The management of 1,164 patients presenting with chest pain to Portiuncula Hospital Ballinasloe

The first findings of the Pre-Hospital Emergency Care Project

June 2003

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Preface

Coronary heart disease remains the single leading cause of death in Ireland**.** Coronary syndromes resulting from coronary artery disease include unstable angina and acute myocardial infarction (heart attack) and may lead to death if not recognized and treated appropriately. The Report of the Cardiovascular Health Strategy Group (1999) highlighted the role of community services, in particular general practitioners, in the early recognition of and intervention in such acute cases to reduce the burden of illness and death from heart disease. The majority of patients who have acute coronary syndromes present to the general practitioner or the accident and emergency department with chest pain. The management of chest pain is therefore seen as central to the strategy for the identification and management of patients with suspected heart problems.

This is a report of the first year of a collaborative chest pain developmental audit involving general practitioners in the Western Health and Midland Health Boards who refer patients to Portiuncula Hospital Ballinasloe. The audit is part of the East Galway and West Midlands Pre-Hospital Emergency Care Project, and is a response by the two health boards to the recommendations in the Cardiovascular Health Strategy. The audit was coordinated by a steering committee consisting of representatives from the two health boards and their ambulance services, Portiuncula Hospital, the Department of General Practice, National University of Ireland, Galway and the Irish College of General Practitioners.

We are very grateful to the following:

- Catherine Duffy, Sinead Sheridan/Claire Robinson and Pat Marren, Primary Care Units; Drs Matt Linehan and Tony Lowry, and Mary O'Rourke-Keenan and Carmel Brennan, Cardiovascular Strategy Offices at the Western and Midland Health Boards.
- Andrew Murphy, Professor of General Practice, National University of Ireland, Galway, for supervising the audit.
- Management and staff of Portiuncula Hospital Ballinasloe for their support, especially Barkat Khan, Cardiac Registrar and Aine Conroy, Staff Nurse.
- Pre-hospital Emergency Care Project Steering Committee (Appendix I) for directing the audit.
- All the participating general practitioners (Appendix II) and patients.

Finally we are indebted to John Barton, Consultant Physician/Cardiologist at Portiuncula Hospital Ballinasloe, for time spent in reviewing patients' records and clinical input to the report.

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Introduction

Coronary heart disease remains the single leading cause of mortality in Ireland with 6149 deaths reported in 2001[1]. The majority of patients who have heart disease present to the general practitioner or the A&E department with chest pain. A collaborative approach between general practitioners and acute hospital services in the management of chest pain is therefore at the centre of any strategy for the identification and management of patients with suspected heart problems. The primary aim of the audit is to describe current management of patients with acute chest pain presenting to general practitioners in the East Galway and West Midlands area and the A&E department at Portiuncula Hospital Ballinasloe, County Galway. A secondary aim is to develop a collaborative approach to the management of this group of patients.

Methodology

This was a prospective study of the management of patients with suspected cardiac chest pain presenting in the community and at Portiuncula Hospital Ballinasloe. All patients presenting with chest pain and related symptoms at the accident and emergency department were captured using a Complaint List (Appendix II) and from ward reviews. Data collected were regularly crosschecked with the HIPE (Hospital In-Patient Enquiry) database to ensure a comprehensive coverage. Patients who were considered to have suspected cardiac chest pain at the initial assessment, based on history and electrocardiogram (ECG), were identified and audited using information gathered from an audit sheet, Standard GP Referral letter, A&E audit form and interviews with patients.

Ethical approval was obtained from the Portiuncula Hospital Ethics Committee. Verbal consent was obtained from patients interviewed.

Results

A total of 1164 patients presented with chest pain and related symptoms from 1 October 2001 to 30 September 2002; 988 presented at the A&E, 166 identified from ward reviews and 10 from the HIPE. Of these 438 (38%) were considered to have suspected cardiac chest pain based on history and ECG and this cohort was audited.

Of the 438 patients 65% were males, 35% were females. The mean age of patients was 66 years ranging from 17 – 95 years. The average distance at onset of symptoms was 15 miles and the majority of patients (69%) arrived in hospital in their own transport. Fifty-nine percent (260) were diagnosed with a cardiac condition. Females presented significantly ($p < 0.01$) with non-classical symptoms more often than males. The median time from calling for help to arrival at hospital was 1 hour 15 minutes. Call to arrival at the hospital differed between patients who arrived in the ambulance (62 minutes $n = 49$) and those who arrived in their own transport (109 minutes $n = 33$, $p < 0.01$, Mann-Whitney U test). On arrival to hospital patients were admitted to CCU in 1 hour 30 minutes (median time). Of the 54 patients with ST elevation MI 41 received thrombolysis, 16 in the A&E department. 27 patients were given a single bolus thrombolytic agent. The median call to needle time was 1 hour 50 minutes. Call to needle did not differ with residential address or mode of transport to hospital. The difficulties in implementing evidence-based guidelines are highlighted.

Conclusions

The study highlights the importance of a collaborative approach to managing patients with cardiac chest pain within the hospital and between the hospital and the community. The findings and the interpretations indicate the potential for improved pre-hospital cardiac care and the practical and policy issues that would need to be addressed and implemented. The difficulties in both accessing and evaluating the accuracy of recorded health information may account for the marginal impact of audit on hospital delay times. This points to the need to develop appropriate systems for the routine recording of information to facilitate health care monitoring.

Recommendations

Public awareness campaign

- Developing local or national public awareness campaigns to decrease delays in seeking help. Campaign strategy must take into account the complex nature of decision-making processes and other factors such as equity issues and gender differences in symptom presentation.

Health care monitoring: information needs

- Whilst the development of a health information strategy is the responsibility of the department of health and health boards, policies and guidelines on the management of heart disease should incorporate routine mechanisms for monitoring activities.

Service developments

Community services

- Support the ability of general practitioners to provide cardiac life support through regular training.
- Facilitate closer liaison between general practitioners and the ambulance services with the aim of developing policies on the practical and clinical concerns about community administration of thrombolysis.

Community – hospital interface

- Develop and implement policies and guidelines to further facilitate the collaborative work between community services from both health boards and Portiuncula Hospital:
    - Further develop the provision of ECG Telemetry in the project area by extending it to general practices.
    - Develop a protocol for fast tracking patients with acute chest pain which would include a dedicated chest pain clinic.
    - Improve the management of patients with heart failure by establishing dedicated clinics in general practices.

Portiuncula Hospital

- Develop guidelines on the administration of thrombolysis in the A&E department.
- Further work is required in developing and implementing guidelines on the management of acute coronary syndromes and developing acute chest pain services.

- Build on the chest pain audit by undertaking work to address the specific areas highlighted this report.

Introduction

Coronary heart disease remains the single leading cause of mortality in Ireland with 6149 deaths in 2001[1]. The Report of Cardiovascular Health Strategy Group[2] published in 1999 highlighted the role of community services in the early recognition of and intervention in acute cases to reduce the mortality and morbidity from heart disease. Acute coronary syndromes (ACS) are a major cause of morbidity if not appropriately treated in a timely fashion. There are increasing numbers of effective treatments which have resulted in improved outcomes for patients with ACS. However the benefits of these treatments depend upon prompt assessment of patients, accurate diagnoses and early initiation of treatment. Delays in treatment, especially for patients with AMI, lead to higher mortality.

A major part of the delay, called *patient delay,* which is the time elapsed from the onset of symptoms and the recognition by the patient that the symptoms require medical treatment. Whilst there is a general belief that the delay in seeking help is due to the lack of awareness and recognition of the symptoms of heart disease and inaction, the effectiveness of interventions for decreasing delay is uncertain[3]. A recent study has shown that the decision to seek help is a complex interaction of factors including knowledge, beliefs and context of the event[4].

There are also delays from the time patients contact health care workers to treatment being given. These are broken down into:

- *GP delay*: the time elapsed from patients contacting their GP to arrival of the GP to the patient or the patient arriving at the GP surgery.

- *Ambulance delay*: the time elapsed from patients calling for the emergency service to arrival of the ambulance with the patient at the hospital.
- *Hospital delay:* the time elapsed from patients arriving at the hospital until they are given recommended treatments.

The two most widely measured and used time intervals in the monitoring of patients with AMI are *call to needle time* - the interval between patients initial call for help to receiving thrombolysis, and *door to needle time* - the interval between patients arriving in hospital and receiving thrombolysis. In the past decade in Ireland studies[5-7] have shown a significant reduction in these delay times. However, to achieve the call to needle time of 90 minutes (or 60 minutes – in the UK NHS National Service Framework on Heart Disease[8]) and a door to needle time of 30 minutes as recommended in the Cardiovascular Health Strategy will require the development of routine mechanisms for monitoring the quality, effectiveness and efficiency of care both in the community and the hospital. Furthermore there is a need for care providers to acquire appropriate training and skills in cardiac care.

The majority of patients who have chest pain present to the general practitioner or the accident and emergency department with chest pain. The management of chest pain is therefore seen as central to the strategy for the identification and management of patients with suspected ACS. A dedicated chest pain clinic or unit is now accepted as the most effective method of managing patients presenting to hospitals with acute chest pain. It is also increasingly seen as a bridge between the community and hospital for managing

cardiac chest pain. The rational behind chest pain clinics, some argue, is that it is a safe, effective and cost efficient means of ensuring that patients at low and intermediate risk of heart disease receive appropriate care[9]. As well as reducing inappropriate admissions and discharges, chest pain units have been associated with a reduction in length of stay in hospital[9].

There is widespread acceptance that a collaborative approach between the hospital and the community is needed to improve the management of patients with suspected ACS. This is particularly important in an area such as that served by Portiuncula Hospital Ballinasloe (PHB) which is largely rural with the average distance to hospital of about 20 miles. A development audit was therefore initiated with the aim to both describe the current management of patients with suspected cardiac chest pain presenting in the community and hospital and to develop appropriate policies and guidelines for monitoring the care of this group of patients. The audit is part of the East Galway and West Midlands Pre-hospital Cardiac Emergency Care Project (PHECP) established in 2001. The aim of the project is to ensure that patients who present with cardiac problems in the community and at PHB receive the best possible care available. The audit is supported by the Western and Midland Health Boards and coordinated by a steering committee consisting of representatives from the two health boards and their ambulance services, PHB, the Department of General Practice, National University of Ireland, Galway and the Irish College of General Practice. A GP facilitator ensures that the potential for general practitioners' involvement in the audit and the project is maximized.

The objectives of the project are:

- To describe the patient population presenting with chest pain and related symptoms at the A&E department at PHB.
- To implement the recommended guidelines for the management of patients with ACS.
- To develop policies and protocols for the management of patients with chest pain
- To improve the monitoring of patients with established heart disease by improving the routine mechanisms for recording data
- To develop a collaborative and integrated approach to the management of patients with acute chest pain between the community services in the Western and Midland Health Boards and PHB.
- To develop protocols for fast tracking patients with acute chest pain and develop a dedicated Chest Pain Clinic

Methodology

Study setting

Portiuncula Hospital Ballinasloe in County Galway is a semi urban hospital with a catchment population of about 100,000 people. It has three full-time consultant physicians, one with an interest in cardiology. It has an eight-bed coronary/intensive care unit (CCU/ICU), a cardiac rehabilitation unit and facilities for non-invasive investigations including stress testing, telemetry and echocardiography.

PHB has an A&E consultant service three days a week. About 18,500 patients attend the A&E department each year of whom about 1,200 are estimated to present with chest pain and related symptoms. Forty-nine general practitioners (WHB 24, MHB 25) refer patients to PHB. These general practitioners are involved in the audit and also are participating in the larger pre-hospital project which include training on immediate cardiac care and the provision of grants for the purchase of equipment (defibrillators, oxygen equipment and a resuscitation bag) for the management of patients with suspected ACS. A GP information pack on the project and audit was produced and circulated to general practitioners.

All patients presenting with chest pain and related symptoms at the A&E department were captured using a Complaint List (Appendix III). In addition, the Cardiac Research Nurse conducted regular reviews of the wards and CCU to identify patients who were missed on admission. Data collected were regularly crosschecked with the HIPE (Hospital In-Patient Enquiry) database to ensure a comprehensive coverage. This involved a retrospective search of the medical records of patients who were admitted

during the audit period with the international classification of disease (ICD) codes for coronary heart disease (401-4149, 78650-78651, 78659).

Patients who were considered to have suspected cardiac chest pain at the initial assessment, based on history and electrocardiogram (ECG), were identified and audited using information gathered from the audit sheet, A&E audit form, GP referral letters, ambulance forms and where possible from interviews with patients. Ethical approval was obtained from the PHB Ethics Committee. Verbal consent was obtained from patients interviewed.

Audit Sheet

An audit sheet (Appendix IV) was completed for each patient with suspected cardiac chest pain. This contained individual primary level data on sociodemographic details of patients, response times, treatment received before admission to hospital, within the hospital and on discharge from hospital. The Cardiac Research Nurse completed the audit sheet from information gathered from medical records, standard GP referral letters, ambulance forms, the A&E audit form and where possible from interviews with patients.

A&E Audit Form

A diagnosis of myocardial infarction was based on symptoms, changes in ECG and the concentration of cardiac markers. Troponin I was the cardiac marker used for the detection of myocardial infarction. The audit form (Appendix V) included a classification and diagnosis of chest pain syndromes as recommended by the American

College of Cardiology/American Heart Association in their guidelines on unstable angina/non ST elevation Myocardial Infarction[10]. This involved grading angina, determining the likelihood that chest pain was due to a coronary syndrome or not and assessing the short term risk of death or myocardial infarction in patients presenting with unstable angina/non ST elevation myocardial infarction.

Standard GP referral letter

General practitioners were asked to complete a Standard GP Referral Letter (Appendix VI) for patients referred to the A&E department whom they suspected might be an ACS. The information contained in the letter included demographic details of patients, health and medical details, initial physical examination and treatment given to patient and time elements of care.

Evaluation of audit

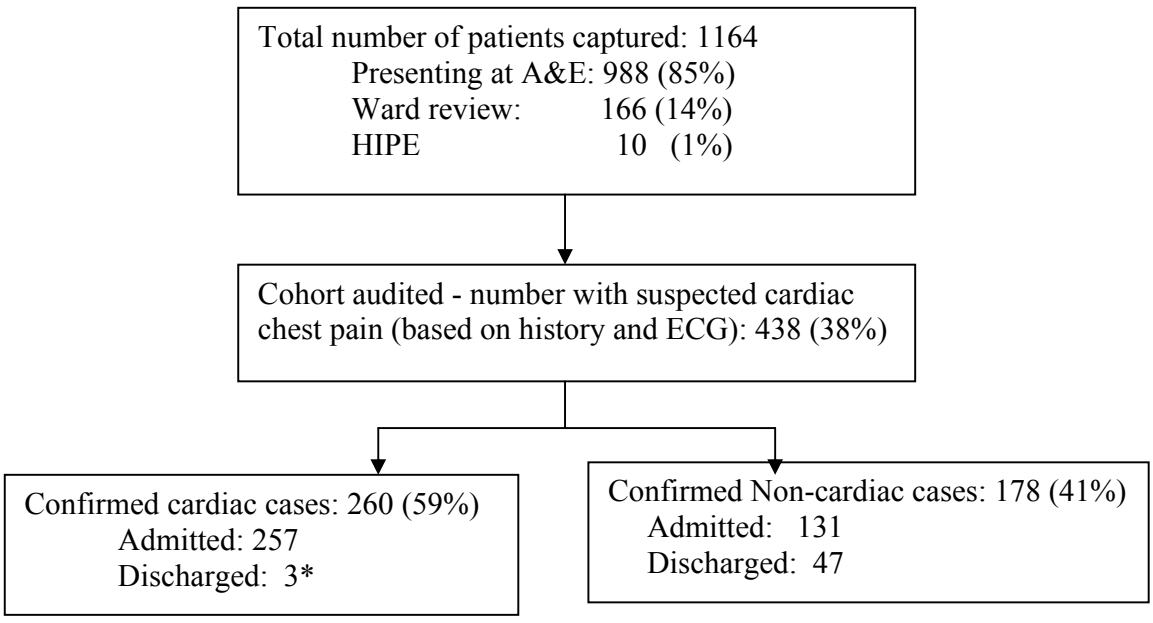
As part of the audit process regular informal feedback sessions were held with staff in CCU, the A&E department, laboratories and the ambulance services. The results of the first 6 months of the audit were also presented to hospital staff. The effect of the audit on delays and other aspects of the audit are discussed in the report.

Results

The audit cohort

A total of 1164 patients presented with chest pain and related symptoms at PHB from 1 October 2001 to 30 September 2002; 988 presented to the A&E department; 166[a] were identified from ward and CCU reviews and 10 from the HIPE (December 2001 – September 2002). Of these 38% (438) were considered to have suspected cardiac chest pain based on history and ECG and this cohort was audited. The results presented below are based on the information gathered on these patients from medical records, standard GP referral letters, ambulance forms, A&E audit form and interviews with 22% of patients (98/438). An audit flow chart is shown in figure 1.

Figure 1: Audit flow chart.



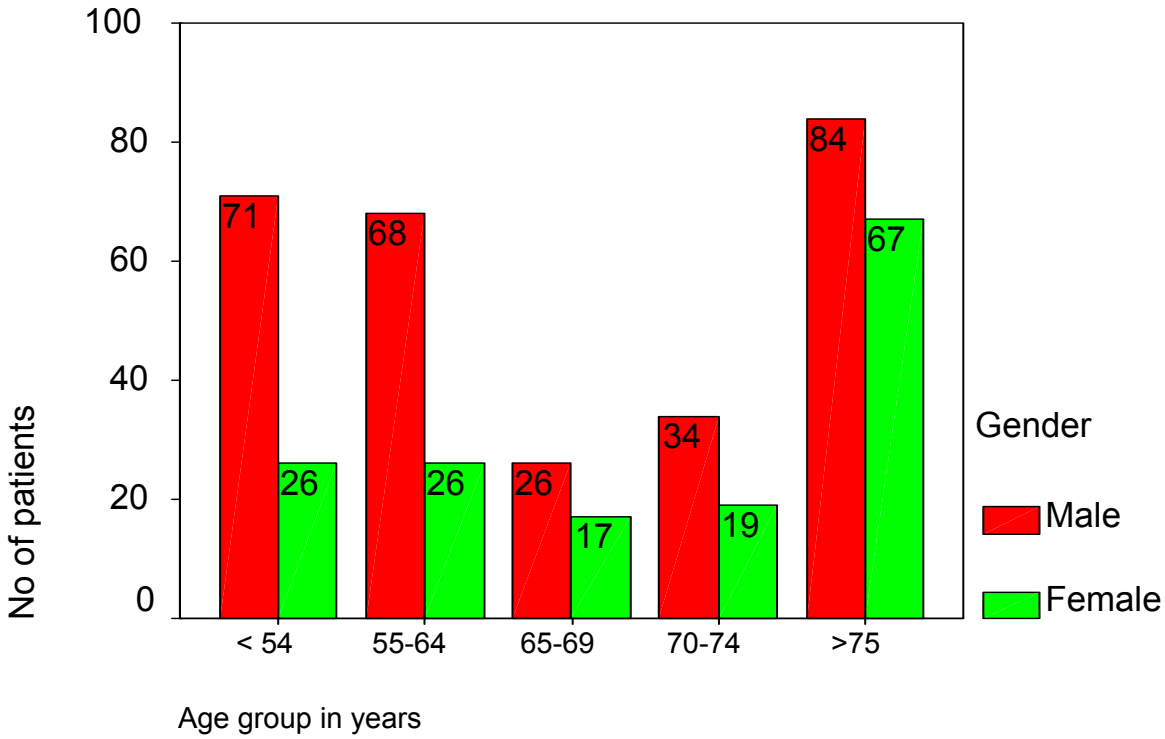
[a] It was anticipated that not all patients with chest pain would be identified on admission. Therefore, to ensure a comprehensive coverage the cardiac research nurse conducted regular reviews of the wards and CCU.

* 2 were known cardiac patients with OPD appointments few days after visit and one was called back with raised Troponin I.

Demographic details of patients

Of the 438 patients audited 65% (283) were males, 35% (155) were females. The mean age was 66 years (range 17 – 95 years). Females (mean age 69.1) were significantly older than males (mean age 64.8, $p < 0.05$). The distribution of age and gender of patients is shown in figure 2. There is a greater difference in the number of males and females in the lower age groups than at the higher range.

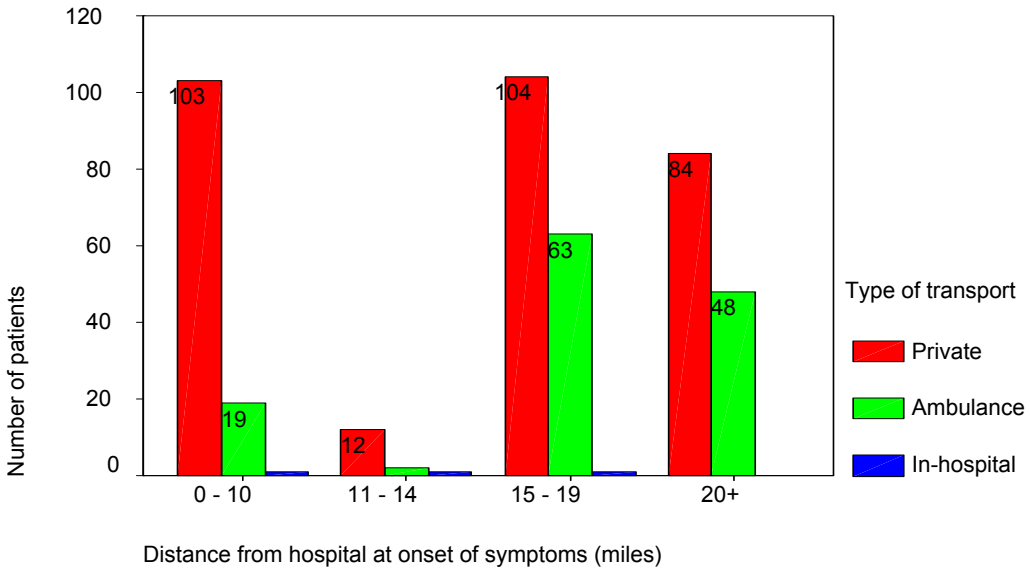
Figure 2: Age and gender distribution of patients (N=438)



Thirty-eight percent (168) were retired, 36% (157) were in employment, 18% (77) were homemakers and 5% (21) were unemployed. Fifty-one percent (222) were GMS eligible, 27% (119) had private insurance, 19% (85) were fee-paying, and 2% (7) had company insurance.

Sixty percent (264) lived in a rural[a] area, 40% (174) in an urban area. The average distance from onset of symptoms to hospital was 15 miles ranging from 1 – 40 miles. Sixty-nine percent (303) used their own transport, 30% (135) the ambulance service. The distribution of the distance at onset of symptoms and type of transport to hospital is shown in figure 3.

Figure 3: Distribution of distance at onset of symptoms and type of transport to hospital.



The type of transport to hospital differed ($p < 0.01$ Mann-Whitney U Test) with distance from hospital at onset of symptom with patients who were at a distance below the average (mean 14 miles) arriving in hospital in private transport and those at a distance above the average (mean 17 miles) arriving in an ambulance. On the other hand patients were more likely to arrive in hospital in private transport if they lived in a rural area (private transport 190, n = 303, ambulance 73, n =132) than in an urban area (private

[a] Based on locally defined in-house hospital patient administration system.

transport 112, n = 303, ambulance 59, n = 132) but this failed to achieve significance ($p > 0.05$ Mann-Whitney U Test).

Presenting complaint, description and location of pain and who patients contacted

The majority of patients 73% (318/438) presented with chest pain, 7% (29/438) with chest tightness and dyspnoea respectively, 4% (17/438) with collapse and 3%[a] (15/438) each with angina and other related symptoms. Of the 318 patients who presented with chest pain 69% (221) were males, 31% (97) were females. Females (complaint mean score[b] 7.50) were significantly more likely to be admitted with atypical presentations than males (complaint mean score 6.50, $p < 0.01$).

Eighty-six percent (377/438) reported the *location* of their pain as the chest and in 72% of patients (315/438) the pain radiated to the arm. In the patients where the description of pain was recorded, 38% *described the history of pain* as a new onset, 35% as at rest, 14% as exertional, and13% as increasing from norm.

Of the 438[c] patients, 64% (279) of patients *contacted* their GP at onset of pain, 27% (117) presented at the A&E department and 8% (37) contacted the ambulance service. The GP referred 64%, 35% self-referred. Referral differed significantly between patients[d] in rural areas (self-referred 30%, GP referred 69%) and urban areas (self-referred 40%,

[a] The A&E Complaints Master File has angina as an admitting complaint
[b] Admitting complaints (Appendix III) were scored, 1 – 20. Women were more likely to present with symptoms with scores greater than 6 (chest pain). They include shortness of breath, palpitations, dyspnoea, weakness and tiredness (associated features of cardiac pain).
[c] 1% of cases were in-patient
[d] Residential address not applicable in 6 patients

GP referred 57%, $p < 0.05$ Mann-Whitney U test). Of the total of 149 self referred, 79% (118) presented at the A&E department, 21% (31) contacted the ambulance service.

Health details

Risk factors and previous history of heart disease

Eighty-five percent (372/438) of patients had at least one risk factor present and 44% (192/438) had previous history of heart disease.

Obesity scores

The weight and height of patients were obtained from medical records and from interviews with patients. These were used to calculate the body mass index (BMI) which in turn was used to grade the obesity score in 59% (260/438) of patients. Seven percent (19/260) were underweight, [BMI < 20]; 25% (66/260) were of healthy weight, Grade 0 [BMI 20–24.9]; 46% (119/260) were overweight, Grade I [BMI 25-29.9]; 19% (48/260) were obese, Grade II [BMI 30-39.9]; and 3% (8/260) had severe obesity, Grade III [BMI > 40]. The data shows that 68% (177/260) of patients were overweight or obese.

Pre-hospital care

The GP referred 282 (64%) of the 438 patients of which 37 (13%) had GP referral letters[a]. The proportion of patients who received treatment in the community and the type of treatments is shown in table 1.

GP referral letters

Thirty-seven patients had a referral letter from their GP, 5 (14%) patients were subsequently diagnosed as non-cardiac in the A&E and were excluded from the audit. Three patients (8%) died in the community.

The information contained in the referral letters is summarized below.

Table 1: Pre-hospital care: interventions

Type of treatment	% received pre-hospital (The total number of patients who received intervention)
Analgesia	42 (45/106)
Aspirin	23 (87[b]/380)
ECG	7 (30/433)
GTN	62 (131/209)
Oxygen	45 (88[c]/197)
Defibrillation	5 (2/37)
CPR	5 (2/37)

[a] GPs were asked to complete referral letters for cases with suspected acute cardiac chest pain.
[b] 41 patients were previously on aspirin
[c] For 69 patients oxygen was administered by the ambulance service

Demographic details

Of the 37 patients, 76% (28) were males, 24% (9) were females. The mean age was 67.2 years (range 31 – 89 years). Females (mean age 72.6 years) were older than males (mean age 65.4 years) but failed to achieve significance. Fourteen patients (38%) were GMS eligible, 15 (40%) had private health insurance and 8 (22%) were fee-paying. 68% (25) had at least one risk factor present and 46% (17) had a previous history of heart disease.

Twenty-eight patients (76%) lived in a rural area, 9 (24%) in an urban area. The average distance from hospital at onset of symptoms was 18 miles and 26 (70%) arrived at the hospital in the ambulance, 10 (27%) in their own transport.

Presenting complaint and admission

Thirty-two patients (86%) presented with chest pain, 1(3%) each with chest tightness and dyspnoea. 28 patients (76%) were admitted, 6 (16%) were discharged and 3 (8%) died in the community.

Pre-hospital care

Of the 37 patients 24(65%) received GTN spray, 22 (59%) received aspirin, 18 (49%) received analgesia (Cyclimorph 13, [Route intravenous 12, intramuscular 1]; Morphine 3, [Route intravenous 1, intramuscular 2]), 17 (46%) received oxygen, 2 (5%) received CPR and in 2 (5%) patients automated external defibrillation was performed.

Primary diagnosis and cardiac cases

Twenty-one patients (62%) with GP primary diagnosis of ACS were diagnosed with a cardiac condition, 11 (30%) were non-cardiac, 2 (5%) were still being investigated and 3 (8%) died in the community (results of post-mortem not known). Of the 21 cardiac cases, 13 (62%) were diagnosed with AMI (ST elevation MI 8, non-ST elevation MI 5), 4 (19%) with unstable angina, 1 (5%) with angina, and 3 (14%) with atrial fibrillation.

Pre-hospital care in patients with AMI

Nine (69%) of the 13 patients with AMI received GTN spray, 8 (62%) received aspirin and oxygen respectively, 7 (54%) received analgesia and 1 (8%) each received CPR and automated external defibrillation.

Use of thrombolysis

Of the 8 patients with ST elevation MI 6 (75%) received thrombolysis. The reason for not receiving thrombolysis was recent gastrointestinal bleeding and death in the community.

Pre-hospital care time intervals

Table 2 shows a summary of the different pre-hospital time components in the audit cohort and the 37 patients for whom GP referral letters were received.

Table 2: Pre-hospital time intervals (median time)

	Audit cohort (N = 438)	GP referral letters (N = 37)
Patient delay – pain onset to call for help	3 hours (n[a] = 146)	1hr 45 minutes (n = 15)
GP delay – call for help to patient being attended by GP	16 minutes (n = 21)	16 minutes (n = 8)
Ambulance delay – call for help to ambulance arriving in hospital with patient	58 minutes (n = 47)	1 hour 12 minutes (n = 11)
Call for help to arrival in A&E	1hour 15 minutes (n = 82)	1 hour 18 minutes (16)
Pain onset to arrival in A&E	3hours18 minutes (n = 215)	3 hours 9 minutes (n = 22)

Comparison of pre-hospital care time intervals with type of transport to hospital, referral route and residential address

Patients who arrived in hospital in their own *transport* and those who arrived in an ambulance were compared on the four pre-hospital time intervals. The groups only differed ($p < 0.01$) on the time interval between patients calling for help to arriving in hospital, with the patients who arrived in private transport experiencing greater delay (median 109 minutes n = 33) than those arriving in ambulance (median 62 minutes n = 49).

[a] The number of patients for whom information was available

In relation to the *route of referral* the groups differed on ambulance delay, call for help to arrival in hospital and pain onset to arrival in hospital. As expected patients who were attended by the GP (median 60 minutes n = 33) experienced a greater ambulance delay ($p < 0.05$) than those who called the ambulance themselves (median 50 minutes n = 14). Patients referred by GP also experienced greater delays from call for help and pain onset to arrival in hospital (call for help to hospital GP referral 251 minutes n = 130, self-referral 150 minutes n = 85, $p < 0.05$; pain onset to hospital GP referral 90 minutes n = 65, self referral 55 minutes n = 17, $p < 0.05$ Mann-Whitney U Test).

The pre-hospital time intervals were also compared in patients whom a *GP referral letter* was received and the audit cohort. The groups only differed ($p < 0.05$) on the ambulance delay. Patients with referral letters (median 72 minutes n = 11) experienced greater delay than the audit cohort (median 52 minutes n = 36)

As expected *urban and rural* patients differed significantly on ambulance delay (rural median 71 minutes n = 21, urban median 51 minutes n = 26, $p < 0.05$); call for help to arrival in hospital (rural median 90 minutes n = 53, urban median 58 minutes n = 29, $p <0.05$); and pain onset to arrival to hospital (rural median 218 minutes n = 134, urban median 174 minutes n = 81, $p < 0.05$).

In-hospital care

Initial assessment

On arrival at hospital 50% (n = 416) of patients were assessed by a nurse immediately or within one minute and examined by a doctor within 12 minutes (n = 260) median time. Of the 438 patients 89% were admitted, 75% (293/391) to the ward and 24% (94/391) to CCU.

Diagnostic criteria

Of the 438 patients with suspected cardiac discomfort, an ECG was performed on 99% of patients, median time 8 minutes (range 1 minute to 4 hours); 30% (132) were stress tested, median time 7 days (range 1 day – 2.5 months); 21% (91) had an echocardiogram, median time 5 days (range 1 – 5.8 months).

Troponin I assays were performed on 94% (412) of patients. Of these 76% (313) had concentrations < 0.5ng/ml, 24% (99) had raised concentrations of up to 63 ng/ml. The median time interval between blood samples and test results being available was 9 hours ranging from 1 – 23 hours.

The AHA/ACC guidelines on management of patients with Unstable Angina/Non-ST Elevation Myocardial Infarction recommend stratifying patients with chest pain into those with a high, intermediate and low likelihood of having an acute coronary syndrome secondary to coronary disease. The audit form in respect of this stratification was completed in only 33% of patients (145/438). 43% of patients with suspected cardiac

chest discomfort had a high, 29% an intermediate and 28% a low likelihood of chest pain being secondary to coronary artery disease.

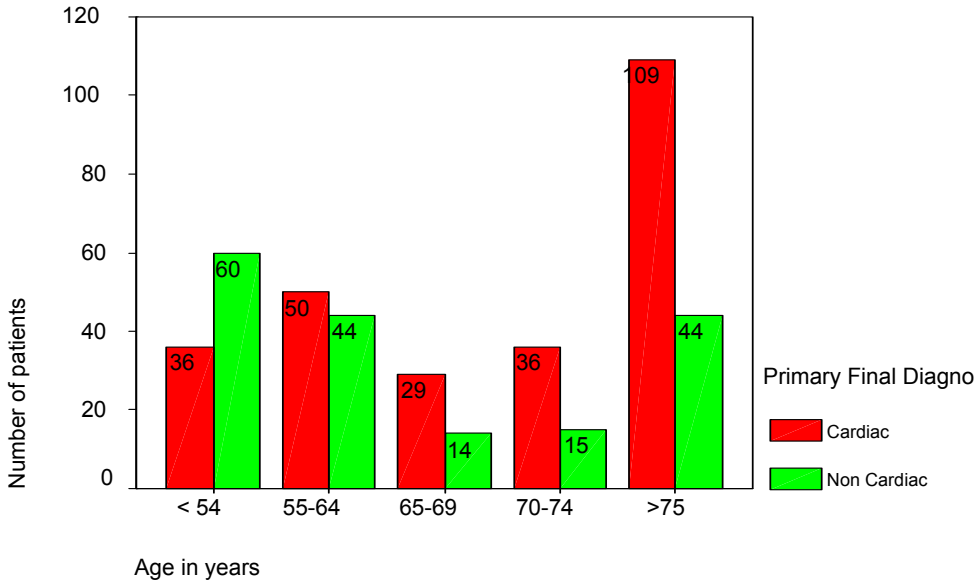
Impact of new definition of myocardial infarction

Since the introduction of Troponin assays as a marker of myocardial infarction, patients presenting with symptoms suggestive of unstable angina have been re classified as having either unstable angina or non-ST elevation myocardial infarction. Those with elevation of Troponin are now categorized as having non ST elevation myocardial infarction.

Diagnosis

The consultant or registrar and cardiac research nurse reviewed each patient's records to confirm primary diagnosis. Of the 438 patients, 59% (260) were cardiac, 68% males and 32% females. The age distribution of cardiac and non-cardiac cases is shown in figure 4.

Figure 4: The age distribution of diagnosis



The admitting complaint for the majority (69%) was chest pain; females (mean complaint score 8.5) presented with more non-classical symptoms than males (mean complaint score 6.7, $p < 0.01$). The GP referred 64% (166), 35% (90) were self-referred. Seventy-four percent (131/178) of non-cardiac cases were admitted, GP referred 65% (85), self-referred 35% (46). The categories of primary cardiac diagnosis are shown in table 3.

Table 3: Categories of primary cardiac cases (N = 218)

Categories of cardiac cases	Count (%)
ST elevation MI	54 (25)
Non-ST elevation	80 (37)
Stable angina	24 (11)
Unstable angina	60 (27)

Risk factor and previous history of heart disease

Of the 260 cardiac cases 88% had at least one risk factor present and 49% had a previous history of heart disease. Tables 4 and 5 show the risk factor distribution and previous history of heart disease in patients with ST elevation MI, non-ST elevation MI and unstable angina.

Table 4: Previous history of heart disease in patients with myocardial infarction and unstable angina

	ST elevation MI	Non-ST elevation MI	Unstable angina
Risk factor present	**48/54 (89%)**	**73/80 (91%)**	**54/60 (90%)**
Smoking	18 (38%)	16 (22%)	14 (26%)
Hypertension	17 (35%)	31 (42%)	21 (39%)
Hypercholesterolaemia	16 (33%)	24 (33%)	32 (59%)
Diabetes	9 (19%)	10 (14%)	12 (22%)
Family history of chd	15 (31%)	20 (28%)	21 (39%)

Table 5: Risk factors in patients with myocardial infarction and unstable angina

	ST elevation MI	Non-ST elevation MI	Unstable angina
Previous history of heart disease	**11/54 (20%)**	**40/80 (50%)**	**39/60 (65%)**
MI	5 (45%)	28 (70%)	20 (51%)
Angina	4 (36%)	21 (53%)	19 (49%)
Angiogram	8 (73%)	26 (65%)	31 (79%)
CABG	4 (36%)	17 (43%)	21 (54%)

Patients with AMI

A total of 134 patients had AMI: ST elevation MI 54, non-ST elevation MI 80. 63% (85) were males, 37% (49) were females. The mean age was 71 years, range 38 – 101 years. Females (mean age 76.4 years) were significantly older than males (mean age 67.9 years, $p < 0.01$). Thirty-eight percent (51) had a previous history of heart disease.

Sixty-five percent (87) lived in a rural area, 35% (47) in an urban area. 55% (74) arrived in hospital in private transport, 43% (57) in ambulance and the average distance from hospital at onset of symptoms was 14.9 miles.

For 68% (91) of patients the admitting complaint was chest pain. Females (mean complaint score 8.3) differed significantly from males (mean complaint score 6.8, $p < 0.01$). The type of transport did not differ with residential address, rural or urban.

Medication in hospital

Ninety-nine percent (257/260) of cardiac patients were given a beta-blocker in the hospital, 46% previously on it, 97% (252[a]/260) received aspirin, 58% (61/106) received analgesia, 55% (109/197) received oxygen, and 37% (78/209) received GTN spray.

Ninety-nine percent of the 134 patients with AMI received a beta-blocker, 99% (133/134) received aspirin, 63% (36/57) received analgesia, 61% (63/104) received oxygen, 47% (32/68) received GTN spray, and 40% (53/134) received plavix. Sixty-three percent (15/24) of patients with angina and 82% (49/60) of patients with unstable angina received a beta-blocker.

Use of thrombolysis

Of the 54 patients with ST elevation MI, 41 received thrombolysis; 25 were given in CCU and 16 given in the A&E department. Twenty-seven of the 41 patients were given a single dose thrombolytic agent; A&E 15, CCU 12. The main reasons for not giving

[a] 8 patients received warfarin

thrombolysis included gastrointestinal bleed, embolic event in the leg, low blood pressure, patient time delay and inconclusive ECG**.**

In-hospital care time intervals

The in-hospital care time intervals in the audit cohort and in the 37 patients with GP referral letters are shown in table 5.

Table 6: In-hospital care time intervals (median)

	Audit cohort	GP referral letters
Hospital delay	1 hour 30 minutes (n = 59/134)	1 hour 18 minutes (n = 5/13)
Door to needle	1 hour 15 minutes (n = 32/41)	1 hour 10 minutes (n = 5/6)
Call to needle	1 hour 50 minutes (n = 22/41)	2 hours 10 minutes (n = 3/6)
Pain onset to needle	4 hours 0 minutes (n = 30/41)	2 hours 40 minutes (n = 5/6)

In-hospital care time intervals were compared with residential address, mode of transport to hospital and route of referral. Only the median time interval from pain on set to patient receiving thrombolysis differed ($p < 0.05$, Mann-Whitney) with patients in rural areas experiencing greater delays (255 minutes n = 30) than those in urban areas (225 minutes n = 11).

Effect of audit on care time intervals

Pre-and in-hospital care time intervals in the first and second half of the audit were compared to assess the effect of formal and informal feedback sessions to hospital staff and the wider audit community. Pre-hospital care time intervals did not differ. The

hospital delay (time from admission to transfer to CCU) and call to needle times decreased in the second half of the audit but failed to achieve significance (median hospital delay 111 minutes n =30 to 85 minutes n = 29; median call to needle time 110 minutes n = 8 to 86 minutes n = 22). An unexpected finding was the increase in median door to needle time by 18 minutes from 66 minutes (n = 11) to 84 minutes (n = 26).

Impact of thrombolysis in A&E on care time intervals

As expected the median door to needle and call to needle times differed significantly ($p < 0.05$) with location where thrombolysis was given, with patients given thrombolysis in the CCU experiencing greater delays than those given thrombolysis in A&E (door to needle CCU 104 minutes (n = 21), A&E 31 minutes n = 16, $p < 0.05$; call to needle CCU 135 minutes (n = 14), A&E 80 minutes n = 25).

Discharge outcomes

Mortality and length of stay in hospital

Of the 260 cardiac cases 93% (242) were discharged alive from the hospital with a median length of stay in hospital of 9 days (range 1 day –2.3[a] months); CCU 10 days (range 1 day – 1month), ward 9 (1 days – 2.3 months). As expected the median length of stay in hospital for patients with AMI was greater than the average, ST elevation MI 12 days (range 2 days – 2.3 months), non-ST elevation 9.5 days (range 2 days – 1.7 months). The median length of stay for non-cardiac cases was 4 days (range 1 day – 1 month).

[a] Problem with wound healing

The hospital mortality was 6% (15/260), ward mortality 5% (8/170), CCU mortality 8% (7/87). Of the 15 deaths 53% were females, 47% were males. Females (mean age 84.9 years) were significantly older than males (mean age 78.4 years, $p < 0.05$). All 15 deaths were related to AMI; ST elevation MI 6 (3 were thrombolysed), mortality 11%(6/54); non-ST elevation MI 9, mortality 11% (9/80). An additional three deaths occurred in the community.

Medication on discharge from hospital

Of the 243 cardiac patients discharged alive from hospital 86% (210) received aspirin, 72% (175)) received a statin, 71% (172) received beta blocker, 55 (134) received ACE inhibitors, 51% (123) received GTN spray, 30% (72) received diuretics, 29% (70) received plavix and 20% (46/243) received nitrates. The numbers of patients with AMI, unstable angina and angina who received ACE inhibitors, aspirin and beta blockers are shown in table 7.

Table7: The proportion of patients with AMI, unstable angina and angina prescribed ACE inhibitors, aspirin and beta blockers on discharge

	ST elevation MI **(n = 47/54)**	Non-ST elevation MI **(n = 68/80)**	Unstable **(n = 62)**	Angina **(n = 22/24)**
Ace Inhibitors	72% (34/47)	63% (43/68)	42% (26/62)	33% (8/24)
Aspirin	87% (41/47)	96% (65/68)	89% (55/62)	95% (21/22)
Beta Blockers	77% (36/47)	75% (51/68)	84% (52/62)	77% (17/22)

Referral to tertiary services and waiting time

Of the 260 cardiac cases 45% (117) were referred to tertiary care with a total of 172 referrals. The distribution of referrals and proportions of patients with ST elevation MI, non-ST elevation MI and unstable angina referred for tertiary treatment and the type of interventions are shown in table 8.

Table 8: Referral to tertiary care in patients with AMI and unstable angina

	ST elevation MI **(n = 54)**	Non-ST elevation MI **(n = 80)**	Unstable angina **(n = 62)**	Total
Angiogram	42 (78%)	69 (86%)	48 (77%)	92% (159/172)
Angioplasty	3	10	6	12% (19/159)
Angioplasty with stent	10	11	8	18% (29/159)
CABG	1	8	2	7% (11/159)
Transplant	-	1	-	0.6% (1/159)

The median waiting time for referral was angiogram 10 days (range 1 day – 5.4 months), angioplasty 9 days (range 2 days - 3.4 months) and CABG 14 days (range 1 day – 1.7 months).

Discussion

The findings of this audit are based on information obtained from medical records and other hospital information systems and self-reported data on patients. The difficulties in accessing this information and its accuracy remains an obstacle to adequately describing current care provision for patients with suspected cardiac chest pain. In spite of these limitations the results of the audit and interpretations provide some useful and interesting insights into current management of patients with ACS in the East Galway and West Midlands area.

Comparison with other studies

The results of the audit are similar to other national and international data. As expected the findings are similar with the largest proportion of delay of 3 hours attributed to the patient (Table 2). This was significantly reduced to 1hour 45 minutes for 15 of the 37 patients who were attended to by the general practitioner before they were referred to hospital. For those patients (tables 3 and 5), however, there was a greater ambulance delay (GP attended 1hour 12 minutes, Audit cohort 58 minutes) and a higher call to needle time (GP attended 2 hours 10 minutes n = 6, Audit cohort 1 hour 50 minutes n = 22). This highlights the importance of pre-hospital thrombolysis if a call to needle time of 90 minutes is to be achieved.

The table also shows a larger proportion of non-ST elevation MI diagnosed in Portiuncula Hospital, Ballinasloe. As already stated earlier in the report, this is due to the introduction of Troponin I assays, which replaced the conventional cardiac enzyme

assays as a more sensitive marker, for the diagnosis of AMI and cardiac damage[11]. The significance of this is further discussed below under the impact of guidelines and policy development on audit.

An unexpected finding from this study is that over two-thirds of patients arrived in hospital in their own transport, including 50% of patients with AMI. This is further reflected in the number of patients in rural areas (private 190, ambulance 73) who arrived in hospital in private transport compared to those in urban areas (private 112, ambulance 59). However, when the distance at onset of symptoms is compared with type of transport residential address had a significant reverse effect. Patients at above average distance of 15 miles from hospital at onset of pain arrived in hospital in an ambulance (mean 17 miles for 132 patients) and those at below average distance (mean 14 miles for 303 patients, $p < 0.01$) in private transport. Although traditionally self-referred patients may not receive as urgent attention as those brought by ambulance, the results show that in-hospital time care intervals did not differ between the groups.

A distinguishing feature of this audit from other Irish studies is the recording of the A&E admitting complaint in the audit cohort. The results show that while the majority (69%) of the patients with a cardiac condition were admitted with chest pain females were significantly more likely to be admitted with non-classical symptoms of cardiac chest pain than males. This finding is in keeping with the results of other studies[12-13] which have found that atypical presentations and non-classical symptoms such as

weakness/tiredness, dyspnoea, palpitations, neck and jaw pain were more common in females with heart disease.

Improving the community – hospital interface

As a developmental audit the implementation of both the community and hospital elements was crucial to the audit outcomes. A particular strength of the audit was the collaborative approach, facilitated by the two health boards, between PHB, general practitioners and the ambulance services. This has provided an opportunity for multidisciplinary and multi-agency learning and for the identification of barriers to a seamless cardiac service in the PHB catchment area. Improving communication and joint working between general practitioners, the ambulance services and PHB remains a priority for the pre-hospital programme. A GP direct access stress testing service has developed as part of the project and other such joint initiatives including chest pain and heart failure clinics have been proposed.

The role of general practitioners is crucial in managing chest pain and is highlighted by the 64% of patients who contacted their GP at onset of pain and were referred to hospital. This is however, lower than the figures reported in other studies[5-7] and in the health board area (Table 9). In this study a significant proportion, 34% (149), of patients with chest pain did not call their general practitioner and instead presented directly to the hospital (118 patients) or contacted the ambulance services (31 patients). While this behaviour may be related to concerns about access to care it is, however, important to make the public aware, of the importance of first seeking help from their general practitioner or

calling the ambulance. Again rural and urban patients differed ($p < 0.05$) with more patients in the rural areas being referred by a GP (Self 30% n = 149 patients, GP 69% n = 282) than in urban areas (Self 40% n = 149, GP 57% n = 282, $p < 0.05$). Possible interpretations of this finding include public concerns about access issues and advice given to patients with a previous history of heart disease who form 49% of confirmed cardiac cases. There is widespread acceptance that patients who present to the general practitioner with acute chest pain receive better pre-hospital cardiac care as shown by the findings of this study. However, if the general practitioner role in pre-hospital care is to be enhanced access issues would need to be addressed and close collaboration with the ambulance service would be necessary. This would help in overcoming many of the practical difficulties.

The audit shows that chest pain represents about 6% of the volume of annual A&E workload at PHB. The proportion of patients 74% (131/178) admitted with non-cardiac chest pain lends support to previous studies[14-15] that found a substantial proportion of those admitted with chest pain to have a benign cause. Furthermore, the median length of stay in hospital for this group of patients was 4 days ranging from 1 day to 1 month. Eleven percent of the audit cohort was discharged from the A&E department. Specific work would be undertaken to identify the proportion of these patients re-admitted as cardiac patient, as some studies[15-16] have estimated that about 2-8% of patients discharged from the A&E department after presenting with chest pain have significant heart damage. These results show that an appropriate and effective initial triaging is

required at PHB. The next stage of the audit is expected to focus on developing collaborative guidelines and policies on the management of chest pain.

Guidelines and policy development: impact on audit

As discussed above since the introduction of Troponin I assays as a marker of myocardial infarction, patients presenting with symptoms suggestive of unstable angina have been re-classified as having either unstable angina or non-ST elevation myocardial infarction. One hundred and forty-five (33%) of the cohort of patients with a diagnosis of cardiac chest pain would originally have been considered to have a diagnosis of unstable angina before the introduction of Troponin assays. Because of the re-definition, 80 (55%) of the 145 are now diagnosed as having non-ST elevation myocardial infarction. The importance of this is highlighted by the fact that there was no mortality in patients with a diagnosis of unstable angina, whereas mortality was 11% in patients with non-ST elevation myocardial infarction. Pell et al, (2003)[17] found that this group of patients were significantly different from those identified using the traditional diagnostic criteria in relation to demography, eligibility for thrombolysis and outcome. More detailed analysis would be performed to identify this group of patients: the demographic details, treatments received and discharge outcomes.

The implementation of the A&E audit form based on the classification and diagnosis of chest pain syndromes as recommended by the American College of Cardiology/American Heart Association in their guidelines on unstable angina/non ST elevation Myocardial Infarction was an important feature of the audit. The low percentage of patients (33%) for

whom guidelines were completed appear to be due to the difficulty for doctors in completing an additional record sheet and the nature of junior doctors' posts. It is anticipated that the guidelines, when fully implemented, would help in identifying and fast tracking patients who present at the A&E with signs and symptoms of chest pain that are likely to be ischaemic in nature.

Access to Troponin I assays is crucial to the implementation of the AHA guidelines. The audit indicates a median time of 9 hours ranging from 1 to 23 hours from when blood is taken from patients to results becoming available. Currently normal testing times are 12.00pm and 16.00pm weekdays, one testing time on weekends and no testing on call unless specifically requested by the consultant. Although the results are available on laboratory computerized records 45 minutes after tests, the times the results are accessed by clinicians are currently not recorded. Specific work would be required to establish how results are accessed and the number of patients where results were used to confirm diagnosis. Additionally, a recent study conducted at PHB by Cavanagh and Cassidy[11] showed that while there was an increased laboratory costs with the change over from traditional markers to Troponin I assays these were, however, offset by an average two days reduction in length of stay in patients whose chest pain was not caused by AMI.

The introduction of the policy to give thrombolysis in the A&E significantly ($p < 0.01$ Mann-Whitney) reduced the door to needle and call to needle times in those patients who received thrombolysis in A&E (door to needle CCU 104 minutes, A&E 31 minutes; call to needle time CCU 135 minutes, A&E 80 minutes). There was also a significant increase

of 63% in the use of the single dose thrombolytic agents from 5 in the first half to 22 in the second half of the audit. While these developments are welcomed in decreasing treatment time delays in these patients, it is important that protocols are in place to ensure a safe and effective practice. For example, the traditional thrombolytic agents and the single dose bolus drugs have important differences in major adverse effects.

Conclusions

The findings of this study highlight the importance of a collaborative approach in managing patients with cardiac chest pain within PHB and between PHB and the community. The results and the interpretations indicate the potential for improved pre-hospital cardiac care and the practical and policy issues that would need to be overcome. The difficulties in accessing and evaluating the accuracy of health information may account for the marginal impact of audit on hospital delay times. This points to the need to develop routine information systems to facilitate health care monitoring.

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Appendixes

Appendix I

Pre-Hospital Emergency Care Project Steering Committee Members

John Barton	Consultant Physician Cardiologist, Portiuncula Hospital
Ray Bonnar	Chief Ambulance Officer, WHB
Carmel Brennan	Manager, Cardiovascular Health Strategy, MHB
John Cunningham	Coordinator, Cardiovascular Projects, Ambulance Service, WHB
Catherine Duffy (Chair)	Development Officer, Primary Care Unit, WHB
Mary O'Rourke-Keenan	Manager, Cardiovascular Health Strategy, WHB
Matt Linehan	General Practitioner, WHB & PHECP GP Facilitator
Tony Lowry	General Practitioner & Primary Care Unit, MHB
Pat Marren	Administrator, Primary Care Unit, MHB
Robert Mortem	Acting Chief Ambulance Officer, MHB
Andrew Murphy	Professor of General Practice, NUI, Galway
Sinead Sheridan/ Claire Robinson	Coordinator Pre-Hospital Emergency Cardiac Project, WHB
Fionnuala Scully	Nurse Manager, Coronary Care Unit, Portiuncula Hospital

In Attendance:

Victoria Ononeze	Researcher, Department of General Practice, NUI, Galway
Siobhan Woods	Cardiovascular Research Nurse, Portiuncula Hospital

Appendix II

List of participating general practices

Name	**Address**		
Western Health Board			
Dr Ciaran Arnold	Dunlo Street	Ballinasloe	Co. Galway
Dr Ray Brogan	Portumna	Co. Galway	Co' Galway
Dr H. Bugler	Marina Medical Centre	Ballinasloe	Co. Galway.
Dr Martin Daly	Health Centre	Ballygar.	Co. Galway
Dr Madeleine Daly	Health Centre	Ballygar	Co. Galway
Dr Roderick Fahy	St. Brendan's St.	Portumna	Co. Galway
Dr Annraoi Finnegan	Marina Medical Centre	Ballinasloe	Co. Galway
Dr John Flaherty	The Sycamores	Main St, Loughrea	Co. Galway
Dr P. Geraghty	Glenamaddy	Co. Galway	Co. Galway
Dr David Hanney	Old Galway Road	Loughrea	Co. Galway
Dr Matt Linehan	Mountbellew	Co. Galway	Co. Galway
Dr Miriam Mangan	Health Centre	Ballygar	Co. Galway
Dr R. Martin-Duddy	The Pharmacy	Portumna	Co. Galway
Dr Niall McGauran	Health Centre	Eyrecourt	Co. Galway
Dr Bart Maloney	Abbey House	Loughrea	Co. Galway
Dr J. Moore	Mountbellew	Co. Galway	Co. Galway
Dr Mary Murphy	Laurencetown	Co. Galway	Co. Galway
Dr Sean Murphy	St. Brendan's Rd.	Portumna	Co. Galway
Dr E. O'Beirn	Dunlo Street	Ballinasloe	Co. Galway.
Dr P.J. O'Brien	Kiltormer	Co. Galway	Co. Galway
Dr John O'Reilly	Barrack Street	Loughrea	Co. Galway.
Dr Marguerite O'Reilly	Barrack Street	Loughrea	Co. Galway.
Dr Donal Twohig	Health Centre	Kilconnell	Ballinasloe
Midland Health Board			
Dr G. Cuffe	Medical Centre	Moate	Co. Westmeath.
Dr V. Harkins	Health Centre	Banagher	Co. Offaly
Dr J. Hunt	Kilcormac	Co. Offaly	Co. Offaly
Dr G. Kearon	Garden Vale	Athlone	Co. Westmeath
Dr P. Kelly	Ballymore	Co. Westmeath	Co. Westmeath
Dr P. Kenny	Banagher	Co. Offaly	Co. Offaly
Dr R. Kirby-O'Hanlon	The Batteries	Athlone.	Co. Westmeath
Dr F. Lee	Medical Centre	Moate	Co. Westmeath
Dr L. Lowry	1 Newtown Terrace	Athlone	Co. Westmeath
Dr T. Lowry	1 Newtown Terrace	Athlone	Co. Westmeath.
Dr G. Lynch	Medical Centre	Moate	Co. Westmeath.
Dr T. Meagher	Ballymahon Rd.	Athlone	Co. Westmeath
Dr P. McAuliffe	Green Street	Birr	Co. Offaly
Dr M. McCormick	Garden Vale	Athlone	Co. Westmeath.

Name	**Address**		
Dr D. McGivney	Ballymahon	Co. Longford	Co. Longford
Dr Paddy McGovern	Seffin, Birr	Co. Offaly	Co. Offaly
Dr G. Murphy	Health Centre	Ferbane	Co. Offaly
Dr D. O'Brien	Wilmer Road	Birr	Co. Offaly
Dr Denise O'Hare	Oxmantown Mall	Birr	Co. Offaly
Dr John O'Hare	Oxmantown Mall	Birr	Co. Offaly
Dr R. O'Leary	Bonavalley	Athlone	Co. Westmeath
Dr M.O'Mahony	Glasson	Athlone	Co. Westmeath
Dr P. O'Meara	Garden Vale Court	Athlone	Co. Westmeath
Dr U. O'Neill	Retreat Road	Athlone	Co. Westmeath.
Dr J. Rice	Garden Vale	Athlone	Co. Westmeath.

Appendix III

A&E Complaints Masterfile Codes

Patients for inclusion in the Chest Pain Audit at Portiuncula Hospital Ballinasloe

Complaint Score		Code	Code description
1.		AFIB	Atrial Fibrillation
2.		AN	Angina
3.		ARMPN	Arm Pain
4.	Males	BA	Back Pain
5.		CA	Cardiac Arrest
6.		CH	Chest Pain
7.		CHES	Chest Tightness
8.		COL	Collapse
9.		DI	Dizziness
10.		DYS	Dyspnoea
11.	Females	EPIG	Epigastric Pain
12.		HYPO	Hypotension
13.		HYPT	Hypertension
14.		LE	Lethargic
15.		NE	Neck Pain
16.		PAL	Palpitations
17.		SH	Shock
18.		SY	Syncopal Episode
19.		TA	Tachycardia
20.		Other	……. (PLEASE SPECIFY)

Please put identification label with admitting complaint and any Times known in this notebook for all patients admitted with the above Complaint Codes. Thank you

Appendix IV

Western Health Board Chest Pain Study Data Collection Sheet Portiuncula Hospital

Incident Date ☐☐☐☐☐☐ **Patient I.D.** ☐☐☐☐☐☐

A&E Admitting Complaint_____Provisional diagnosis_____

_____

Final Diagnosis_____

Patient Details

Sex: Male ☐ Female ☐ D.O.B. ☐☐☐☐☐☐

Occ/Status: Employed ☐ Retired ☐ Unemployed ☐

Homemaker☐

Residence: Rural ☐ Urban ☐

Hospital distance ☐☐ miles Distance at onset of symptoms ☐☐ miles

Insurance Type: GMS ☐ VHI / Bupa ☐

Fee paying ☐ Company ☐

Previous CHD Hx: Yes ☐ No ☐

MI ☐ Angina ☐ IHD ☐

Angiogram ☐ Angioplasty ☐ CABG ☐

Risk Factors: Yes ☐ No ☐

Smoker ☐ Hypertension ☐ Hypercholesterolaemia ☐

Diabetes ☐ Family Hx ☐ Sedentary lifestyle ☐

GP/Ambulance Section

Who did patient contact? GP ☐ Ambulance ☐ A&E ☐

GP I.D. number: ☐☐☐☐☐☐

History of pain: Hours ☐ Days ☐ Weeks ☐

Onset time: ☐☐:☐☐ **Date**☐☐☐☐☐☐ At rest ☐ On exertion ☐

New onset ☐ Increasing from norm ☐

Description of pain: Crushing ☐ Sharp ☐ Burning ☐

Tightness ☐ Pressure ☐

Location of Pain: Chest ☐ Arm ☐ Shoulder ☐ Throat ☐

Radiation of pain: Yes ☐ No ☐ Arm ☐ Jaw ☐ Neck ☐ Epigastric ☐ Shoulder ☐ Back ☐

Associated Features: Yes ☐ No ☐

Tiredness/Weakness ☐ SOB ☐ Nausea ☐

Dizziness ☐ Palpitations ☐ Sweating ☐

GP Diagnosis: Cardiac ☐ NonCardiac ☐ Musculoskeletal ☐

Respiratory ☐ GI ☐

Referred to: OPD ☐ A&E ☐

Referred to hospital: Self ☐ GP ☐

Hospital informed: Yes ☐ No ☐

Transport: Private ☐ Ambulance ☐ Public ☐

GP accompanied patient: Yes ☐ No ☐

Investigations and Treatments Pre-Hospital & Hospital

Q1. (a) First ECG performed Date ☐☐☐☐☐☐ Time ☐☐:☐☐

GP ☐ Ambulance ☐ A&E ☐ CCU ☐ Other ☐

Findings_____

Preliminary diagnosis_____

Site of M I_____

(b)Second ECG performed Date ☐☐☐☐☐☐ Time ☐☐:☐☐

GP ☐ Ambulance ☐ A&E ☐ CCU ☐ Other ☐

Findings_____

Preliminary diagnosis_____

AMERICAN HEART ASSOCIATION /CANADIAN CARDIOVASCULAR ASSOC.
Principal Presentation of Angina (Braunwald 1989)

Rest angina ☐ New onset angina ☐ Increasing angina ☐

Grading of Angina according to Canadian Cardiovascular Classification (Campeau 1976)

Grade I ☐ Grade II ☐ Grade III ☐ Grade IV ☐

Likelihood that Signs and Symptoms of Chest Pain are Ischaemic in Nature (Braunwald et al 1994)

High Likelihood ☐ Intermediate Likelihood ☐ Low Likelihood ☐

Short Term Risk of Death or Nonfatal MI in Patients with Unstable Angina (AHCPR clininal guidelines)

High Risk ☐ Intermediate Risk ☐ Low Risk ☐

Drugs

Q2 **Oxygen** Yes ☐ No ☐

Location GP ☐ Ambulance ☐ A&E ☐ CCU ☐ Ward ☐

Q3 **Aspirin** Yes ☐ No ☐

Location Home ☐ GP ☐ Ambulance ☐ A&E ☐ CCU ☐ Ward ☐

Q4 **GTN spray** Yes ☐ No ☐

Location Home ☐ GP ☐ Ambulance ☐ A&E ☐ CCU ☐ Ward ☐

Q5 **Analgesia** Yes ☐ No ☐ Morphine ☐ Cyclimorph ☐ Anti-inflammatory ☐ Route IV ☐ IM ☐ PO ☐

Location Home ☐ GP ☐ Ambulance ☐ A&E ☐ CCU ☐ Ward ☐

Q6 **Plavix** Yes ☐ No ☐

Q7 **Betablocker** previous Yes ☐ No ☐ Given Yes ☐ No ☐

Location GP ☐ Ambulance ☐ A&E ☐ CCU ☐ Other ☐

Q8 **Thrombolysis** Yes ☐ No ☐ Type_____ Time ☐☐:☐☐

Location GP ☐ Ambulance ☐ A&E ☐ CCU ☐ Ward ☐

If No please state reason_____

Q9 (a) **Troponin I** Yes ☐ No ☐ Time ☐☐:☐☐ Results time ☐☐:☐☐

Result < .5 ☐ up to 4.5 ☐ > 4.5 ☐

(b) **Troponin I** Yes ☐ No ☐ Result < .5 ☐ up to 4.5 ☐ > 4.5 ☐

(c) **Troponin I** Yes ☐ No ☐ Result < .5 ☐ up to 4.5 ☐ > 4.5 ☐

Q10 **Lipid profile** Yes ☐ No ☐

Result Total Chol High (>5) Yes ☐ No ☐

LDL High (>3) Yes ☐ No ☐

Q11 **Admitted** Yes ☐ No ☐ Location CCU ☐ Ward ☐

Q12 **Telemetery** Yes ☐ No ☐

Q13 **Stress Test** Yes ☐ No ☐ **Cardiac Echo** Yes ☐ No ☐

Weight_____Kg **Height** _____ **BM Index**_____ **Obesity Score** _____

Diagnosis of Chest Pain/AHA Guidelines Cardiac Yes ☐ No ☐

Q14 Definite acute coronary syndrome

MI with ST elevation Yes ☐ No ☐

Site of MI _____

MI without ST elevation Yes ☐ No ☐

Site of MI _____

Q15 Stable Angina Yes ☐ No ☐

Q16 Unstable Angina Yes ☐ No ☐

Q17 Secondary Unstable Angina Yes ☐ No ☐

Q18 Arrhythmia Yes ☐ No ☐

Atrial Fibrillation ☐ Atrial flutter ☐ Ventricular Tachy ☐

Ventricular Fibrillation ☐ LBBB ☐ RBBB ☐ CHB ☐

Q19 Cardiac Failure Yes ☐ No ☐ LHF ☐ RHF ☐ CCF ☐

Q20 Myocarditis Yes ☐ No ☐

Q21 Pericarditis Yes ☐ No ☐

Q22 Non Cardiac pain Yes ☐ No ☐

Interview Yes ☐ No ☐ Duration of interview ☐☐ minutes Date ☐☐☐☐☐☐

Would you be willing to be contacted regarding your recovery by post in the future?

Yes ☐ No ☐

Hospital Discharge

Q24 **Discharged from CCU** Alive Yes ☐ No ☐ Date ☐☐☐☐☐☐

Q25 **Discharged from Hospital** Alive Yes ☐ No ☐ Date ☐☐☐☐☐☐

Q26 **Cardiac Medications on Hospital discharge** Yes ☐ No ☐

Ace Inhibitor ☐ Aspirin ☐ Betablocker ☐ Calcium Antagonist ☐

Digoxin ☐ Diuretics ☐ GTN spray ☐ Nitrate ☐ Plavix ☐ Statin ☐

Q27 **Referred to Tertiary Centre** Yes ☐ No ☐

Angio Yes ☐ No ☐ **Angioplasty** Yes ☐ No ☐

Angioplasty + Stent Yes ☐ No ☐ **CABG** Yes ☐ No ☐

Q28 **Outpatient Appointment made** Yes ☐ No ☐

Q29 **Referred for Cardiac Rehabilitation** Yes ☐ No ☐

Signed_____

Date_____

Time Specification Components

	Time	**Date (dd:mm:yy)**	**If delay, pl specify reason**
Pain onset Current pain (if any)	□□:□□	□□□□□□	What did the patient think the pain was? : Indigestion □ Muscular□ Heart Pain □ Chest Trouble□
Call for help	□□:□□	□□□□□□	If delay, Why?
Arrival of/at GP's	□□:□□	□□□□□□	
Departure from GP's care	□□:□□	□□□□□□	
Ambulance call	□□:□□	□□□□□□	
Ambulance arrival	□□:□□	□□□□□□	
Ambulance Departure	□□:□□	□□□□□□	
Arrival at A&E	□□:□□	□□□□□□	
Triage	□□:□□	□□□□□□	
Seen by Doctor 1	□□:□□	□□□□□□	
Hospital ECG (first)	□□:□□	□□□□□□	
Discharge from A&E	□□:□□	□□□□□□	
Arrival at CCU/ward	□□:□□	□□□□□□	
Start of Thrombolysis	□□:□□	□□□□□□	
Door to needle time	□□□□	□□□□□□	
Call to needle time	□□□□	□□□□□□	
Pain to needle	□□□□		
Exersise test		□□□□□□	Positive Negative Inconclusive
Cardiac Echo		□□□□□□	Yes □ No □
Transcutaneous angiography		□□□□□□	
Angioplasty		□□□□□□	
Coronary artery bypass graft		□□□□□□	
Duration of stay in hospital	□□ days	□□□□□□ Discharge date	

AuditSW02

Appendix IV

A&E Audit Form

Chest Pain Study Data Collection Sheet: A&E Department
Portiuncula Hospital, Ballinasloe

All NCHD staff please complete the following:

Medical Record No ☐☐☐☐☐☐ **Date** ☐☐ ☐☐ ☐☐ **Time patient seen** ☐☐:☐☐

History of pain: Hours ☐ Days ☐ Weeks ☐

Current pain (if any) Onset time ☐☐:☐☐ Date ☐☐ ☐☐ ☐☐

At rest ☐ On exertion ☐

New onset ☐ Increasing from norm ☐

Description of pain in patients own words:_____

Crushing ☐ Sharp ☐ Burning ☐

Tightness ☐ Pressure ☐

Location of pain: Please note where patient points to (position of pain)

Chest ☐ Arm ☐ Shoulder ☐ Neck ☐

Radiation of pain: Yes ☐ No ☐

Jaw ☐ Neck ☐ Epigastric ☐ Shoulder ☐

Associated Features:

Tiredness/weakness ☐ SOB ☐ Nausea ☐

Dizziness ☐ Palpitations ☐ Sweating ☐

ECG performed: **Date** ☐☐☐☐☐☐ **Time** ☐☐:☐☐

A&E ☐ CCU ☐ Ward/OPD ☐

Findings (please note ST↑ , ST↓ ,T↓ or normal)

_____

_____

Preliminary Diagnosis_____

_____

Please complete other side

Using the tables located in A&E and all clinical areas please complete the following sections:

Principal Presentation of Angina (Braunwald 1989)

Rest angina ☐ New onset angina ☐ Increasing angina ☐

Grading of angina according to Canadian Cardiovascular Classification (Campeau 1976)

Grade I ☐ Grade II ☐ Grade III ☐ Grade IV ☐

Likelihood that Signs and Symptoms of Chest Pain are Ischaemic in Nature (Braunwald et al 1994)

High Likelihood ☐ Intermediate Likelihood ☐ Low Likelihood ☐

Short Term Risk of Death or Nonfatal MI in patients with Unstable Angina (AHCPR clinical guidelines)

High Risk ☐ Intermediate Risk ☐ Low Risk ☐

Troponin I *Yes* ☐ *No* ☐ ***Time Taken*** ☐☐:☐☐

Result time ☐☐:☐☐ *(If known)*

Result *< 0.5* ☐ *up to 4.5* ☐ *> 4.5* ☐

THE FOLLOWING TO BE COMPLETED PRIOR TO DISCHARGE

Diagnosis of Chest Pain/AHA Guidelines

Definite acute coronary syndrome

MI with ST elevation *Yes* ☐ *No* ☐

MI without ST elevation (positive Troponin I) *Yes* ☐ *No* ☐

Stable Angina Yes ☐ No ☐

Unstable Angina (Pain at rest, ECG Normal,Troponin I Neg)

Yes ☐ No ☐

Possible Acute Coronary Syndrome (Suspicious history, Troponin I Neg, ECG normal)
Yes ☐ No ☐

Non Cardiac Pain Yes ☐ No ☐

Findings_____

Other Diagnosis

Arrhythmias Yes ☐ No ☐

Cardiac Failure Yes ☐ No ☐

LVF ☐ RHF ☐ CCF ☐

Final Diagnosis_____

Appendix VI

Standard GP Referral Letter

Standard Referral Letter (G.P.s referring patients with suspected acute coronary syndrome to Portiuncula Hospital) please tick answers

Dear Doctor,

Thank you for admitting this patient.

Mr./Mrs./Miss _____

of_____

_____

_____

whom I suspect of having:
Acute MI ☐
Unstable Angina ☐

)ther ☐_____

Date of Birth :☐☐:☐☐:☐☐

GMS Patient: Yes☐ No☐

Patient"s G.P.

_____

History of presenting complaint:

_____
_____

_____
_____

_____
_____

_____
_____

_____
_____

Other significant History

_____
_____

_____
_____

_____
_____

_____
_____

_____
_____

Occupation _____
Ocupational Status:
Full Time ☐
Part Time ☐
Retired ☐
Unemployed ☐

History of Present Complaint:
(24 hour clock (include date if necessary)
Onset of current pain: /
Time patient called GP /
Time GP arrived /
Time ambulance called /
Time ambulance arrived /

Previous Cardiac History

Previous MI: Yes☐ No☐
If yes date: ☐☐:☐☐:☐☐
Previous Angina: Yes ☐ No☐
If yes date: ☐☐:☐☐:☐☐

Regular Medication (please list)

_____
_____

_____
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_____

Allergies (please list)

_____

_____

_____

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_____

_____

_____

_____

_____

_____

Initial Physical Examination

HR _____bpm

BP _____/_____

Pulmonary oedema? Yes ☐ No☐

Drugs Administered	Given/Used	Name	Dose	Time	Route
Oxygen	Yes☐ No☐				
Aspirin	Yes☐ No☐				

Hospital Informed
Yes ☐ No☐

Did you travel to hospital with patient?
Yes ☐ No☐

Any other comments:

ECG Trace Yes☐ No☐ ECG Performed? Yes ☐ No☐ If yes, please comment on result _____ _____ __ _____ __ _____ __ Did you use ECG Telemetry? Yes ☐ No ☐ If yes, did you encounter any difficulties in performing this? Yes ☐ No☐ Hospital Informed Yes☐ No☐ Did patient reach hospital Yes☐ No☐ Sudden Death Yes☐ No☐ Post Mortem Yes☐ No☐	**GTN Spray**	Yes☐ No☐				_____ _____ _____ _____ _____ _____ _____ _____ _____ _____
	Analgesia	Yes☐ No☐			SI☐ PO☐ IV☐ IM☐	
	SIGNED			**PRACTICE STAMP**		

EAST GALWAY/WEST MIDLANDS PRE HOSPITAL EMERGENCY CARE PROJECT

Activity to Date

The East Galway/West Midlands Pre Hospital Emergency Care Project was established in 2001 to ensure that East Galway and West Midlands patients presenting with acute cardiac problems receive the best possible care both in the local community and in Portiuncula Hospital, Ballinasloe. The project was established following the recommendations of the Cardiovascular Strategy *'Building Healthier Hearts'*. It is also influenced by Research undertaken at U.C.H.G. in 1999 by Walsh et al and by the DART project in the North Western Health Board. The project is co-ordinated by a steering committee and involves collaboration between local General Practitioners, staff at Portiuncula Hospital and the ambulance services together with liaison between the Department of General Practice, N.U.I. Galway, the Irish College of General Practice, the Cardiovascular and Primary Care Units of the Western Health Board and Midland Health Board.

The project consists of a number of elements:

- Provision of advisory defibrillators to local practices who have undergone specific training in the management of cardiac emergencies in the community
- Provision of GP basic life support kits
- Co-ordination of emergency care between General Practitioners, ambulance and hospital services to ensure that patients receive appropriate and timely treatment
- Increase in the range and availability of cardiac diagnostic and management services
- Auditing of the management of patients with heart attacks both in the community and hospital. The results of the first Audit from October 2001 to September 2002 were published in 2003. This report is the results of the second audit from February 2005 to July 2005.

Provision of Defibrillators

This project involved the provision of defibrillators and support equipment to practices in the projects area where a GP has completed an Immediate Care Course.
A total of 52 General Practitioners agreed to participate in the project. To date 35 GP based FR2 Automated External Defibrillators have been distributed in the East Galway / West Midland areas. The defibrillators have been used 10 times since October 2001 and of those 10 patients, five were discharged alive from hospital. This is a great success story for the project, the GPs and especially for the people who were treated successfully and their families.

GP Information Packs

GP information packs regarding the project were circulated to all GPs who signed up to the project. This pack gave GPs an overview of the project and its primary aims. Details of the proposed audit of patients presenting with acute coronary syndrome at Portiuncula Hospital were also included. GPs were asked to complete a duplicate referral letter, which was part of the data collected by the Research Nurse and the Research Officer from NUI Galway for analysis.

Basic Life Support Equipment

35 GPs now have an emergency resuscitation equipment bag as recommended by the project. One of the aims of the project was for GPs to have a constant supply of oxygen. This is supported by the Ambulance Service, who exchange a full oxygen cylinder for a used cylinder when attending a cardiac emergency.

GP Direct Access Stress Testing Services

In order to strengthen links and liaison between community and hospital services, an open access stress testing service has been provided in Portiuncula Hospital from November 2002.

Continuing Training And Liaison

Completion of the immediate care course was required prior to provision of the defibrillators. To date 46 GPs and 19 Practice Nurses have completed this course.
The Resuscitation Department in Portiuncula Hospital continue to visit GP practices for the Western Health Board area to review resuscitation skills and to provide retraining on use of defibrillators. The Ambulance Service provides this re-training in the Midland Health Board area.

With the benefit of the training in the immediate care courses and the provision of emergency care equipment, GPs on the project have reported that they feel more secure in the even of a cardiac emergency and are more efficient in their management of acute cardiac emergencies.

Contact

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