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Tús Áite do Shábháilteacht Othar
Patient Safety First

Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

Acute Coronary Syndromes Programme

♥ Model of Care ♥

March 2012

Royal College of Physicians of Ireland

Acute Coronary Syndromes Programme - Model of Care
March 2012

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Glossary of Terms

ACS	Acute Coronary Syndrome - myocardial infarction (heart attack) and unstable angina.
Angio-graphy	An investigative procedure involving injection of contrast material to visualise the coronary arteries via X-Ray.
Cath lab	Catheterisation Laboratory where angiography, PPCI and PCI are performed.
CCU	Coronary Care Unit within a hospital
CHAIR	Coronary Heart Attack Ireland Register operating in Cork and Kerry
CHD	Coronary heart disease (narrowing or blockages in the vessels, usually due to atherosclerosis
CPG	Clinical Practice Guideline
CR	Cardiac Rehabilitation
ED	Emergency Department
ECG	Electrocardiogram – a test that measures the electrical activity of the heart recording any problems
EMS	Emergency Medical Service (HSE Ambulance & Dublin Fire Brigade)
ESC	European Society of Cardiology
ESRI	Economic Social Research Institute
EWTD.	European Working Time Directive
HIPE	Hospital In Patient Enquiry – system In hospitals managed by ESRI
LOS	Length of Stay
NSTEMI	Non ST elevation myocardial infarction
NSTE ACS	Non ST elevation Acute Coronary Syndrome (which includes NSTEMI and unstable angina).
ORS	Optimal Reperfusion Service – service to effectively and efficiently deal with STEMI patient care nationally.
PCI	Percutaneous Coronary Intervention - involves the injection of contrast material, a balloon to enlarge the blood vessels, extraction devices to remove any clots and may involve the insertion of a stent (metal coil).
PPCI	Primary PCI – a PCI as the primary (first) means of reperfusion (opening of the arteries) in an acute STEMI patient.
PHECC	Pre-Hospital Emergency Care Council – statutory body for standards in pre-hospital emergency care
RDO	Regional Director of Operations – one for each of 4 HSE regions
STEMI	ST elevation myocardial infarction (elevated S and T segments on the ECG)
24/7	24 hours a day, 7 days a week (for 365 days a year)
9 to 5	9am to 5pm Monday to Friday (generally excluding public holidays). In the context of a 9-5 PPCI centre needs to be clearly defined regionally.

Executive Summary

The Acute Coronary Syndrome (ACS) programme was initiated to standardise treatment nationally of patients suffering from heart attack in its different forms. The working group has drawn up protocols for this Optimal Reperfusion Service based on international guidelines and best practise.

Delivery of the programme will depend on rationalisation of existing services, major input from the national ambulance service and cooperation from a wide range of stakeholders involved in the management of heart disease.

The designation of Cardiac units as 24/7 or 9/5 centres is based on current staff and facilities enabling them to deliver an acute coronary syndrome service. Minimum requirements to deliver such a service again is based on international best practice.

These designations will be reviewed regularly and units that are expanding in terms of staff and facilities may be re-designated when this has been achieved.

The aim of the programme is to ensure that all patients with ACS nationally are managed according to clear protocols in a timely and efficient manner.

1. Introduction - Context, purpose and benefits

This document outlines what ACS is, aspects of the ACS programme and the model of care for ACS. More detailed documents on each area can be requested from the ACS Working Group.

Definition of acute coronary syndromes (ACS)

Acute Coronary Syndromes (ACS) are myocardial infarction (heart attack) and unstable angina.

There are two types of heart attack – ST elevation myocardial infarction (STEMI) and Non ST elevation myocardial infarction (NSTEMI). ACS are generally grouped as either STEMI or NSTE ACS (which includes the NSTEMI and unstable anginas).

How ACS is recognised and treated

In general, hospitals will carry out a number of investigations and procedures to:

- determine if there is a confirmed ACS and the extent of the ACS; and
- treat the symptoms and/or the syndrome/disease.

STEMI diagnosis can also be done pre-hospital via a 12 lead ECG machine with ECGs transmitted to a hospital for interpretation and/or via interpretation by trained paramedics.

The main investigation is the Electrocardiogram (ECG) that is a test that measures the electrical activity of the heart recording any problems with the heart's rhythm, and the conduction of the heart beat through the heart which may be affected by underlying heart disease. ECGs are particularly useful in determining those patients with ST segment elevation that will benefit from early reperfusion either by primary percutaneous coronary intervention (PPCI) or by the administering of thrombolysis.

PPCI is recognised internationally as the preferred treatment of STEMI in terms of morbidity and mortality outcomes. Where PPCI cannot be delivered within an acceptable timeframe, thrombolysis is recommended with early transfer to a PPCI centre for angiography.

PPCI involves the injection of contrast material to visualise the coronary arteries. A balloon is used to enlarge the blood vessels – where they have narrowed – with extraction devices to remove any clots. It may also involve the insertion of a stent (metal coil) at the narrowed segment of the vessel to prevent further narrowing.

Thrombolysis is the administering of a clot-dissolving drug treatment, usually administered directly into a forearm vein, to dissolve the clot (thrombus) in the coronary artery so as to restore blood flow and minimise muscle damage to the heart.

ACS patients should also receive certain medications on being admitted, such as Aspirin and generally a Beta Blocker plus medications on discharge including Aspirin, Beta Blocker, Angiotensin Converting Enzyme Inhibitors (ACEI) or Angiotensin Receptor Blockers (ARB) and Lipid Lowering medication. If the patient is a smoker he/she should get smoking cessation therapy/advice and all ACS patients should be enrolled in a Cardiac Rehabilitation programme.

Objectives of the ACS Programme – quality, access and cost

From the outset, the programme has had the following objectives

Quality

- Every patient with acute coronary syndrome is managed according to the primary PCI protocol (including early angiography for NSTEMI)
- Implement targeted programme to prevent Coronary Heart Disease

Access

- Every patient with acute coronary syndrome is diagnosed correctly and without delay

Cost

- Reduce median length of stay for STEMI patients from 5 to 4 days and thus reduce the number of bed days by 1800 per year.
- Reduce median length of stay for NSTEMI by 24 hrs thus reducing number of bed days by 6000 per year.

Key tasks

The key tasks relating to the objectives are:

- Standardised pre-hospital response, triage, treatment and transport of patients (including equipping vehicles with 12 lead ECGs and training paramedics in ECG use and interpretation)
- Established primary PCI Centres
- Standardised hospital response in a primary PCI Centre
- Standardised hospital response in other hospitals
- Established Cardiac Rehabilitation programmes in all acute hospitals
- Established Secondary prevention programmes in primary care setting
- Patient information and awareness campaigns on recognising signs of a heart attack and contacting the emergency services
- Coordinated first response to collapse – ambulance, uniformed co-responders and community.
- Strategy to identify and reduce risk factors for ACS.

Solution areas to address current situation

From the experience, research, data and the evidence it became clear that solution areas were:

1. Develop and implement an ACS protocol addressing key areas:

    - Standardised pre-hospital response, triage and transport for STEMIs and NSTE ACS
    - Designated and defined primary PCI centres working with networked general hospitals
    - Standardised national care pathways and protocols
    - Assured patient follow up with cardiac rehabilitation and secondary prevention in primary care
    - Information / ICT mechanism to assure timeliness of treatment with low complication rates

2. Develop public awareness campaigns regarding ACS symptoms and to call for help 999/112

3. Develop and implement a programme of prevention of coronary heart disease (CHD) addressing:

    - Population approach in tandem with other stakeholders
    - Primary prevention to include high risk groups in association with Primary Care
    - Secondary prevention with coordination between primary care, hospital and cardiac rehabilitation.

It also became clear that to have the most immediate effect and improvement in mortality and morbidity from ACS that **priority needed to be given to solution area 1**.

Key benefits of the ACS programme

By implementing an optimal reperfusion service (ORS) strategy, involving primary PCI for 80% of patients nationally who suffer from ST elevation myocardial infarction (STEMI), and thrombolysis for the remaining 20%), and providing early angiography for risk assessed Non ST Elevation ACS (NSTE ACS) patient this should result in:

- earlier discharge and thus a decrease in the median length of stay: and
- a marked reduction in mortality and morbidity (in and out of hospital)..

By implementing a public awareness campaign on ACS symptoms and in contacting the EMS this should result in

- patients being in a better condition when entering hospital thus quicker recovery and less bed days; and
- lower morbidity and mortality (in and out of hospital).

2. Need for reperfusion therapy in Ireland

The purpose of this section is to review indices of need for primary PCI and early angiography for NSTE ACS. Each HSE area has circa 1 million population with all four areas experiencing large reduction in mortality from CHD in the last decade. Notably Cork and Kerry continue to have significantly higher mortality than the national average. Ireland has a low proportion of the population over 65 years but this is projected to increase significantly.

This combination of increasing survival and aging of the population will place considerable demands for cardiovascular services in the coming years. A mapping exercise showed that 81% of the Irish population, aged over 55 years, lives within a 90 minute drive time to Dublin, Cork and Galway. (see **Table 1** and **Appendix 1**)

The number of hospitalisation for ACS has decreased by 13% in the last decade and the pattern of hospitalisations for ACS has also changed from predominantly STEMI to NSTE ACS (see **Appendix 2**). In 2008 the number of STEMI discharged was1639 with presentations (24 hours) patients across the country of 5 per day on average (maximum of 12 STEMI admissions per day recorded in 2008). The number of NSTE ACS in 2008 was 6827.

The length of stay for STEMI has dropped to 5 days (median) over the decade with the international norm of 4 days (median) yet to be achieved. For NSTEMI, with larger numbers, the LOS has not changed greatly in 2008 (median = 7) with potential for efficiency and saving of bed days in this patient group.

A recent international review, applied to Ireland, would suggest that Ireland aim for a provision of between 4-8 centres for its population.

Table 1 Drive times and population served *(Source: Health Atlas)*

	60 mins	**90 mins**	**120 mins**
Population 55 years and older	57%	81%	93%
Total population	**66%**	**90%**	**96%**

3. Current ACS care provision in Ireland

Of 34 hospitals currently providing emergency care to Acute Coronary Syndrome (ACS) patients, nine have Cath labs with 5 of these having two labs each and providing 24/7 service though within their own immediate catchment largely.

Public awareness of symptoms of heart attack has not received attention in recent years, an important feature in all successful programmes to improve early detection, and reduce mortality and morbidity. Also 60% of people in Irish studies call the EMS which is low compared with other countries. Few hospitals have formal arrangements with the ambulance service for managing the steps in pre-hospital care and swift transport to the Cath lab.

Almost 40% of STEMI patients got PPCI in 2010 using the Heartbeat series of hospitals (n=14). Secondary prevention therapy initiation is high with some variation. No current information is available on invitation to or timing of CR post event. The median length of stay for STEMI and NSTEMI is 5 and 7 respectively which is long by international standards. IT systems vary and no structured approach exists to capture of minimum data for audit.

Information from the visits by the ACS team to all Cath lab hospitals in Autumn 2010 can be found in **Appendix 3**.

4. National ACS protocol and evidence base

This section covers the guideline for ACS care incorporating the optimal reperfusion service (ORS) guideline for STEMIs (see **Appendices 4** and **5**) plus some of the evidence base supporting the guideline.

***STEMI** is defined as ST-segment elevation in 2 or more contiguous leads (2mm in leads V_2 and V_3 or 1mm in any other leads) or new onset LBBB' (accepting that interpretive ECG machines may vary slightly from this depending on age and gender)*

This definition is based on research of international definitions and presentations from leading experts.

*The ACS programme recommends that patients be **transported directly to a Primary PCI centre** if this can be achieved within 90 minutes of first medical contact [ECG diagnosis].*

The ESC (2007) recommends that PPCI should be performed within 2 hours of first medical contact [ECG acquisition] This time frame allow for 30 minutes for door of cath lab to balloon time. The UK guidelines advocate that pre-hospital 12 lead ECG by emergency medical systems would be crucial in reducing door-to-reperfusion times.

*The ACS programme recommends that **all patients are considered for primary PCI** unless transport times to the cath lab are greater than 90 minutes – in these circumstances thrombolysis (pre hospital or in hospital) should be administered.*

It is widely agreed that primary PCI is an effective treatment of STEMI and most countries in the developed world have implemented Primary PCI programmes. While some countries, such as Denmark have a 100% PPCI treatment rate for STEMI, other countries such as the UK have implemented a hybrid approach, which includes primary PCI and thrombolysis. While the evidence for pre-hospital thrombolysis is clear, this may not be a practical solution in Ireland where potential numbers of pre-hospital thrombolysis administration may be too low to be safe and effective.

*The ACS programme recommends **transferring thrombolysed patients to a primary PCI centre as soon as possible** to ensure that either rescue angioplasty can be performed in a timely manner if needed, or angiography can be performed within 3 to 24 hours*

Reperfusion with thrombolytics still carries a risk of death or recurrent MI and therefore current guidelines recommend routine coronary angiogram within 3 to 24 hours following thrombolysis. The decision to delay angiography at least 3 hours post-thrombolysis is based upon studies that investigated a facilitated PCI approach, which increased the risk of stroke, bleeding, mortality and recurrent MI. The exception to this delay of 3 hours is when patients require a rescue PCI.

*The ACS programme recommends **transferring risk assessed NSTE ACS patients to a primary PCI centre or PCI centre within 24 hours** to ensure early angiography can be performed*

5. Implications for the four HSE regions

Section purpose

This section sets out the important elements of the proposed national protocol and the practical implication of providing that service. Essential to changing to an Optimal Reperfusion Service is safety with transparent protocols on managing patients, clear communication on how the service provision will be effected and trained and resourced with professionals providing the service.

The spectrum of the programme spans from increasing public awareness, equipping and training the ambulance service to deliver direct transfer of patient from site to Cath lab, defined requirements of a PPCI centre, requirements to ensure cardiac rehabilitation and secondary prevention medications to monitoring requirements to ensure continuous improvement.

Designated PPCI centres for Ireland

While all hospitals with Cath labs and interventional programmes may undertake PPCI for walk in patients during the day the national proposal for an optimal reperfusion service with designated PPCI centres with formal arrangements clearly understood by the ambulance will be as follows:

- Dublin North East - designated centre is Mater hospital (24/7)
- Dublin Mid Leinster - designated centres are St James's (24/7) and St Vincent's hospitals (24/7)
- South –designated centres are Cork University hospital (24/7) and Waterford Regional hospital (9-5)
- West - -designated centre is Galway University hospital (24/7).

The unit in Limerick Regional Hospital (HSE West) is currently expanding. Designation will be revisited when this is achieved.

Emergency PPCI treatment in the North West will be from Dublin or Galway with a medium term solution to be explored (in conjunction with Northern Ireland). Ideally the establishment of a permanent catheter laboratory in the North West to deal with PCI for NSTE ACS patients will improve the quality and cost of care for these patients.

Essential features of a safe and effective Optimal Reperfusion Service (ORS)

From the outset it is important to emphasise key foundation stones of a safe and effective ORS as:

- Safe practice (clarification - NO confusion, agreement for NO refusal of patients, training especially in EMS),
- Adherence to international standards
- Health gain for population
- Developmental in nature allowing future changes and innovation
- An effective and efficient audit system to monitor quality and performance

To ensure we progress from the current reperfusion service to that of a national ORS then important areas to address are to:

- ensure national agreement
- implement the programme robustly
- ensure readiness in pre-hospital sector
- understand and deal with the knock on effects on various parts of the system (CCU beds, Cath Labs, elective work, ED, Ambulance)
- understand and plan for staffing requirements
- clarify costs of implementation
- set out clear monitoring and evaluation parameters.

Significant elements in the ACS programme

a. Improving public awareness of symptoms Most successful countries concurrently implement a programme to alert people to the need to seek help early for chest pain and allied symptoms as well as the importance of calling the EMS to achieve rapid triage, diagnosis and transport to the most appropriate centre.

b. Ensure pre-hospital triage with 12 lead ECG application and transmission / interpretation is available via trained and equipped EMS These are integral to ensuring timely treatment in this medical emergency

c. Implement direct patient transfer to Cath Lab For EMS conveyed patient (currently ~ 65% patients in Ireland) direct transfer from ambulance to Cath lab at PPCI Centre is essential. For 'walk-in' patients to other hospitals swift diagnosis/turnaround with, in most cases, rapid transfer to PPCI Centre is important.

d. Recommended important characteristics of designated PPCI centres

(a) No refusal policy
(b) Adequate CCU/step down beds
(c) Dedicated call service and point/s for ECG reception
(d) relevant skill mix in cath lab - interventional cardiologist, nursing, technical and radiology
(e) Minimum of 2 labs is recommended at 24/7 PPCI centre to ensure access at all times
(f) Minimum roster of 1:5 Interventionalist Cardiologists is recommended for 24/7 centres (a minimum of 3 Interventionalist Cardiologists for 9-5 centre)
(g) The aim in this national ORS strategy is for at least 80% PPCI initially with 90% achieved after 5 years
(h) National protocol with local adaptation if necessary

e. Cardiac rehabilitation and secondary prevention Is initiated prior to discharge. Invitation to Phase 3 within 4 weeks of discharge

Proposed plan for provision of an ORS in Ireland – by HSE region

HSE Dublin North East (DNE)

Indicators of NEED for acute cardiac care in DNE

- Population of HSE DNE - 927,525 (22%) in Census 2006 with population projection estimates to affect this HSE area - decrease in the population of Dublin with increases in Mid East (Kildare, Meath and Wicklow) and Midlands.
- Mortality Population in the North East had higher mortality than Ireland in 1990's with current CHD mortality comparing favourably to Irish figures.
- Hospitalisations **Appendix 2** shows the number of patients who were discharged with diagnosis of ACS in 2008.

Indicators of SUPPLY in DNE

- Five of the six hospitals providing acute care contribute to Heartbeat
- Current pattern of provision shows a median LOS of 6 days using 3342 bed days

PROVISION of PPCI service in DNE - Proposed Plan

- 24/7 service in Mater hospital with Beaumont hospital managing daytime walk-in patients only (circa 40% of their normal caseload). See **Appendix 3** re Mater and Beaumont hospitals characteristics.
- EMS (HSE and DFB) would then work to a bypass of all other hospitals when called to patient. Triage, diagnosis (with 12 lead ECG) and communication would take place in ambulance and with PPCI centre. (This only refers to STEMI patients)
- For NSTE-ACS angiography within 24 hours in either Mater or Beaumont hospitals.

HSE Dublin Mid Leinster (DML)

Indicators of NEED for acute cardiac care in DML

- Population of HSE DML was 1,215711 (29%) in Census 2006. with population projection estimates expected to affect DML: decrease in the population of Dublin with increases in Mid East (Kildare, Meath and Wicklow) and Midlands.
- Mortality from coronary heart disease (CHD) has declined significantly in the last 25 years. Dublin has below average mortality but male mortality in Midlands is significantly higher compared with Ireland overall.
- Hospitalisations **Appendix 2** shows the number of patients who were discharged with diagnosis of ACS in 2008.

Elements of SUPPLY in DML

- Two of the nine hospitals providing acute care contribute to Heartbeat
- Current pattern of provision shows a median LOS of 4 days using 4095 bed days

PROVISION of PPCI service - Proposed Plan

- 24/7 service in St James Hospital and in SVUH for DML and daytime walk-in only service in AMNCH. See **Appendix 3** re SJH, SVUH and AMNCH characteristics.
- EMS (HSE and DFB) would then work to a bypass protocol when called to patient. Triage, diagnosis (with 12 lead ECG) and communication would take place in ambulance and with PPCI centre.
- For NSTE-ACS angiography within 24 hours in either SJH, SVUH or AMNCH.

HSE South

Indicators of NEED for acute cardiac care in HSE South

- Population of HSE South 1,080999 (26%) in Census 2006
- Population projection estimates suggest that the population of South West and South East may increase somewhat depending on interregional migration.
- Population in the South (Cork and Kerry) had significantly higher CHD mortality than Ireland in 1990's – this pattern remains. Female mortality in South East is significantly higher than Ireland overall.
- Hospitalisations **Appendix 2** shows the number of patients who were discharged with diagnosis of ACS in 2008.

Indicators of SUPPLY in HSE South

- Four of the nine hospitals providing acute care contribute to Heartbeat
- Current pattern of provision shows a median LOS of 5 days using 3515 bed days

PROVISION of PPCI service in South - Proposed Plan

- 24/7 service in CUH with Waterford Regional hospital providing 9 am -4 pm service initially. WRH has potential to develop into 24/7 service following infrastructural and staff developments. See **Appendix 3** re CUH and WRH characteristics.
- EMS Patient triage, diagnosis (with 12 lead ECG) and communication with bypass arrangements.
- For NSTE-ACS angiography within 24 hours in either CUH or WRH hospitals.

HSE West

Indicators of NEED for acute cardiac care in HSE West

- Population of HSE West 1,010,690 (24%) in Census 2006 with 17% elderly at present. Population projection estimate may affect the West depending on interregional migration.
- Population in the West has similar CHD mortality to Ireland overall
- Hospitalisations **Appendix 2** shows the number of patients who were discharged with diagnosis of ACS in 2008.

Indicators of SUPPLY in HSE West

- Two of the ten hospitals providing acute care contribute to Heartbeat
- Current pattern of provision shows a median LOS of 6 days using 3965 bed days

PROVISION of PPCI service in West - Proposed Plan

- 24/7 service in Galway (GUH) for the region with Limerick Regional Hospital (LRH) managing walk-in daytime patients initially. LRH would require developments in infrastructure and staffing to be able to provide 24/7 service. See **Appendix 3** re GUH and LRH characteristics and **table 2** for Sligo and Letterkenny..
- For the NW thrombolysis and transfer or direct transfer to Dublin or Galway as the short term solution. Medium term there is a need for Cath lab development in NW.
- EMS would then work to a bypass of all other hospitals when called to patient. Triage, diagnosis (with 12 lead ECG) and communication would take place in ambulance and with PPCI centre.
- For NSTE-ACS, angiography within 24 hours in either GUH or LRH.

The North West

There are challenges in providing PPCI to the population of the North West. These are large distances to interventional cardiology, lack of service in the wider area of NW Ulster, the small size of the population and its separateness from its natural hinterland by the border with Northern Ireland.

The ACS programme will continue to be involved in discussions on short, medium and long term solutions for the region.

Table 2 Sligo and Letterkenny General Hospitals

Sligo General Hospital	Letterkenny General Hospital
• Mobile Cath Lab • 1 Day a week • I General Cardiologist • 520 diagnostic angiograms 2009 • 11 CCU Beds • Pre hospital thrombolysis by Mobile Coronary Care Unit • Geographical logistics for timely access to PCI Centre • Ambulance and hospital staff depletion with lengthy patient transfers	• Mobile Cath Lab • 1 Day a week • I FT Interventional Cardiologist • 460 diagnostic angiograms 2009 • 8 CCU Beds • Pre hospital thrombolysis by some GPs • Capacity for additional cardiac facilities • Geographical logistics for timely access to PCI Centre • Ambulance and hospital staff depletion with lengthy patient transfers

6. Pre-hospital service readiness

Section purpose

The purpose of this section is to outline the requirements and preparedness of the emergency medical service (EMS) to implement the proposed ACS protocol. Full data can be requested from the ACS working group.

What is required from the EMS

The EMS will need to ensure that all ambulances attending patients with acute conditions, cardiac symptoms or collapse have:

1. Equipment to undertake a 12 Lead ECG
2. Ability to interpret or transmit the ECG using one (or more) of the following
    a. direct practitioner recognition in the field,
    b. transmission to clinician/hospital (fax, phone) or
    c. by practitioner use of accredited interpretive software
3. Trained personal in application of 12 lead ECG
4. Trained personal in ability to interpret or transmit the ECG to clinician/hospital
5. Trained personal in ability to communicate with Cath Lab clinician
6. PHECC Clinical Practice guidelines as the standard operating protocol to be followed.
7. Protocol for direct transport of patient with suspected STEMI from patient location to the Cath Lab in the PPCI centre unless there is an indication for thrombolysis to be given at the local hospital. This protocol will mark a change from current practice of initial transport of patient to the local hospital and initial assessment in Emergency Dept of Cath Lab hospital.
8. Ability to repatriate the patient post procedure back to local hospital within 24hrs.

Assessing pre hospital readiness to implement ACS protocol

In late 2010 the ACS programme working group conducted a survey of EMS readiness based on certain criteria. The following information gives the broad results of that survey (with updated information where known).

General

- There are 98 ambulance stations in ROI with 281+ ambulance vehicles (some missing data). Varying number of vehicles per station.

ECG capability

- In late 2010, 224 (80%) ambulances had 12 lead ECGs in vehicles. Ambulances in Eastern and Southern areas had the lowest number of 12 lead ECGs in ambulances and the highest number of 3-lead machines. This gap in 12 lead ECGs was addressed in 2011 with new 12 lead ECG machines bought and supplied to EMS resulting in all operational Ambulances being equipped with 12 lead ECG machines.
- The average age of 12 lead ECGs in each area was 5 years or more (reduced now due to some new machines bought in 2011). No area has a replacement policy for 12 lead ECGs. The cost of providing a 12 lead ECG machines s around €25k per machine.

Staffing and training

- In late 2010 there were 1,278 front-line staff working in ambulance service, 1077 (84%) are paramedics and 162 (13%) are advanced paramedics. The numbers of advanced paramedics has increased in 2011/12 and continues to increase steadily.
- All AP are trained to apply and interpret 12 lead ECG. A training programme was started in 2011 to train paramedics to apply & interpret 12 lead ECG. Currently around 80% are trained and it is expected that all will be trained by end of June 2012.
- Cost of training all paramedics is €840k

Practice in ambulances

- There are no bypass protocols in place across the country for STEMI/chest pain
- Pre-hospital thrombolysis practised/reported in Mid-West & West only.
- Following transport to nearest hospital for confirmation of STEMI, then urgent transport to PCI facility in most areas.

Calls and response times

- There were 159,955 AS1 Calls in 2009 of which 11,549 (7.2%) were for chest pain, cardiac arrest or heart problem.

Estimating the impact of a change in ACS protocol - NW, SE & MW

For the geographical areas of the North West, South East and Mid West the impact on the transport requirement for EMS service of a change in ACS protocol regarding STEMI patients was studied.

- **For the NW** it was calculated that about out 140 patients per year (70 each from Sligo and Letterkenny) would require out of county transport to Galway or Dublin.
- **For SE** (with Waterford as a 9-5 PPCI centre) about 140 patients per year would need transport from parts of the region out of hours (5pm – 9am) to either Dublin or Cork – around 3 per week.
- **For MW** (with Limerick as a 'walk-in' daytime PCI centre only) about 200 patients would need transport to Galway or Cork – 93 in 'office hours' (circa 2 per week) and 116 out of hours (circa 2 per week).

Pre-hospital service readiness in Dublin NE and Swords

As Dublin NE may possibly be the 1st phase of implementation what follows is the DNE status

12 Lead ECG **-** All ambulance stations have either Life Pak 12 (NE) or Zoll (Swords).

Interpretive Software - Life Pak 12/15 (NE) and Zoll in Swords

Transmission of ECG - Transmission is possible in NE ambulances, however there are technical and other issues to overcome as well as dealing with 2 different equipment transmission systems.

Personnel: Advanced Paramedics - In NE there are 22 Advanced Paramedics in 7 of the 9 stations. In Swords there are 2 APs (with DFB covering the rest of North Dublin). The spread of APs is not even with more APs in Castleblaney and Navan and none in Ardee and Cavan. This was the situation in 2011.

Personnel: Paramedics - There are circa 50 HSE Ambulance paramedics in NE and 6 in Swords. In the NE about 20 paramedics are trained to apply and interpret 12 lead ECG (up to June 2011). In Swords all paramedics are up-skilled.

Capacity for **rapid response -** In 2009 there were 332 STEMI in DNE though it may be better to inflate the figures to allow for a small % of false positives being transported. Data for hospitals in catchment of ambulance stations:

- OLLHD, Louth 51 patients
- Monaghan, Cavan 54 Patients (some for NI?)
- Navan, Connolly 63 patients
- Beaumont 71 patients
- Mater 93 patients

7. The ACS Model of Care – principles and by site

Section purpose

The purpose of this section is to outline the model of care, that is, what is broadly expected to happen to an ACS patient once picked up by an Ambulance or arrival at a hospital – general principles, by site and by condition (STEMI or NSTE ACS).

STEMIs can only be confirmed by 12 lead ECG in the Ambulance or in a hospital.

ACS care – general principles (STEMIs and NSTE ACS)

ST Elevation MIs (STEMIs)

(a) Optimal Reperfusion Therapy via primary percutaneous coronary intervention (PPCI) or thrombolysis (as per ACS ORS protocol).

(b) Designated PPCI centres for Ireland = 5 x 24/7 centres and 1 x 9-5 centre

(c) A no refusal policy (for STEMI patients) at PPCI centres (during operating hours for the 9-5 centre).

(d) Clear communication protocols at PPCI centres and no confusion.

(e) Ambulance to transfer to PPCI centre or local acute hospital according to ACS ORS protocol (**also see ACS care by site**).

(f) Urgent transfer to PPCI centre after any thrombolysis either pre-hospital or in a non PPCI centre.

(g) Repatriation to a coronary care or telemetry bed in a local hospital from PPCI centre or PCI centre following successful reperfusion for engagement with local rehabilitation and other local services such as smoking cessation counselling.

Non ST Elevation ACS (NSTE ACS)

(a) Ambulance to transfer to nearest available acute hospital for ACS diagnosis confirmation and care

(b) Rapid transfer (within 24 hours) for risk assessed* NSTE ACS to a PPCI or PCI centre for angiography investigation

(c) Repatriation to a coronary care or telemetry bed in a local hospital from PPCI or PCI centre for engagement with local rehabilitation and other local services such as smoking cessation counselling

* NSTE ACS should be risk assessed using the GRACE protocol http://www.outcomes-umassmed.org/grace/

ACS care by site

Acute hospital with ED and no permanent catheter laboratory

Follow protocols and bundles for ACS diagnosis and care including early ECG, early medications, relevant discharge medications, rehabilitation and smoking cessation

For confirmed STEMI

(a) **if** transport to PPCI centre is possible within 90 minutes **then** immediate ambulance transport to PPCI centre (no local thrombolysis to be given)

(b) **if** transport to PPCI centre is not possible within 90 minutes **then** the patient should receive thrombolysis in hospital (followed by ambulance transfer to a PPCI centre as soon as possible following thrombolysis).

(c) prepare for patient return from PPCI centre for engagement with local rehabilitation and other local services such as smoking cessation counselling

For NSTE ACS (confirmed by troponins and ECG result)

(a) arrange rapid transfer (within 24 hours) for risk assessed *NSTE ACS to a PPCI or PCI centre for angiography investigation

(b) prepare for patient return from PPCI or PCI centre for engagement with local rehabilitation and other local services such as smoking cessation counselling

* NSTE ACS should be risk assessed using the GRACE protocol http://www.outcomes-umassmed.org/grace/

Acute hospital with ED and a permanent catheter laboratory doing PCI but not a designated PPCI centre

Follow protocols and bundles for ACS diagnosis and care including early ECG, early medications, relevant discharge medications, rehabilitation and smoking cessation.

For confirmed STEMI

(a) **if** available capacity **then** perform immediate (within 90 minutes of diagnosis) PPCI for walk-in patients

(b) **if** no available capacity to perform immediate (within 90 minutes of diagnosis) PPCI for walk-in patients **then** follow model of care for acute hospital with ED (and no permanent catheter laboratory)

For NSTE ACS (confirmed by troponins and ECG result)

(a) **if** available capacity **then** perform angiography investigation within 3 to 24 hours for risk assessed* NSTE ACS patients

(b) **if** no available capacity to perform angiography investigation within 3 to 24 hours for risk assessed* NSTE ACS patients **then** follow NSTE ACS model of care for acute hospital with ED (and no permanent catheter laboratory)

* NSTE ACS should be risk assessed using the GRACE protocol http://www.outcomes-umassmed.org/grace/

Acute hospital with ED and a permanent catheter laboratory being a designated '9-5' PPCI centre

- Follow protocols and bundles for ACS diagnosis and care including early ECG, early medications, relevant discharge medications, rehabilitation and smoking cessation
- Ensure clear opening and consistent times, single hospital contact point and an ECG reception point to enable efficient and effective coordination with the ambulance service and with referring hospitals
- Ensure adequate CCU and step-down beds, adequate cath lab availability plus a no refusal (of STEMI patient) policy during stated opening times

For confirmed STEMI

(a) perform immediate PPCI for ambulance transported and walk-in patients within opening hours

(b) outside opening hours (of cath lab) follow model of care for acute hospital with ED (and no permanent catheter laboratory)

(c) following successful reperfusion repatriate patient if necessary to a coronary care or telemetry bed in a local hospital for engagement with local rehabilitation and other local services such as smoking cessation counselling

For NSTE ACS (confirmed by troponins and ECG result)

(a) perform angiography investigation within 3 to 24 hours for risk assessed* NSTE ACS patients

(b) following angiography investigation repatriate patient if necessary to a coronary care or telemetry bed in a local hospital for engagement with local rehabilitation and other local services such as smoking cessation counselling

* NSTE ACS should be risk assessed using the GRACE protocol http://www.outcomes-umassmed.org/grace/

Acute hospital with ED and a permanent catheter laboratory being a designated 24/7 PPCI centre

- Follow protocols and bundles for ACS diagnosis and care including early ECG, early medications, relevant discharge medications, rehabilitation and smoking cessation
- Ensure 24/7 availability, single hospital contact point and an ECG reception point to enable efficient and effective coordination with the ambulance service and with referring hospitals
- Ensure adequate CCU and step-down beds, adequate cath lab availability (two cath labs) plus a no refusal (of STEMI patient) policy

For confirmed STEMI

(a) perform immediate PPCI for ambulance transported and walk-in patients

(b) following successful reperfusion repatriate patient if necessary to a coronary care or telemetry bed in a local hospital for engagement with local rehabilitation and other local services such as smoking cessation counselling

For NSTE ACS (confirmed by troponins and ECG result)

(c) perform angiography investigation within 3 to 24 hours for risk assessed* NSTE ACS patients

(d) following angiography investigation repatriate patient if necessary to a coronary care or telemetry bed in a local hospital for engagement with local rehabilitation and other local services such as smoking cessation counselling

* NSTE ACS should be risk assessed using the GRACE protocol http://www.outcomes-umassmed.org/grace/

8. Implementation of the ORS strategy

Section purpose

This section sets the elements of implementation plus the basic plan and phases. Many elements are still in the process of being addressed including recruitment of cardiologists and as these are progressed this section will be expanded in any update of this document.

Elements of implementation

The implementation of an optimal reperfusion service has required and will require addressing many elements including (but not limited to):

- Determining the number of centres that provides the optimal level of primary PCI to the population
- Workforce planning to ensure that the service can be implemented while adhering to the EWTD.
- Agreement on repatriation in each HSE region to ensure that patients can be discharged by day 3 where possible, without impacting on the patient flow in primary PCI centres
- Discussion on the impact on workload and CCU activity in non-PCI centres
- Addressing the impact of altered ambulance workload - while the volume of journeys may reduce, these journey times will be longer, therefore impacting on the delivery of services, particularly in rural areas.
- Prompt and robust referral to cardiac rehabilitation services. Greater collaboration between rehab centres in each network may be required to ensure that all patients have access to services.
- Development and implementation of a robust evaluation of the ORS - this will include data collection and the determination of key data sets. Currently HIPE portal is being tested to determine if it can achieve this function.

Checklist for regional and local implementation of ACS programme

Baseline and targets

- □ Baseline current performance using ACS KPI set.
- □ Agree local targets in relation to quality, access and bed day savings
- □ RDO Sign off of local targets

Local Delivery

- □ Review Model of care, protocols, and guidelines developed as part of the ACS programme
- □ Conduct local GAP analysis
- □ Identify and document desired local design variations (if any) to the model of care
- □ Agree design variations with the ACS programme lead

Local roles and governance

- □ Roles and responsibilities defined for all staff involved in ACS services
- □ Nominated local Clinical Lead and back-up for ACS
- □ Nominated ACS Nurse with appropriate training
- □ Other nominated ACS implementation members
- □ Access to allied health professionals for multi-disciplinary care particularly cardiac rehabilitation, smoking cessation counsellors and dietician
- □ Integrate roles into the existing governance structures within the organisation with clear lines to CEO/Hospital managers

Implementing ACS care improvements

- □ Process is in place for collection of national minimum dataset (KPIs) and regular reporting of agreed performance metrics (currently quarterly via Heartbeat – testing use of HIPE Portal)
- □ Effective local multi-disciplinary team meetings in place responsible for monitoring and improving Acute Coronary Syndrome care
- □ Formal link/strategy between Cardiology and ED to identify presentations with Acute Coronary Syndrome (ACS) – early triage of chest pain and timely decisions
- □ Engage Ambulance Service and establish clear communication protocols for: initial contact to PPCI centre hospital re cath lab (single number, established ECG reception point)
    - □ direct communication to relevant crew from PPCI centre hospital re STEMI patient
    - □ inter hospital transport of STEMI for PPCI (with appropriate ACLS trained personnel)
    - □ inter hospital transport of STEMI post failed thrombolysis for rescue PCI
    - □ inter hospital transport of STEMI post thrombolysis for angiography
    - □ inter hospital transport of ACS patients for early repatriation to local hospital
    - □ direct Ambulance access to cath lab (for PPCI centre hospitals) – bypass of ED
- □ Clear communication between hospitals for timely repatriation of ACS patients.
- □ Ensure adequate CCU/Telemetry beds for ACS patients - direct and repatriated
- □ Ensure timely access to in-patient angiography for STEMIs and risk assessed NSTE ACS ideally within 24 hours of admission
- □ In hospital Cardiac Rehabilitation to begin once patient is clinically well enough to receive it and/or appointments for CR arranged for a date within 4 weeks
- □ Patient information available for all patients admitted with Acute Coronary Syndrome

9. Measuring performance

Section purpose

The purpose of this section is to look at metrics (or key performance indicators) which are sensible indicators of care, that meet criteria of encompassing access to health service, quality of care and cost factors and also have an overlap with recognised international indicators in order to agree an indicator set for Ireland and the supporting arrangements for embedding these in practice. This is a developing area.

Information systems to support performance measuring

Possible monitoring mechanisms that could be used in ACS are:

(a) HIPE as is,

(b) Adjustments to HIPE,

(c) HIPE PORTAL (new flexible product from ESRI available in 2011)

(d) New and separate database - possibly an ACS register or an extension of the CHAIR register.

Key performance indicators (KPIs)

KPI Title Type of Reperfusion therapy for STEMI (Heart attack)

- Description: The % STEMI patients (or LBBB) who get PPCI or thrombolysis reperfusion therapy (RT) or are contraindicated
- Rationale: International evidence supports PPCI at a Cath lab centre with good throughput if achievable within the travel time of 120 mins. Current treatment is mainly rapid thrombolysis at local hospital (TL).
- Target: 80% of STEMIs in Ireland to get PPCI as form of RT

KPI Title Timely Reperfusion therapy for STEMI (Heart attack)

- Description: The % STEMI patients (or LBBB) who get timely reperfusion therapy
    - First medical contact (FMC) to balloon < = 120 mins OR
    - Door to balloon <= 90 mins OR
    - Door to needle <= 30 mins
- Rationale: International evidence supports swift restoration of blood flow to blocked coronary artery as a medical emergency. Current treatment is mainly rapid thrombolysis at local hospital (TL) but newest form of treatment is emergency primary angioplasty (PPCI) at Centre.
- Target: 90% achieve timely RT (as defined previously)

KPI Title Length of stay in hospital

- Description: The median LOS for a) STEMI and b) NSTEMI patients
- Rationale:
    - For STEMI the change in treatment from thrombolysis to primary angioplasty will result in a reduction in LOS of ~1 day when the programme is fully up and running.
    - For NSTEMI early angiography is now indicated to inform treatment. It has the added advantage of improving LOS considerably. Initial goal is reduction of 1 day but is likely to be greater once the programme is fully operational.
- Target:
    - Median LOS for STEMI 2009 HIPE data IRELAND = 5, DML = 4, DNE = 5, South = 4, West=5. Target Ireland and all regions with LOS= 4
    - Median LOS for NSTEMI 2009 HIPE data IRELAND = 6, DML = 5, DNE = 7, South = 5, West = 6.5 Target Ireland and all regions with LOS=5.

KPI Title Early referral for cardiac rehabilitation

- Description: The % of ACS patients, admitted as an emergency, who are referred to an early Cardiac rehabilitation programme/secondary prevention programme on discharge (First appointment within 4 weeks of discharge)
- Rationale: There is robust evidence indicating that exercise based CR programmes improve risk factors among patients with CHD leading to a reduction in total mortality (20-30%) and cardiac mortality (30%)
- Target: 90% of eligible patients by 2013

KPI Title Discharge bundle

- Description: The percentage of eligible (not contraindicated) ACS patients who receive these elements of care on discharge - Medication (ASA, B Blockers, Statin and ACE/ARBs) and Smoking cessation counselling
- Rationale: The evidence for a secondary prevention programme of medication and smoking cessation advice in reducing morbidity and mortality is extensive
- Target: 90% of all eligible patients

10. Patient information and guidelines

Background

While Ireland: Take Heart documented that 32 (86.5%) hospitals used ACS guidelines (mainly ESC) there is no updated information on this. Heartbeat has shown that most participating hospitals (n=14) achieve high performance for many aspects of non time dependant STEMI care nonetheless there is little information on what pathway of care if any is used for patient care from first contact to discharge.

Some local and international algorithms have been obtained and studied. Site visits, site questionnaires and a process mapping exercises have also informed the development of appropriate Irish protocols and pathways. These are still to be fully developed.

DCS&P nave managed to get approval to use UK NHS information. This is currently going through the process of being adjusted for use in Ireland.

11. Communications and Governance

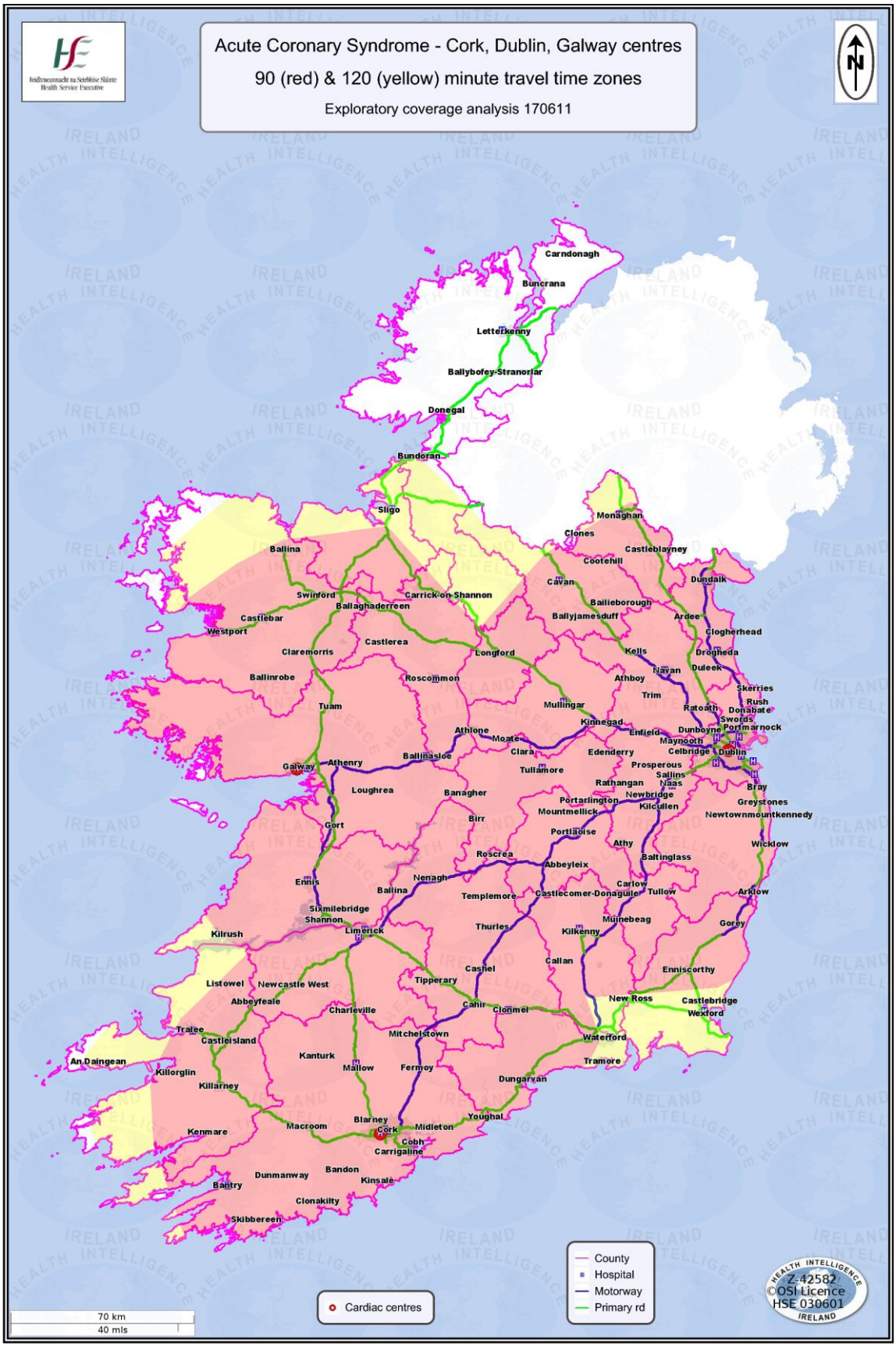
Members of the ACS Working Group and their roles

Prof. Kieran Daly	Program Lead:
Dr. Siobhan Jennings	Public Health Specialist
Deirdre Mulligan	Nurse Service Planner
Sue Hennessy	Research (CNS)
Martin Dunne	Pre-Hospital (Amb)
Paudie O'Riordan	Pre-hospital (Amb)
Dr Geoff King	Pre-Hospital (PHECC)
Brendan Cavanagh	Programme Manager
Regina Black	Relief Project Manager
Patricia Dunne	Practice nurse lead
Dr Cathal O'Donnell	Pre-Hospital (Amb)
to be nominated	GP representative

ACS Clinical Advisory Forum members

Dr Gavin Blake	Mater Hospital Dublin
Dr David Foley	Beaumont Hospital Dublin
Dr Peter Quigley	St Vincent's Hospital Dublin
Dr Peter Kearney	Cork University Hospital
Dr Jim Crowley	Galway University Hospital
Dr Niall Mulvihill	St James's Hospital Dublin
Dr Andrew Maree	Waterford General Hospital
Dr Brendan Meany	Limerick Regional Hospital
Dr David Mulcahy	AMNCH Hospital Tallaght

Appendix 1: Drive times of 90 & 120 mins to Dublin, Cork and Galway 24/7 PPCI centres



Appendix 2 ACS discharges, 2008 (HIPE) and facilities

HSE DNE	STEMI	NSTEACS	Total	CCU beds	C. Rehab unit
Mater	100	308	408	12	Y
Connolly	39	398	437	6	Y
Beaumont	78	512	590	12	Y
OLLHD	27	109	136	3	Y
Cavan	23	93	116	4	Y
Louth	37	109	146	4	Y
Monaghan	20	56	76	4	Y
Navan	42	179	221	4	Y
Total	**366**	**1764**	**2130**	**49**	
HSE DML	**STEMI**	**NSTEACS**	**Total**	**CCU beds**	**C. Rehab unit**
Loughlinstown	26	197	223	5	Y
Naas	43	157	200	6	Y
SVH	68	261	329	10	Y
SJH	75	336	411	9	Y
St. Michael's	8	38	46	5	Y
Tallaght	84	171	255	9	Y
Tullamore	41	67	108	4	Y
Mullingar	37	87	124	6	Y
Portloaise	23	82	105	4	Y
Total	**405**	**1396**	**1801**	**58**	
HSE South	**STEMI**	**NSTEACS**	**Total**	**CCU beds**	**C. Rehab unit**
Waterford	44	231	275	6	Y
Kilkenny	57	205	262	6	Y
Wexford	49	221	270	5	Y
Clonmel	35	261	296	3	Y
Mercy	19	100	119	4	Y
SI VI	41	139	180	8	Y
Mallow	26	56	82	4	Y
CUH	76	351	427	8	Y
Tralee	60	143	203	4	Y
Bantry	No data	No data	No data		Y
Total	**407**	**1707**	**2114**	**48**	
HSE West	**STEMI**	**NSTEACS**	**Total**	**CCU beds**	**C. Rehab unit**
Limerick	78	270	348	16	Y
St. John's	5	17	22	3	Unsure
Ennis	43	58	101	4	Y
Nenagh	28	60	88	5	Y
Roscommon	43	68	111	4	Y
Portiuncla	29	72	101	2	Y
UCHG	83	216	299	8	Y
Mayo	59	306	365	8	Y
Letterkenny	47	225	272	8	Y
Sligo	46	162	208	5	Y
Total	**461**	**1454**	**1915**	**63**	

Note: CCU bed data collected at Cath lab visits and 2006 survey for Ireland:Take Heart for non Cath lab hospitals

Appendix 3: Hospitals factors for a PPCI service

HSE DNE

Mater MU Hospital

Critical Factors	Strength	Challenge
At least 2 Cath labs	Yes	
At least 5 Interventional Cardiologists	4 FT & 4 PT	
Providing 24/7 service	Yes	
PCI volume	800 in 11m (n=872/yr)	
Cardiothoracic Surgery	Yes	
From EMS to Lab directly	Yes	
Formal Pre-hospital agreement		No
IT system		No clinical system
Sufficient CCU beds	12 CCU beds	
Other	Business Plan for 3rd Lab	City centre may impact access

Beaumont Hospital

Critical Factors	Strength	Challenge
At least 2 Cath labs		1 lab
At least 5 Interventional Cardiologists		2FT
Providing 24/7 service		Ad hoc on call arrangement
PCI volume	530/ yr	
Cardiothoracic Surgery		No
From EMS to Lab directly	Yes	
Formal Pre-hospital agreement	EMS ECG transmission to activate Cath lab agreed	
IT system	CVIS (Tomcat) recently	
Sufficient CCU beds	12 beds	
Other	Business case for 2nd lab	

HSE DML

St James's Hospital

Critical Factors	Strength	Challenge
At least 2 Cath labs	Yes	
At least 5 Interventional Cardiologists	4 FT & 1PT	
Providing 24/7 service	Yes	
PCI volume	659 in 6m (n=1318/yr)	
Cardiothoracic Surgery	Yes	
From EMS to Lab directly	Yes	
Formal agreement w EMS		No
IT system		No clinical system
Sufficient CCU beds	9 CCU beds	
Other	Business Plan for 3rd Lab	City centre may impact access Repatriation can be difficult

St Vincent's U Hospital

Critical Factors	Strength	Challenge
At least 2 Cath labs	Yes	
At least 5 Interventional Cardiologists	5 FT, 1 PT	
Providing 24/7 service	Yes	
PCI volume	374/yr (2009)	
Cardiothoracic Surgery		No
From EMS to Lab directly	Yes (via front door)	
Formal agreement w EMS	Yes with HSE (not DFB)	
IT system	Yes (Centricity)	
Sufficient CCU beds	10 beds	
Other		OOH staffing needs strengthening

AMNCH Tallaght

Critical Factors	Strength	Challenge
At least 2 Cath labs		1 Lab
At least 5 Interventional Cardiologists		3.5 WTE
Providing 24/7 service		Extended day
PCI volume	310 in 10 m (n=372/yr)	
Cardiothoracic Surgery		No
From EMS to Lab directly	Yes	
Formal agreement w EMS		No
IT system		No
Sufficient CCU beds	9 beds	
Other	Strategic access near main motorways Physical capacity to build Spare capacity/no wait list Business plan submitted for expansion of services	

HSE South

Cork University Hospital

Critical Factors	Strength	Challenge
At least 2 Cath labs	Yes	
At least 5 Interventional Cardiologists	3 FT, 4PT	
Providing 24/7 service	Yes	
PCI volume	599/yr (2008)	
Cardiothoracic Surgery	Yes	
From EMS to Lab directly	Yes	BUT via ED currently
Formal agreement w EMS	EMS transmission of ECG	BUT not activation of Lab
IT system	CVIS (Tomcat) recently	
Sufficient CCU beds	8 CCU beds	
Other	Cardiology services transferred to Cardiac Renal Centre	Staffing of service is yet to be sorted within reconfiguration for City Pre-hospital resources

Waterford Regional Hospital

Critical Factors	Strength	Challenge
At least 2 Cath labs		1 Lab
At least 5 Interventional Cardiologists		2 FT
Providing 24/7 service		No
PCI volume	208 in 6 m (n= 416/yr)	
Cardiothoracic Surgery		No
From EMS to Lab directly		No
Formal agreement w EMS		No
IT system	CVIS well established	
Sufficient CCU beds	6 beds	
Other	New ED plan included 2nd Lab	Pre-hospital resources Align with Reconfiguration

HSE West

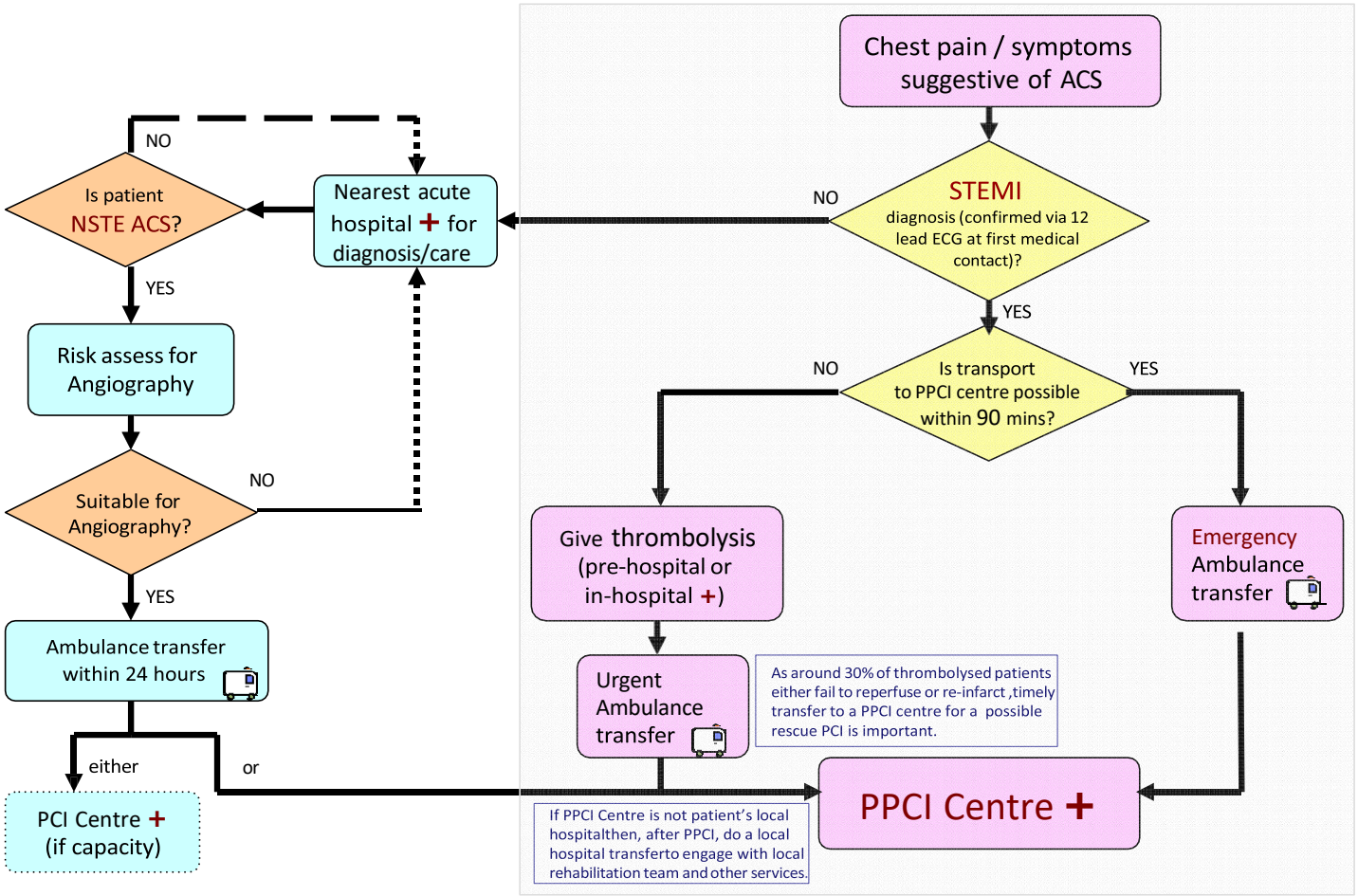
Galway University Hospital

Critical Factors	Strength	Challenge
At least 2 Cath labs	Yes	
At least 5 Interventional Cardiologists	4 FT, 1PT	
Providing 24/7 service	Yes	
PCI volume	530/yr (2009)	
Cardiothoracic Surgery	Yes	
From EMS to Lab directly	Yes	
Formal agreement w EMS	Pilot with iPhone	BUT no formal agreement
IT system	Yes (Centricity)	
Sufficient CCU beds	8 CCU beds	
Other	Business plan for Cardiac Services	OOH staffing deficit CCU staffing deficit EMS deficit Delays in repatriation

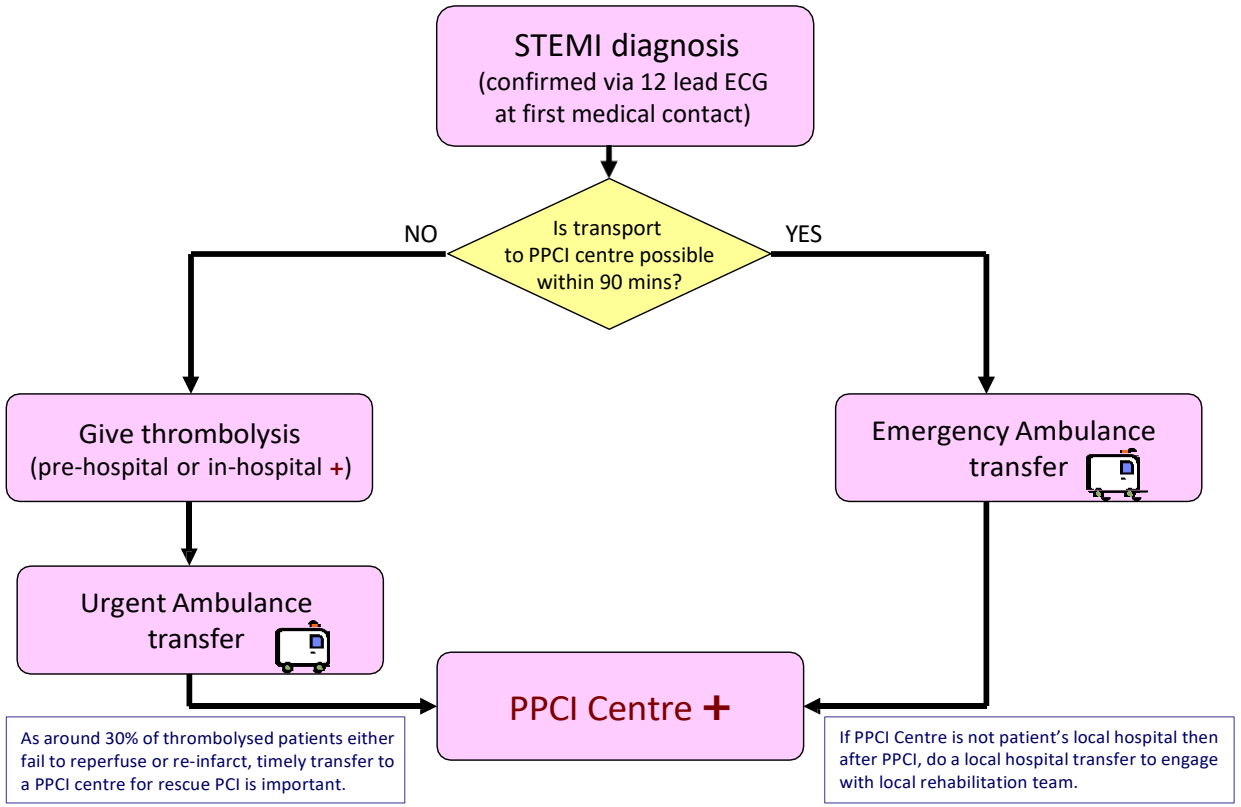
Limerick Regional Hospital

Critical Factors	Strength	Challenge
At least 2 Cath labs		1 Lab
At least 5 Interventional Cardiologists		1 FT
Providing 24/7 service		No
PCI volume	233 (2008 survey to SJ)	
Cardiothoracic Surgery		No
From EMS to Lab directly		EMS to ED currently
Formal agreement w EMS		No
IT system	Medcom capacity	
Sufficient CCU beds	7 CCU beds	
Other	Business case submitted for enhanced cardiac services, including 1 FT Cardiology Cons	OOH staffing deficit EMS deficit Align with Reconfiguration

Appendix 4: ACS Immediate Care Protocol



Appendix 5: Optimal Reperfusion Service (ORS) Protocol



STEMI definition: STEMI is defined as ST-segment elevation in 2 or more contiguous leads (2mm in leads V2 and V3 or 1mm in any other leads) or new onset LBBB - accepting that interpretive ECG machines may vary slightly from this depending on age and gender.

Transport to a PCI centre: The ACS programme recommends that patients be transported directly to a Primary PCI centre if this can be achieved within 90 minutes of first medical contact [ECG diagnosis].

Thrombolysis: The ACS programme recommends transporting eligible patients (those more than a 90 minute transport time to a PPCI centre) to the nearest appropriate ED for in-hospital thrombolysis, unless an established pre-hospital thrombolysis programme is already in place.

Transfer to PPCI centre following thrombolysis: The ACS programme recommends transferring thrombolysed patients to a primary PCI centre as soon as possible to ensure that either rescue angioplasty can be performed in a timely manner if needed, or angiography can be performed within 3 to 24 hours

Appendix 6: Main references / Information sources

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