given to the practicalities involved in CHAIR being subsumed within NCIS, including issues related to staffing, infrastructure, timescales, and data collection/management to clinicians to help enhance clinical care for ACS patients.</td>
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### 6.3 Costs / Value for Money

#### 6.3.1 Administrative Costs of Running CHAIR

In Section 3.2.4 above, we set out the current annual costs of CHAIR, which amount to around €406k at present.

In absolute terms, this sum does not represent a particularly significant amount of expenditure, and the resources deployed to support CHAIR are not excessive and are in line with other comparable costs in terms of staffing, office accommodation...
and so forth. We see very little opportunity for making cost reductions in the running of CHAIR at present.

6.3.2 Does CHAIR Achieve Value for Money?

The question of whether CHAIR achieves value for money is more problematic, as it moves away from consideration of absolute cost towards the comparison of those costs with the benefits received from public investment in the initiative.

As reported in Section 6.2 above, we believe that CHAIR has not achieved significant benefit to date in terms of becoming a fully integrated element of cardiovascular service provision, and that it has not facilitated a widespread improvement in clinical care for ACS patients in the eight hospitals, although some isolated examples of good practice arising from CHAIR have been observed.

Overall, our assessment is that the main benefit presented by CHAIR to date has been its achievement of proof of concept, by showing its capability to effect and influence changes in clinical practice for the better care of patients. As stated above, it has not delivered fully on that capability, simply because it has not become fully integrated within mainstream clinical practice in the pilot hospitals.

Consequently, we must conclude that CHAIR has achieved modest value for a modest investment to date, but also that little or no further value can be obtained under the present circumstances. Having achieved proof of concept, CHAIR must be capable of delivering further and more significant benefit from continued public investment if it is to continue as a publicly-supported programme. For the reasons outlined in Section 6.2.3 above, we believe that there are fundamental limitations in CHAIR’s ability to move to that next stage of delivering benefit, so long as it continues not to be fully integrated within mainstream clinical practice. As a result, we believe that CHAIR is likely to deliver poor value for money in the future, and we would recommend that it should be not be continued in its present format as a stand-alone project.

6.3.3 Overall Scorecard Evaluation And Recommendations

<table>
<thead>
<tr>
<th>Scorecard Evaluation</th>
<th>Costs / Value for Money</th>
<th>Recommendations</th>
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<tbody>
<tr>
<td>5) Administrative costs of CHAIR are reasonable in the context of current operations and available cost comparators, with minimal scope for savings.</td>
<td></td>
<td>d) CHAIR should not be continued in its present format as a stand-alone project.</td>
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<tr>
<td>6) CHAIR has delivered modest value for a modest investment to date, as it has achieved proof of concept for the pilot.</td>
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<tr>
<td>7) CHAIR is likely to deliver poor value for money in the future as a result of its failure to become fully integrated in mainstream clinical practice for ACS patient care.</td>
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**EVALUATION OF CHAIR—FINAL REPORT TO THE DEPARTMENT OF HEALTH AND CHILDREN**
6.4 Information and Administration Issues

6.4.1 Overview

In many ways, the information and administration issues pertaining to CHAIR represent the most successful element of the pilot project to date. Overall, the CHAIR pilot has proven over the last two to three years that it is possible, for a relatively small investment, to gather a significant body of data relating to ACS patients and to manage that data in an ICT enabled setting, and to produce meaningful performance reports which have the capacity to facilitate such features as changes in clinical practice, research into the needs of the population for cardiovascular health services, clinical audit, and so forth. Section 3.4 above described the information management and ICT systems arrangements which currently apply to CHAIR, and in the following paragraphs we present our analysis of how well these arrangements have been applied in practice.

6.4.2 Data Collection and Information Management

Broadly speaking, the arrangements for data collection within the CHAIR pilot project work effectively, but are far from efficient. Within the eight hospitals, the CROs have developed a range of administrative processes by which the necessary patient data can be gathered from a variety of sources, which are generally different from one hospital to another. For the most part, these processes include the need for the CRO to manually transcribe data from hard copy sources or from other ICT systems, and then to input the same data onto the CHAIR system. Whilst these arrangements are effective – as evidenced by the internal data quality audit conducted in September 2003 – it must also be said that they are quite inefficient and outmoded. If CHAIR were to be taken forward (either as part of NCIS or in some other format), we would strongly recommend the adoption of other procedures to speed up and modernise the process, including:

- Use of hand-held data capture devices which could be used to record data at source in a file format compatible with CHAIR, and then to upload the data onto the CHAIR system electronically;
- Creation of interface links between CHAIR and other systems (such as the PAS) which might be used to feed relevant data into CHAIR;
- General streamlining of business processes and working arrangements (including provision of proper work space for CROs to enable them to perform their work close to patient locations, rather than having to access patient files in corridors and other inappropriate places).

6.4.3 ICT Systems Issues

It is almost three years since the inception of CHAIR, and we are somewhat surprised that there are still no links between the PAS and the CHAIR system in most of the hospitals. However, the trial at Mallow General Hospital has been encouraging, and indicates that the creation and effective running of such a link...
can be made to work effectively. This should be borne in mind in the context of CHAIR’s possible future state as a component of NCIS, although the forthcoming replacement of hospital information systems nationally with a new iSOFT product will require further work to rebuild the interface.

A more significant problem relates to the refusal by IT staff at the two voluntary hospitals in Cork to permit any connection between CHAIR and their hospital networks, for reasons associated with fears of virus infection. In practice, this has led to the CROs in these hospitals having to use a PC for CHAIR alone, with no connections for email or internet access other than through a separate PC. Again, this is inefficient and wasteful of resources. Whilst we can appreciate that there is a strong desire on the part of the IT staff at these locations not to expose their networks to any risk of virus infection, we feel that the policy adopted is overly restrictive, particularly when CROs in other hospitals which are just as vulnerable to virus infection do have the capacity to access both CHAIR and other hospital systems from a single PC. We would recommend that this position be examined in more detail from a technical perspective, to identify a suitable resolution to the satisfaction of all parties.

6.4.4 Organisational and Governance Arrangements for CHAIR

As a small pilot project, CHAIR operates within the structure of the HSE Southern Area, and its organisational and management arrangements would appear to be both relatively informal and suitable for the nature and size of the project. Effective liaison is maintained with related projects such as NCIS and CARDS, and meetings are scheduled to facilitate the involvement or oversight of clinicians with an interest in caring for ACS patients. Project governance was originally dealt with through the local Steering Committee established at the commencement of the initiative, and which has met infrequently since the launch of the pilot.

Overall, we are satisfied that the organisational and governance arrangements which currently apply to CHAIR are fit for its purpose and work effectively, and we see no need for any change to these.

6.4.5 Overall Scorecard Evaluation And Recommendations

<table>
<thead>
<tr>
<th>Information and Administration Issues</th>
<th>Recommendations</th>
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</thead>
<tbody>
<tr>
<td>6) Arrangements for data collection within the CHAIR pilot project work effectively, but are outmoded and far from efficient.</td>
<td>e) More efficient arrangements would include:</td>
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<td>• use of hand-held data capture devices;</td>
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<td>• Creation of interface links between CHAIR and other “feeder” systems;</td>
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<td></td>
<td>• General streamlining of business processes and working arrangements.</td>
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<tr>
<td>9) We are surprised that there are no links between the PAS and CHAIR in most of the hospitals. However, the trial at Mallow General Hospital has been encouraging, and indicates that the creation and effective running of such</td>
<td>f) Should CHAIR be incorporated within NCIS, effective links between it and hospital PAS products must be established.</td>
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<td></td>
<td>g) The forthcoming replacement of hospital information systems nationally with a new</td>
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EVALUATION OF CHAIR –
FINAL REPORT TO THE DEPARTMENT OF HEALTH AND CHILDREN
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<tr>
<td>a link can be made to work effectively.</td>
<td>ISOFT product will require further work to rebuild such an interface</td>
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<tr>
<td>10) The refusal by IT staff at the two voluntary hospitals in Cork to connect CHAIR to their hospital networks creates inefficiencies and a waste of resources. We feel that the policy adopted is overly restrictive, particularly when CROs in other hospitals which are just as vulnerable to virus infection, do have the capacity to access both CHAIR and other hospital systems from a single PC.</td>
<td>h) We recommend that this position be examined in more detail from a technical perspective, to identify a suitable resolution to the satisfaction of all parties.</td>
</tr>
<tr>
<td>11) We are satisfied that the organisational and governance arrangements which currently apply to CHAIR are fit for its purpose and work effectively.</td>
<td>i) We recommend no change to organisational and governance arrangements for CHAIR, within its current context.</td>
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### 6.5 Stakeholder Perspectives

#### 6.5.1 General Assessment

As reported in Section 5 above, the fact that knowledge about CHAIR is confined to a small number of hospital-based staff who actively participate in the project makes it difficult to gain any real breadth of perspective when gathering the views of stakeholders. By definition within the context of CHAIR, stakeholders are those with a certain vested interest in the project, and it is not possible to take objective soundings from a broad range of interested parties.

In particular, it has not proven possible to identify the perspectives of patients whose details are registered within CHAIR, simply because they are unaware of its existence in almost every case. Of more concern to us, because it illustrates the stand-alone nature of CHAIR and its relative disconnection from other elements of cardiovascular care, is the fact that GPs participating in Heartwatch in HSE Southern Area are typically unaware of what CHAIR consists of or the benefits it offers.

Amongst those clinicians who currently participate in CHAIR, there is a strong sense that the pilot project has achieved some of its original aims, particularly in terms of proving that the concept of gathering and managing data for ACS patients can be made to work effectively. It was also recognised by many stakeholders that with CHAIR having been running now for over two years, some form of change is necessary, and that greater analysis of the data (and allocation of resources to support this) would be a logical next stage, either on a continued stand-alone basis or as part of NCIS.
6.5.2 Overall Scorecard Evaluation And Recommendations

<table>
<thead>
<tr>
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<th>Recommendations</th>
</tr>
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<tbody>
<tr>
<td>12) CHAIR stakeholder perspectives are confined to those actively participating in the project, and do not include patients, GPs or other hospital-based clinicians currently uninvolved in CHAIR.</td>
<td>j) Any future continuation of CHAIR, or inclusion of CHAIR within a wider project such as NCIS, must include a much wider base of participants than we have observed under the present circumstances, and should ideally reach out to patients whose details are held in CHAIR.</td>
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<tr>
<td>13) It is accepted by many stakeholders currently involved in CHAIR that the pilot has reached a natural stage in its development where further change is required. We endorse this view as it tends to accept that there is limited advantage in proceeding with CHAIR under current circumstances, and that inclusion in a more broadly-based project such as NCIS makes sense.</td>
<td>k) The specific steps required to incorporate CHAIR within NCIS should be examined and a detailed project plan developed.</td>
</tr>
</tbody>
</table>

6.6 Conformity with National Policies and Strategies

6.6.1 Overview

The scorecard evaluation, as reported above, deals primarily with the intrinsic aspects of CHAIR and attempts to measure the impact it achieves within the four quadrants of the scorecard. Within a public policy context, however, it is also important to note the extent to which a publicly-funded initiative such as CHAIR conforms with national policies and strategies, as any failure to conform would inevitably invite questions as to its continued resourcing. Two main policy documents published within the last four years are worthy of note: the national health strategy “Quality and Fairness”, published in 2001, and the 2004 document “Health Information – A National Strategy”.

6.6.2 “Quality and Fairness”

Although the 2001 national health strategy was very broad-ranging in its scope, and set out 121 separate actions covering every aspect of the health system in Ireland, a number of its key objectives are found within CHAIR and the governing principles which led to its inauguration. For example, “Quality and Fairness” specifically targets a substantial programme of improvements in accident and emergency departments (action 86), including the need for “chest pain clinics, respiratory clinics and in-house specialist teams... to fast-track patients”.

More fundamentally, the four national goals of “Quality and Fairness” are deeply resonant of the principles underpinning CHAIR:
- Goal 1: Better Health for Everyone;
- Goal 2: Fair Access;
• Goal 3: Responsive and Appropriate Care Delivery;
• Goal 4: High Performance.

In this regard, much of what CHAIR offers – better use of statistical information and other evidence to improve delivery of care, standardisation of high-quality approaches, better patient focus, and other features – is central to the various objectives and targets articulated against these goals. Accordingly, we believe CHAIR to be in a position to deliver well against the objectives of “Quality and Fairness”, albeit with some way to go before its theoretical benefits can be realised in practice (specifically through better buy-in from clinicians).

6.6.3 Health Information – A National Strategy

The 2004 National Health Information Strategy (NHIS) also set out a number of broad principles and plans through which better use of information and ICT systems will take place in the coming years, in order to help deliver the goals and targets published in “Quality and Fairness”.

Although much of NHIS is strategic in nature and does not deal with the specific needs of areas such as cardiovascular care, one of its central components is the phased implementation of an electronic healthcare record or EHR (action 15). NHIS states that:

“The greatest advantage of the electronic healthcare record for the individual client/patient and health professional is in bringing together the global, integrated and up-to-date health history of the client/patient at the time of consultation so that critical decisions can be much better informed. It also provides the potential for a much greater level of clinical decision support in the future.”

The EHR also “supports and enables shared care through quick and easy access to data where there are overlapping areas of interest, e.g. between primary and secondary care in managing referrals, ePrescribing, or the care of clients/patients with chronic conditions such as diabetes, heart disease or cancer.”

From a health surveillance perspective, the EHR also “supports and replaces much of the data collection activity currently required for clinical registries, e.g. cancer, cardiovascular disease, or surgical procedures; this frees up resources that can be dedicated to the intelligence function in analysing and using the information that is collected.” It also supports risk management processes and “clinical audit, research and epidemiological processes where analytical techniques allow flexible ways to answer new questions in response to changing information needs and priorities.”

Of course, CHAIR is not an EHR and was not developed as such. It does, however, have the potential to become part of an EHR system and certainly offers a number of the central aspects which would be expected of an effective and
functioning EHR, including a patient database, data gathering methods and processes, treatment records, and data analysis capability, amongst others.

Accordingly, we believe that CHAIR conforms well with the central concepts and principles stated within NHIS, and we do not see any reason why it cannot (as part of NCIS) be further developed to help deliver some of the specific targets contained in NHIS.
7 CONCLUSIONS

7.1 Overview

Overall, our evaluation of CHAIR has shown that it has been a good and well-managed project, which has achieved much of what it set out to do in terms of proving that data collection and management for ACS patients can be organised effectively through the use of a dedicated ICT system and the deployment of registration staff with sound clinical understanding. However, we must also conclude that CHAIR is of limited use without significant clinical engagement in quality improvement processes, and that its continuation in its present guise would be of very limited benefit.

7.2 Key Decisions on CHAIR

Fundamentally, the Department must consider whether it wishes to maintain CHAIR or to terminate the pilot project.

Our conclusion is that if CHAIR were to remain unaltered and its future position were to be that of a stand-alone project, it would be extremely difficult to justify the continued level of public investment in the project, bearing in mind the limited extent of qualitative benefit obtained to date. Our recommendation in that regard would be to terminate the pilot.

However, we are very cognisant of the fact that CHAIR is now in a transitional phase, and that its status is likely to alter radically as a result of the implementation of NCIS. Under this scenario, CHAIR moves from being a relatively stand-alone project to a position wherein it is part of a much wider, more integrated initiative dealing with a broader range of cardiovascular information at a national level. Importantly, NCIS will be a central element in the accreditation process for hospital cardiology departments, giving it a higher profile with greater national attention than has been possible with CHAIR.

Nonetheless, the future plans for CHAIR do not alter the fact that CHAIR has not succeeded in achieving significant engagement from the majority of consultant cardiologists and physicians dealing with ACS patients. Whilst it has been suggested to us that HIQA will play a key role in encouraging medical staff to take a greater interest and involvement in initiatives such as CHAIR and NCIS, this view is aspirational and the effort involved in altering consultants' behaviour (in the context of forthcoming discussions on the Common Contract) should not be underestimated.

Our conclusion on this issue is that there are sufficient, positive signs that CHAIR (as part of NCIS) will be capable of delivering substantial benefits in the near future (i.e. within the next 12 - 18 months), to the extent that continued investment will be justifiable. In particular, it can help to play a key role in the quality agenda to be pursued by HIQA, and can form a basis for effective clinical audit, service planning, and the design of highly effective services to meet proven needs.
clinical need. That said, we remain firmly of the belief that these improvements stand little chance of success unless the following components are added to CHAIR as part of NCIS:

- A champion with power and authority who can maximise the involvement of clinical colleagues;
- A commitment to uniformity from the sponsoring organisation(s);
- A dedicated operational research capability focused exclusively on CHAIR, with the capacity to generate routine and occasional reports;
- A commitment to clinical audit amongst medical and nursing staff caring for ACS patients.

If these components are added, then we see no reason why CHAIR (as part of NCIS) should not be very successful in improving the care provided to ACS patients.

**CORE RECOMMENDATION:**
We are therefore happy to recommend the continuation of CHAIR within NCIS, with the specific proviso that major attention is devoted to ensuring that the above four key components are built into CHAIR/the NCIS ACS module at an early opportunity.

We also believe that it would be prudent for the Department to re-evaluate the impact of CHAIR (as part of NCIS) around 12 – 18 months after it has become subsumed within NCIS (i.e. around mid-2007). In order to facilitate this process, it would be advisable for clear performance indicators to be established for CHAIR as soon as possible, so that firm benchmarks may be used for the purposes of comparison and to identify measurable improvements. Such benchmarks could include the number and extent of consultants participating in CHAIR (a key deficiency under the current arrangements), and process-related improvements such as changes in treatment provided, drugs prescribed, door-to-needle times and other key measures.

We now move on to discuss briefly some aspects of how CHAIR might function as part of NCIS.

### 7.3 Continuing CHAIR as Part of NCIS

As reported above, NCIS is making progress nationally with the design and roll-out of its various modules. With specific regard to the current plans of NCIS within the HSE Southern Area, it is proposed to introduce:

- Acute coronary syndrome (ACS) registers to each of the eight acute hospitals within the HSE Southern Area (direct replacements for CHAIR registers);
- Cardiac rehabilitation (CR) registers at the eight hospitals (currently being progressed);
- Percutaneous coronary intervention (PCI) registers to Cork University Hospital and the Bon Secours Hospital in Cork;
An electrophysiology (EP) register to the South Infirmary; and

A cardiac Surgery (CS) module to CUH (one already exists but will require changes).

Although it is premature to define specifically how the various NCIS modules will work in practice, it has been proposed that most of the NCIS data collection should be done by the clinical practitioners involved (mostly doctors and nurses). In particular, cardiac rehabilitation and cardiac surgery staff would take the lead in data collection and entry on the NCIS registers within their respective areas. However, there is some debate as to the methods for EP data collection, as this involves three individual datasets and is likely to be quite time-consuming. Similarly, the PCI data will probably be substantial, involving many elective PCIs as well as admitted patients. For ACS data – that covered at present by CHAIR – it has yet to be decided whether the criteria for inclusion will be the same as at present or will alter (i.e., the inclusion of both suspect and confirmed ACS cases, as currently, or confirmed cases alone; and the inclusion of all cases in hospital, or those in CCU/ICU alone).

Given the amount of data collection, entry and management which is anticipated within NCIS, it is clear that specific attention must be given to the question of how these activities are resourced. Although the wider aspects of NCIS outside the ACS field are beyond our scope in this project, we believe that the CHAIR pilot to date has proven that dedicated resources are required to manage the significant volumes of ACS data generated within the eight acute hospitals, and that a similar level of resourcing would be necessary in the future (unless it were decided to conduct data collection on a non-continuous basis).

This being the case, whilst some elements of the data collection and entry for cardiac rehabilitation and surgery would be undertaken by clinical practitioners in these areas, there is merit in considering whether other, more resource-intensive, aspects of NCIS data collection and entry – such as PCI and EP – would need to be supported by other personnel, particularly given the workload pressures upon medical and nursing staff. In this instance, a ready-made solution would appear to be that CHAIR staff might assume responsibility for certain other data collection duties under NCIS (with perhaps some modest addition to resources, if the need for this could be justified).

(This calls into question the extent of CHAIR data collection – whether it should be continuous or randomised/selective. As discussed in Section 6.2.3 (footnote 12) above, the option exists either to have continuous data collection, or to conduct it during a defined period each year, or on a randomised basis. Provided that there is no statistical imbalance, there is no reason why any of these approaches could not be made to work, with the result that the selection of the approach will often be based upon the availability and cost of resources to undertake the data gathering. In the context of CHAIR, we believe that it should be possible for data gathering to be reduced from a continuous basis to a selective basis – for example, during a defined three-month period every year – without necessarily reducing the quality of the information collected. This would then free up CROs for other NCIS-related
tasks in respect of modules other than ACS, providing a local, experienced resource at each CHAIR location to help implement NCIS more smoothly, with less learning and induction time required.)

As this evaluation is focused specifically on CHAIR, we do not wish to stray outside the boundaries of our terms of reference by making recommendations regarding the future support structures required by NCIS. However, given the likely need for local management of the NCIS roll-out and the existing CHAIR resources and structures, we would propose that the Department, in conjunction with its partners in the HSE and in the NCIS project, should examine closely the potential for the management and resourcing arrangements of CHAIR to be subsumed within NCIS at an early date (for example, 1 January 2006) in order that the current CHAIR staff can play a significant role in the implementation of the NCIS modules in the eight Cork and Kerry acute hospitals, and can provide an immediate basis for NCIS to go live in these locations during 2006. This solution, which requires more detailed analysis and discussion between the various parties, would appear to us to represent the smoothest means of achieving an effective transition from CHAIR to NCIS, with minimal disruption.

7.4 Concluding Thoughts and Considerations

The data set collected by CHAIR includes patient details, pre-existing risk factors, symptom onset, care interventions and timings and discharge status. It therefore presents the possibility of constructing a detailed picture of not only individual patient journeys, but also institutional performance and community profiles. The dataset is broadly comparable with international cardiac datasets, including CARDS.

The inclusion of patient details which include educational attainment and social class, would potentially allow the examination of equity profiles which could elucidate the variation in service that might be afforded to different genders and social classes. This is, however, highly dependent on the quality of the data. It has been noted above (Section 3.3.2) that data ascertainment in respect of social class has not been completely satisfactory.

The clinical data collected under CHAIR would potentially be highly appropriate for service planning purposes. This might include improved mechanisms for rapid diagnosis thus avoiding admission, or restructured discharge arrangements. Both of these approaches could potentially save significant resources by reducing total bed days.

The reported fears of some medical staff that the data might be used as a performance management system indicate that there is still some way to go in gaining understanding that the key potential of the system lies in the possibility to improving the quality of clinical treatment provided to patients. The data reports which analyse key indicators (such as time delay to thrombolysis) by hospital are extremely useful documents. They allow individual institutions to see how their performance compares to others. This comparison takes place however without
there being any overall standard or target being set, either in terms of the degree of variation that is acceptable between institutions or in the level of performance that it is desirable that all institutions should meet.

Although it must be acknowledged that the CHAIR pilot has been largely dominated by the testing of the feasibility of the information collection, including vital issues such as accuracy and completeness, it is disappointing that the clinical community has not seized the opportunity to use this valuable resource for clinical audit purposes. Engagement in clinical audit is a core element of good clinical practice and the availability of such high quality comparative data is a rarity in most fields of medical endeavour.

Ideally, the information would be at the centre of an approach that set standards for quality of care that all institutions would strive to meet. Such an approach would ensure:

- that such standards would be evidence based and benchmarked against best international practice;
- that standards would be subject to review and refinement in the light of progress; and
- that the progress in achieving the standards would be reviewed regularly at a clinical team, hospital and national level.

7.5 Recommendations

Our central recommendation to the Department is as follows:

**CORE RECOMMENDATION:**

We recommend the continuation of CHAIR within NCIS, with the specific proviso that major attention is devoted to ensuring that the following four key components are built into CHAIR/the NCIS ACS module at an early opportunity:

- A champion with power and authority who can maximise the involvement of clinical colleagues;
- A commitment to uniformity from the sponsoring organisation(s);
- A dedicated operational research capability focused exclusively on CHAIR;
- A commitment to clinical audit amongst medical and nursing staff caring for ACS patients.

In summary, the supporting recommendations emerging from this study are as follows:

a) At an absolute level, we do not see any real benefit to be derived from CHAIR being continued in its present format. Evidence from other countries has shown that clinical data from registers such as CHAIR does not necessarily have to be collected on a continuous basis, but may be gathered within a defined timeframe (for example, one quarter each year) to track progress, to provide sufficient information to assist
research and to inform the debate on clinical audit. As stated above, the CHAIR pilot has proven that the methodology can work, although the extent to which the data has subsequently been put to use for the improvement of clinical practice is limited and is somewhat disappointing.

b) On the question of whether CHAIR should be maintained, our view is that this is difficult to justify in its current situation. However, it should be recognised that the option also exists to continue to operate CHAIR in a modified format, as part of a wider initiative such as NCIS, and we believe that this is a more valid issue to address. This consideration has informed our core recommendation, set out above.

c) Further consideration should be given to the practicalities involved in CHAIR being subsumed within NCIS, including issues related to staffing, infrastructure, timescales, and data collection/management to clinicians to help enhance clinical care for ACS patients.

d) From a value for money perspective, CHAIR should not be continued in its present format as a stand-alone project.

e) More efficient arrangements which might be introduced to CHAIR would include:

- use of hand-held data capture devices;
- creation of interface links between CHAIR and other "feeder" systems;
- general streamlining of business processes and working arrangements.

f) Should CHAIR be incorporated within NCIS, effective links between it and hospital PAS products must be established.

g) The forthcoming replacement of hospital information systems nationally with a new iSOFT product will require further work to rebuild such an interface.

h) We recommend that the position regarding the CHAIR PCs in the two Cork voluntary hospitals, and their lack of network connections, should be examined in more detail from a technical perspective, to identify a suitable resolution to the satisfaction of all parties.

i) We recommend no change to organisational and governance arrangements for CHAIR, within its current context.

j) Any future continuation of CHAIR, or inclusion of CHAIR within a wider project such as NCIS, must include a much wider base of participants than we have observed under the present circumstances, and should ideally reach out to patients whose details are held in CHAIR.

k) The specific steps required to incorporate CHAIR within NCIS should be examined and a detailed project plan developed.

7.6 Next Steps

We look forward to signing off this final report with representatives of the Department of Health and Children in the near future.
APPENDIX 1: CHAIR – SAMPLE PILOT SOFTWARE SCREENS

EVALUATION OF CHAIR – FINAL REPORT TO THE DEPARTMENT OF HEALTH AND CHILDREN
EVALUATION OF CHAIR
FINAL REPORT TO THE DEPARTMENT OF HEALTH AND CHILDREN
**APPENDIX 2: CHAIR PILOT DATA ENTRY SHEET ITEMS**

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<tr>
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<tr>
<td>Grey (Italic) Text</td>
<td>Information is optional for the CHAIR registry</td>
</tr>
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Patient and General Demographics

- **Medical Record No** __________
- **Title** __________
- **First Name(s)** __________
- **Last Name** __________
- **Address Street (& No)** __________
- **Town/City** __________
- **County/Country** __________
- **Telephone No** __________
- **Sex** (circle one) Male Female Unknown
- **Date of Birth (DOB)** __________
- **Date of Death** __________
- **Marital Status** (circle or underline one) Apart Divorced Married Not specified Other Single Widowed
- **Education Status** (circle or underline one) No Formal Education Other Primary Secondary Tertiary Technical University Unknown
- **Employment Status** (circle or underline one) Disability Benefit Full Time Employed Household duties Part Time Employed Retired Student Unemployed Unknown
- **Healthboard [by residence]** (circle or underline one) SHB NAHB SWAHB ECAHB NEHB NWHB WHB MHB MWHB SEHB Unknown
- **Health Cover** (circle or underline one) None GMS VHI BUPA Other (PHI) Unknown
- **Occupation** __________
- **Work Telephone No** __________
**CAPITA**

**Appendix 2, Page 2**

Next of Kin Details

<table>
<thead>
<tr>
<th>Relationship</th>
<th>First Name(s)</th>
<th>Last Name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Address Street (&amp; No)</th>
<th>Town/City</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>County/Country</th>
<th>Telephone No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Relevant patient and next of kin details entered into CHAIR (tick if yes) ☐

General practitioner details

<table>
<thead>
<tr>
<th>GP Name (last name)</th>
<th>(first name or first initial(s))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GP Address</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<table>
<thead>
<tr>
<th>GP Tel No</th>
<th>Heartwatch (HW) Doctor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>yes (on list) no (not on list)</td>
</tr>
</tbody>
</table>

Admission details

<table>
<thead>
<tr>
<th>Admission Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consultant Name (last name)</th>
<th>(first name or first initial(s))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Admission Location (circle or underline one)

- CCU/ICU
- Coronary Ward
- A&E Ward
- Other Ward

Admission Source (circle or underline one)

- Direct GP
- Direct Outpatients Dept
- Other
- Transfer from another Hospital
- Unknown
- Chest Pain Clinic
- A&E (via GP)
- A&E Self

Admission Diagnosis (circle or underline one)

- definite MI
- probable MI
- unstable angina
- chest pain (possible cardiac)
- already in hospital
- unknown
- angina

Transport to Hospital (circle or underline one)

- Ambulance
- Car
- Other
- Unknown

**WARD TRANSFERS**

<table>
<thead>
<tr>
<th>Transfer From</th>
<th>To</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</table>

<table>
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<th>Transfer From</th>
<th>To</th>
<th>Date</th>
<th>Time</th>
</tr>
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<tbody>
<tr>
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</table>

<table>
<thead>
<tr>
<th>Transfer From</th>
<th>To</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Transfer From</th>
<th>To</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Thrombolysis Details

<table>
<thead>
<tr>
<th>Medical &amp; Ambulance Records</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Onset of symptoms</td>
<td>Date <em><strong>/</strong></em>/____</td>
<td>Time <em><strong>:</strong></em></td>
</tr>
<tr>
<td>Call for Professional help</td>
<td>Date <em><strong>/</strong></em>/____</td>
<td>Time <em><strong>:</strong></em></td>
</tr>
<tr>
<td>Arrival at Hospital/A/E</td>
<td>Date <em><strong>/</strong></em>/____</td>
<td>Time <em><strong>:</strong></em></td>
</tr>
</tbody>
</table>

Thrombolysis administered (circle or underline one) | yes | no

If yes
When Thrombolysis administered | Date ___/___/____ | Time ___:___ |

Thrombolysis Type (circle or underline one)
- Streptokinase
- Retepolase
- Alteplase
- Tenecteplase
- Other tPA derived drug
- Other
- Unknown

If no
Reason Thrombolysis not administered (circle or underline one)
- Drug Contra-Indication
- Blood dyscrasia
- Internal Bleeding / Surgery
- No Initial ECG Criteria
- Persisting Hypertension
- Prolonged/Traumatic CPR
- Primary Angioplasty
- Time Delay
- Recently thrombolysed (other hospital)
- Other
- Unknown

### Risk Factors

<table>
<thead>
<tr>
<th>Medical Records</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(Patient) History of CHD (circle or underline one)</td>
<td>MI</td>
<td>Unstable Angina</td>
</tr>
<tr>
<td>Family History of CHD (circle or underline one)</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Diabetes (circle or underline one)</td>
<td>None</td>
<td>Diet Treatment</td>
</tr>
<tr>
<td>Physical Activity (circle or underline one)</td>
<td>Unknown</td>
<td>Active (&gt;3 times a week for at least 20 mins)</td>
</tr>
<tr>
<td>Height __ cm</td>
<td>Estimated</td>
<td>yes</td>
</tr>
<tr>
<td>Smoking Status (circle or underline one)</td>
<td>Current Smoker (&lt;6mths)</td>
<td>Former Smoker (&gt;6mths)</td>
</tr>
<tr>
<td>History of Hypertension (circle or underline one)</td>
<td>Yes - lifestyle treatment</td>
<td>Yes - drug treatment</td>
</tr>
<tr>
<td>Alcohol consumption (circle or underline one)</td>
<td>None</td>
<td>Unknown</td>
</tr>
<tr>
<td>Heavy (Male - &gt;/= 21 units or Female - &gt;/= 14 unit)</td>
<td>Moderate (Male - 1 - 21 units or Female - 1 - 14 units)</td>
<td></td>
</tr>
<tr>
<td>BP Systolic (first reading) ___</td>
<td>BP Diastolic (first reading) ___</td>
<td></td>
</tr>
<tr>
<td>Cholesterol (mmol/l): LDL ___</td>
<td>HDL ___</td>
<td>Trigs ___</td>
</tr>
<tr>
<td>On Current Cholesterol Drug (on admission) (circle or underline one)</td>
<td>yes</td>
<td>no</td>
</tr>
</tbody>
</table>

Minimum (mandatory) admission detail entered into CHAIR (tick if yes) □
### Medical Records

**Clinical**

**Procedures done (circle or underline any relevant procedures)**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Angioplasty</td>
</tr>
<tr>
<td>2.</td>
<td>Angioplasty <em>(other hospital)</em></td>
</tr>
<tr>
<td>3.</td>
<td>Angioplasty + Stent</td>
</tr>
<tr>
<td>4.</td>
<td>Angioplasty + Stent <em>(other hospital)</em></td>
</tr>
<tr>
<td>5.</td>
<td>Cardio Pulmonary Resuscitation</td>
</tr>
<tr>
<td>6.</td>
<td>Cardioversion</td>
</tr>
<tr>
<td>7.</td>
<td>Coronary Artery Bypass Graft <em>(other hospital)</em></td>
</tr>
<tr>
<td>8.</td>
<td>Coronary Artery By-pass Graft</td>
</tr>
<tr>
<td>9.</td>
<td>Defibrillation</td>
</tr>
<tr>
<td>10.</td>
<td>Heart Transplant</td>
</tr>
<tr>
<td>11.</td>
<td>Oth. Cardiac Catheter</td>
</tr>
<tr>
<td>12.</td>
<td>Other</td>
</tr>
<tr>
<td>13.</td>
<td>Pericard Drain</td>
</tr>
<tr>
<td>14.</td>
<td>Permanent Pacemaker</td>
</tr>
<tr>
<td>15.</td>
<td>Pleural Tap</td>
</tr>
<tr>
<td>16.</td>
<td>Swan Ganz Catheter</td>
</tr>
<tr>
<td>17.</td>
<td>Temporary Pacemaker</td>
</tr>
<tr>
<td>18.</td>
<td>Valve Replacement</td>
</tr>
<tr>
<td>19.</td>
<td>Ventilation</td>
</tr>
</tbody>
</table>

**Topography for acute MI (circle or underline any relevant locations)**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Aberrant Conduction</td>
</tr>
<tr>
<td>A.</td>
<td>Anterior</td>
</tr>
<tr>
<td>A.</td>
<td>Anterolateral</td>
</tr>
<tr>
<td>A.</td>
<td>Anteroseptal</td>
</tr>
<tr>
<td>A.</td>
<td>Inferior</td>
</tr>
<tr>
<td>A.</td>
<td>Inferolateral</td>
</tr>
<tr>
<td>A.</td>
<td>Lateral</td>
</tr>
</tbody>
</table>

**No Ischaemic change**

**Other Ischaemic changes**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>Right Ventricular</td>
</tr>
<tr>
<td>E</td>
<td>True Posterior</td>
</tr>
<tr>
<td>C</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

**ACS Complications (circle or underline any relevant complications)**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Asystole</td>
</tr>
<tr>
<td>2.</td>
<td>Atrial Fibrillation</td>
</tr>
<tr>
<td>3.</td>
<td>Atrial Flutter</td>
</tr>
<tr>
<td>4.</td>
<td>Cardiogenic Shock</td>
</tr>
<tr>
<td>5.</td>
<td>Deep Vein Thrombosis</td>
</tr>
<tr>
<td>6.</td>
<td>Dressler Syndrome</td>
</tr>
<tr>
<td>7.</td>
<td>Frozen Shoulder</td>
</tr>
<tr>
<td>8.</td>
<td>Heart Block</td>
</tr>
<tr>
<td>9.</td>
<td>Left Ventricular Aneurysm</td>
</tr>
<tr>
<td>10.</td>
<td>Left Ventricular Failure</td>
</tr>
<tr>
<td>11.</td>
<td>Other</td>
</tr>
<tr>
<td>12.</td>
<td>Pericarditis</td>
</tr>
<tr>
<td>13.</td>
<td>Post MI unstable angina</td>
</tr>
<tr>
<td>14.</td>
<td>Pulmonary Embolism</td>
</tr>
<tr>
<td>15.</td>
<td>Pulseless Electrical Activity <em>(PEA)</em></td>
</tr>
<tr>
<td>16.</td>
<td>Valve Dysfunction</td>
</tr>
<tr>
<td>17.</td>
<td>Ventricular Rupture</td>
</tr>
<tr>
<td>18.</td>
<td>Ventricular Fibrillation</td>
</tr>
<tr>
<td>19.</td>
<td>Ventricular Tachycardia</td>
</tr>
<tr>
<td>20.</td>
<td>Cerebrovascular Accident <em>(CVA)</em></td>
</tr>
</tbody>
</table>

**New Q Waves (circle one)**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

Any clinical procedures done at ‘..*(other hospital)*’ electronically transferred- □ Yes □ No
### Investigations (circle or underline relevant investigations and results)

<table>
<thead>
<tr>
<th>Investigation</th>
<th>Result options</th>
<th>Date (and Time)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Electrocardiogram (ECG)</td>
<td>ECG Normal</td>
<td>Arrhythmia</td>
</tr>
<tr>
<td></td>
<td>Bundle Branch Block Left</td>
<td>ST elevation</td>
</tr>
<tr>
<td></td>
<td>ST depression</td>
<td>T Wave changes</td>
</tr>
<tr>
<td>Diagnostic ECG (If initial is not diagnostic ECG)</td>
<td>ECG Normal</td>
<td>Arrhythmia</td>
</tr>
<tr>
<td></td>
<td>Bundle Branch Block Left</td>
<td>ST elevation</td>
</tr>
<tr>
<td></td>
<td>ST depression</td>
<td>T Wave changes</td>
</tr>
<tr>
<td>Chest X-Ray (CXR)</td>
<td>CXR Normal</td>
<td>Congestive Changes</td>
</tr>
<tr>
<td></td>
<td>Congestive Changes Pulmonary oedema</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Muscular-skeletal changes</td>
<td>Obstructive Airways</td>
</tr>
<tr>
<td></td>
<td>Pleural Changes</td>
<td>CXR Other abnormality</td>
</tr>
<tr>
<td>CE - CK</td>
<td>Elevated</td>
<td>Not Elevated</td>
</tr>
<tr>
<td></td>
<td>Peak Value</td>
<td>mU/L</td>
</tr>
<tr>
<td>CE - CK-MB</td>
<td>Elevated</td>
<td>Not Elevated</td>
</tr>
<tr>
<td></td>
<td>Peak Value</td>
<td>mU/L</td>
</tr>
<tr>
<td>CE - Troponin T</td>
<td>Elevated</td>
<td>Not Elevated</td>
</tr>
<tr>
<td></td>
<td>Peak Value</td>
<td>ng/mL</td>
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<tr>
<td>CE - Troponin I</td>
<td>Elevated</td>
<td>Not Elevated</td>
</tr>
<tr>
<td></td>
<td>Peak Value</td>
<td>ng/mL</td>
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</table>

### Investigations done at other hospital electronically transferred - □ Yes □ No
**Medications (on Discharge)**

<table>
<thead>
<tr>
<th>DRUG SHEET</th>
<th>Medications (circle or underline relevant medications)</th>
</tr>
</thead>
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<tr>
<td>16. Proton Pump Inhibitor</td>
<td>17. Unknown</td>
</tr>
</tbody>
</table>

**Discharge details**

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<thead>
<tr>
<th>MEDICAL RECORDS</th>
<th>Discharge Date _ _ / _ _ / _ _ _ Time _ : _ _</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discharge Diagnosis (circle or underline relevant diagnoses)</td>
<td></td>
</tr>
<tr>
<td>1. Angina</td>
<td>2. chest pain (non cardiac)</td>
</tr>
</tbody>
</table>

| Discharge Destination (circle or underline one) |

<table>
<thead>
<tr>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Referred for Cardiac Rehabilitation advice/treatment (circle or underline one)</td>
</tr>
</tbody>
</table>

| Patient eligible & consented for short patient outcome follow-up (tick if yes) | □ (see over) |
| Patient eligible & consented for full patient outcome follow-up (tick if yes) | □ (see over) |

All relevant details entered into chair (tick if yes) □

---

EVALUATION OF CHAIR – DRAFT FINAL REPORT TO THE DEPARTMENT OF HEALTH AND CHILDREN
Follow Up on patient outcome after discharge (if relevant)

**For short (and full) follow up**

<table>
<thead>
<tr>
<th>Effective Follow Up Date</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>

Is patient deceased?  
☑ Yes  ☐ No

If yes -  
<table>
<thead>
<tr>
<th>Date of Death</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>

Cause of Death -  
☑ MI ☐ other cardiac  ☐ non cardiac

**For full follow up only**

Has patient returned to a hospital as an inpatient?  
☐ Yes  ☐ No

If yes -  
<table>
<thead>
<tr>
<th>Date of 1st return visit</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>

Reason -  
☑ MI ☐ CABG ☐ PCI ☐ Angiogram ☐ CHF (no MI) ☐ Rhythm disturbance (no MI)  
recurrent Angina (no MI) ☐ other cardiac condition ☐ other non cardiac condition

*(Computer entry note: Select reasons and add (+) for each reason, then press 'Add Ret Visit'*)

<table>
<thead>
<tr>
<th>Date of 2nd return visit</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>

Reason -  
☑ MI ☐ CABG ☐ PCI ☐ Angiogram ☐ CHF (no MI) ☐ Rhythm disturbance (no MI)  
recurrent Angina (no MI) ☐ other cardiac condition ☐ other non cardiac condition

*(Computer entry note: Select reasons and add (+) for each reason, then press 'Add Ret Visit'*)

<table>
<thead>
<tr>
<th>Date of 3rd return visit</th>
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<th></th>
<th></th>
</tr>
</thead>
</table>

Reason -  
☑ MI ☐ CABG ☐ PCI ☐ Angiogram ☐ CHF (no MI) ☐ Rhythm disturbance (no MI)  
recurrent Angina (no MI) ☐ other cardiac condition ☐ other non cardiac condition

*(Computer entry note: Select reasons and add (+) for each reason, then press 'Add Ret Visit'*)

Is the patient (when consented) a smoker (via CHAIR records)?  
☐ Yes  ☐ No

*(If patient was a smoker) has he/she not smoked in the last month (30 days)?*  
☐ Yes (not smoked)  ☐ No (smoked)

Is patient receiving cardiac rehabilitation advice/treatment post discharge?  
☐ Yes  ☐ No

Other Comments/Notes

---

**EVALUATION OF CHAIR – DRAFT FINAL REPORT TO THE DEPARTMENT OF HEALTH AND CHILDREN**
APPENDIX 3: DETAILED STATISTICAL INFORMATION IN RELATION TO CHAIR

(We are indebted to Mr Brendan Cavanagh, CHAIR Pilot Project Manager, for the provision of this material.)
CHAIR Pilot general statistics

- Over 9400 CHAIR admissions to end April 2005
- About 5% are re-admissions
- Discharge - ACS (MI and Unstable Angina) (38%)
  - Male 67% (mean age 65.3)
  - Female 33% (mean age 71.9)
- Discharge - Non ACS (incl. other cardiacs) (62%)
  - Male 62% (mean age 60.3)
  - Female 38% (mean age 63.5)
CHAIR registrations (showing ACS discharge diagnoses) from 1 May 2003 to 31 Jan 2005 (all 8 hospitals)
CHAIR registrations showing all discharge diagnoses from 1 May 2002 to 30 April 2005 (all 8 hospitals)
CHAIR registrations (showing ACS discharge diagnoses) from 1 May 2002 to 30 April 2005 (all 8 hospitals)
CHAIR ACS discharge diagnoses (MIs and UA) from 1 May 2002 to 30 April 2005 (all 8 hospitals)
CHAIR Non ACS discharge diagnoses from 1 May 2002 to 30 April 2005 (all 8 hospitals)
CHAIR registrations showing all discharge diagnoses from 1 May 2003 to 31 Jan 2005 (all 8 hospitals)

Note: ACS Discharges include STEMI, N-STEMI and UA
CHAIR registrations (showing ACS discharge diagnoses) from 1 May 2003 to 31 Jan 2005 (all 8 hospitals)

Note: ACS Discharges include STEMI, N-STEMI and UA
CHAIR ACS discharge diagnoses (MIs and UA) from 1 May 2003 to 31 Jan 2005 (all 8 hospitals)
CHAIR Non ACS discharge diagnoses from 1 May 2003 to 31 Jan 2005 (all 8 hospitals)
Mean age (by gender) for all CHAIR and ACS discharge diagnoses from 1 May 2003 to 31 Jan 2005

- Female ACS
- Female CHAIR
- Male ACS
- Male CHAIR

<table>
<thead>
<tr>
<th>1st Qtr</th>
<th>2nd Qtr</th>
<th>3rd Qtr</th>
<th>4th Qtr</th>
<th>5th Qtr</th>
<th>6th Qtr</th>
<th>7th Qtr</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/5/03-</td>
<td>1/8/03-</td>
<td>1/11/03-</td>
<td>1/2/04-</td>
<td>1/5/04-</td>
<td>1/8/04-</td>
<td>1/11/04-</td>
</tr>
<tr>
<td>31/7/03</td>
<td>31/10/03</td>
<td>31/1/04</td>
<td>30/4/04</td>
<td>31/7/04</td>
<td>31/10/04</td>
<td>31/1/05</td>
</tr>
</tbody>
</table>
Admission diagnoses for CHAIR admissions to 30 April 2005

- Definite MI: 15%
- Unstable Angina: 28%
- Probable MI: 7%
- Angina: 5%
- Chest Pain cardiac?: 44%
- Other: 1%
Discharge diagnoses for CHAIR admissions to 30 April 2005

- Chest Pain Non Cardiac: 28%
- Other cardiac: 8%
- Angina: 11%
- Other: 11%
- ACS: 13%
- STEMI: 10%
- NonSTEMI: 19%
- Unstable Angina: 11%
Discharge diagnoses for ACS discharges to 30 April 2005

- STEMI: 25%
- NonSTEMI: 46%
- Unstable Angina: 29%
General Statistics from CHAIR
Thrombolysis to 30 April 2005 on the 928 CHAIR admissions with a discharge diagnosis of ST Elevation MI

Note: To 1st September 2003 62% of STEMIs were thrombolysed.

Reasons for No Thrombolysis

- Time Delay – 37%
- No initial ECG criteria – 13%
- Internal Bleeding – 5%
- Primary Angioplasty – 4%
- Prolonged CPR – 3%
- Other – 38%
Discharge medications for all MI discharge diagnoses (STEMI and Non STEMI) as a % prescribed

- **Antiplatelets**
- **Beta Blocker**
- **Lipid Lowering**
- **ACE Inhibitor**

Data:
- **to 1 Jan 2004**
  - Antiplatelets: 91%
  - Beta Blocker: 83%
  - Lipid Lowering: 73%
  - ACE Inhibitor: 62%
- **to 1 May 2004**
  - Antiplatelets: 92%
  - Beta Blocker: 83%
  - Lipid Lowering: 76%
  - ACE Inhibitor: 64%
- **to 1 Mar 2005**
  - Antiplatelets: 89%
  - Beta Blocker: 80%
  - Lipid Lowering: 76%
  - ACE Inhibitor: 63%
General Statistics from CHAIR
Mortality follow up on all MI discharge diagnoses to 1 Sept 2004

MIs all CHAIR Hospitals

1410, 83%

178, 11%

28, 2%

65, 4%

- Survived post discharge
- Deceased within 30 days
- Deceased > 30 days
In-hospital Mortalities
There were 329 in hospital mortalities (MIs and others) registered in CHAIR to 30 April 2005

Female, 139, 42%
Mean Age = 78
Min Age = 35*
Max Age = 95

Male, 190, 58%
Mean Age = 74
Min Age = 48**
Max Age = 91

* 35 year old died of other cardiac (non ACS)  ** 48 year old died of non cardiac cause
Non Cardiac Chest Pain discharges
There were 2493 discharges of Non Cardiac Chest Pain registered in CHAIR to 30 April 2005

Female, 1113, 45%
Mean Age = 61
Min Age = 20
Max Age = 92

Male, 1383, 55%
Mean Age = 56
Min Age = 20
Max Age = 96
APPENDIX 4: TERMS OF REFERENCE FOR THE EVALUATION OF CHAIR
Tender Document for the Independent Evaluation of the Coronary Heart Attack Ireland Register (CHAIR) Pilot Project

(Evaluator’s Note: We have cross-referred the main sections of our Final Report to the principal items included in the brief set out below.)

The Coronary Heart Attack Ireland Register (CHAIR) is a health information system to evaluate the clinical care of acute coronary syndrome (ACS) patients admitted to acute hospitals and to support evidence-based health service planning.

CHAIR has been running for over a year in the eight hospitals, public and private in the Southern Health Board. It is timely to evaluate the CHAIR pilot in order to consider the lessons from CHAIR in any extension to the rest of the country as part of the development of cardiovascular health information systems.

The purpose of this document is to describe the scope and proposed methods of the evaluation of the CHAIR Pilot project.

1. Purpose of the evaluation

The aim of the evaluation of the CHAIR Pilot system (structure, procedures, dataset and software) is to assess the extent to which it is achieving its stated aims and objectives, in particular to record, describe and analyse registered patient demographics, diagnostic and treatment details and hospital outcomes, the impact of CHAIR, the cost effectiveness and efficiency of CHAIR and make recommendations on any extension of CHAIR to the rest of the country, in the development of strategies to improve the quality of ACS patient care in hospital and the community.

2. Evaluation Methods

There are already large volumes of material available from the local management committee on the structures and processes of the CHAIR Pilot, as well as the CHAIR data. The successful company will have access to this data.

Specifically the company will have to:

- conduct a survey (quantitative and / or qualitative) to obtain the views and satisfaction of key stakeholders on CHAIR in relation to the quality of the data, the strengths and weaknesses of data collection at a local level, and how could efficiency or quality be improved in any national extension. [See Final Report Sections 3 and 5]

- review of the above information and identify areas of weakness in the current system, including,
• Having completed the above, make recommendations on the most efficient and effective means of collecting data on acute coronary syndromes nationally. These should be set in the context of concurrent developments under the aegis of the National Cardiovascular Information Systems Steering Committee, including the EU Cardiovascular Data and Registration Standards (CARDS) project during the Irish presidency as well as the national health strategy, Quality and Fairness. [See Final Report Sections 4 and 6]. Specific areas to be addressed include:

(a) To what extent has the CHAIR Pilot achieved its objectives? This will include comments on the scope, completeness and quality of the data collected, software and hardware, structures in place for data collection, staff training, efficiency, data security, and on the report prepared based on the analysis of the data. [See Final Report Section 6]

(b) What impacts / benefits did the CHAIR Pilot have on:
   • Patient care
   • Staff training
   • Work procedures, and
   • Clinical audit [See Final Report Sections 6.2 and 6.3]

(c) Is the CHAIR Pilot in its current state cost effective vis a vis:
   • Clinical time taken to gather and forward data
   • The structure of data gathering and analysis
   • Impact on patient care. [See Final Report Sections 6.2, 6.3, 6.4 and 6.5]

(d) What other lessons have been learned and what other modifications are necessary to roll out CHAIR on a national basis, having regard to national and international developments and strategies in the cardiovascular health information systems area. How and in what timeframe should this next system be evaluated? [See Final Report Sections 6 and 7]

3. Tendering Requirements

There will be two steps to selecting the successful independent evaluator to this programme.
Step 1. Companies are requested to complete an application form and submit in no more than 5 A4 pages, Times New Roman Font 12, single spacing:

- Experience of similar projects in recent years
- The Applicant company's management structure (organisation chart)
- Brief description of management approach to this project if awarded
- Applicant's quality policy.
- Experience of proposed staff responsible for providing the service.
- Estimated budget to complete evaluation
- Any other information the Applicant considers relevant.

Companies will be short-listed at this stage.

Step 2. Short-listed companies will submit a detailed proposal and attend for selection interview setting out:

- Detailed methods to be adopted to complete the work with timeframes.
- Detailed costing.

How to Apply

The application form is available on www.etenders.gov.ie or by application to the Department of Health and Children.

Contact details:

Peter Henshaw
Department of Health and Children
Hawkins House
Dublin 2.

Tel: 635 3053

e-mail: Peter_Henshaw@health.gov.ie

Receipt of replies to Step 1 must be received in the Department of Health and Children no later than 5 pm on 30th July 2004.