NOCA National Office of Clinical Audit

IHAA Irish Heart Attack Audit

IRISH HEART ATTACK AUDIT
NATIONAL REPORT 2024

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NATIONAL OFFICE OF CLINICAL AUDIT (NOCA)

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NOCA National Office of Clinical Audit

IHAA Irish Heart Attack Audit

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National Report 2024

NOCA National Office of Clinical Audit

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8th January 2026

Dear Professor Margey,

On behalf of the NOCA Governance Board, I wish to acknowledge receipt of the *Irish Heart Attack Audit National Report 2024.*

We extend our congratulations to you and the entire team, including Audit Manager Joan McCormack, Research Analyst Olga Brych, the Governance Committee, and the Patient and Public Interest Representatives, whose contributions continue to strengthen the relevance and impact of this audit.

This report provides an important national overview of care for patients with ST-elevation myocardial infarction and highlights key issues such as delays in access to reperfusion therapy, pre-hospital pathway challenges, and trends in risk factors. The findings emphasise the need for continued system-wide focus on improving timely access to definitive treatment and strengthening public awareness of heart attack symptoms.

We also wish to acknowledge the dedication of audit personnel and hospital teams who ensure the continued delivery of high-quality data collection that underpins this essential work.

This letter serves as the formal endorsement of the NOCA Governance Board for the Irish Heart Attack Audit National Report 2024.

Yours sincerely,

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PREFACE

The management of ST elevation myocardial infarction (STEMI) changed radically with the advent of primary percutaneous coronary intervention (PCI) almost 20 years ago. Ireland's Acute Coronary Syndrome (ACS) Programme began in 2014, and since then more than 10,000 patients with a STEMI have been brought from their homes or public places directly – or sometimes via the nearest emergency department (ED) – to a cardiac catheterisation laboratory for immediate primary PCI. In order to monitor the effectiveness, safety and outcomes of the *Acute Coronary Syndromes Programme Model of Care*, the ACS Programme established Heartbeat (a data collection tool embedded in the Hospital In-Patient Enquiry (HIPE) system) and a team of specialist cardiology nurses to gather the data. Since 2019, the National Office of Clinical Audit (NOCA) has assumed governance of Heartbeat and established the Irish Heart Attack Audit (IHAA). It has enhanced the reporting process across all primary PCI centres and reports on nine key quality indicators quarterly and annually.

Dr Ronan Margey, Joan McCormack and the entire NOCA team are to be congratulated for delivering the *Irish Heart Attack Audit National Report 2024*. The report focuses on nine key quality indicators and represents a vital collaborative effort to monitor and enhance the quality of care for patients who experience a STEMI in Ireland. Its conclusions and recommendations, if implemented, should lead to improvements in care and better outcomes for all patients with a STEMI.

This 2024 report shows a 13% increase in STEMI cases since 2017, a figure that slightly outpaces national population growth. The data on smoking and its link to premature heart attacks remain stark. Smokers present with a STEMI an average of 11 years earlier than non-smokers, with this gap widening to 13 years for women, reinforcing the need for continued public health initiatives to reduce smoking.

This report also brings to light a concerning decline in the proportion of patients receiving timely reperfusion therapy since 2017, from 67% to 58%. In addition to the 45% of patients who waited for more than 60 minutes before calling for an ambulance in 2024, several other potential delays in achieving timely perfusion need to be examined, including time to ambulance arrival to the patient. Delays in STEMI diagnosis in non-PCI EDs, in calling for an ambulance, or in the ambulance arriving have led to several hospitals having 0% success, in 2024, in transferring patients to primary PCI centres within the 90-minute target time, a situation that requires immediate and coordinated action. This report highlights these issues and recommends an increase in the number of ambulances available, a public awareness campaign regarding symptom recognition and calling 112/999, and measures to reduce ED 'door in door out' times.

This report not only serves as a record of progress to date, but is also a clear call to action. Its recommendations are essential steps towards ensuring that every patient in Ireland receives timely, effective and equitable care. The data provide the evidence needed for each Regional Health Area to examine its PCI network and implement targeted quality improvement initiatives, and these initiatives need to begin without delay.

Professor Joe Galvin,
National Clinical Co-Lead,
HSE National Heart Programme

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GLOSSARY OF TERMS AND DEFINITIONS

ACRONYM	FULL TERM
ACS	acute coronary syndrome
ARB	angiotensin II receptor blocker; an oral medication sometimes used in the treatment of high blood pressure, heart attack, heart failure, and diabetes.
CABG	coronary artery bypass graft
cath lab	catheterisation laboratory
CHD	coronary heart disease
CR	cardiac rehabilitation
denominator	The total number/cohort that a calculation is made from. It is the bottom number of a fraction that shows the total number of equal parts that an object is divided into. For example, in '20/100', '100' is the denominator.
DIDO	door in door out
dL	decilitre
DTB	door to balloon
ECG	electrocardiogram
ED	emergency department
ESC	European Society of Cardiology
FMC	first medical contact
FMCTB	first medical contact to balloon
FMCTD	first medical contact to door
g	gram
GP	general practitioner
GRACE	Global Registry of Acute Coronary Events
Heartbeat	A web-based data collection tool.
h:mm	hour(s):minute(s)
HIPE	Hospital In-Patient Enquiry
HPO	Healthcare Pricing Office
HSE	Health Service Executive
ICD-10-AM	International Classification of Diseases, Tenth Revision, Australian Modification
IHAA	Irish Heart Attack Audit
IQR	interquartile range
KPI	key performance indicator
KQI	key quality indicator
LOS	length of stay
MI	myocardial infarction

NAS	National Ambulance Service
NCCA	National Centre for Clinical Audit
NCP-ACS	National Clinical Programme for Acute Coronary Syndrome
NOCA	National Office of Clinical Audit
NSTEMI	non-ST elevation myocardial infarction
numerator	The number that is derived from the denominator as the subset meeting a specific criterion. It is the number above the fractional bar. For example, in '20/100', '20' is the numerator.
ORS	optimal reperfusion service
PCI	percutaneous coronary intervention
QI	quality improvement
SMR	standardised mortality ratio
statins	A group of oral medications that work to reduce the level of cholesterol in the blood.
STEMI	ST elevation myocardial infarction
thrombolysis	Intravenous medication therapy to treat heart attack by pharmacologically dissolving arterial clots.

EXECUTIVE SUMMARY

This report presents an analysis of contemporary performance for 2024 in the management of ST elevation myocardial infarction (STEMI) in the Republic of Ireland, drawing on 1,882 cases submitted to the Heartbeat portal in 2024. While mortality remains within expected ranges, both in our risk-adjusted modelling and compared with international registries, several concerning trends have emerged in relation to reperfusion timeliness, inter-hospital transfers, and the burden of cardiovascular risk factors, particularly smoking among younger patients. These findings highlight the need for a renewed focus on public awareness, system-level process improvement and targeted risk factor management to reduce the incidence and improve the treatment of STEMI in Ireland.

DECLINING RATES OF PRIMARY PERCUTANEOUS CORONARY INTERVENTION

Primary percutaneous coronary intervention (PCI) is the internationally preferred therapy for STEMI. However, its delivery in Ireland is in decline. In 2024, only 77% (n=1251) of patients with a STEMI received primary PCI, compared with 86% (n=1232) in 2017. Simultaneously, the proportion receiving thrombolysis has risen modestly but remains suboptimal, and variation in thrombolysis use is evident across hospitals. The variation in the delivery of primary PCI, and of thrombolysis when transport for timely primary PCI is not feasible, cannot be explained by simple geographic distance. Structural and systematic delays in the diagnosis and transport of patients with a STEMI have led to deviation from the agreed national clinical model of care for STEMI across different hospital networks.

The decline in primary PCI reflects two key issues: delayed patient presentation to hospital, and initial presentation to non-PCI-capable hospitals. Only 55% (n=893) of patients with a STEMI arrived directly by ambulance to a PCI centre in 2024, with a further 10% (n=161) self-presenting to a PCI centre. Twenty-four percent (n=388) of patients self-presented to non-PCI-capable hospitals. In total, 32% (n=513) were transferred by ambulance from a non-PCI-capable hospital and only 57% (n=292) of transferred patients ultimately underwent primary PCI, compared with 87% (n=936) of those arriving directly to a PCI centre. Alarmingly, 11% (n=176) of patients were contraindicated for reperfusion due to late presentation, most commonly due to patients seeking help more than 12 hours after symptom onset.

DELAYS IN SYMPTOM RECOGNITION AND FIRST MEDICAL CONTACT

Patient delay in seeking medical help is a critical contributor to delayed opportunities for timely reperfusion. In 2024, only 45% (n=402) of patients who arrived directly by ambulance to a PCI centre called for help within 1 hour of symptom onset, down from 49% (n=419) the previous year. This persistent delay in symptom recognition and ambulance activation underlines the importance of public awareness campaigns around symptom recognition and STEMI treatment pathways. Without early help-seeking behaviour and pre-hospital electrocardiogram (ECG) diagnosis, the benefits of advanced reperfusion networks cannot be realised.

DELAYS IN DIAGNOSTIC ECG

Across the STEMI care pathway, regardless of whether patients self-present to PCI centres or present initially to non-PCI-capable hospitals, the timeliness of diagnostic ECG remains inadequate. Only 35% (n=52) of patients who self-presented to a PCI centre received an ECG within the recommended 10 minutes of arrival in 2024, and this falls further to 28% (n=110) among patients who first presented to non-PCI-capable hospitals. These missed targets are particularly important for self-presenting patients, for whom rapid ECG diagnosis is the main determinant of reperfusion timing. For this group, the median time from first medical contact to balloon (FMCTB) was 84 minutes in 2024, well above the 60-minute target.

INTER-HOSPITAL TRANSFER AND POOR 'DOOR IN DOOR OUT' PERFORMANCE

For patients initially presenting to non-PCI-capable hospitals, transfer delays remain the greatest systemic weakness. In 2024, just 3% (n=12) of patients who initially presented to a non-PCI-capable hospital achieved the recommended 'door in door out' (DIDO) time of 30 minutes, and only 26% (n=106) met the target of arrival at a PCI centre within 90 minutes of first medical contact. These delays significantly undermine equitable access to reperfusion and remain a persistent gap in the STEMI network. Improved coordination, governance, communication, National Ambulance Service resourcing, and real-time use of audit data are urgently required.

DECLINES IN TIMELY THROMBOLYSIS

For patients in whom primary PCI cannot be achieved within 90 minutes, guideline-directed thrombolysis remains underutilised and delayed. Rates of timely thrombolysis have halved, falling from 45% in 2017 to just 22% in 2024. This decline is particularly concerning given the role of thrombolysis as the critical alternative to PCI when inter-hospital transfer times are prolonged. Variation between hospitals suggests inconsistent adherence to treatment protocols/ standards, further disadvantaging patients presenting outside PCI centres.

POOR REPERFUSION TIMELINESS IN DIRECT AND SELF-PRESENTING PATIENTS

Even among patients presenting directly to PCI centres, timeliness targets were inconsistently achieved in 2024. Just 55% (n=449) met the 30-minute door to balloon (DTB) target, with performance varying widely across centres (70% in the highest-performing hospital versus 35% in the lowest-performing hospital). Self-presenters fared worse, with only 30% (n=38) achieving a FMCTB time within 60 minutes. These findings underscore the need for hospital-level quality improvement initiatives focusing on both emergency department (ED) time to ECG processes, and catheterisation laboratory (cath lab) activation and processes.

DECLINE IN ED BYPASS

Another concerning trend is the reduced use of ED bypass for patients diagnosed with a STEMI prior to hospital arrival or at referring hospitals. This decline has contributed to longer in-hospital delays, further eroding the gains made by early diagnosis and ambulance transport. Reinforcing direct-to-lab transfer policies is essential to restore efficiency and maximise the benefit of pre-hospital ECG diagnosis.

RISK FACTORS, SMOKING AND YOUNG PATIENTS WITH A STEMI

Risk factor burden remains high among patients with a STEMI, with 90% (n=1460) having at least one cardiovascular risk factor and 37% (n=594) having three or more. Diabetes was present in 27% (n=430) of patients with a STEMI in 2024. Smoking continues to exert a disproportionate burden, particularly in younger patients. Smokers present with a STEMI on average 11 years earlier than never smokers, with an even larger gap among women (13 years). In 2024, 36% of patients with a STEMI were current smokers, double the national average. Although the delivery of smoking cessation advice has improved to 95%, these figures highlight the pressing need for intensified smoking prevention efforts.

RISK FACTOR BURDEN AND OPPORTUNITY FOR CHRONIC DISEASE MANAGEMENT

The high prevalence of hypertension, hypercholesterolaemia, diabetes, and smoking among patients with a STEMI underlines the ongoing need for primary prevention strategies. With more than one-third of patients having three or more modifiable risk factors, this cohort represents a clear opportunity for chronic disease management intervention. National initiatives such as the Making Every Contact Count programme should be systematically applied in order to improve long-term risk factor control and reduce future STEMI incidence.

CONTINUED DATA QUALITY IMPROVEMENT

This year's report also highlights the continued year-on-year improvement in the completeness and quality of data collection in the national audit, reflected in the improvements in the completeness of the 30-day survival and cardiac rehabilitation referral data metrics. Our individual network of PCI clinical leads and senior cardiology nurses who collect data deserve praise and recognition for their efforts over the last 8 years to improve this.

The Irish Heart Attack Audit remains grateful to all our PCI sites, clinical leads, cardiology nurses, National Office of Clinical Audit management and data analytics teams, and our governance and writing group's support and work throughout the year to help collect, analyse and interpret the data that are shared in this report.

KEY FINDINGS

DEMOGRAPHICS

- A total of 1,882 cases were submitted to the Heartbeat portal during the 2024 reporting period, reflecting a continuing upward trend from 1,742 cases in 2021.
- Overall, 1,615 patients with a STEMI were recorded on the Heartbeat portal in 2024, indicating a 13% increase since 2017 (N=1427), slightly higher than the population increase in the same period (12%) (Central Statistics Office, 2024).
- Males accounted for 75% (n=1208) of all patients with a STEMI in 2024 and had a median age of 62 years (interquartile range (IQR): 54–71 years). Female patients with a STEMI were older, with a median age of 67 years (IQR: 58–76 years).
- In 2024, 90% (n=1460) of patients with a STEMI had at least one cardiovascular risk factor. The most prevalent risk factors were hypertension (n=860, 53%) and hypercholesterolaemia (n=718, 44%). Thirty-seven percent (n=594) of patients had three or more potentially modifiable cardiovascular risk factors.
- Twenty-seven percent (n=430) of patients had a diagnosis of diabetes in 2024.
- Smoking causes STEMI at a younger age. On average, smokers present with a STEMI 11 years earlier than people who have never smoked. Among females, current smokers presenting with a STEMI in 2024 had a median age of 61 years (IQR: 53–67 years) compared with a median age of 74 years (IQR: 64–82 years) for females with a STEMI who had never smoked. The proportion of male patients aged 40 years or under who were current smokers decreased from 74% in 2023 to 64% in 2024.

TIMELINESS OF REPERFUSION

- Only 45% of patients who arrived directly by ambulance to a PCI centre called for help within 60 minutes of symptom onset in 2024.
- Primary PCI was performed in 87% (n=713) of patients who presented directly to a PCI centre in 2024, compared with 57% (n=292) of those who initially presented to a non-PCI-capable hospital.
- In 2024, 77% of patients who arrived directly by ambulance to a PCI centre met the 90-minute target from first medical contact to door, compared with only 26% of those who were transferred from another hospital.
- The proportion of patients receiving an ECG within 10 minutes of arrival at hospital is suboptimal. Only 35% of patients who self-presented to a PCI centre met this target in 2024, and the rate is even lower, at just 28%, for those who self-presented to a non-PCI-capable hospital.
- A DIDO time of 30 minutes, the recommended goal for patients who initially present to a non-PCI-capable hospital, was achieved in only 3% of cases in 2024.
- The DTB target of 30 minutes recommended to achieve timely primary PCI was achieved in 55% of patients who presented directly to a PCI centre and in 63% of patients who were transferred to a PCI centre in 2024.
- The proportion of patients who received timely primary PCI has seen a steady decline, from 68% in 2017 to 61% in 2024.
- The proportion of patients who received timely thrombolysis has seen a steady decline, from 44% in 2017 to 22% in 2024.

KEY FINDINGS

OUTCOMES	
•	No PCI centre had a mortality rate higher than the expected range.
•	Timely primary PCI was associated with reduced mortality. In 2024, those who received timely primary PCI had an unadjusted mortality rate of 4.1% (n=32), compared with 7.4% (n=31) for those who did not receive timely primary PCI.
•	The proportion of patients with a STEMI who were current smokers and were recorded as receiving smoking cessation advice has gradually increased, from 80% in 2022, to 91% in 2023, and to 95% (n=553) in 2024, meeting the associated key quality indicator target of 90% (Health Service Executive, 2012).
•	One-half (n=812) of patients with a STEMI were discharged directly home from a PCI centre in 2024, similar to the 52% reported in 2023; 41% (n=665) were transferred to another acute hospital for ongoing STEMI care, which is unchanged from 2023.

RECOMMENDATIONS

RECOMMENDATION 1

Improve the rate of primary PCI for all patients with a STEMI.

RECOMMENDATION 2

Improve the timeliness of reperfusion for all patients with a STEMI.

RECOMMENDATION 3

All PCI centres should implement targeted quality improvement initiatives to increase the proportion of patients with a STEMI who arrive at a PCI centre by ambulance who achieve the recommended 'door to balloon' time of 30 minutes or less.

RECOMMENDATION 4

All PCI centres should implement targeted quality improvement initiatives to increase the proportion of patients with a STEMI who self-present to a PCI centre who achieve the recommended 'first medical contact to balloon' time of 60 minutes or less.

KEY FINDINGS 2024

1615 confirmed STEMIs in 2024

75% Male with median* age **62** years.

25% Female with median age **67** years.

ARE YOU AT RISK OF A HEART ATTACK?

Smoking damages the heart and blood vessels. Thirty-six percent of patients with a STEMI in 2024 were smokers at the time of their heart attack, double the rate of smoking nationally (17%). Current smokers present with heart attack on average 11 years earlier than those who have never smoked.

36%

Too much cholesterol in your blood, known as hypercholesterolaemia, increases your risk. Forty-four percent of patients with a STEMI in 2024 had a previous history of hypercholesterolaemia.

44%

High blood pressure, known as hypertension, increases your risk. Fifty-three percent of patients with a STEMI in 2024 had a previous history of hypertension.

53%

Diabetes puts you at increased risk of having a heart attack. Twenty-seven percent of patients with a STEMI in 2024 had a diagnosis of diabetes.

27%

GETTING TO THE RIGHT HOSPITAL AT THE RIGHT TIME

IF YOU THINK SOMEONE IS HAVING A HEART ATTACK, CALL 112 OR 999 STRAIGHT AWAY.

Paramedics can do an electrocardiogram (ECG) on the spot. If it shows a STEMI, they will take the person directly to a specialist hospital (PCI centre) for urgent treatment. If the person goes to a non-specialist hospital themselves, it can cause delays because they might then need to be transferred to a specialist hospital. That's why calling an ambulance is the fastest and safest option.

45%

Only **45**% of patients with a STEMI who arrived at a PCI centre directly by ambulance in 2024 called for help within 60 minutes of the onset of symptoms.

55%

55% of patients were brought directly by ambulance to a PCI centre in 2024.

32%

32% of patients were transferred by ambulance from a non-specialist hospital to a PCI centre.

28%

28% of patients who were transferred from a non-specialist hospital to a PCI centre had an ECG completed within 10 minutes.

3%

3% of patients with a STEMI achieved the 30-minute 'door in door out' (DIDO) target in 2024.

DIDO time is the total time a patient with a heart attack spends at the first hospital, from arrival to departure to a PCI centre. The goal is to minimise this time in order to ensure that patients receive life-saving treatment as quickly as possible.

*The median is the middle number in a list of numbers.

HOW IS A HEART ATTACK TREATED

PRIMARY PCI

Primary PCI is an emergency procedure performed in specialist hospitals in order to quickly open a blocked heart artery during a heart attack. To be most effective, this procedure needs to be done within 2 hours after a heart attack is diagnosed. Doing it within this time is called timely primary PCI.

61% received timely primary PCI.

61%

	Arrived directly to a PCI centre	Presented to a non-PCI centre and then transferred by ambulance to a PCI centre
PROPORTION WHO RECEIVED PRIMARY PCI	87%	57%
PROPORTION WHO RECEIVED TIMELY PRIMARY PCI	77%	30%

Patients who receive timely primary PCI have lower mortality compared with those who do not:

TIMELY PRIMARY PCI 4.1% mortality rate

NOT TIMELY PRIMARY PCI 7.4% mortality rate

THROMBOLYSIS

If a patient is unable to get to a PCI centre within 90 minutes, treatment with thrombolysis – a medication that dissolves blood clots – can be given.

In order to be effective, this medication needs to be given within 30 minutes of diagnosis of a STEMI; this is called timely thrombolysis.

In 2024, 7% of patients with a STEMI received treatment with thrombolysis; 22% of those received timely thrombolysis.

22%

PREVENTING ANOTHER HEART ATTACK

91%

In 2024, **91%** of patients with a STEMI had an appropriate secondary prevention medication bundle prescribed, an increase from 86% in 2023 and achieving the target of 90%.

97%

In 2024, **97%** of patients with a STEMI were referred to cardiac rehabilitation, which provides an exercise programme from 91% in 2023 and achieving the target of 90%.

THE PATIENT PERSPECTIVE: **PAULA'S STORY**

The National Office of Clinical Audit is committed to putting the voice of the patient at the centre of national clinical audit, providing a broader picture of quality and safety and patients' experience of healthcare. Here is Paula's story, as told in her own words.

PAULA'S STORY

In 2023, I was 44 years old and considered myself of average health and fitness. During a trip to Sligo, I decided to try stand-up paddleboarding for the first time. While out on the water, I suddenly felt faint. With help from my instructor, I got back to shore and tried to recover with water and an energy bar. I initially thought I was dehydrated or had low blood pressure, but I was still faint and sweaty, and I felt unusual pressure in both my upper arms.

I asked a friend to take me to the hospital, still thinking it was nothing serious. By the time I arrived at Sligo University Hospital I felt nauseous. A porter noticed that I did not look well and asked that I be seen quickly. A nurse took my blood pressure and an electrocardiogram, and within minutes, I was told I was having a heart attack. Suddenly, there were doctors and nurses all around. I was so shocked and stunned as I had no idea that something that serious could happen to me. When my husband arrived, I didn't know how to tell him what was happening.

A LIFE-CHANGING SURGERY AND THE ROAD TO RECOVERY

I was given life-saving clot-busting medication and airlifted by army helicopter to University Hospital Galway.

When we arrived, I was rushed to the Coronary Care Unit. During an angiogram, the cardiologists discovered multiple blockages in the arteries in my heart, and told me I needed cardiac bypass surgery. This was major surgery with a long recovery time, and I spent 25 days in the hospital before being discharged.

Recovery was long and difficult, but I had a lot of support from family and friends. I attended a cardiac rehabilitation programme in Cork, where I live. It lasted 6 weeks and was really beneficial, in particular the exercise programme and psychotherapy support. I had additional support from Croí, the heart and stroke charity whose mission is to prevent cardiovascular disease, save lives and promote recovery and well-being (https://croi.ie/heart/women-at-heart/).

It has been 2 years since my heart attack, and I am doing really well. I changed a lot of things about my life and now I try to be as healthy as possible. I go to the gym twice a week, I walk regularly, and my health is good. I also returned to the world of work this year, which is a really positive step.

"Recovery was long and difficult, but I had a lot of support from family and friends. I attended a cardiac rehabilitation programme in Cork, where I live."

KNOW THE SYMPTOMS AND DON'T DELAY

My survival is down to the quick decisions of the people around me on that day, and the skill of the medical teams. My story also emphasises how easily missed heart attack symptoms in women can be. I thought I was just feeling faint; the scariest thing is how subtle the signs were.

I now advocate for increased awareness of women's heart health through working with Croí, and I urge others, especially women, not to dismiss unusual symptoms.

My message is clear: **know the signs, don't delay, and seek help immediately. It could save your life.**

CHAPTER 1
INTRODUCTION

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CHAPTER 1: **INTRODUCTION**

INTRODUCTION

In the European Union, ischaemic heart disease remains the single largest cause of death, responsible for more than 860,000 deaths (19% of all deaths) among men and almost 880,000 deaths (20% of all deaths) among women each year (Wilkins *et al.*, 2017). There are two broad types of heart attack, classified by findings on the electrocardiogram (ECG): ST elevation myocardial infarction (STEMI) and non-ST elevation myocardial infarction (NSTEMI). In Ireland, heart attacks affect an estimated 6,000 people per year (National Office of Clinical Audit, 2022).

WHAT IS A HEART ATTACK?

A heart attack is a life-threatening medical emergency in which the blood supply to the heart is suddenly cut off, usually by a blood clot (thrombosis) forming at the site of a pre-existing narrowing or blockage, which can be relatively mild. The abrupt lack of blood supply to the heart can seriously damage the heart muscle. If left untreated, the heart muscle downstream from the blockage will begin to die. The extent of the damage is broadly correlated to the amount of muscle supplied by the blocked artery and the length of time the muscle is deprived of blood. After a finite time, this damage is irreversible.

Symptoms of a heart attack include (Figure 1.1):

- new, persistent chest pain; this can feel like the chest is being pressed or squeezed by a heavy object, and the pain can radiate from the chest to the jaw, neck, arms and back
- new, persistent shortness of breath.

In female patients, older patients or patients with diabetes, heart attacks can present with different symptoms, milder symptoms, or vague symptoms such as abdominal pain, confusion or sweatiness. These are sometimes called atypical symptoms and can make it more difficult to diagnose a heart attack (Ibanez *et al*., 2018). Risk factors for coronary heart disease (CHD) include: smoking, elevated cholesterol levels, diabetes, family history of CHD, high blood pressure, and being overweight or obese.

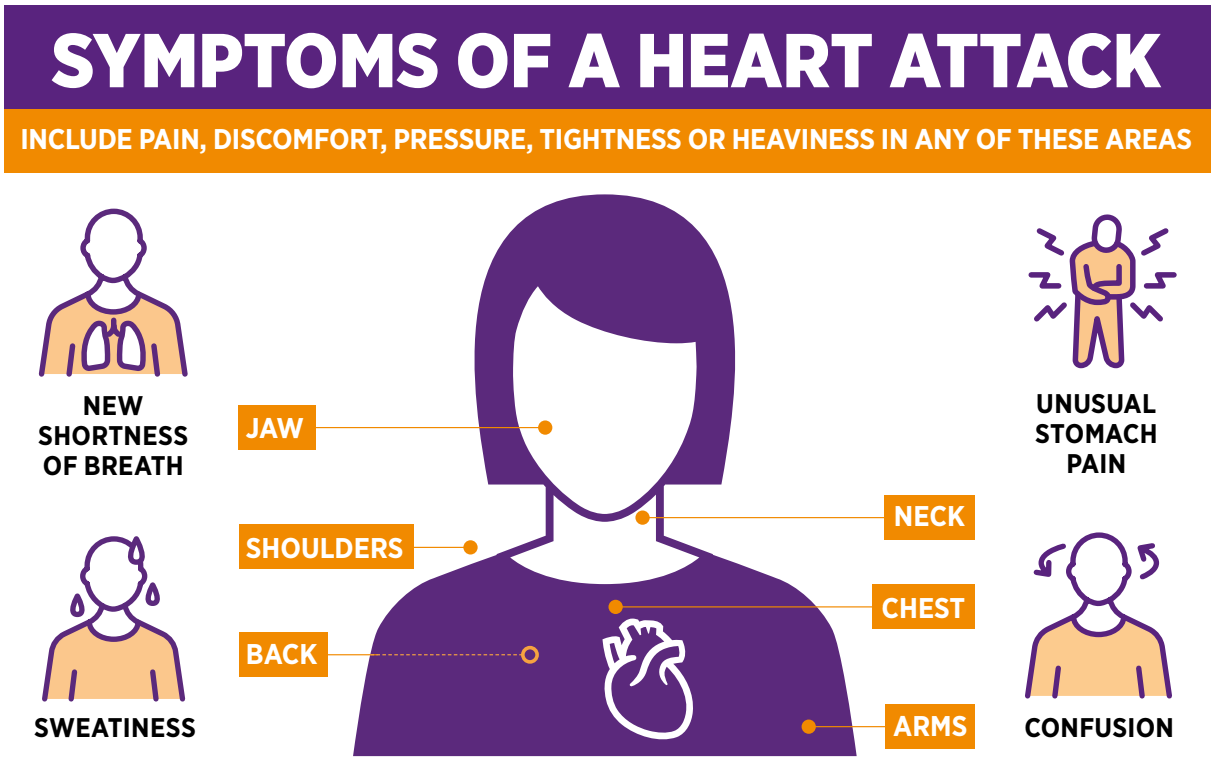


FIGURE 1.1: SYMPTOMS OF A HEART ATTACK

HOW ARE PEOPLE WHO HAVE A STEMI TREATED IN IRELAND?

Early recognition and treatment of a heart attack is critical to the outcome. STEMIs are diagnosed using 12-lead ECG machines. They are treated urgently with reperfusion (restoring blood flow), either by use of a clot-dissolving drug (thrombolysis) or by insertion of a wire into the artery in order to open it with a balloon and stent (metal scaffold) and allow blood to flow to the heart muscle again (percutaneous coronary intervention (PCI)). The internationally recognised gold standard treatment for STEMI is to perform emergency reperfusion within 120 minutes of first medical contact (FMC). This is known as primary PCI (sometimes referred to as primary angioplasty) and can only be done in a hospital equipped with an emergency catheterisation laboratory (cath lab). In 2013, the National Clinical Programme for Acute Coronary Syndrome (NCP-ACS) implemented an optimal reperfusion service (ORS) protocol (Figure 1.2) for the care of patients with a STEMI, with the aim of saving lives by standardising care across the country. Further information on the ORS protocol and the indicators underpinning the Heartbeat dataset is provided in the *Irish Heart Attack Audit National Report 2017–2020* (National Office of Clinical Audit, 2022). Transport timelines in the updated 2023 European Society of Cardiology acute coronary syndromes guideline (Byrne *et al*., 2023) remain unaltered.

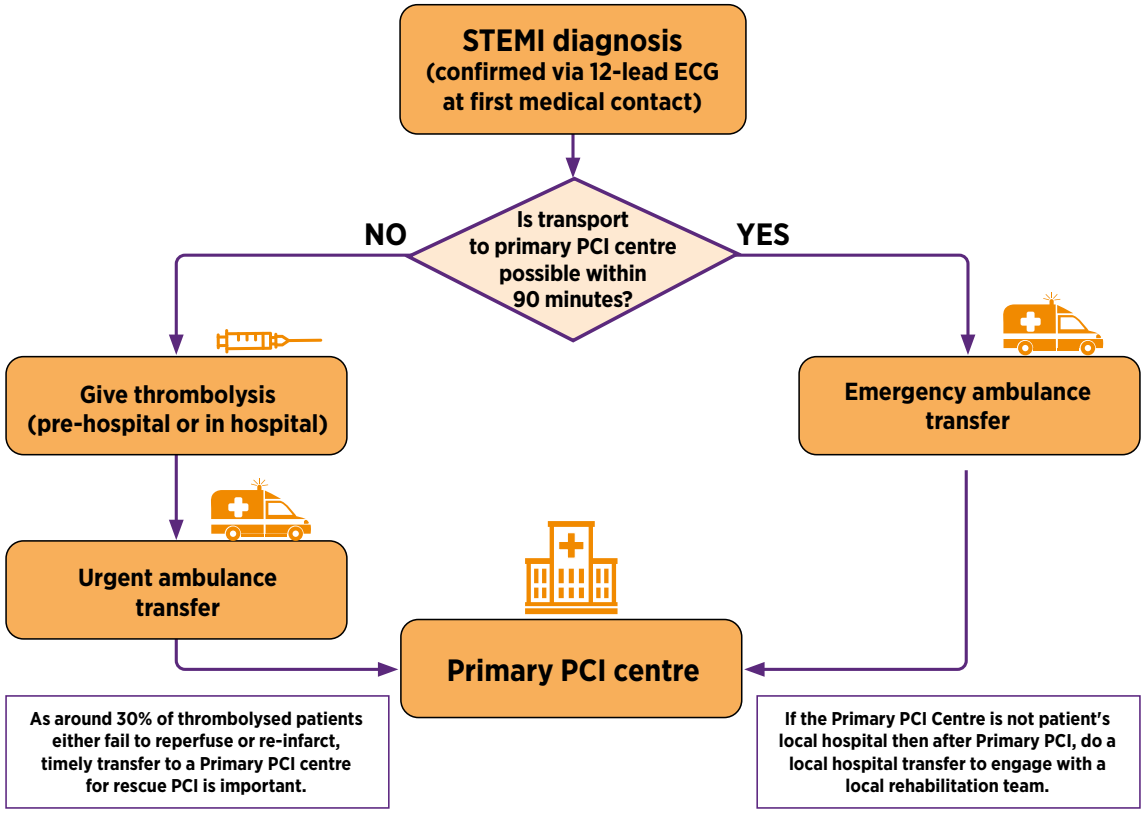


FIGURE 1.2: OPTIMAL REPERFUSION SERVICE PROTOCOL. SOURCE: HSE (2012)

Currently, seven primary PCI centres are designated to receive patients with a STEMI who are brought directly by emergency ambulance. Six provide 24/7 access and one provides access from 8.00am to 8.00pm, Monday to Friday. For parts of Donegal, Altnagelvin Area Hospital in Derry provides 24/7 coverage as part of a cross-border care arrangement between the Health Service Executive (HSE) and the United Kingdom's National Health Service. A further three hospital PCI centres provide primary PCI from 9.00am to 5.00pm, Monday to Friday, for patients with a STEMI who self-present to the PCI centre or who are already inpatients (Table 1.1). The term 'PCI centre' is used in this report to refer to both designated primary PCI centres and non-designated, 9.00am to 5.00pm weekday PCI centres.

TABLE 1.1: PCI CENTRES

Designated Primary PCI centres	9.00am–5.00pm weekday PCI centres
Cork University Hospital: 24/7	Beaumont Hospital‡
Letterkenny University Hospital (in cooperation with Altnagelvin Area Hospital):* 24/7	St Vincent's University Hospital‡
Mater Misericordiae University Hospital: 24/7	Tallaght University Hospital‡
St James's Hospital: 24/7	
University Hospital Galway: 24/7	
University Hospital Limerick: 24/7	
University Hospital Waterford: 8.00am–8.00pm, Monday–Friday†	

* Patients in Donegal with a STEMI who receive primary PCI in Altnagelvin Area Hospital are transferred to Letterkenny University Hospital for all further STEMI care.

† University Hospital Waterford expanded the primary PCI service to be provided from 8.00am to 8.00pm daily in March 2025. In 2024, University Hospital Waterford provided primary PCI to patients with a STEMI from 8.00am to 5.00pm, Monday to Friday.

‡ These PCI centres are primarily for patients who self-present or who are inpatients in these hospitals when a STEMI is diagnosed. They provide a PCI service between 9.00am and 5.00pm on weekdays only.

PURPOSE OF THIS REPORT

This report both describes the quality of care provided to patients with a STEMI in 2024 in all 10 hospitals providing a primary PCI service using Heartbeat data, and evaluates the quality of care provided against best practice standards and key quality indicators (KQIs) in order to inform recommendations for improvement.

This report compares hospital-to-hospital performance on processes and outcomes. This report was prepared by a multidisciplinary writing group and overseen by the Irish Heart Attack Audit (IHAA) Governance Committee.

WHO IS THIS REPORT AIMED AT?

The *Irish Heart Attack Audit National Report 2024* is intended for use by a wide range of individuals and organisations, including:

1. patients and carers
2. patient advocacy organisations
3. healthcare professionals involved in heart attack care and primary PCI; clinicians and hospital managers; HSE health regions; and the National Ambulance Service
4. policy-makers
5. researchers.

The report has been designed in two parts:

1. The *Irish Heart Attack Audit National Report 2024* presents the key findings of the IHAA, including case mix, patient pathway and outcomes.
2. The *Irish Heart Attack Audit Summary Report 2024* will be of particular interest to patients, patient organisations and the public.

CHAPTER 2
METHODOLOGY

CONTENTS

CHAPTER 2: **METHODOLOGY**

THE IRISH HEART ATTACK AUDIT

The IHAA is a clinically led audit that uses the Heartbeat dataset, which the ACS programme developed in 2012 in order to monitor the care provided to patients with a STEMI. The origins of the monitoring programme were described in the *Irish Heart Attack Audit National Report 2017–2020* (National Office of Clinical Audit, 2022). Appendix 1 outlines the aim and objectives of the IHAA.

The IHAA Governance Committee oversees the IHAA, and its membership comprises clinical experts, patient and public interest representatives, the Healthcare Pricing Office (HPO), senior accountable healthcare management, and research and specialist bodies (Appendix 2).

DATA SOURCES

Heartbeat data are entered into the Hospital In-Patient Enquiry (HIPE) system. The Heartbeat dataset, as defined in the Irish Heart Attack Audit Data Dictionary Version 1.0 (National Office of Clinical Audit, 2024a), was collected on all cases admitted to a PCI centre following activation of the ORS protocol (Figure 1.2) and submitted by each hospital to the HIPE system via the Heartbeat portal. HIPE is the principal source of national data on discharges from acute hospitals in Ireland. It collects demographic, clinical and administrative data on discharges from, and deaths in, acute public hospitals nationally.

The reference population for this national report is limited to patients aged 17 years and over. The HIPE data and the Heartbeat data were merged within HIPE to form an anonymised dataset before being sent to the National Office of Clinical Audit (NOCA).

DATA COLLECTION

Each PCI centre has a nominated audit coordinator (usually an experienced cardiology nurse who has been formally trained in the Heartbeat dataset and data entry) and a clinical lead who leads on cardiac service governance within the hospital (Figure 2.1). The audit coordinator enters the data into the Heartbeat portal for the PCI centre. If a patient is discharged from a PCI centre to another hospital, follow-up data are sourced, where possible, by the audit coordinator in the PCI centre and entered into the Heartbeat portal. If this information is unavailable, it should be recorded as 'unknown'. Consequently, the PCI centres carry the responsibility for recording the care of patients with a STEMI in conjunction with their referring hospitals. It is likely that a small number of patients who are admitted to a hospital without a cath lab may not transfer to a PCI centre due to specific contraindications and/or comorbidities; these patients are not recorded in the Heartbeat portal. All data related to cross-border care are submitted by the audit coordinator in Letterkenny University Hospital.

DATA VALIDATION

Several validations are built into the design of the Heartbeat portal in order to display messages when an apparently illogical sequence is encountered. In addition, a number of mandatory fields (mainly related to admission and reperfusion data) require entry before data can be stored. In 2020, the NOCA data analytics and research team developed a data validation process for the IHAA. This process involves the data analyst producing a report of any missing information within the data and any data anomalies. This report is sent quarterly to the audit coordinators, who amend the records.

DATA ANALYSIS

NOCA received the Heartbeat data from the HPO for the 2024 reporting period on 23 April 2025. The NOCA Data Analyst completed the analysis following data checks with the HPO. The analysis was conducted using Statistical Package for the Social Sciences V25. Where appropriate, statistical tests were applied. The chi-squared statistical test was used for binary and categorical data points. Where appropriate, independent sample *t*-tests were used in order to determine the statistical difference in the means of the continuous data points. As a measure of statistical uncertainty, 95% confidence intervals were presented for the means of numerical data points. Where the observed *p*-value was less than or equal to 0.05, this was considered to indicate statistical significance.

In 2022, the NOCA data analytics and research team, as well as the IHAA Clinical Lead and Audit Manager, commenced a project to develop a risk-adjusted in-hospital mortality model for the IHAA and a management strategy in order to manage statistical outliers. The Global Registry of Acute Coronary Events (GRACE) model was used in order to estimate expected mortality; this was then used to calculate standardised mortality ratios, which were plotted using funnel plots (see Chapter 6). For a detailed description of the project, including the GRACE model and funnel plots, see Chapter 9 in the *Irish Heart Attack Audit National Report 2022 and 2023* (NOCA, 2024b).

INCLUSION CRITERIA

The analysis in this report is based on records captured on the Heartbeat portal. It includes patients who were:

i discharged between 1 January and 31 December 2024, inclusive
ii aged 17 years and over.

EXCLUSION CRITERIA

This report excludes patients who:

i were aged 16 years and under
ii died in the emergency department (ED) before treatment could be initiated.

INDICATORS OF CARE

There are internationally validated and widely accepted quality indicators for benchmarking the processes and quality of treatment of patients with a STEMI (Appendix 3). These indicators reflect key, evidence-based elements of pre-hospital emergency diagnosis, pre-hospital emergency treatment, and hospital treatment on admission and on discharge, which promote best outcomes in terms of mortality and morbidity. Ten key performance indicators (KPIs) were defined in the *Acute Coronary Syndromes Programme Model of Care* (HSE, 2012), and two of these KPIs are reported quarterly to the HSE's Business Intelligence Unit and inform the HSE's annual National Service Plan. In 2021, the following nine KQIs were agreed by the IHAA Governance Committee to be reported quarterly via the NOCA dashboard reporting system:

1. percentage of eligible patients with a STEMI who received reperfusion
2. percentage of patients with a STEMI who arrived directly to a primary PCI centre who had timely primary PCI[1]
3. percentage of patients with a STEMI who were transferred from a non-primary-PCI-capable hospital to a primary PCI centre who had timely primary PCI[2]
4. percentage of patients with a STEMI who had radial access for primary PCI
5. percentage of patients with a STEMI who were discharged with an appropriate secondary prevention medication discharge bundle
6. percentage of patients with a STEMI who actively smoke who were offered smoking cessation advice
7. percentage of eligible patients with a STEMI who were referred for cardiac rehabilitation phase 3
8. percentage completeness of the 'survival status at 30 days' data point recorded in Heartbeat
9. percentage of patients who have a cardiac rehabilitation phase 3 date recorded.

The NOCA dashboard is available in each PCI centre, and the KQI results for 2024 are highlighted throughout this report. The metadata for each KQI are available in Appendix 4, and the result of each KQI for 2024 is reported within the findings. Frequency tables for each figure are available in Appendix 5.

[1] Timeliness is based on the time from the first positive ECG to wire cross.
[2] Timeliness is based on the time from the first positive ECG to wire cross.

TABLE 2.1

HOSPITALS WE WORK WITH

NOTE: Dublin Hospitals have been displayed collectively by hospital group

HSE WEST AND NORTH WEST
University Hospital Galway
Letterkenny University Hospital

**ALTNAGELVIN HOSPITAL*
IHAA uses data from Altnagelvin Hospital, which provides 24/7 primary PCI coverage for parts of Donegal as part of a cross-border care arrangement between the HSE and the NHS.

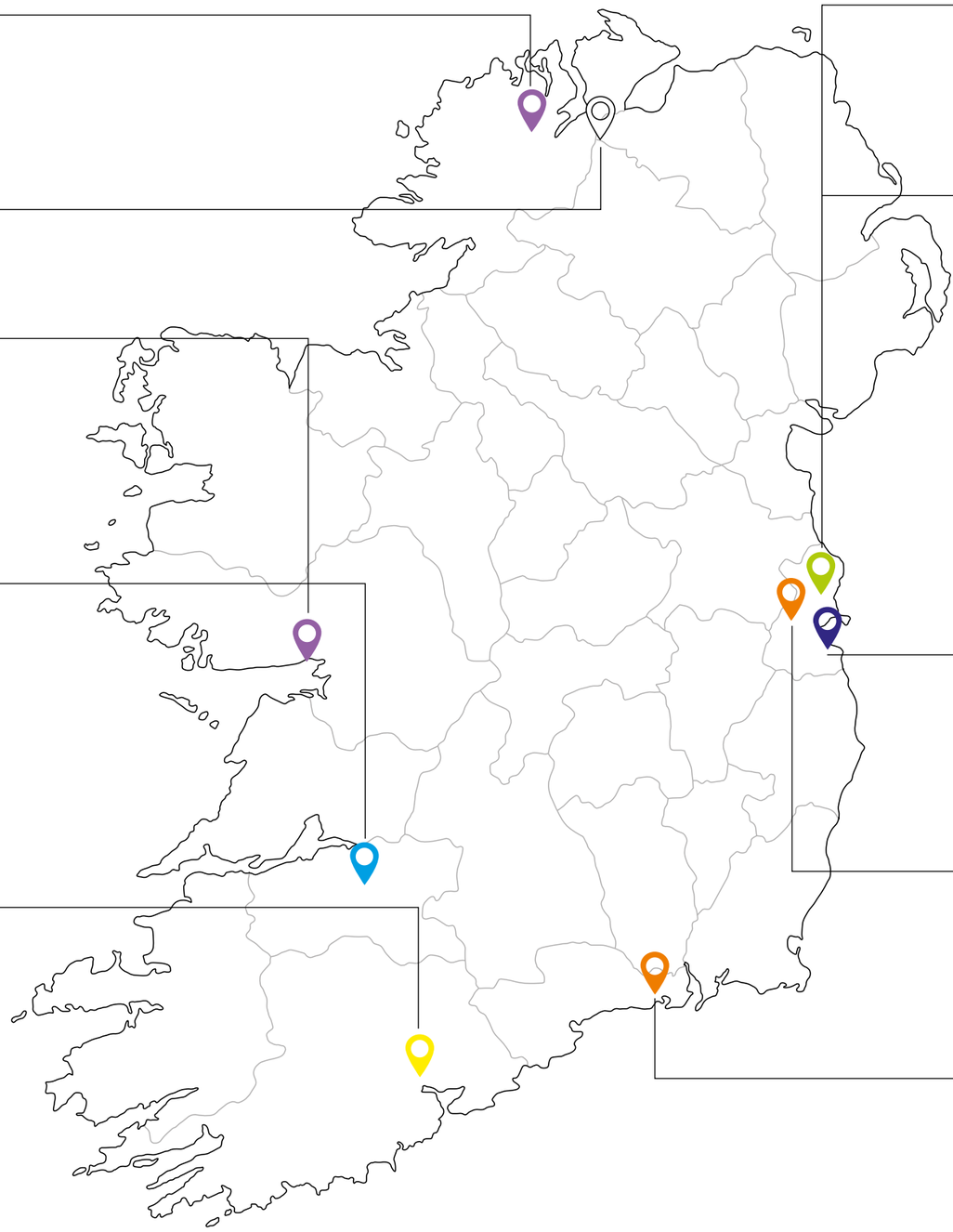
HSE MID WEST
University Hospital Limerick

HSE SOUTH WEST
Cork University Hospital

HSE DUBLIN AND NORTH EAST
Beaumont Hospital
Mater Misericordiae University Hospital

HSE DUBLIN AND MIDLANDS
St James's Hospital
Tallaght University Hospital

HSE DUBLIN SOUTH EAST
St Vincent's University Hospital
University Hospital Waterford



LETTERKENNY UNIVERSITY HOSPITAL
IHAA CLINICAL LEAD: Dr Santosh David
IHAA AUDIT COORDINATOR: Sreeji Kurup

ALTNAGELVIN HOSPITAL*
IHAA CLINICAL LEAD: Dr Godfrey Aleong

UNIVERSITY HOSPITAL GALWAY
IHAA CLINICAL LEAD: Dr James Crowley
IHAA AUDIT COORDINATOR: Mary Hynes

UNIVERSITY HOSPITAL LIMERICK
IHAA CLINICAL LEAD: Dr Samer Arnous
IHAA AUDIT COORDINATOR: Breda McDermott, Catriona Ahern

CORK UNIVERSITY HOSPITAL
IHAA CLINICAL LEAD: Dr Jack Laffan
IHAA AUDIT COORDINATOR: Yvonne McConnon

BEAUMONT HOSPITAL
IHAA CLINICAL LEAD: Dr Mark Kennedy
IHAA AUDIT COORDINATOR: Ciara Power

MATER MISERICORDIAE UNIVERSITY HOSPITAL
IHAA CLINICAL LEAD: Prof. Gavin Blake
IHAA AUDIT COORDINATOR: Elizabeth O'Connor, Jamie Byrne

ST JAMES'S HOSPITAL
IHAA CLINICAL LEAD: Prof. Andrew Maree, Dr Ian Pearson
IHAA AUDIT COORDINATOR: April Villalobos

TALLAGHT UNIVERSITY HOSPITAL
IHAA CLINICAL LEAD: Dr David Moore
IHAA AUDIT COORDINATOR: Catherine Markham

ST VINCENT'S UNIVERSITY HOSPITAL
IHAA CLINICAL LEAD: Dr Charles McCreery
IHAA AUDIT COORDINATOR: Erica Carty

UNIVERSITY HOSPITAL WATERFORD
IHAA CLINICAL LEAD: Dr Patrick O'Callaghan
IHAA AUDIT COORDINATOR: Mairead Hanrick

CHAPTER 3
DATA QUALITY STATEMENT

Coverage of Data Release

Completeness of Data Release

Accuracy of Data Release

CONTENTS

CHAPTER 3: DATA QUALITY STATEMENT FOR THE *IRISH HEART ATTACK NATIONAL REPORT 2024*

This chapter provides an assessment of the quality of the IHAA data in this report using internationally agreed dimensions of data quality (Health Information and Quality Authority, 2018). Table 3.1 describes the context of the data in this report, Table 3.2 outlines the characteristics of the data quality within this report and Table 3.4 provides an overall assessment of the quality of the data in this report.

TABLE 3.1: CONTEXT OF DATA IN THIS REPORT

SCOPE	This data quality statement provides an assessment of the Heartbeat data released for this report in 2024. This statement solely focuses on the data quality dimension of 'accuracy and reliability', and specifically on the following characteristics: • coverage of data release • completeness of data release • accuracy of data release.
PURPOSE	This will help the reader decide whether the data are fit for the user's specific purpose.
DATA SOURCE	Data for this report have been extracted from the HIPE system, which includes data submitted to the Heartbeat portal within HIPE.
TIMEFRAME OF DATA RELEASE	The data released in this report are based on data reported between 1 January and 31 December 2024.
TYPE OF DATA	Final

TABLE 3.2: CHARACTERISTICS OF DATA QUALITY

Coverage of data release	For this report, data are included from all PCI centres (both designated primary PCI and non-designated, 9.00am to 5.00pm weekday PCI centres) (see Table 1.1). The number of patients with a STEMI recorded on Heartbeat compared with the number of patients with a STEMI recorded on HIPE gives an indication of coverage. In 2024, 90% of STEMI cases recorded on HIPE had additional clinical data recorded on Heartbeat.
Completeness of data release	The number of data points in the Heartbeat dataset, as defined in the Irish Heart Attack Audit Data Dictionary Version 1.0 (NOCA, 2024a), was revised from 66 in 2021 to 78 in 2022.[3] Completeness of all data points is presented in Appendix 6. In 2024, almost all (97%) of the data points had over 90% completeness. The capture of follow-up data requires the audit coordinators to gather the data from another hospital. Without adequate resources for data collection and good networks between hospitals to collect the data, follow-up data can be missing. Despite challenges in collecting follow-up data, the level of completeness has steadily increased over the years (Figure 3.1).

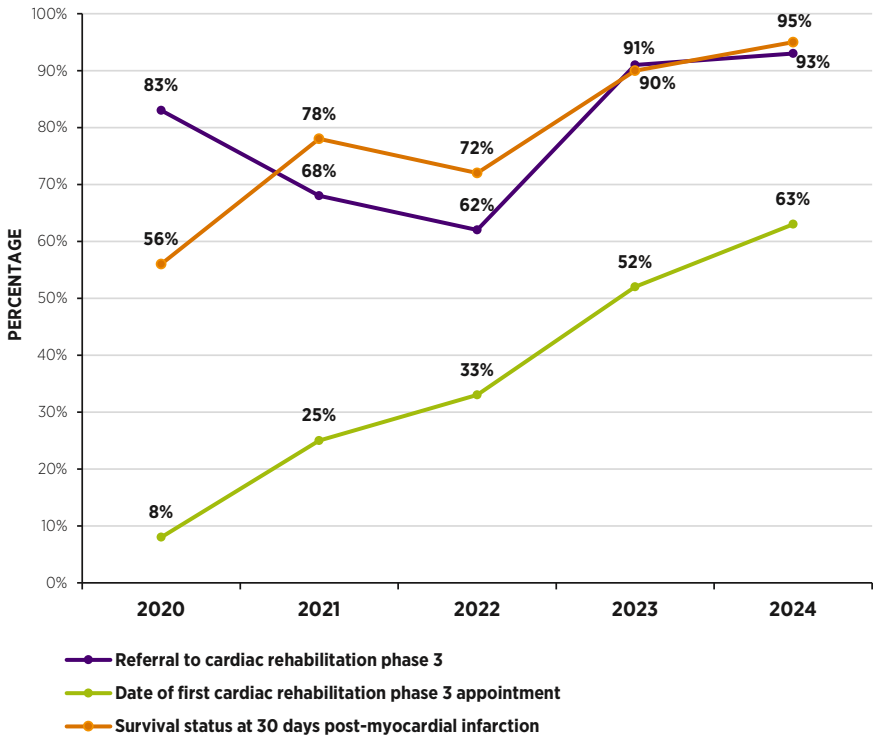


FIGURE 3.1: DATA COMPLETENESS IN FOLLOW-UP DATA, 2020–2024

[3] Thirteen new data points were added and 1 was removed.

Completeness of data release

Table 3.3 displays the number and proportion of cases that were included in the calculation of each of the KQIs in 2024. Each KQI uses multiple variables for its calculation. The table displays the overall number and proportion of cases with each required variable recorded. For instance, KQI 1 (percentage of eligible patients with a STEMI who received reperfusion) requires two variables to calculate: contraindication to reperfusion and reperfusion type. Overall, 89.5% of cases had both of these variables recorded.

TABLE 3.3: COMPLETENESS OF VARIABLES REQUIRED FOR KEY QUALITY INDICATOR CALCULATION, 2024

	n	%
KQI 1: Percentage of eligible patients with a STEMI who received reperfusion	1446	89.5%
KQI 2: Percentage of patients with a STEMI who were brought directly to a primary PCI centre who had timely primary PCI	936	99.8%
KQI 3: Percentage of patients with a STEMI who were transferred from a non-primary-PCI-capable hospital to a primary PCI centre who had timely primary PCI	292	99.3%
KQI 4: Percentage of patients with a STEMI who had radial access for primary PCI	1251	99.8%
KQI 5: Percentage of patients with a STEMI who were discharged with an appropriate secondary prevention medication discharge bundle	1471	97.5%
KQI 6: Percentage of patients with a STEMI who actively smoke who were offered smoking cessation advice	556	88.4%
KQI 7: Percentage of eligible patients with a STEMI who were referred for cardiac rehabilitation phase 3	1487	98.5%
KQI 8: Percentage completeness of the 'survival status at 30 days' data point recorded in Heartbeat	1453	92.0%
KQI 9: Percentage of patients who have a cardiac rehabilitation phase 3 date recorded	630	56.0%

Accuracy of data release

All data were reported, including missing or unknown data.

TABLE 3.4: ASSESSMENT OF DATA IN THIS REPORT

Strengths of data in this report	All hospitals eligible to participate in the IHAA are included. All hospitals have access to their own data and can run reports locally through the Heartbeat portal. Data validation reports are provided quarterly to all participating hospitals. Any commonly found inaccuracies were discussed at the bimonthly audit coordinator meetings in order to maximise compliance. A data dictionary and user manual are available and are updated annually in order to support the submission of accurate data. This report is now in a position to provide more outcome results than previous reports. These additional outcome results include: ✓ 'door in door out' times for patients with a STEMI who are transferred from a non-PCI-capable hospital to the primary PCI centre ✓ door to first positive ECG times for patients with a STEMI who are transferred from a non-PCI-capable hospital to a primary PCI centre ✓ risk-adjusted mortality.
Limitations of data in this report	Patient-level data linkage between Heartbeat and ambulance records is not currently available. As a result, the time of the first positive ECG is used as a proxy for the time of FMC. When comparing the timeliness of primary PCI with that in other jurisdictions, this limitation should be taken into account. The logistic regression model coefficients that are available to be fitted for the GRACE probability of death were estimated in 2014, and therefore may be outdated and no longer appropriate. The logistic regression model coefficients can be developed using IHAA data; however, at the time of writing this report, there was not a sufficient amount of data for this implementation. The IHAA Governance Committee has agreed that the NOCA outlier management policy will not commence until the model has been refined and supported by larger quantities of data.

CHAPTER 4

DEMOGRAPHIC AND CARDIOVASCULAR RISK FACTOR PROFILE

CONTENTS

CHAPTER 4: DEMOGRAPHIC AND CARDIOVASCULAR RISK FACTOR PROFILE

SCOPE OF CHAPTER

Chapter 4 presents data on the demographic and cardiovascular risk factor profile of all cases submitted to the Heartbeat portal in 2024. The data include only cases that triggered the ORS protocol (Figure 1.2) and their subsequent admission to a PCI centre. Comparisons with the *Irish Heart Attack Audit National Report 2022 and 2023* (NOCA, 2024b) and other international reports are made, where applicable. Emerging trends in age and sex demographics, comorbidities, and cardiovascular risk factors (including smoking) are outlined and discussed.

HEARTBEAT CASE SUBMISSIONS, 2024

A total of 1,882 cases were submitted to the Heartbeat portal during the 2024 reporting period, reflecting a continuing upward trend. Submissions have steadily increased, from 1,742 cases in 2021 to 1,803 in 2022 and 1,836 in 2023. Figure 4.1 displays the proportion of all cases submitted by each participating hospital during the 2024 reporting period. St James's Hospital and the Mater Misericordiae University Hospital together continue to receive almost one-half of all admissions to PCI centres.

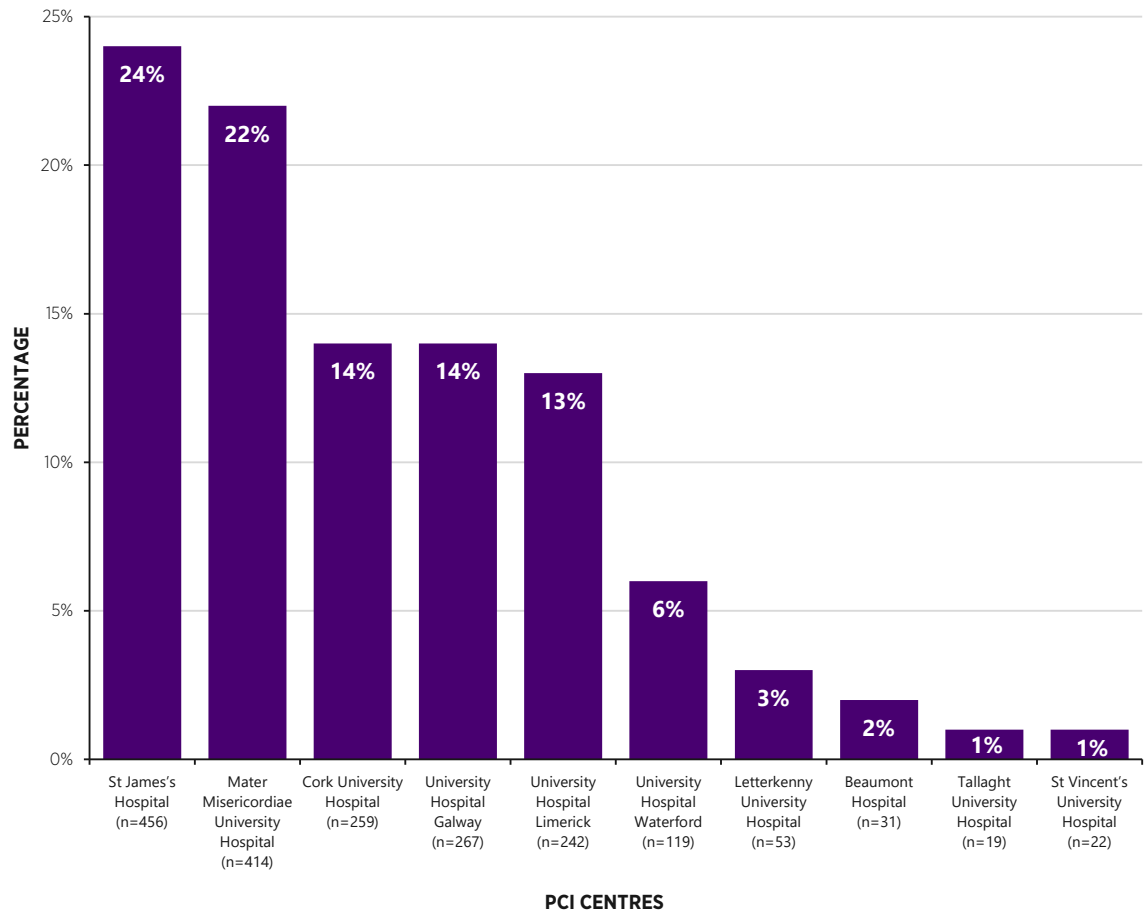


FIGURE 4.1: PROPORTION OF HEARTBEAT CASE SUBMISSIONS, BY PCI CENTRE (N=1882)

CONFIRMED STEMI DIAGNOSIS AND ALTERNATIVE DIAGNOSES

Each case submitted to the Heartbeat portal as a possible STEMI in 2024 had a confirmed discharge diagnosis. The potential diagnostic categories that could be recorded included: STEMI, NSTEMI, unstable angina, pericarditis, myocarditis, takotsubo cardiomyopathy, non-cardiac chest pain, and other/unknown. In 2024, 86% (n=1615) of cases had a confirmed diagnosis of a STEMI, 11% (n=202) had an alternative diagnosis, and 3% (n=65) were reported as 'other/unknown' (Figure 4.2). The distribution of diagnoses in 2024 remains consistent with the 2023 figures.

In 2024, the most common alternative diagnosis (n=202) was non-cardiac chest pain (n=65, 32%), followed by NSTEMI (n=49, 24%) and pericarditis (n=49, 24%). The breakdown of alternative discharge diagnoses is available by hospital in the supplementary frequency tables in Appendix 7.

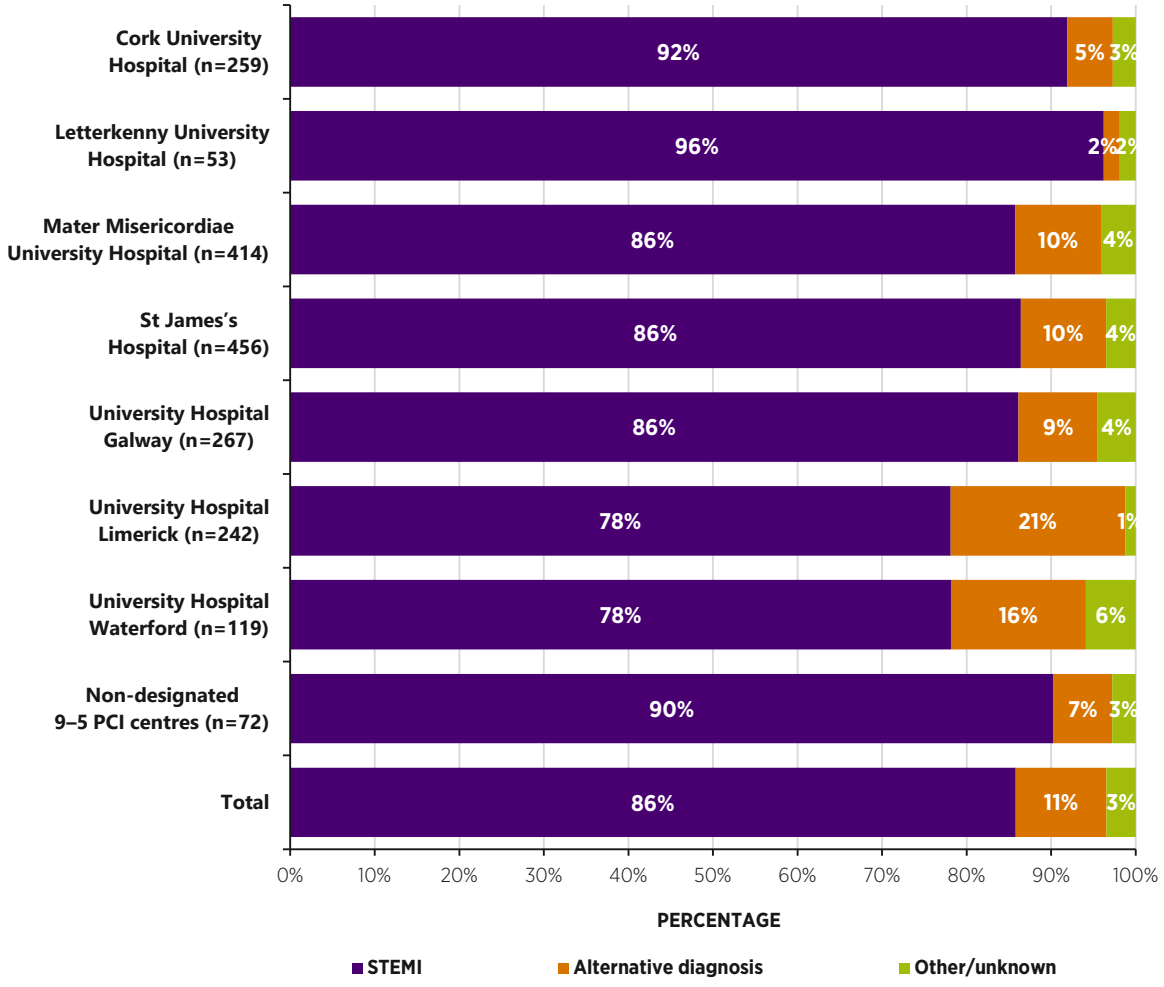


FIGURE 4.2: DISCHARGE DIAGNOSIS, BY PCI CENTRE (N=1882)

STEMI, SEX AND AGE

Of the 1,615 patients with a confirmed diagnosis of a STEMI treated in PCI centres in 2024 (Figure 4.3), the majority were male (n=1208, 75%); this is consistent with previous years.

The mean and median age of patients with a STEMI in 2024 was 63 years (interquartile range (IQR): 55–73 years), which is consistent with 2023 results. For males, the median age was 62 years (IQR: 54–71 years). Female patients with a STEMI were older, with a median age of 67 years (IQR: 58–76 years). There was a larger proportion of females aged 65 years and over (n=238, 58%) compared with males (n=486, 40%).

For males, the median age was 62 years (IQR: 54–71 years)

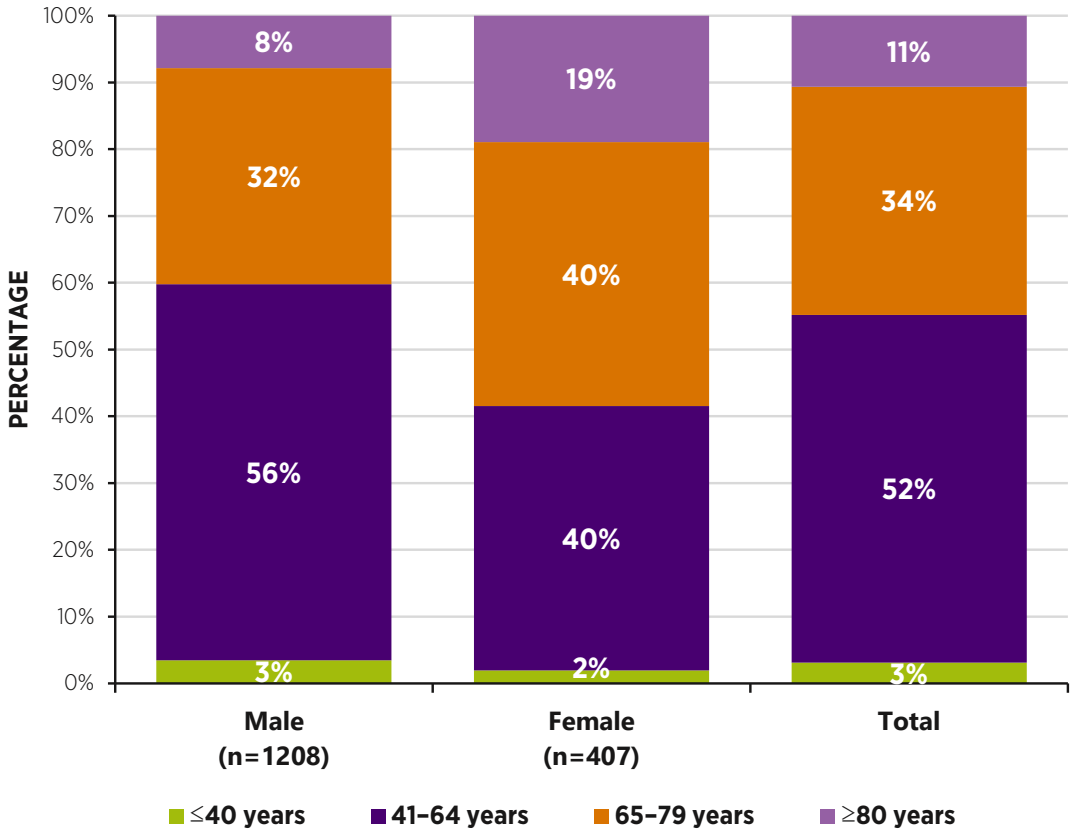


FIGURE 4.3: PERCENTAGE OF STEMI CASES, BY SEX AND AGE GROUP (N=1615)

CARDIOVASCULAR DISEASE HISTORY AND KNOWN COMORBIDITY PROFILE OF PATIENTS WITH A STEMI

In 2024, 33% (n=526) of patients with a STEMI had at least one known atherosclerotic cardiac diagnosis such as angina, a prior cardiovascular event such as a myocardial infarction (MI) or a PCI, or a known non-cardiac comorbidity. During 2024, the most frequently reported conditions were previous PCI (n=200, 12%), previous angina (n=172, 11%) and previous chronic lung disease (n=166, 10%). Sixty-six percent (n=1065) of patients had no known comorbidities recorded. Additional cardiovascular risk factors are presented in Table 4.1, indicating that 90% (n=1460) of patients with a STEMI had at least one cardiovascular risk factor.

Figure 4.4 demonstrates sex-related differences in prior cardiovascular disease and comorbidity rates. As previously outlined, female patients with a STEMI tended to be older on presentation and were more likely to have a documented prior cardiac disease or other comorbidity than males.

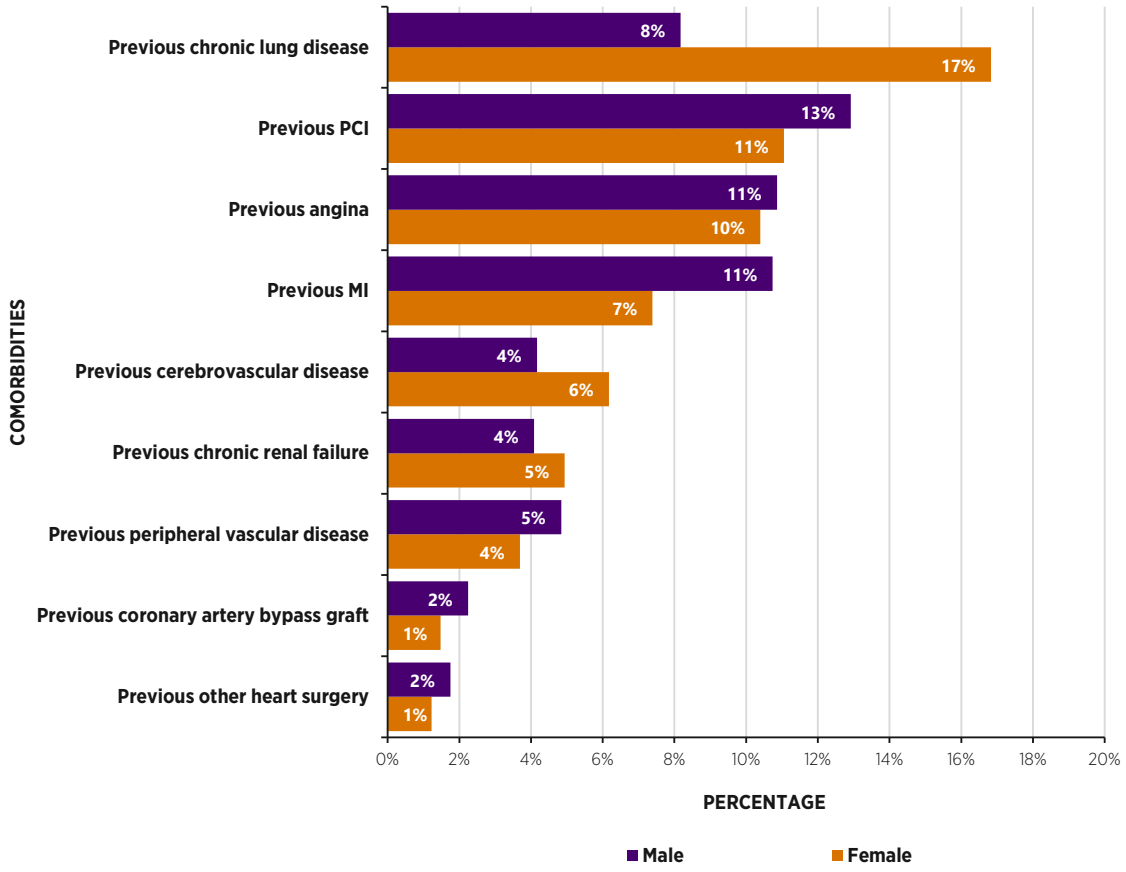


FIGURE 4.4: PRIOR CARDIOVASCULAR DISEASE AND MAJOR COMORBIDITIES IN PATIENTS WITH A STEMI, BY SEX[4]

[4] The proportions were calculated separately (excluding cases where comorbidities were unknown) for each prior cardiovascular disease and comorbidity. One patient may have had one or more cardiovascular diseases and comorbidities; therefore, some patients are counted more than once.

PRIOR CORONARY HEART DISEASE

In 2024, the proportion of patients with a STEMI who had a pre-existing diagnosis of coronary heart disease (CHD) (prior MI, prior angina, prior PCI, and/or prior coronary artery bypass graft (CABG)) was 19% (n=298). Figure 4.5 displays the proportion of patients with a STEMI who were admitted with prior CHD, by sex and age group.

In total, there was little variation between male and female patients with a STEMI (19% of males versus 18% of females) who had at least one pre-existing CHD diagnosis. In all age groups, male patients had a larger proportion of pre-existing CHD diagnoses when compared with female patients.

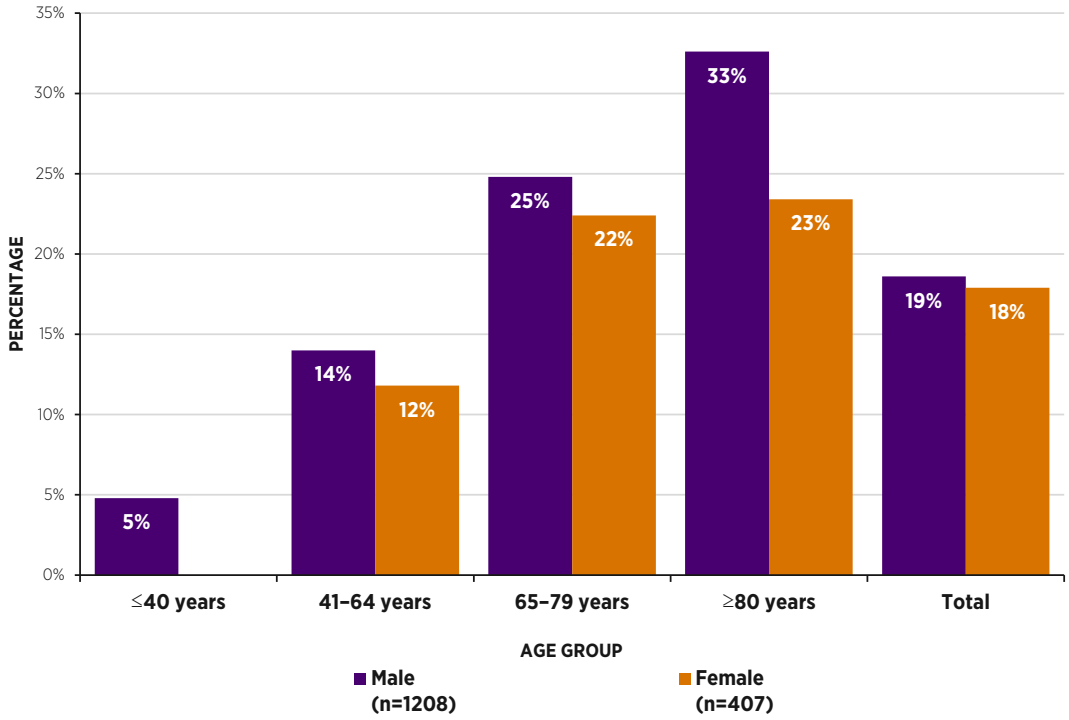


FIGURE 4.5: PROPORTION OF PATIENTS WITH A STEMI WITH PRIOR CORONARY HEART DISEASE, BY SEX AND AGE GROUP (N=1615)

DIABETES PROFILE IN PATIENTS WITH A STEMI

While most patients with a STEMI in 2024 did not have diabetes (n=1173, 73%), 27% (n=430) had a diagnosis of diabetes before or during admission. This proportion has gradually increased, from 18% of patients with a STEMI in 2021 to 19% in 2022 and 22% in 2023. This increase is likely attributed to improved data quality, as the proportion of patients with unknown diabetes status decreased from 8% (n=116) in 2022 to 1% (n=12) in 2024.

Type 2 diabetes is not recorded as a specified data point in the Heartbeat dataset, but the number of cases has been inferred from the 'diabetes controlled with diet or oral medication' data point. This report may underestimate the true prevalence of type 2 diabetes in patients with a STEMI, as the Heartbeat dataset does not record the subtype of diabetes as a specified data point. The HIPE system does capture data on diabetes based on diabetes type (e.g. type 2). The IHAA is working with the Healthcare Pricing Office to assess the congruence between the Heartbeat and HIPE datasets and the potential for using HIPE data to report on the prevalence of diabetes. Further information is provided in Chapter 8.

Figure 4.6 shows the distribution of patients with a STEMI in 2024 who were diagnosed with diabetes, by sex and age group. Male patients with a STEMI had a lower rate of diabetes compared with female patients. The percentage of male patients aged 65–79 years with diet-controlled diabetes increased from 5% in 2023 to 11% in 2024, while the percentage of male patients aged 80 years and over with oral medication-controlled diabetes decreased from 23% in 2023 to 14% in 2024.

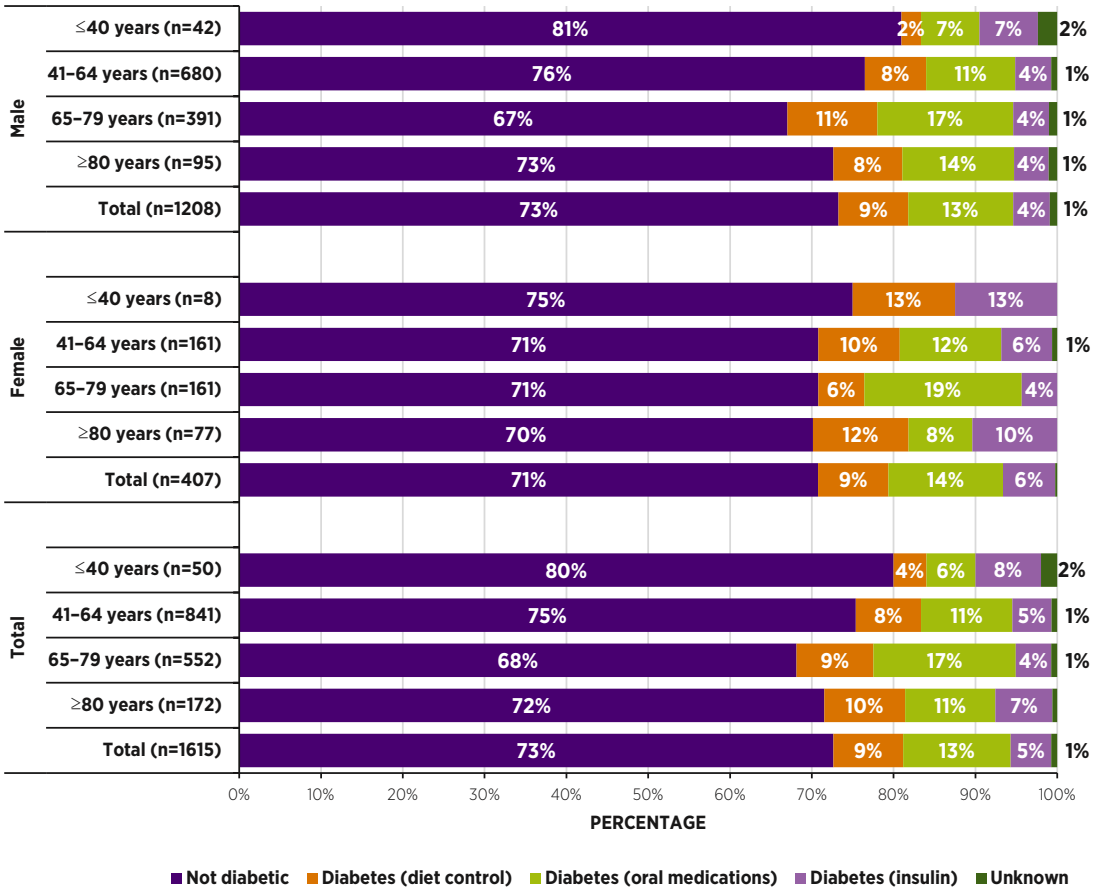


FIGURE 4.6: DIABETES PROFILE OF PATIENTS WITH A STEMI, BY SEX AND AGE GROUP (N=1615)

SMOKING AND AGE PROFILE OF PATIENTS WITH A STEMI

On average, smokers present with a STEMI 11 years earlier than people who have never smoked

In 2024, 36% (n=584) of patients with a STEMI were current smokers, which was consistent with the 2023 result (35%). The proportion of patients with a STEMI who currently smoke remains substantially higher than the national population average, which was reported to be 17% in 2024 (Department of Health, 2024). The proportion of patients with a STEMI in 2024 who have given up smoking (n=446, 28%) was similar to the national average (30%). Data on the use of nicotine replacement therapy or electronic vaping products are currently not collected as part of the Heartbeat dataset.

Smoking causes STEMI at a younger age. On average, smokers present with a STEMI 11 years earlier than people who have never smoked (mean age of current smokers with a STEMI: 57 years; mean age of never smokers with a STEMI: 68 years).

This premature STEMI risk continues to be more pronounced in female smokers. Among males, current smokers presenting with a STEMI had a median age of 56 years (IQR: 50–62 years) compared with a median age of 66 years (IQR: 57–75 years) for males with a STEMI who have never smoked. Among females, current smokers presenting with a STEMI had a median age of 61 years (IQR: 53–67 years) compared with a median age of 74 years (IQR: 64–82 years) for females with a STEMI who have never smoked.

The proportion of male patients with a STEMI aged 40 years or under who were current smokers decreased from 74% in 2023 to 64% in 2024.

Figure 4.7 shows the smoking profile of patients with a STEMI by sex and age group. The majority of patients with a STEMI aged under 40 years were current smokers (n=33, 66%). As age increased, the proportion of current smokers decreased. This trend highlights the degree to which smoking causes premature CHD events, with patients of both sexes who have never smoked experiencing a STEMI when they were considerably older compared with current smokers.

In 2024, of the 298 patients with a STEMI who had prior CHD, 26% (n=78) were described as current smokers, which is consistent with the 2022 and 2023 results (25%). The proportion of former smokers among this cohort in 2024 was 37% (n=109). These data highlight the importance of providing continuing support for smokers who have experienced a STEMI in order to reinforce quitting and maintaining abstinence from smoking. Moreover, these findings also highlight smoking relapse as a cause of higher future risk of a second heart attack.

Of those patients with a STEMI who were reported as current smokers in 2024 (n=584), 95% (n=553) received smoking cessation advice, an increase from 86% in 2023.

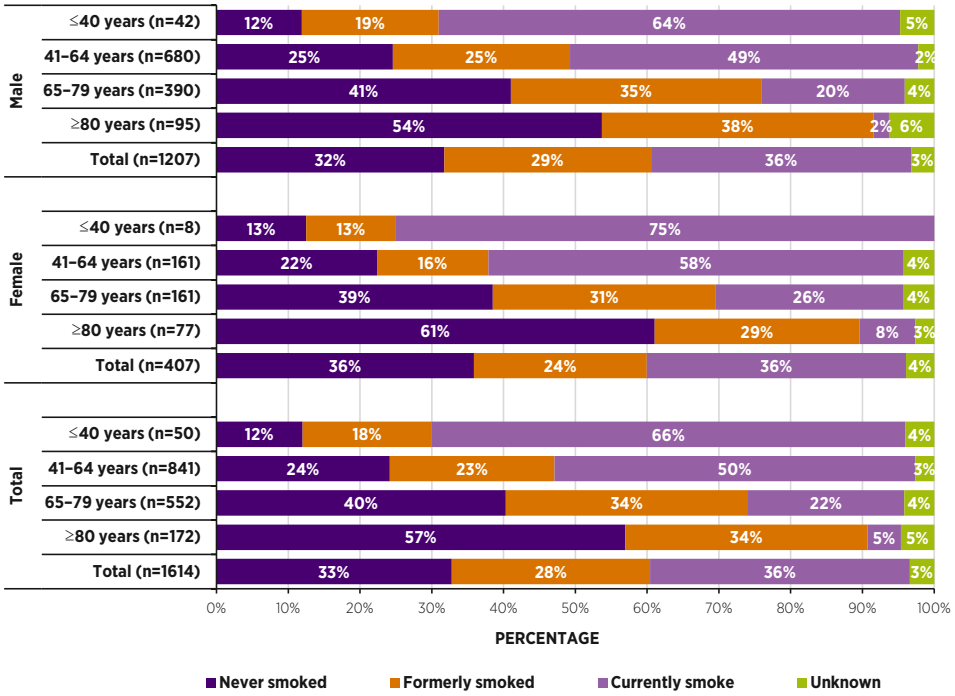


FIGURE 4.7: SMOKING PROFILE OF PATIENTS WITH A STEMI, BY SEX AND AGE GROUP (n=1614)[5]

[5] Patients for whom time information was recorded incorrectly are excluded from Figure 4.7.

CARDIOVASCULAR RISK FACTOR PROFILE OF PATIENTS WITH A STEMI

The most prevalent risk factors were hypertension(53%) and hypercholesterolaemia (44%)

In 2024, 90% (n=1460) of patients with a STEMI had at least one cardiovascular risk factor. This percentage represented an increase from 86% (n=1311) in 2022 and 88% (n=1388) in 2023; however, this increase could be attributed to improved data quality. For instance, in 2022, the diabetes status was unknown in 8% (n=116) of patients with a STEMI compared with just 1% (n=12) in 2024 (Figure 4.6).

Table 4.1 shows the proportion of cardiovascular risk factors by sex. The most prevalent risk factors were hypertension (n=860, 53%) and hypercholesterolaemia (n=718, 44%). A higher proportion of female patients had a history of hypertension (n=235, 58%) compared with male patients (n=625, 52%). Similarly, previous hypercholesterolaemia was more common among women (n=203, 50%) than among men (n=515; 43%).

In 2022, an additional data point, body mass index (BMI), was added to the Heartbeat dataset. The completeness of this data point was 90% in 2022 and 96% in 2024. Table 4.1 shows that more than one-quarter of patients with a STEMI in 2024 had a BMI of 30 or higher.

TABLE 4.1: CARDIOVASCULAR RISK FACTOR PROFILE OF PATIENTS WITH A STEMI

	MALE		FEMALE		TOTAL	
	n	%	n	%	n	%
Previous hypertension	625	52%	235	58%	860	53%
Previous hypercholesterolaemia	515	43%	203	50%	718	44%
Smoking	437	36%	147	36%	584	36%
Diabetes	312	26%	118	29%	430	27%
Prior cardiovascular disease	291	24%	100	25%	391	24%
BMI ≥30	353	29%	104	26%	457	28%

Figure 4.8 shows the proportion of patients with a STEMI who had one to six cardiovascular risk factors. More than one-half of patients with a STEMI (n=866, 54%) had one or two cardiovascular risk factors, and 90% (n=1460) had at least one risk factor.

A substantial proportion of patients had three or more potentially modifiable cardiovascular risk factors on presentation (n=594, 37%). A very small number of patients (n=7, 0.4%) had six risk factors. Identifying these individuals with multiple risk factors at an earlier stage in primary care; chronic disease management programmes; the Making Every Contact Count programme; and, most importantly, adequately addressing modifiable risk factors all provide opportunities to help reduce the incidence of cardiovascular events.

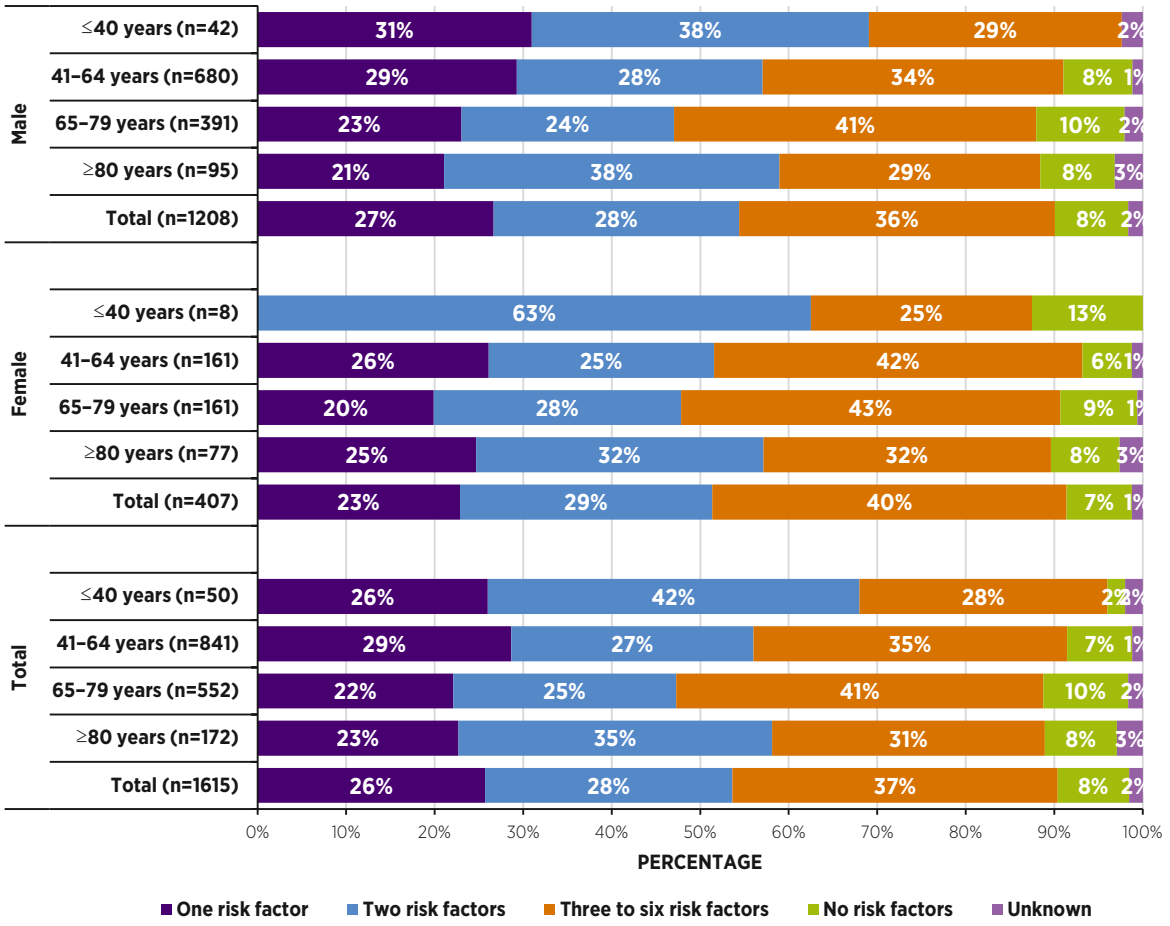
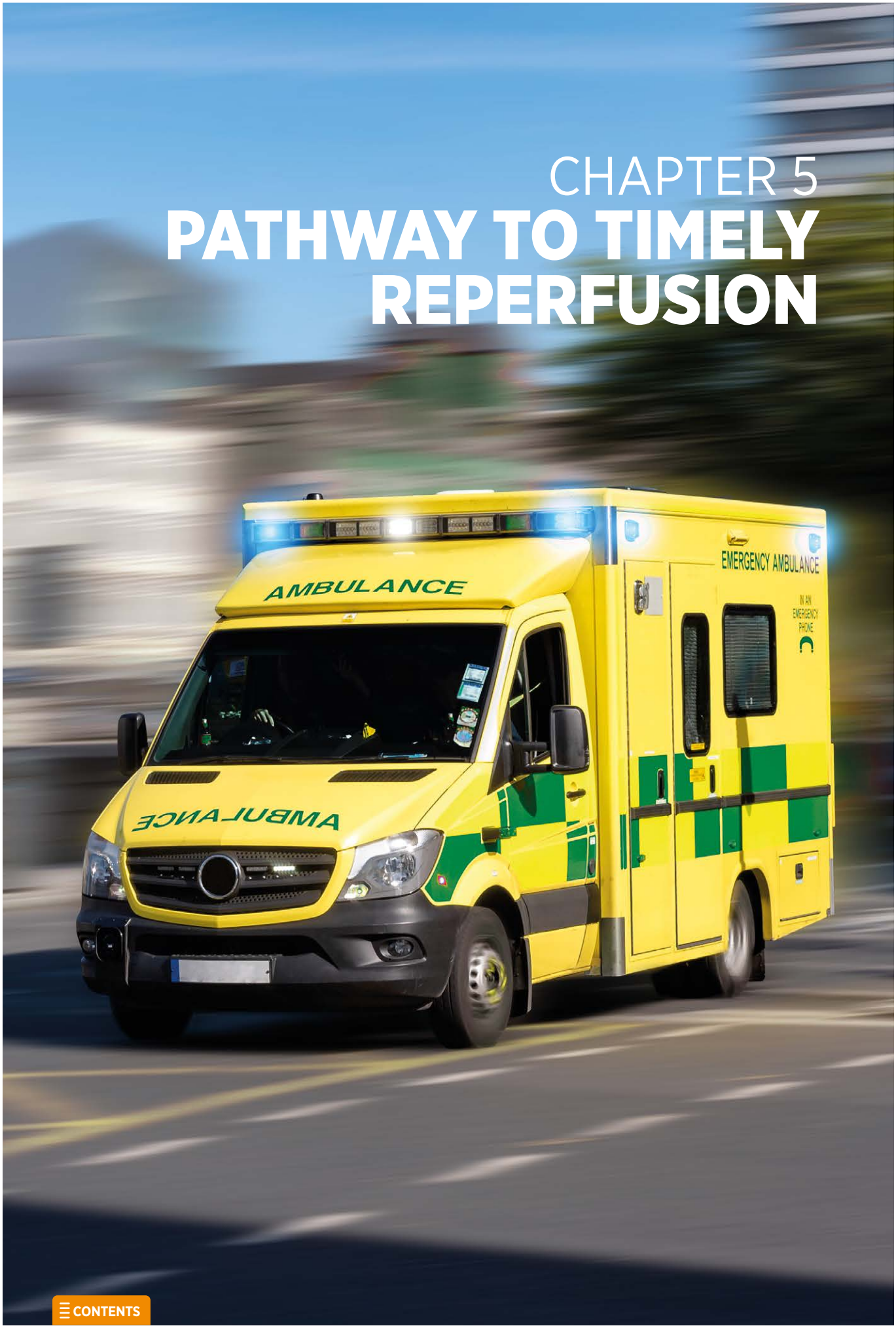


FIGURE 4.8: PREVALENCE OF RISK FACTORS FOR PATIENTS WITH A STEMI, BY SEX AND AGE GROUP (N=1615)

KEY FINDINGS FROM CHAPTER 4

- A total of 1,882 cases were submitted to the Heartbeat portal during the 2024 reporting period, reflecting a continuing upward trend, from 1,742 cases in 2021.
- Overall, 1,615 patients with a STEMI were recorded on the Heartbeat portal in 2024, indicating a 13% increase since 2017 (n=1427) (Figure 5.4), which is slightly higher than the population increase during the same period (12%).
- Males accounted for 75% (n=1208) of all patients with a STEMI and had a median age of 62 years (IQR: 54–71 years). Female patients with a STEMI were generally older, with a median age of 67 years (IQR: 58–76 years).
- Ninety percent (n=1460) of patients with a STEMI in 2024 had at least one cardiovascular risk factor. The most prevalent risk factors were hypertension (53%; n=860) and hypercholesterolaemia (44%; n=718). Thirty-seven percent (n=594) of patients had three or more potentially modifiable cardiovascular risk factors.
- Twenty-seven percent (n=430) of patients with a STEMI in 2024 had a diagnosis of diabetes.
- Smoking causes STEMI at a younger age. On average, smokers present with a STEMI 11 years earlier than people who have never smoked. Among females, current smokers presenting with a STEMI had a median age of 61 years (IQR: 53–67 years) compared with a median age of 74 years (IQR: 64–82 years) for females with a STEMI who have never smoked. The proportion of male patients with a STEMI aged 40 years or under who were current smokers decreased from 74% in 2023 to 64% in 2024.



CHAPTER 5
PATHWAY TO TIMELY REPERFUSION

CONTENTS

CHAPTER 5: PATHWAY TO TIMELY REPERFUSION

SCOPE OF CHAPTER 5

This chapter reports on the patient pathway to timely reperfusion for all patients with a STEMI recorded in the Heartbeat portal (N=1615) in 2024. Reporting on the patient pathway to timely reperfusion is complex and can vary depending on treatment location and how a patient initially accessed STEMI care.

This chapter presents key time intervals to timely reperfusion for three cohorts of patients with a STEMI:
1. patients with a STEMI who arrived directly by ambulance to a primary PCI centre
2. patients with a STEMI who self-presented to a PCI centre
3. patients with a STEMI who presented initially to a non-PCI-capable hospital and were transferred by ambulance to a PCI centre.

Non-designated 9.00am to 5.00pm weekday PCI centres have been amalgamated in this analysis, as each non-designated centre treated a small number of patients and the optimal reperfusion service protocol does not recommend transfer to these sites for primary PCI. Appendix 8 provides detailed definitions of each data point used in order to calculate the time intervals described in this chapter. Comparisons to 2022 and 2023 refer to the results published in the *Irish Heart Attack Audit National Report 2022 and 2023* (NOCA, 2024b).

SOURCE OF REFERRAL TO A PCI CENTRE

The way in which a patient initially accesses care, which is known as the source of referral, may influence the type of reperfusion therapy that they receive and the timeliness of reperfusion. Figure 5.1 shows the sources of referral to PCI centres in 2024.

During 2024, more than one-half (n=893, 55%) of patients with a STEMI arrived directly by ambulance to a PCI centre. The percentage of patients with a STEMI who arrived directly by ambulance ranged from 42% (n=39) in University Hospital Waterford to 69% (n=35) in Letterkenny University Hospital/Altnagelvin Area Hospital. While the overall percentage of cases that arrived directly by ambulance to a PCI centre remained consistent with 2023 (55%), some hospitals experienced year-to-year variations in this proportion. For example, in 2023, 52% of patients with a STEMI arrived to the Mater Misericordiae University Hospital directly via ambulance, and in 2024, the proportion increased to 61%. This was associated with a decrease in the proportion of patients who were transferred to the Mater Misericordiae University Hospital from other non-PCI-capable hospitals, from 40% in 2023 to 33% in 2024. An additional 10% (n=161) of all patients with a STEMI self-presented to a PCI centre in 2024.

One-third (n=513, 32%) of patients with a STEMI in 2024 presented initially to a non-PCI-capable hospital and were subsequently transferred by ambulance to a PCI centre, which was unchanged from 2023 (32%). This includes patients who self-presented to a non-PCI-capable hospital, those who had the STEMI diagnosed while already an inpatient in a non-PCI-capable hospital, and those who may have been brought by ambulance to a non-PCI-capable hospital for stabilisation prior to transfer to a PCI centre.

The location of primary PCI centres and the number of non-PCI-capable hospitals with an emergency department (ED) service nearby may have an impact on the proportion of patients who are able to access a PCI centre directly.

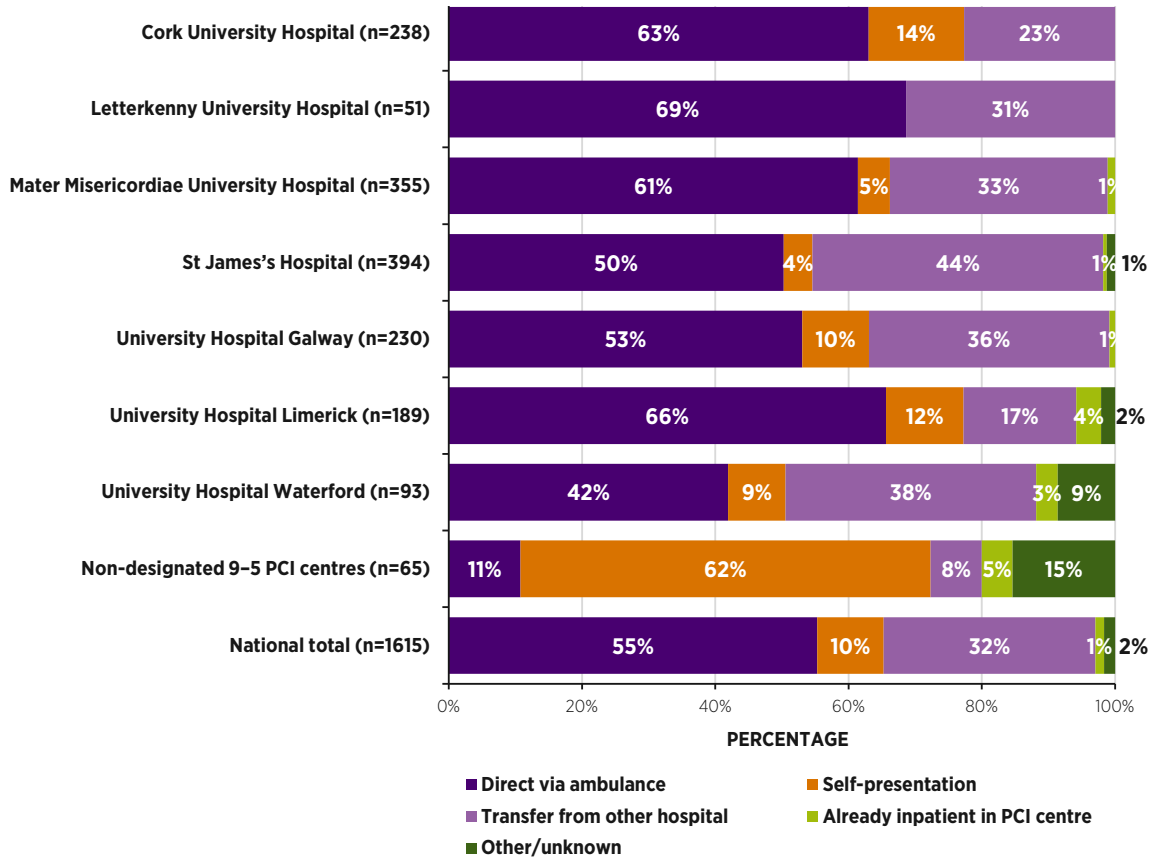


FIGURE 5.1: REFERRAL SOURCE TO A PCI CENTRE FOR ALL PATIENTS WITH A STEMI, BY HOSPITAL (N=1615) [6,7]

[6] Non-designated 9.00am to 5.00pm weekday PCI centres include Beaumont Hospital (n=28), St Vincent's University Hospital (n=19) and Tallaght University Hospital (n=18).
[7] The 'transfer from other hospital' category includes transfer from other hospital and inpatient transfer from other hospital.

TIME INTERVAL FROM ONSET OF SYMPTOMS TO CALL FOR HELP FOR PATIENTS WHO ARRIVED AT A PCI CENTRE DIRECTLY BY AMBULANCE

The quicker that a person who is experiencing heart attack symptoms calls for help, the more likely they are to receive timely treatment, thereby reducing damage to the heart. For those who arrived at a PCI centre directly by ambulance, the call for help time is the time that the 112 or 999 call was received in the ambulance dispatch centre. Figure 5.2 shows the proportion of patients with a STEMI in 2024 whose interval between the time of symptom onset and the time of the call for help was within 60 minutes, by sex.

In 2024, only 45% of patients called for help within 60 minutes

In 2024, the time interval between symptom onset and call for help was within 60 minutes for 45% (n=402) of patients with a STEMI who arrived at a PCI centre directly by ambulance; this was a decrease from 49% (n=419) in 2023. As in previous years, a larger proportion of male patients sought help within 60 minutes of symptom onset in 2024 compared with female patients.

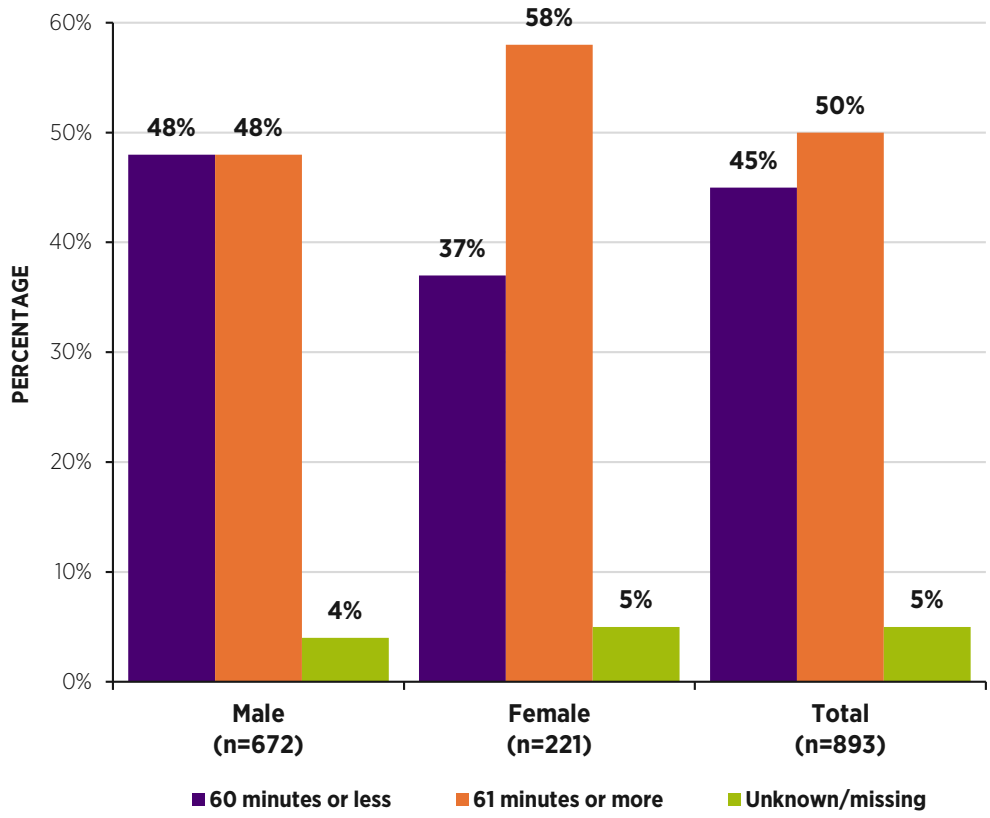


FIGURE 5.2: PROPORTION OF PATIENTS WITH A STEMI WITH A SYMPTOM ONSET TO CALL FOR HELP INTERVAL WITHIN 60 MINUTES, BY SEX (n=893)[8]

[8] Figure 5.2 only includes patients who arrived at a PCI centre directly by ambulance.

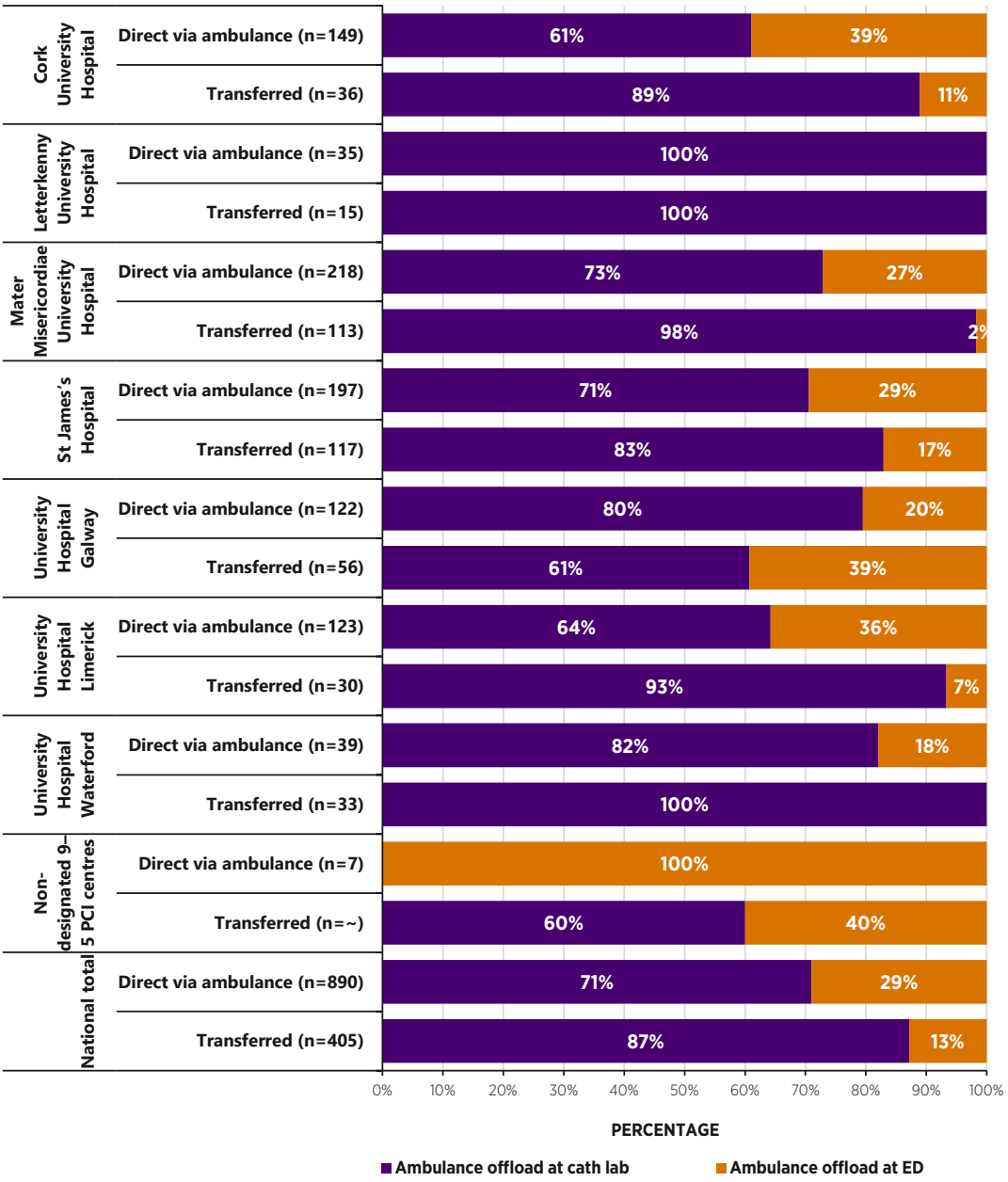
AMBULANCE OFFLOAD LOCATION FOR PATIENTS BROUGHT TO A PCI CENTRE FOR PRIMARY PCI

71% of those brought directly by ambulance to the PCI centre bypassed the ED and went straight to the cath lab.

For patients with a STEMI, the European Society of Cardiology (ESC) recommends an ED bypass direct to the catheterisation laboratory (cath lab) in at least 80% of cases (Ibanez *et al*., 2018). Figure 5.3 shows the ambulance offload location for patients who arrived at a PCI centre directly by ambulance and for patients who were transferred from another hospital to a PCI centre. In 2024, among those who arrived at a PCI centre directly by ambulance, 71% (n=632) were brought directly to the cath lab, bypassing the ED, compared with 75% (n=624) in 2023. Direct arrival at the cath lab may not be possible for valid reasons, such as staff availability outside normal working hours (e.g. where the anticipated arrival time of the patient is sooner than the 30-minute threshold for the on-call staff to arrive on site) or because the cath lab may be occupied (out of hours) by another patient. In such circumstances, it may be safer for the patient to be managed in the ED with nursing, medical care and monitoring prior to transferring to the cath lab. Cases transported to Altnagelvin Area Hospital are accepted if they are stable and can be delivered directly to the cath lab; if not, the patients are stabilised in Letterkenny University Hospital prior to transport to Altnagelvin Area Hospital for primary PCI. The proportion of patients who were transferred from a non-PCI-capable hospital to a PCI centre and brought directly to the cath lab continues to decrease, falling from 95% (n=393) in 2022, to 89% (n=358) in 2023, to 87% (n=353) in 2024.

During 2024, the majority of patients who arrived directly or were transferred to a PCI centre (81%; n=1044/1295) were stable on admission to the PCI centre, compared with 83% in 2023. However, a small proportion of patients (n=75; 6%) were in cardiogenic shock on admission to the PCI centre, and 10% (n=130) had a resuscitated arrest on arrival.[9] For more detailed information on patients' clinical status on arrival at the PCI centre, by hospital, see Appendix 7.

[9] The denominator excludes patients who received thrombolysis and only includes those who arrived directly via ambulance to a PCI centre, or were transferred to a PCI centre (n=1295).



~ Denotes five cases or fewer.

FIGURE 5.3: LOCATION OF AMBULANCE OFFLOAD AT THE PCI CENTRE FOR PATIENTS WHO ARRIVED DIRECTLY BY AMBULANCE TO A PCI CENTRE OR WERE TRANSFERRED FROM A NON-PCI-CAPABLE HOSPITAL, BY PCI CENTRE (n=1295) [10,11,12]

[10] Patients who had thrombolysis were excluded from this analysis.
[11] For patients who were transferred to a non-designated 9.00am to 5.00pm weekday PCI centre: Beaumont Hospital, St Vincent's University Hospital and Tallaght University Hospital were not included individually in Figure 5.3 due to the small number of admissions. However, they are included in the totals for this figure.
[12] Letterkenny University Hospital refers to the Altnagelvin Area Hospital PCI centre, which provides the primary PCI service for Letterkenny University Hospital.

REPERFUSION THERAPY FOR PATIENTS WITH A STEMI

Overall, 1,615 patients with a STEMI were recorded on the Heartbeat portal in 2024, indicating a 13% increase since 2017 (n=1427) (Figure 5.4), which is slightly higher than the population increase during the same period (12%) (Central Statistics Office, 2024). The proportion of patients who received a primary PCI decreased from 86% (n=1232) in 2017 to 77% (n=1251) in 2024 (Figure 5.4), and the proportion of patients who received thrombolysis increased from 3% in 2017 to 7% in 2024. There is notable variation in thrombolysis rates across PCI centres.[13] In St James's Hospital, the thrombolysis rate increased from 9% in 2017 to 14% (n=57) in 2024 (NOCA, 2022). This contrasts with the Mater Misericordiae University Hospital, where fewer than five patients received thrombolysis in both 2017 and 2024, indicating no significant change over time (NOCA, 2022). University Hospital Galway consistently reports higher than average thrombolysis rates, with some fluctuation observed: 11% in 2017, 8% in 2018, and 11% again in 2024. These differences can be partly explained by geographic factors; for example, University Hospital Galway serves a large, predominantly rural catchment area, where thrombolysis remains the more practical reperfusion strategy in many cases. In contrast, St James's Hospital serves a more urban population located closer to the PCI centre, making primary PCI more accessible. The increasing use of thrombolysis in this more urban region suggests evolving referral practices.

Eleven percent (n=176) of patients with a STEMI in 2024 had a contraindication to reperfusion, and 5% (n=75) did not require reperfusion after angiography. The distribution of reperfusion types was similar between sexes (Table 5.1). The proportion of patients who had a contraindication to reperfusion has fluctuated over the years, from 7% in 2020 to 11% (n=176) in 2024. As in previous years, the most common contraindication in 2024 was late (after more than 12 hours) presentation to the hospital (2024: 86% (n=152); 2023: 91%; 2022: 90%). The contraindications recorded for the remaining 14% (n=24) of patients were multifactorial and included resolving symptoms and cases where the patient was too unwell to proceed with reperfusion. A higher proportion of male patients with a STEMI (90%; n=105) were contraindicated as a result of delayed presentation compared with female patients (80%; n=47) (Appendix 7).

Analysis of the timeliness of reperfusion excludes patients with a contraindication to reperfusion therapy. The IHAA dashboard reports on the percentage of eligible patients with a STEMI who received reperfusion.

KQI 1: Percentage of eligible patients with a STEMI who received reperfusion.

TARGET: 95% 2024 RESULT: 95%

[13] Thrombolysis is administered in non-PCI-capable hospitals prior to transfer to the PCI centre.Hospital.

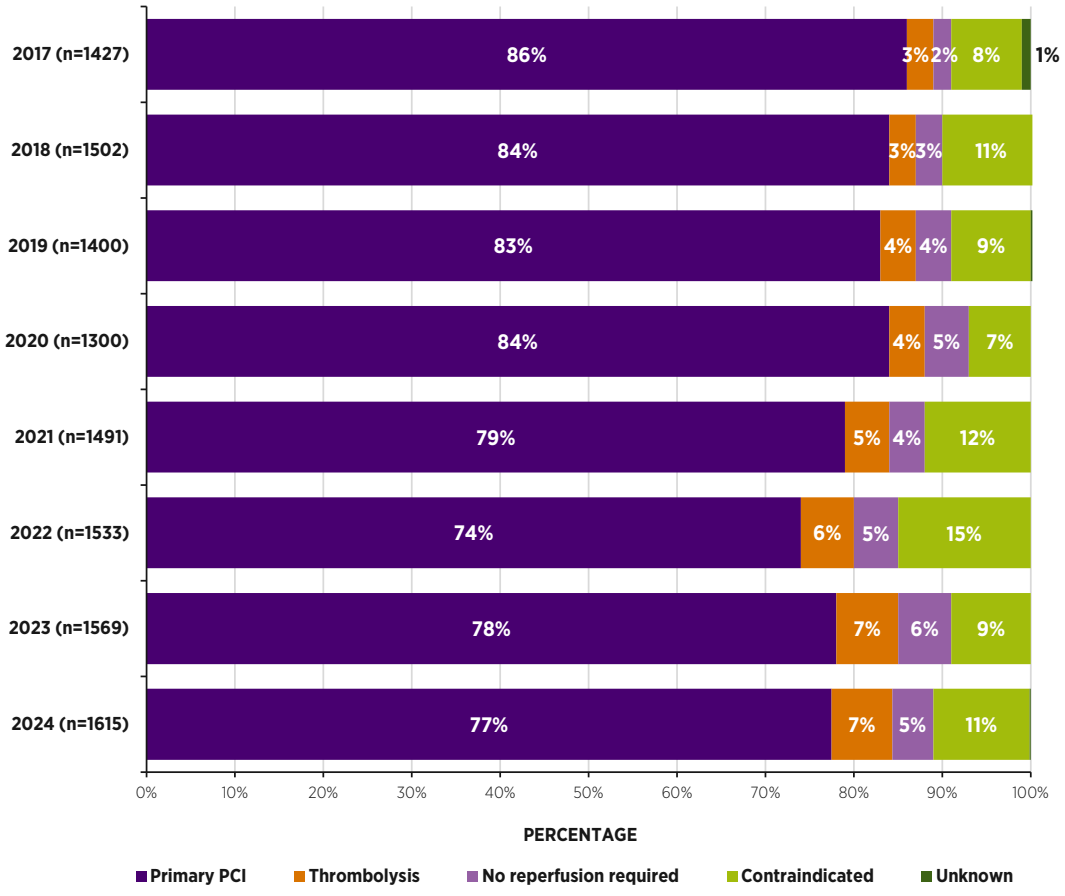


FIGURE 5.4: FIRST REPERFUSION THERAPY TYPE FOR PATIENTS ADMITTED TO A PCI CENTRE WITH A CONFIRMED STEMI, BY YEAR, 2017–2024 (N=11837)

TABLE 5.1: FIRST REPERFUSION THERAPY TYPE FOR PATIENTS ADMITTED TO A PCI CENTRE WITH A CONFIRMED STEMI, BY HOSPITAL AND SEX (N=1615)

		MALE		FEMALE		TOTAL	
		N	%	N	%	N	%
St James's Hospital	Thrombolysis	43	15%	14	13%	57	14%
	Primary PCI	221	76%	80	76%	301	76%
	No reperfusion required	*	*	~	*	11	3%
	Contraindicated	16	6%	9	9%	25	6%
	Unknown	0	0%	0	0%	0	0%
	Total	**289**	**100%**	**105**	**100%**	**394**	**100%**
Mater Misericordiae University Hospital	Thrombolysis	~	*	~	*	~	*
	Primary PCI	223	83%	67	77%	290	82%
	No reperfusion required	10	*	~	*	12	3%
	Contraindicated	32	12%	17	20%	49	14%
	Unknown	~	*	0	0%	~	*
	Total	**268**	**100%**	**87**	**100%**	**355**	**100%**
Cork University Hospital	Thrombolysis	*	*	~	*	19	8%
	Primary PCI	126	70%	44	76%	170	71%
	No reperfusion required	*	*	~	*	14	6%
	Contraindicated	27	15%	8	14%	35	15%
	Unknown	0	0%	0	0%	0	0%
	Total	**180**	**100%**	**58**	**100%**	**238**	**100%**
University Hospital Limerick	Thrombolysis	~	*	~	*	~	*
	Primary PCI	127	87%	34	79%	161	85%
	No reperfusion required	*	*	~	*	8	4%
	Contraindicated	*	*	~	*	17	9%
	Unknown	0	0%	0	0%	0	0%
	Total	**146**	**100%**	**43**	**100%**	**189**	**100%**
University Hospital Galway	Thrombolysis	18	11%	8	14%	26	11%
	Primary PCI	112	65%	34	58%	146	63%
	No reperfusion required	*	*	~	*	21	9%
	Contraindicated	23	13%	14	24%	37	16%
	Unknown	0	0%	0	0%	0	0%
	Total	**171**	**100%**	**59**	**100%**	**230**	**100%**
University Hospital Waterford	Thrombolysis	~	*	0	0%	~	*
	Primary PCI	60	87%	23	96%	83	89%
	No reperfusion required	7	10%	0	0%	7	8%
	Contraindicated	0	0%	0	0%	0	0%
	Unknown	0	0%	~	*	~	*
	Total	**69**	**100%**	**24**	**100%**	**93**	**100%**
Letterkenny University Hospital	Thrombolysis	~	*	0	0%	~	*
	Primary PCI	36	95%	12	92%	48	94%
	No reperfusion required	0	0%	~	*	~	*
	Contraindicated	~	*	0	0%	~	*
	Unknown	0	0%	0	0%	0	0%
	Total	**38**	**100%**	**13**	**100%**	**51**	**100%**
Beaumont Hospital†	Thrombolysis	0	0%	0	0%	0	0%
	Primary PCI	22	100%	6	100%	28	100%
	No reperfusion required	0	0%	0	0%	0	0%
	Contraindicated	0	0%	0	0%	0	0%
	Unknown	0	0%	0	0%	0	0%
	Total	**22**	**100%**	**6**	**100%**	**28**	**100%**
Tallaght University Hospital†	Thrombolysis	0	0%	0	0%	0	0%
	Primary PCI	*	*	~	*	8	44%
	No reperfusion required	0	0%	0	0%	0	0%
	Contraindicated	~	*	~	*	10	56%
	Unknown	0	0%	0	0%	0	0%
	Total	**11**	**100%**	**7**	**100%**	**18**	**100%**
St Vincent's University Hospital†	Thrombolysis	0	0%	0	0%	0	0%
	Primary PCI	*	*	~	*	16	84%
	No reperfusion required	~	*	0	0%	~	*
	Contraindicated	~	*	~	*	~	*
	Unknown	0	0%	0	0%	0	0%
	Total	**14**	**100%**	**~**	*****	**19**	**100%**
National total	Thrombolysis	84	7%	27	7%	111	7%
	Primary PCI	945	78%	306	75%	1251	77%
	No reperfusion required	61	5%	14	3%	75	5%
	Contraindicated	117	10%	59	14%	176	11%
	Unknown	~	*	~	*	~	*
	Total	**1208**	**100%**	**407**	**100%**	**1615**	**100%**

† Non-designated 9.00am to 5.00pm, Monday to Friday PCI centre.
~ Denotes five cases or fewer.
* Further suppression required in order to prevent disclosure of five cases or fewer.

REPERFUSION THERAPY TYPE BY REFERRAL SOURCE

How a patient accesses care initially may influence the type of reperfusion therapy they receive. If a patient self-presents with a STEMI to a non-PCI-capable hospital, and if an inter-hospital transfer cannot be achieved in a timely fashion, the patient should be treated with thrombolysis and subsequently transferred to a PCI centre (sometimes called a pharmaco-invasive strategy or the 'drip-and-ship' strategy). In this scenario, the optimal reperfusion service (ORS) protocol recommends administration of thrombolysis within 30 minutes of diagnosis of a STEMI. If a patient can be transferred to a PCI centre (for primary PCI) in 90 minutes or less, the 2023 ESC acute coronary syndromes guideline (Byrne *et al*., 2023) recommends that the time between arrival at the first hospital and departure to a PCI centre should be within 30 minutes. This is known as the 'door in door out' (DIDO) time.

The type of reperfusion therapy by referral source is displayed in Figure 5.5. Among patients with a STEMI who arrived directly at a PCI centre in 2024, the vast majority (n=936, 87%) had a primary PCI; this is consistent with the 86% reported in 2023. Among patients who initially presented to non-PCI-capable hospitals, 57% (n=292) were transferred to a PCI centre for primary PCI, while 21% (n=107) of patients had thrombolysis as their initial reperfusion strategy.

Similar to previous years, Cork University Hospital, St James's Hospital and University Hospital Galway had more than 30% of patients thrombolysed prior to transfer, compared with less than 10% in the other PCI centres. This could reflect longer travel distance or improved adherence to the ORS protocol, and greater clinician experience and comfort in administering thrombolysis in non-PCI-capable hospital EDs.

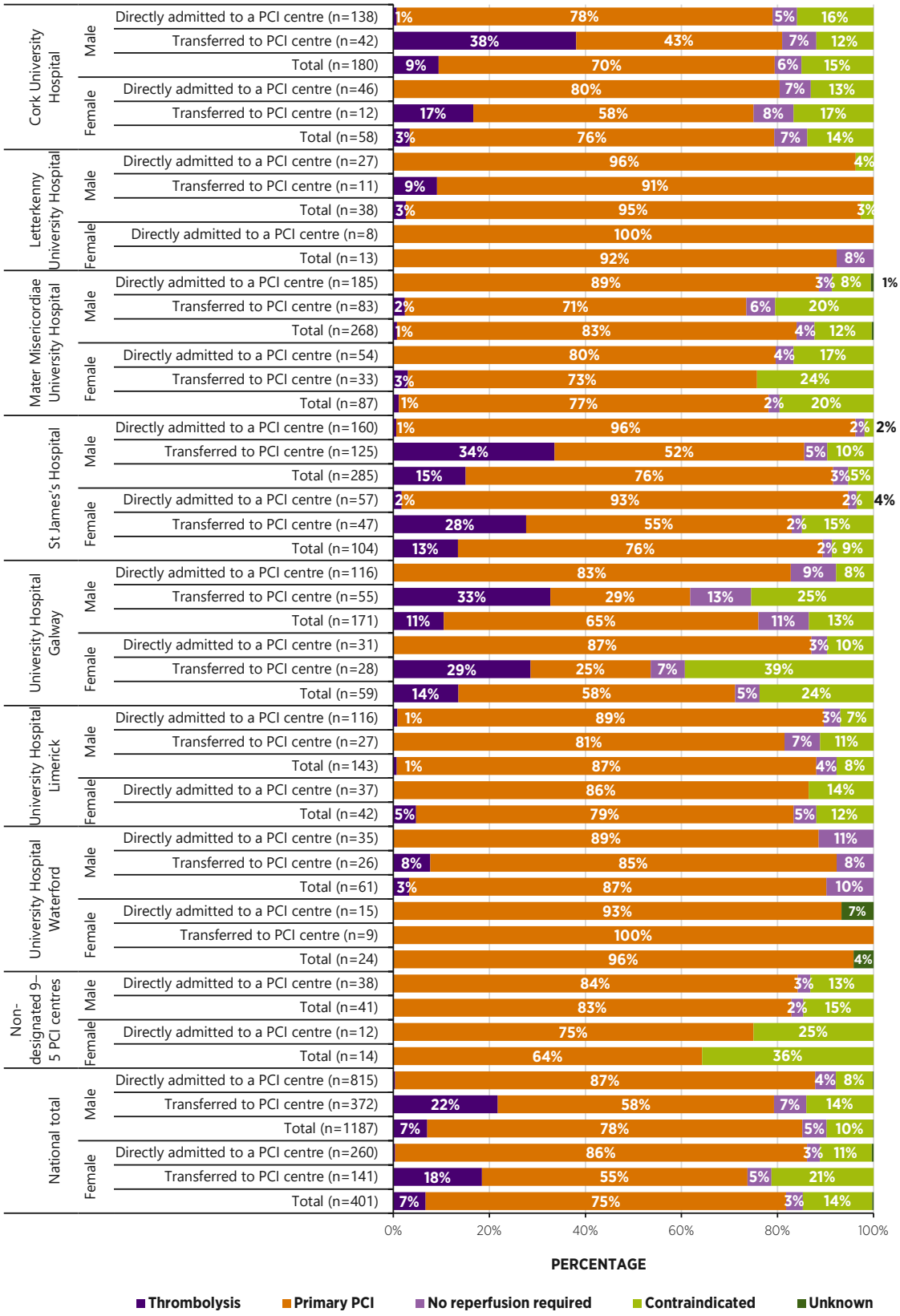


FIGURE 5.5: REPERFUSION THERAPY TYPE, BY REFERRAL SOURCE, PCI CENTRE AND SEX (N=1588)[14]

[14] Directly admitted to a PCI centre' includes patients who arrived at the PCI centre directly via ambulance, those who were already inpatients in a PCI centre, and patients who self-presented to a PCI centre. Non-designated 9.00am to 5.00pm weekday PCI centres include Beaumont Hospital, St Vincent's University Hospital and Tallaght University Hospital. Data on reperfusion therapy type for these hospitals are included in the corresponding frequency table in Appendix 5.

ARTERIAL ACCESS

Primary PCI requires arterial access, which carries an inherent risk of vascular injury or bleeding complications. Bleeding complications are associated with a higher risk of future recurrent ischaemic events and with higher mortality. Traditionally, PCI procedures were performed via a femoral artery approach. The ESC guidelines for STEMI management now recommend access using the radial artery approach for all patients undergoing a PCI procedure (Ibanez *et al*., 2018). This enables early mobilisation and reduces the risk of vascular and bleeding complications, and is associated with a reduction in mortality, based on the clear clinical advantages demonstrated in several large-scale clinical trials of radial versus femoral arterial access. Figure 5.6 displays the proportion of patients who received each type of arterial access in each PCI centre in 2024. During the reporting period, the majority of patients (n=1161, 93%) received primary PCI through radial access. Although the 2024 results remain consistent with 2023 (94%), nationally they remain slightly below the 95% KQI 4 target. The type of arterial access varied slightly between hospitals, with two primary PCI centres (Letterkenny University Hospital and University Hospital Limerick) and two non-designated 9.00am to 5.00pm PCI centres (Beaumont Hospital and Tallaght University Hospital) reaching the 95% KQI 4 target in 2024.

KQI 4: Percentage of patients with a STEMI who had radial access for primary PCI

TARGET: 95% 2024 RESULT: 93%

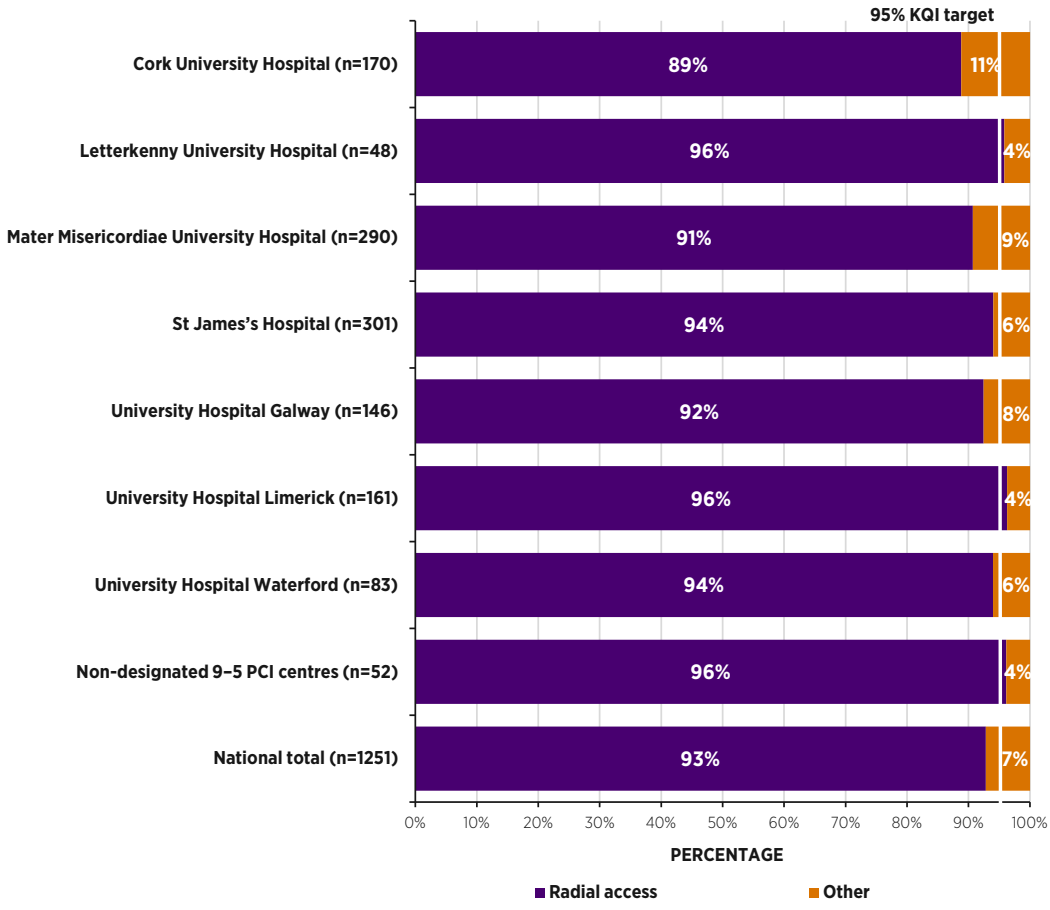


FIGURE 5.6: TYPE OF ARTERIAL ACCESS, BY PCI CENTRE (n=1251) [15,16]

[15] Figure 5.6 includes only patients who were not contraindicated and had a primary PCI performed.
[16] Non-designated 9.00am to 5.00pm weekday PCI centres include Beaumont Hospital, St Vincent's University Hospital and Tallaght University Hospital.

KEY TIME INTERVALS TO TIMELY REPERFUSION

This report presents key time intervals to timely reperfusion for three cohorts of patients with a STEMI:

1. patients with a STEMI who arrived directly by ambulance to a primary PCI centre
2. patients with a STEMI who self-presented to a PCI centre
3. patients with a STEMI who initially presented to a non-PCI-capable hospital and were transferred by ambulance to a PCI centre.

DEFINING TIMELY REPERFUSION

Timely primary PCI is recognised internationally as the preferred treatment for a STEMI (Byrne *et al*., 2023). Where primary PCI cannot be delivered within a clinically acceptable time frame, thrombolysis is recommended, with early transfer to a PCI centre for angiography (HSE, 2012). Table 5.2 displays definitions for timely thrombolysis and timely primary PCI. The *Acute Coronary Syndromes Programme Model of Care* (HSE, 2012) has an agreed target that 90% of patients with a STEMI (who do not have a contraindication to reperfusion) should receive timely reperfusion. The ESC acute coronary syndromes guideline (Byrne *et al*., 2023) recommends the analysis of the cohort of patients who self-present to PCI centres as a distinct group and to increase the door to balloon (DTB) time to 60 minutes in order to facilitate the initial assessment and diagnosis in the PCI centre's ED.

TABLE 5.2: DEFINITION OF TIMELY THROMBOLYSIS AND TIMELY PRIMARY PCI

Timely thrombolysis	Timely thrombolysis is defined as an interval between the first medical contact (FMC) and initiation of thrombolysis (often known as the door to needle time) of 30 minutes or less (HSE, 2012; Hamm *et al*., 2011). For thrombolysis given in hospital, the FMC is defined as the time of arrival at the first hospital, except for inpatients, where the FMC is defined as the time of the first diagnostic electrocardiogram (ECG).
Timely primary PCI	Timely primary PCI is defined as an interval between the FMC and balloon/wire cross of 120 minutes or less (Byrne et *al*., 2023; HSE, 2012). The FMC is defined as the time of the first diagnostic ECG. For those who self-present to PCI centres, timely primary PCI is defined as the time between arrival at the PCI centre and balloon/wire cross being 60 minutes or less (Byrne *et al*., 2023).

TIMELY THROMBOLYSIS

There are two key time intervals to timely reperfusion with thrombolysis:

1. **Door to ECG within 10 minutes:** In order to achieve timely reperfusion with thrombolysis, the ESC acute coronary syndromes guideline (Byrne *et al*., 2023) recommends that all patients with symptoms of a STEMI should have an ECG within 10 minutes of arrival at hospital.

2. **Door to needle within 30 minutes:** Timely reperfusion with thrombolysis is considered to have been achieved when the interval between the time of arrival at the hospital and the time of initiation of thrombolysis is 30 minutes or less.

TIMELY PRIMARY PCI

For all patients with a STEMI who arrive at a PCI centre by ambulance (either directly or transferred), there are three key time intervals to timely reperfusion with primary PCI (Figure 5.7):

1. **FMC to door within 90 minutes:** In order to meet the timely primary PCI target of 120 minutes or less, the time from FMC to arrival at the PCI centre, known as FMC to door (FMCTD), should be within 90 minutes.

2. **DTB within 30 minutes:** In order to meet the timely primary PCI target of 120 minutes or less, the time between arrival at the PCI centre (door) and the time of reperfusion (balloon/wire cross) should be within 30 minutes. This is referred to as the DTB time.

3. **FMC to balloon within 120 minutes:** Timely primary PCI is considered to have been achieved when the time between FMC and balloon/wire cross is 120 minutes or less (Byrne et al., 2023; HSE, 2012). This is known as FMC to balloon (FMCTB).

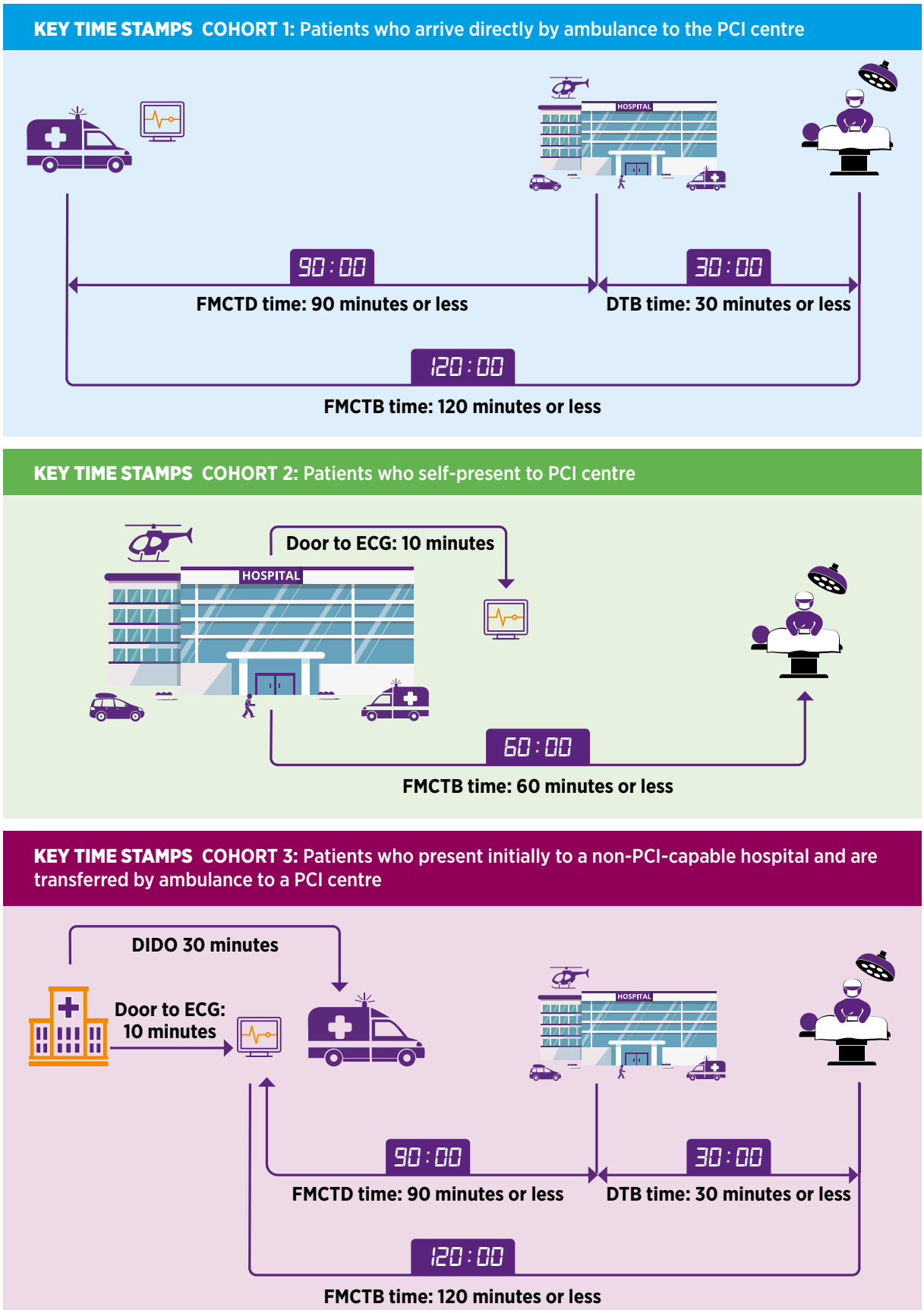


FIGURE 5.7: TIME INTERVAL GOALS

For patients with a STEMI who self-present to a PCI centre, there are two key time intervals to timely reperfusion with primary PCI:

1. **Door to ECG within 10 minutes:** All patients with symptoms of a STEMI should have an ECG within 10 minutes of arrival at hospital.
2. **FMCTB within 60 minutes:** The time of FMC for patients who self-present to a PCI centre is the time of arrival at the PCI centre. Timely primary PCI is considered to have been achieved when the time between FMC and balloon/wire cross is 60 minutes or less (Byrne *et al.*, 2023).

For those who initially present to a non-PCI-capable hospital and are transferred by ambulance to a PCI centre, there are five key time intervals to timely reperfusion with primary PCI:

1. **Door to ECG within 10 minutes:** All patients with symptoms of a STEMI should have an ECG within 10 minutes of arrival at hospital.
2. **DIDO within 30 minutes:** All patients with a STEMI who require urgent transfer from a non-PCI-capable hospital to a PCI centre should achieve a DIDO[17] time of 30 minutes or less.
3. **FMC to door of PCI centre within 90 minutes:** In order to meet the timely primary PCI target of 120 minutes or less, the time from FMC to arrival at the PCI centre (known as FMCTD) should be within 90 minutes.
4. **Door of PCI centre to balloon within 30 minutes:** In order to meet the timely primary PCI target of 120 minutes or less, the time between arrival at the PCI centre (door) and the time of reperfusion (balloon/wire cross) should be within 30 minutes. This is referred to as the DTB time.
5. **FMCTB within 120 minutes:** Timely primary PCI is considered to have been achieved when the time between FMC in the first hospital and balloon/wire cross is 120 minutes or less (Byrne *et al.*, 2023; HSE, 2012). This is known as FMCTB.

All time interval data for 2024 are presented in Figures 5.8–5.19, and timely reperfusion trends by year and by sex are summarised in Tables 5.3–5.5 and Figure 5.20.

[17] This is the interval between the time of arrival at the first hospital and the time of leaving the first hospital.

KEY TIME INTERVALS TO TIMELY REPERFUSION BY PRIMARY PCI FOR THOSE WHO ARRIVED DIRECTLY BY AMBULANCE TO A PCI CENTRE

FIRST MEDICAL CONTACT TO DOOR

For patients with a STEMI who arrived directly by ambulance to a primary PCI centre, the time of FMC is defined as the time of the first positive ECG performed by an ambulance practitioner. Figure 5.8 shows the proportion of patients with a STEMI in 2024 who arrived at the PCI centre within the target of 90 minutes or less, by PCI centre. In 2024, 76% (n=575) of patients achieved a timely FMCTD time; this was a slight reduction from 79% in 2023. The median FMCTD time for all patients who arrived at a PCI centre directly by ambulance in 2024 was 62 minutes (interquartile range (IQR): 41–88 minutes), an increase from 58 minutes (IQR: 39–83 minutes) in 2022 and 2023.

The median FMCTD time for all patients who arrived directly at a PCI centre by ambulance was 62 minutes

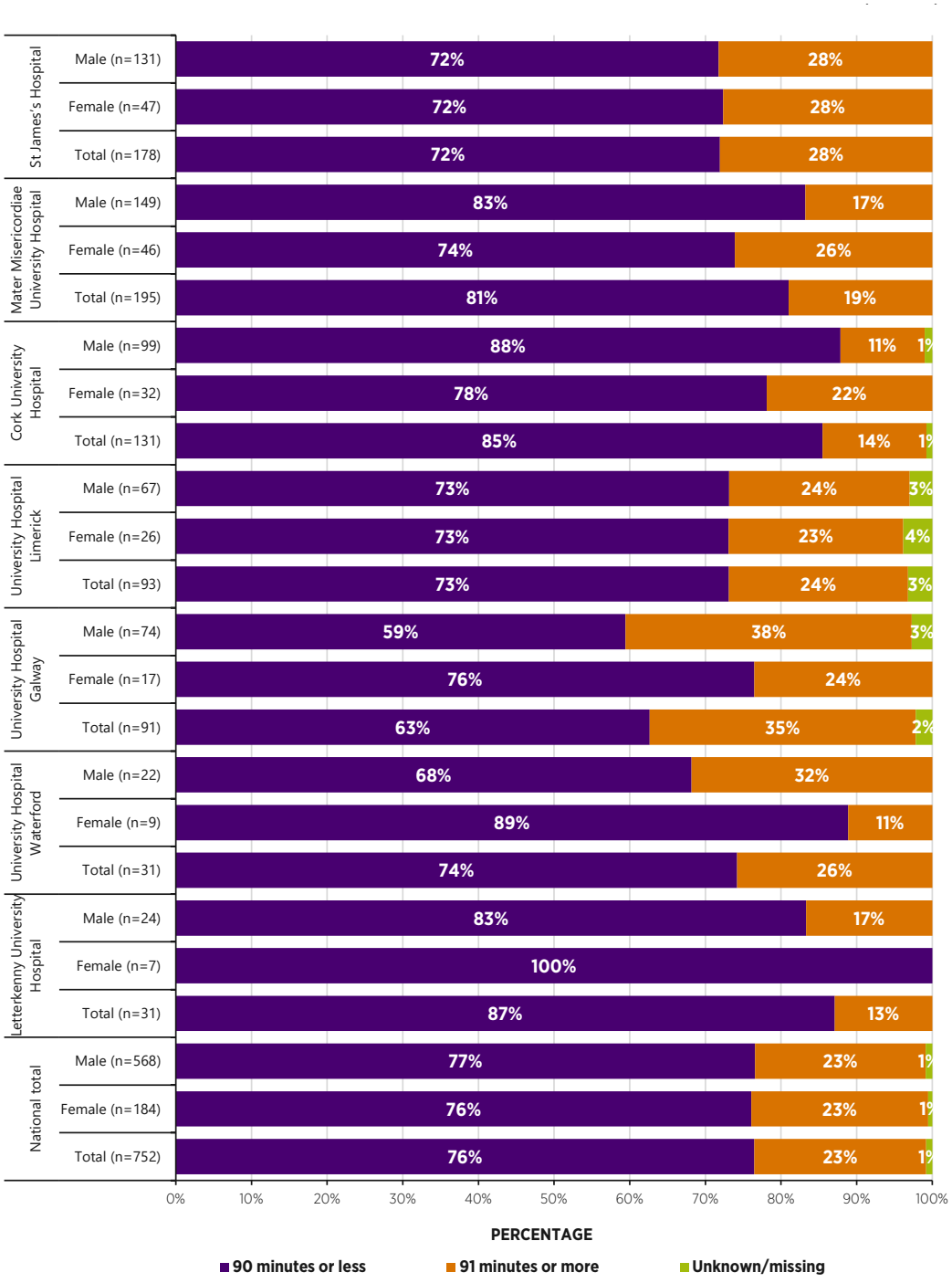


FIGURE 5.8: PROPORTION OF PATIENTS WITH A STEMI WHO ARRIVED AT A PCI CENTRE DIRECTLY BY AMBULANCE WITHIN THE TARGET TIME OF 90 MINUTES, BY PCI CENTRE (n=752)[18,19]

[18] Beaumont Hospital, St Vincent's University Hospital and Tallaght University Hospital are not presented individually in Figure 5.8, as they had fewer than five patients each, but they are included in the national figure.

[19] Patients who had hospital or pre-hospital thrombolysis were excluded from Figure 5.8. Only patients who had their first 12-lead ECG performed by an ambulance practitioner were included in the analysis.

DOOR TO BALLOON

In 2024, of those patients who arrived directly by ambulance to a PCI centre, 55% (n=449) achieved a DTB time of 30 minutes or less; this was consistent with 53% in 2022, and represents an increase from 49% in 2023. However, the DTB results for those who were admitted directly to a PCI centre in 2024 are not directly comparable to previous reports, as in prior years the directly admitted cohort also included self-presenting patients.

There was variation between PCI centres in achieving a DTB time of 30 minutes or less, ranging from 70% (n=135) in the Mater Misericordiae University Hospital to 35% (n=44) in Cork University Hospital (Figure 5.9).

This variation warrants further attention within each PCI centre in order to try to understand and identify delays/local factors contributing to the variation. None of the non-designated 9.00am to 5.00pm weekday PCI centres achieved a DTB time of 30 minutes or less in 2024.

The median DTB time for patients admitted directly to a PCI centre was 29 minutes (IQR: 19–46 minutes) in 2024. Frequency tables in Appendix 5 display the median DTB times and IQRs for each of the PCI centres.

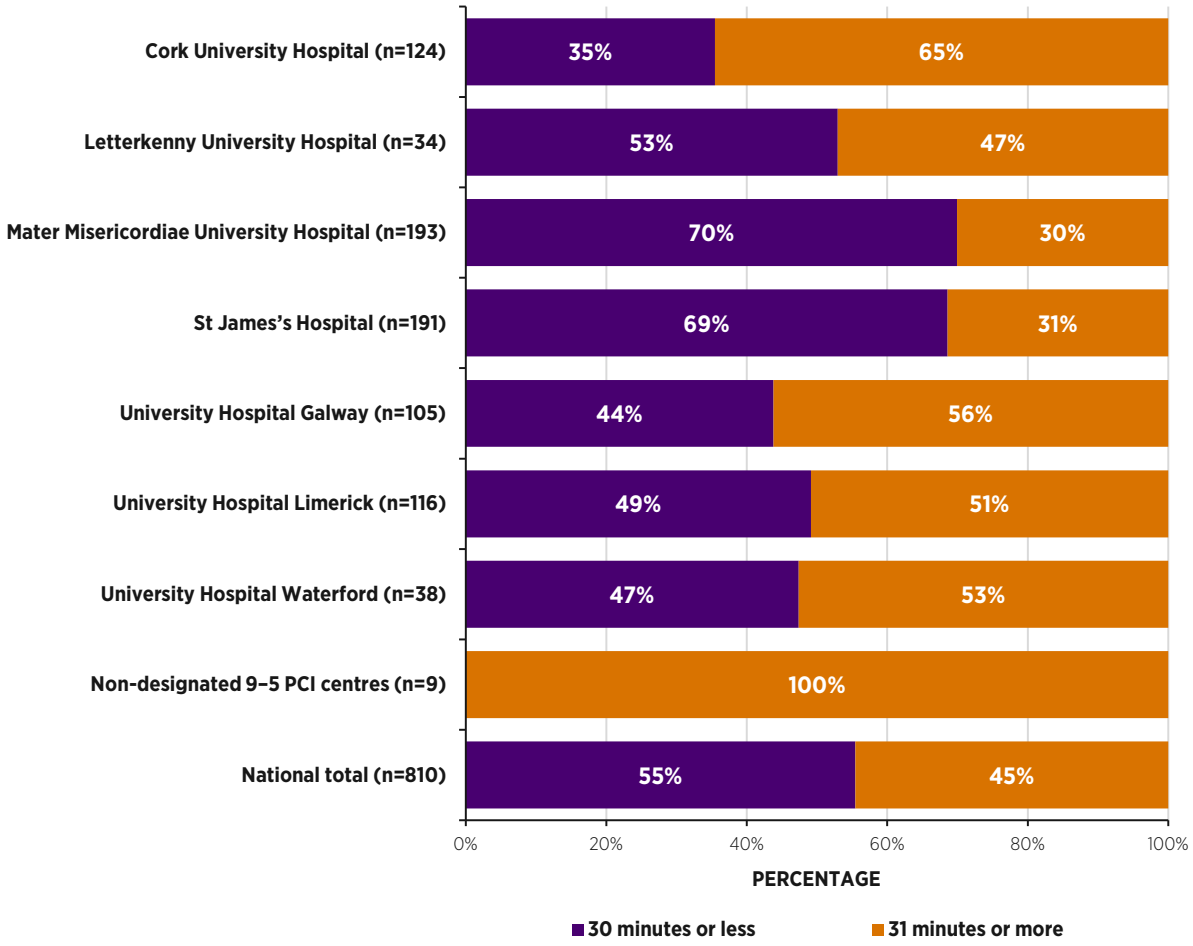


FIGURE 5.9: DOOR TO BALLOON TIME FOR PATIENTS WHO ARRIVED DIRECTLY BY AMBULANCE TO A PCI CENTRE, BY PCI CENTRE (n=810) [20,21]

[20] Non-designated 9.00am to 5.00pm weekday PCI centres include Beaumont Hospital, St Vincent's University Hospital and Tallaght University Hospital. DTB times for these hospitals are included in the corresponding frequency table in Appendix 5.
[21] Directly admitted to a PCI centre' includes patients who arrived at a PCI centre directly via ambulance and those who were inpatients in a PCI centre.

TIMELY PRIMARY PCI: FMCTB

Seventy-seven percent (n=622) of patients with a STEMI who were admitted directly to a PCI centre in 2024 had timely reperfusion, which is a decrease from 79% in 2023 (Figure 5.10). The median FMCTB time for patients admitted directly to a PCI centre in 2024 was 95 minutes (IQR: 72–120 minutes).

KQI 2: Percentage of patients with a STEMI who were brought directly to a primary PCI centre who had timely primary PCI

TARGET: 90% 2024 RESULT: 77%

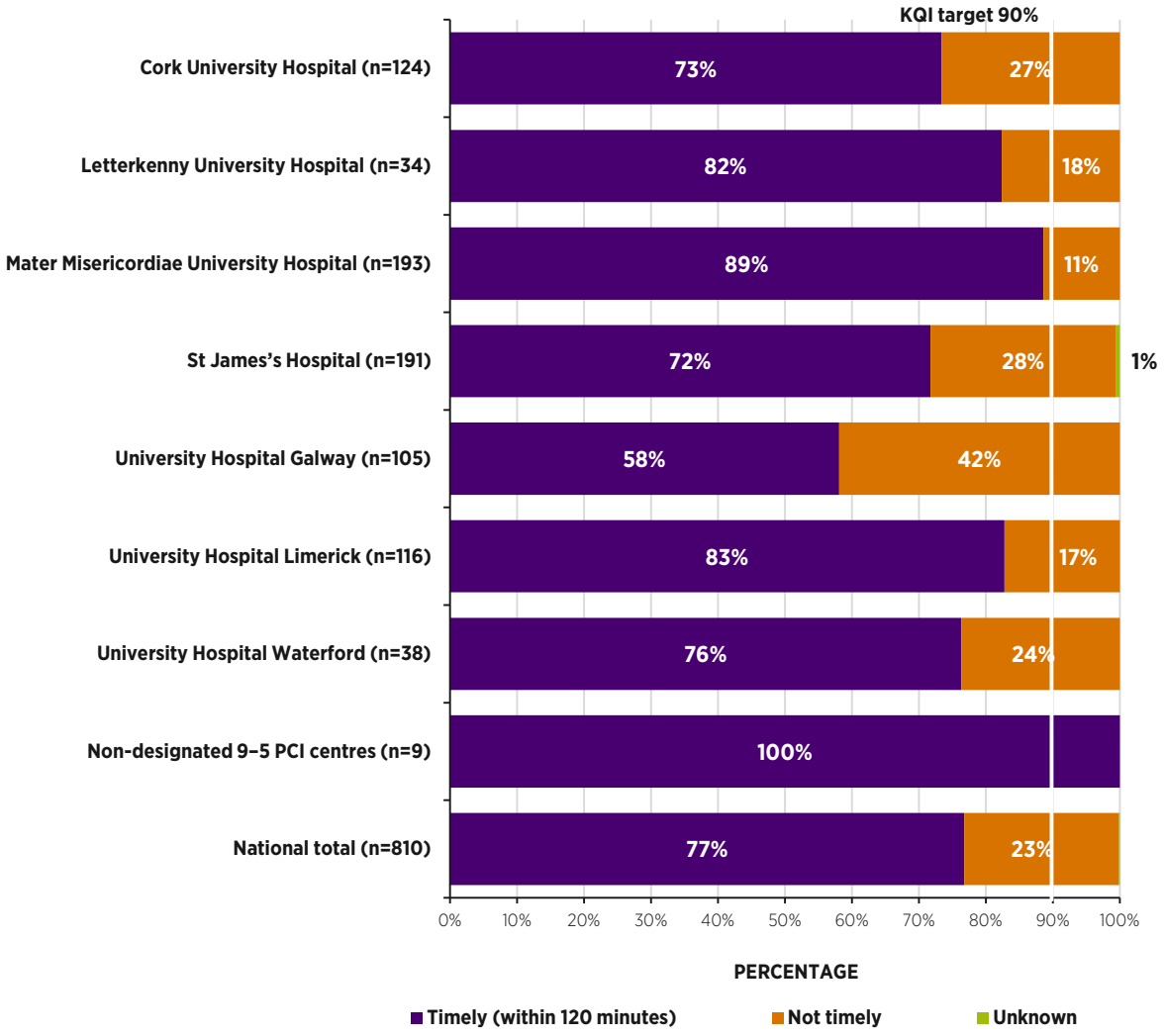


FIGURE 5.10: PROPORTION OF PATIENTS WHO RECEIVED TIMELY PRIMARY PCI FOR THOSE ADMITTED DIRECTLY TO A PCI CENTRE, BY PCI CENTRE (n=810) [22,23]

[22] Directly admitted to a PCI centre' includes patients who arrived at a PCI centre directly via ambulance and those who were inpatients in a PCI centre (n=19).
[23] Non-designated 9.00am to 5.00pm weekday PCI centres include Beaumont Hospital, St Vincent's University Hospital and Tallaght University Hospital. Data on timeliness for these hospitals are included in the corresponding frequency table in Appendix 5.

KEY TIME INTERVALS TO TIMELY REPERFUSION BY PRIMARY PCI FOR THOSE WHO SELF-PRESENTED TO A PCI CENTRE

Timely primary PCI is considered to have been achieved for patients who self-present to a PCI centre when the FMCTB time is 60 minutes or less (Byrne *et al*., 2023).

HOSPITAL ARRIVAL TO FIRST POSITIVE ECG

Reducing the time to ECG is a key opportunity to improve the speed of reperfusion delivery. Figure 5.11 presents the interval between the time of hospital arrival to the first positive ECG[24] for patients who self-presented to a PCI centre and had their first positive ECG performed in the ED. We recommend caution in the interpretation of time to first positive ECG, as the time to first positive ECG is different from the time to first ECG performance. This is important, as some patients may develop ECG changes over time with ongoing chest pain after arrival at hospital.

The median time to first positive ECG for those who self-presented to a PCI centre was 15 minutes (IQR: 8-30 minutes)

In 2024, 149 patients with a STEMI self-presented to a PCI centre and had the first positive ECG in the ED. Of those, 35% (n=52) had their first positive ECG within 10 minutes of arrival. The median time to first positive ECG for this cohort was 15 minutes (IQR: 8–30 minutes).

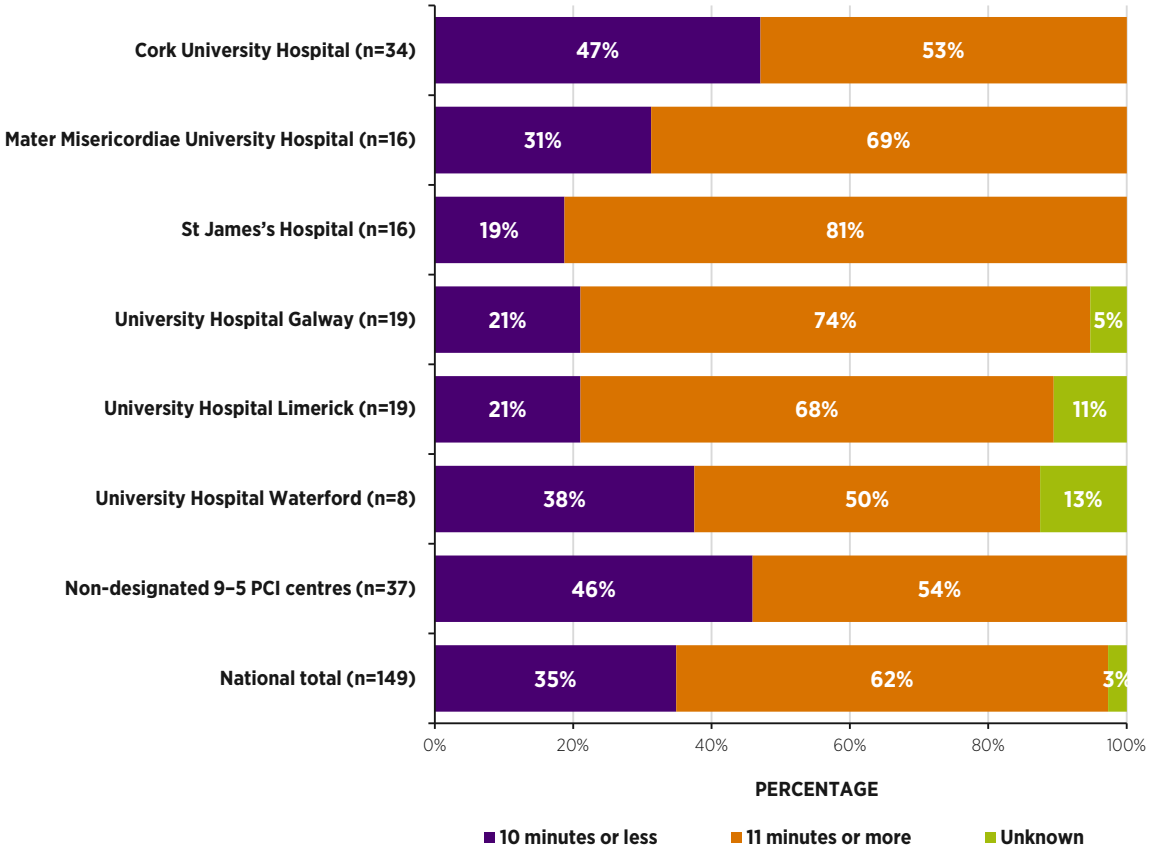


FIGURE 5.11: PROPORTION OF PATIENTS WITH A STEMI WHO SELF-PRESENTED TO A PCI CENTRE AND WHO RECEIVED AN ELECTROCARDIOGRAM WITHIN 10 MINUTES, BY PCI CENTRE, 2024 (n=149)

[24] Heartbeat has always recorded and reported the time of the first positive ECG. Following a recommendation made in the *Irish Heart Attack Audit National Report 2022 and 2023* (NOCA, 2024b), Heartbeat now records the date and time of the first ECG. Reporting of this time stamp will begin when reporting on 2025 data.

TIMELY REPERFUSION BY PRIMARY PCI FOR THOSE WHO SELF-PRESENTED TO A PCI CENTRE

Thirty percent (n=38) of patients with a STEMI who self-presented to a PCI centre in 2024 had timely primary PCI (Figure 5.12). The median FMCTB time for this cohort was 84 minutes (IQR: 54–144 minutes).

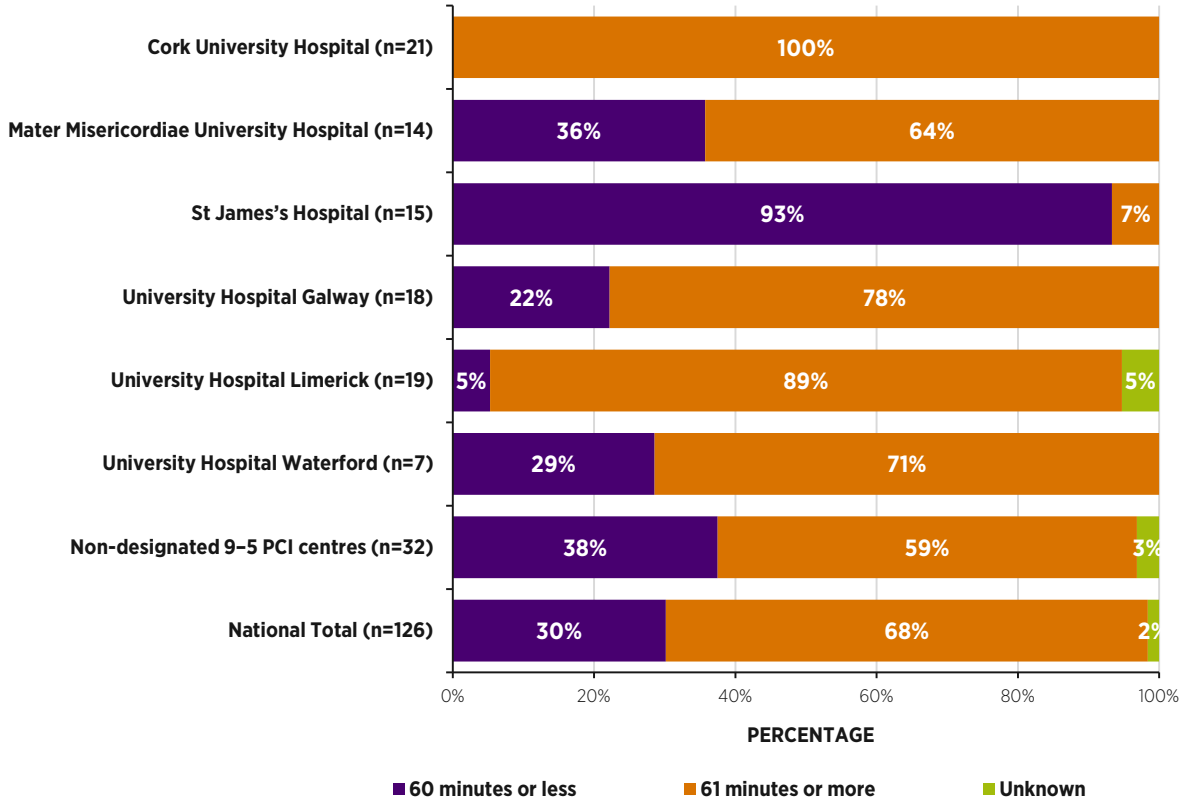


FIGURE 5.12: PROPORTION OF TIMELY PRIMARY PCI FOR PATIENTS WHO SELF-PRESENTED TO A PCI CENTRE, BY PCI CENTRE (n=126)[25]

[25] Non-designated 9.00am to 5.00pm weekday PCI centres include Beaumont Hospital, St Vincent's University Hospital and Tallaght University Hospital. Data on timeliness for these hospitals are included in the corresponding frequency table in Appendix 5.

KEY TIME INTERVALS TO TIMELY REPERFUSION FOR THOSE WHO INITIALLY PRESENTED TO A NON-PCI-CAPABLE HOSPITAL AND TRANSFERRED BY AMBULANCE TO A PCI CENTRE

TIME FROM HOSPITAL ARRIVAL TO FIRST POSITIVE ECG FOR ALL PATIENTS WHO HAD A STEMI DIAGNOSED IN THE ED OF A NON-PCI-CAPABLE HOSPITAL

The majority (n=388, 80%) of patients with a STEMI in 2024 who were initially treated at non-PCI-capable hospitals self-presented to the ED, where the first diagnostic ECG was performed. The results presented in Figure 5.13 reflect the interval between the time of hospital arrival and the first positive ECG for patients who had their first positive ECG performed in the ED and were then transferred to a PCI centre. We recommend caution in the interpretation of time to first positive ECG data, as the time to first positive ECG is different from the time to first ECG performance. This is important, as some patients may develop ECG changes over time with ongoing chest pain after arrival at hospital.

The median time to first positive ECG was 21 minutes for those who initially presented to a non-PCI-capable hospital (IQR: 9-52 minutes)

In 2024, 388 patients with a STEMI had the first positive ECG in the ED and were transferred to a PCI centre for further treatment. Twenty-eight percent (n=110) received the first positive ECG within 10 minutes of arrival to the hospital (Figure 5.13). The median time to first positive ECG for this cohort was 21 minutes (IQR: 9–52 minutes).

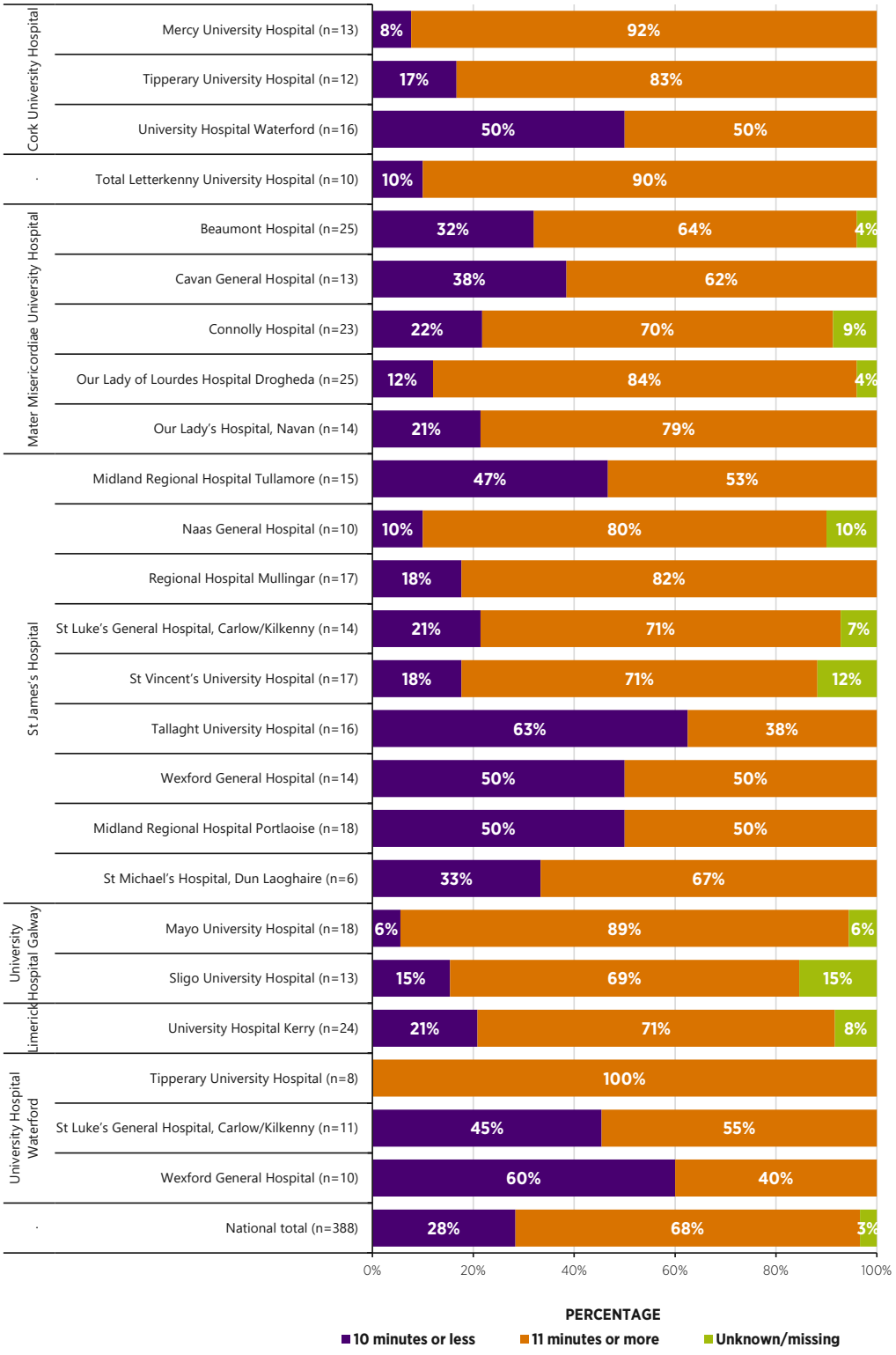


FIGURE 5.13: PROPORTION OF PATIENTS WITH A STEMI WHO WERE TRANSFERRED TO A PCI CENTRE AND WHO RECEIVED AN ELECTROCARDIOGRAM WITHIN 10 MINUTES, BY PCI CENTRE AND REFERRING HOSPITAL (n=388)[26,27]

[26] These cases represent all those who had the first positive ECG in the ED, for cases who had primary PCI or thrombolysis.
[27] Hospitals that had fewer than five patients were excluded individually from Figure 5.13; however, they are included in the total figures, and in the corresponding frequency table (Appendix 5).

KEY TIME INTERVALS TO TIMELY REPERFUSION BY THROMBOLYSIS FOR THOSE WHO INITIALLY PRESENTED TO A NON-PCI-CAPABLE HOSPITAL AND TRANSFERRED BY AMBULANCE TO A PCI CENTRE

TIME FROM HOSPITAL ARRIVAL TO FIRST POSITIVE ECG

In 2024, there were 77 cases who had a STEMI diagnosed in the ED and received thrombolysis. Of those, 38% (n=29) had the ECG completed within 10 minutes.

TIMELINESS OF THROMBOLYSIS THERAPY

The number of patients with a STEMI who were treated with thrombolysis has shown a consistent annual increase, from 81 cases in 2021 to 85 in 2022, 108 in 2023, and 111 in 2024. This may reflect a greater focus on the delivery of thrombolysis for patients who cannot be transferred for primary PCI in a timely manner.

The number of patients with a STEMI who were treated with thrombolysis was 111 in 2024

Of all patients who received thrombolysis as their first reperfusion strategy in 2024, only 22% (n=24) received timely thrombolysis (Figure 5.14), similar to 21% (n=23) in 2023.[28]

Improving the timeliness of thrombolysis was a recommendation in the *Irish Heart Attack Audit National Report 2021* (NOCA, 2023a). A national quality improvement project (developed by the National Heart Programme in conjunction with the HSE National Quality and Patient Safety Directorate, the National Ambulance Service, the Royal College of Physicians of Ireland, and the Irish Heart Attack Audit (IHAA)) is under way and, among other goals, it aims to improve access to timely thrombolysis as part of a pharmaco-invasive reperfusion strategy where timely access to primary PCI is either not feasible or unavailable.

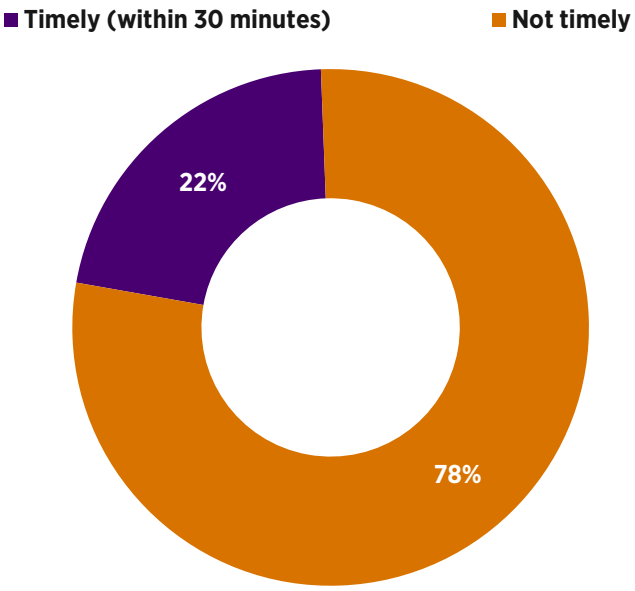


FIGURE 5.14: PROPORTION OF PATIENTS WHO RECEIVED TIMELY REPERFUSION WITH THROMBOLYSIS (n=111)[29]

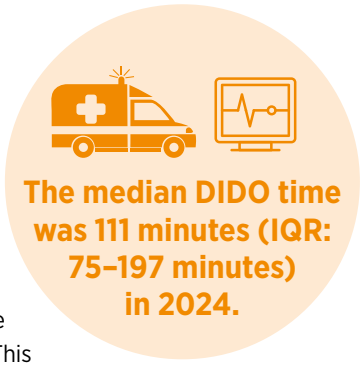
[28] Data quality has improved over time: in 2022, 5% of patients were missing a recorded or accurate date and time, which decreased to 3% in 2023. By 2024, all patients who received thrombolysis had complete date and time documentation.
[29] Hospitals that had fewer than five patients were excluded individually from Figure 5.14; however, they are included in the total figures, and in the corresponding frequency tables.

KEY TIME INTERVALS TO TIMELY REPERFUSION BY PRIMARY PCI FOR THOSE WHO INITIALLY PRESENTED TO A NON-PCI-CAPABLE HOSPITAL AND TRANSFERRED BY AMBULANCE TO A PCI CENTRE

TIME FROM HOSPITAL ARRIVAL TO FIRST POSITIVE ECG

Figure 5.13 presents the time from hospital arrival to first positive ECG for all patients who presented to a non-PCI-capable hospital and had the ECG performed in the ED. In 2024, there were 227 cases who had a STEMI diagnosed in the ED of a non-PCI-capable hospital and received primary PCI. Of those, 29% (n=65) had the ECG completed within 10 minutes.

DOOR IN DOOR OUT TIME



The interval between the time of hospital arrival and the first positive ECG is the first step in the pathway to timely primary PCI (Figure 5.13). The second recommendation for patients with a STEMI who present to a non-PCI-capable hospital, and who require urgent transfer to a PCI centre for primary PCI, is that they should achieve a DIDO time of 30 minutes or less.

In 2024, 405 patients with a STEMI were transferred from a non-PCI-capable hospital to a PCI centre with the intention to treat them with primary PCI. In this analysis, the DIDO time is reported on cases transferred from the ED (n=370) in the first hospital. This includes cases where the first positive ECG was diagnosed in the ED (n=311) and those diagnosed before arrival at the first hospital, either in the ambulance (n=53) or in a general practitioner (GP) surgery (n=6). Of the remaining cases, 12 had the first positive ECG in a hospital ward or coronary care unit, and 23 cases had the STEMI diagnosed while they were already an inpatient in the hospital (either in a general ward or a coronary care unit/high dependency unit); these cases are excluded from this analysis.

The median DIDO time was 111 minutes (IQR: 75–197 minutes) in 2024. Figure 5.15 shows that in 2024, only 3% (n=12) of patients with a STEMI achieved the DIDO target of 30 minutes or less; this was consistent with 4% in 2023. The median DIDO time for those who were diagnosed with a STEMI before arrival at the first hospital was 103 minutes (n=50; IQR: 52–143 minutes), and for those diagnosed in the ED, it was 113 minutes (n=295; IQR: 76–218 minutes).

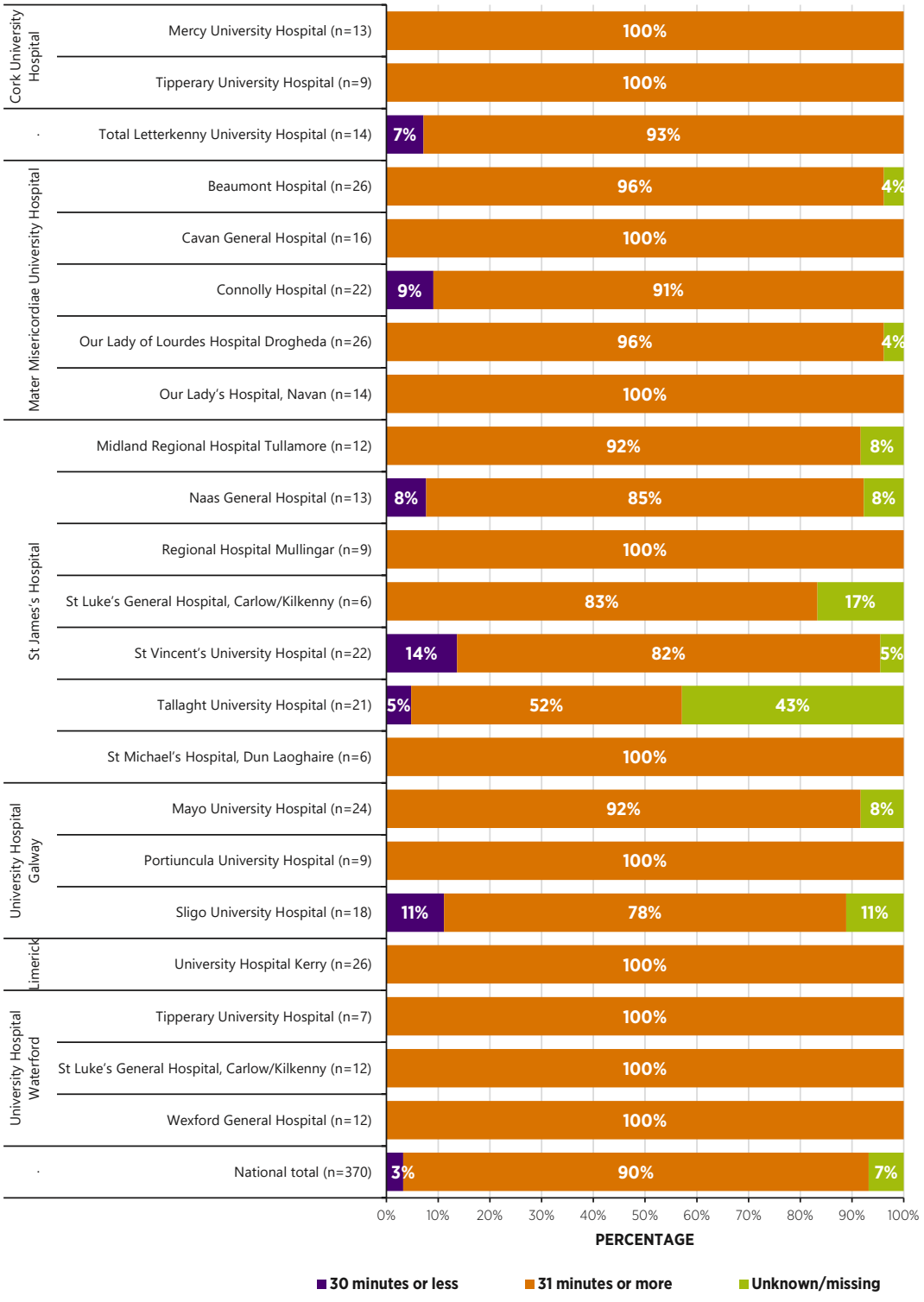


FIGURE 5.15: PROPORTION OF PATIENTS WITH A STEMI WHO WERE TRANSFERRED TO A PCI CENTRE AND WHO ACHIEVED THE 'DOOR IN DOOR OUT' TARGET OF 30 MINUTES OR LESS, BY PCI CENTRE AND REFERRING HOSPITAL (n=370)[30]

[30] Hospitals that had fewer than five patients were excluded individually from Figure 5.15.

FIRST MEDICAL CONTACT TO DOOR - TRANSFERRED

In 2024, 26% (n=106) of patients with a STEMI were transferred from the first hospital of arrival to a PCI centre within 90 minutes (Figure 5.16); this was a decline from 33% in 2023. The median FMCTD time for patients with a STEMI who were transferred to a PCI centre for primary PCI was 126 minutes (IQR: 88–192 minutes) in 2024, an increase from 114 minutes (IQR: 82–179 minutes) in 2023.

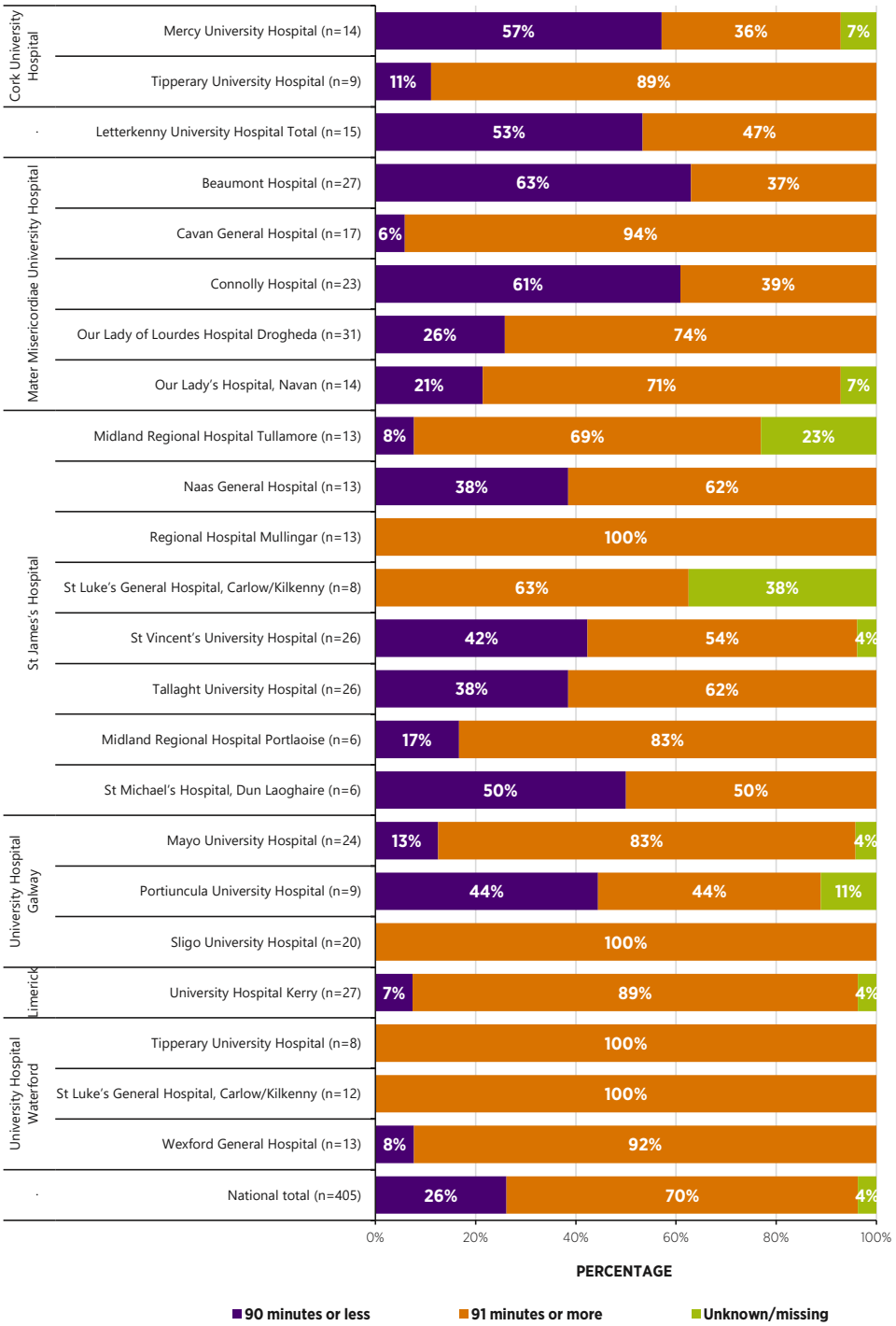


FIGURE 5.16: PROPORTION OF PATIENTS WITH A STEMI WHO WERE TRANSFERRED TO A PCI CENTRE AND WHO ARRIVED WITHIN THE TARGET TIME OF 90 MINUTES, BY PCI CENTRE (n=405)[31]

[31] Non-designated 9.00am to 5.00pm PCI centres and hospitals that had five cases or fewer were excluded individually from Figure 5.16.

DOOR TO BALLOON TIME - TRANSFERRED

In 2024, of patients who were transferred to a PCI centre, 63% (n=184) achieved a DTB time of 30 minutes or less; this represented a decline from 67% in 2023.

There was variation between PCI centres in achieving a DTB time of 30 minutes or less, ranging from 80% (n=66) in the Mater Misericordiae University Hospital to 42% (n=13) in University Hospital Waterford. The median DTB time for those who were transferred to a PCI centre in 2024 was 26 minutes (IQR: 18–38 minutes).

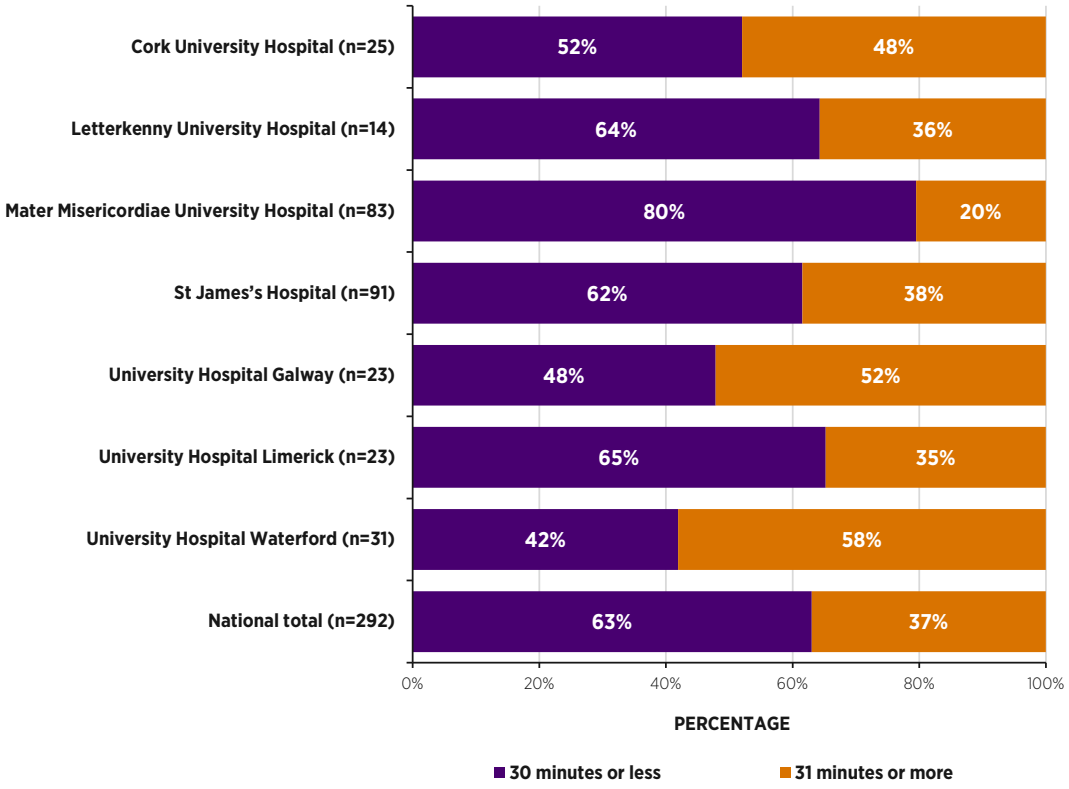


FIGURE 5.17: DOOR TO BALLOON TIME FOR PATIENTS WHO WERE TRANSFERRED TO A PCI CENTRE, BY PCI CENTRE (n=292) [32, 33]

[32] Non-designated 9.00am to 5.00pm weekday PCI centres include Beaumont Hospital, St Vincent's University Hospital and Tallaght University Hospital. DTB times for these hospitals are included in the corresponding frequency table in Appendix 5.
[33] Hospitals that had five patients or fewer were excluded individually from Figure 5.17.

TIMELY REPERFUSION BY PRIMARY PCI: TRANSFERRED

Patients who were transferred to a PCI centre from another hospital in 2024 achieved timely primary PCI in 30% of cases (n=89), which is a notable decline from 45% in 2023. The median FMCTB time for transferred patients in 2024 was 146 minutes (IQR: 113–202 minutes).

Figure 5.18 displays the timeliness of primary PCI, by PCI centre and referring hospital, for 2024. Due to the small number of patients in individual hospitals, caution should be applied when interpreting these results.

KQI 3: Percentage of patients with a STEMI who were transferred from a non-primary-PCI-capable hospital to a primary PCI centre who had timely primary PCI

TARGET: 90% 2024 RESULT: 30%

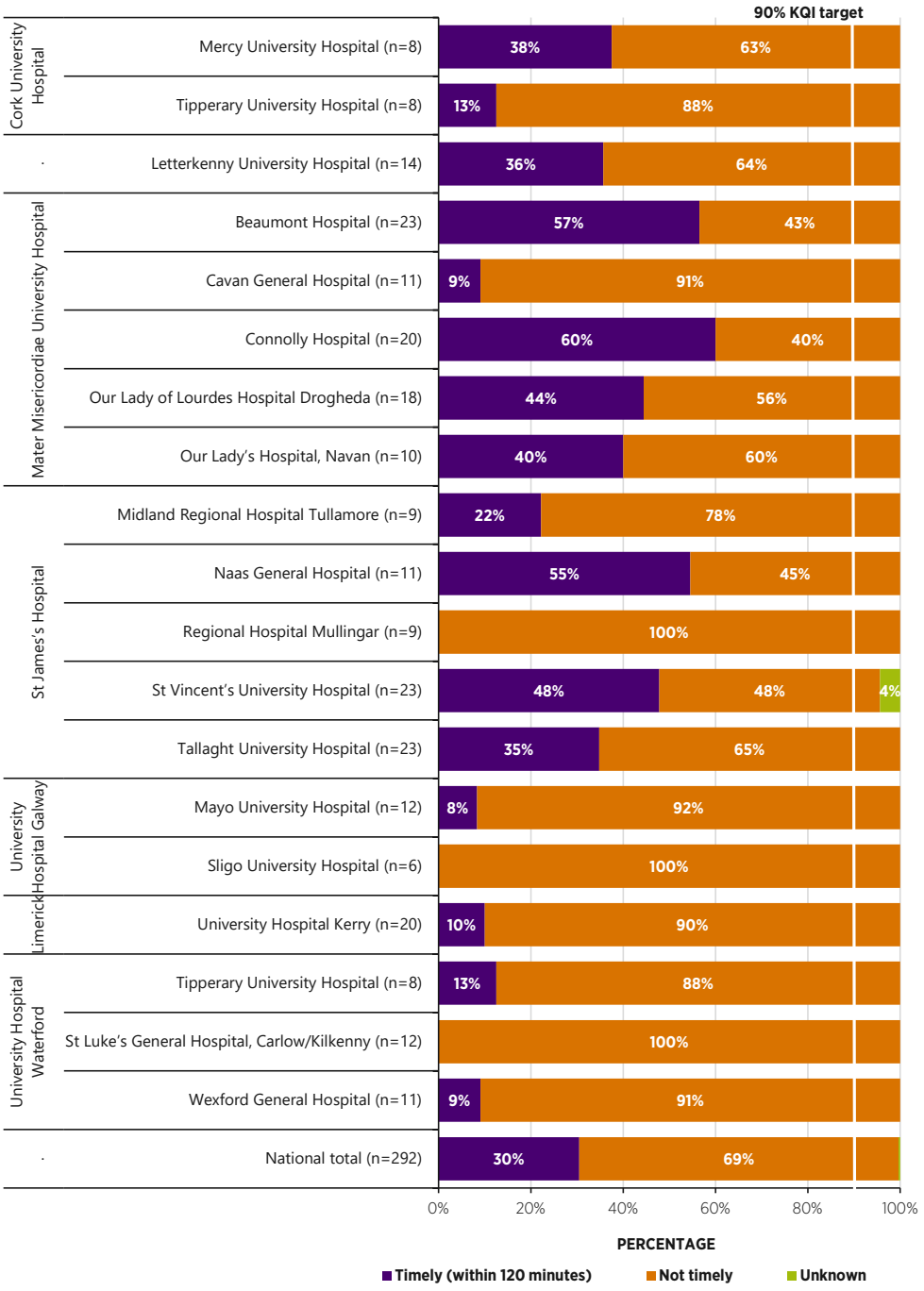


FIGURE 5.18: PROPORTION OF PATIENTS WHO WERE TRANSFERRED TO A PCI CENTRE WHO RECEIVED TIMELY PRIMARY PCI, BY REFERRING HOSPITAL (n=292)[34]

[34] Data on timeliness for these hospitals are included in the corresponding frequency table in Appendix 5. Data on timeliness for hospitals that had five cases or fewer are not presented in Figure 5.18.

TIMELINESS OF THROMBOLYSIS AND PRIMARY PCI FOR THOSE TRANSFERRED TO A PCI CENTRE

Figure 5.19 displays the proportion of patients who were transferred to a PCI centre who received timely reperfusion with either primary PCI or thrombolysis in 2024. In total, only 28% (n=113) received a timely reperfusion.

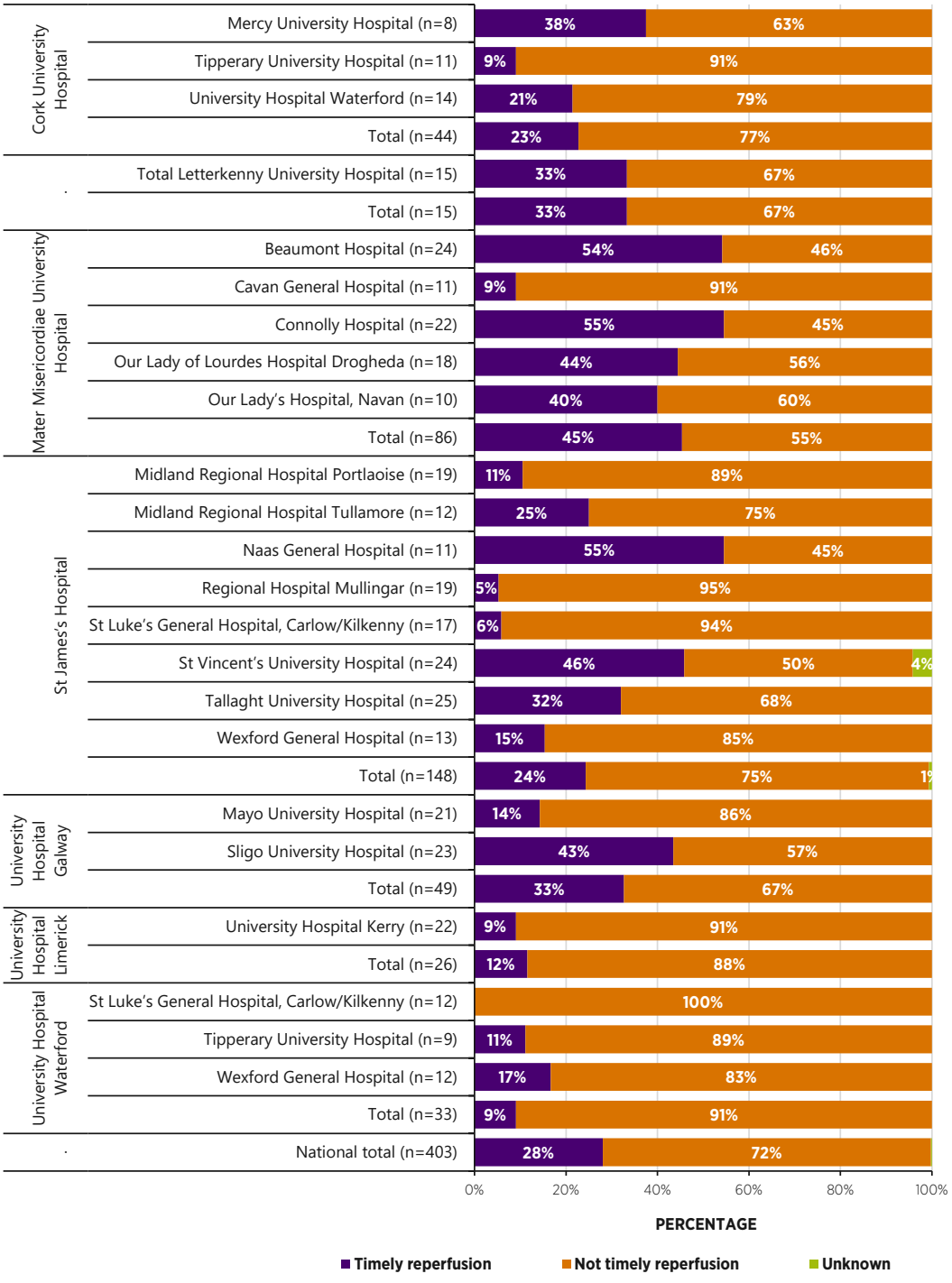


FIGURE 5.19: PROPORTION OF PATIENTS WHO WERE TRANSFERRED TO A PCI CENTRE WHO RECEIVED TIMELY REPERFUSION, BY REFERRING HOSPITAL (n=403)[35]

[35] Reperfusion timeliness includes both patients who received thrombolysis (with a target timeliness of 30 minutes) and those who received primary PCI (with a target timeliness of 120 minutes).

SUMMARY AND TRENDS OF REPERFUSION

In 2024, among patients with a STEMI who received reperfusion therapy, the majority (n=1228, 92%) received primary PCI and 8% (n=111) received thrombolysis as the primary reperfusion strategy. However, only 58% (n=773) of patients received timely reperfusion, continuing the downward trend since 2017, when 67% of patients received timely treatment (Table 5.4).

TIMELINESS OF PRIMARY PCI

In 2024, 61% of patients received timely primary PCI.

The proportion of patients who received timely primary PCI has seen a steady decline, from 68% in 2017 to 61% in 2024 (Table 5.4), which is associated with an increase in the FMCTB time from 97 minutes (IQR: 68–126 minutes) in 2017 to 104 minutes (IQR: 76–138 minutes) in 2024 (Table 5.5).

As highlighted in previous IHAA reports (NOCA, 2024b; 2023a), the method by which a patient accesses the PCI centre affects their likelihood of receiving timely primary PCI. For patients who arrived directly at a PCI centre (including those who arrived directly via ambulance and those who were already inpatients in the PCI centre), the proportion who received timely primary PCI was 77% in 2024, with a median FMCTB time of 95 minutes (IQR: 72–120 minutes), which is within the 120-minute KQI target. For those who self-presented to a PCI centre, the proportion who received timely primary PCI was 30%, with a median FMCTB time of 84 minutes (IQR: 54–144 minutes), which is higher than the 60-minute KQI target; for patients who were transferred to a PCI centre, the proportion who received timely primary PCI was also 30%, with a median FMCTB time of 146 minutes (IQR: 113–202 minutes). Figure 5.20 shows the downward trend in timeliness of primary PCI for all methods of arrival to a PCI centre from 2017 to 2024.

In 2024, variation between the sexes was apparent, with males receiving timely primary PCI in 62% (n=573) of cases, compared with 58% (n=176) of females (Table 5.3).

TIMELINESS OF THROMBOLYSIS

The proportion of patients who received timely thrombolysis has also seen a steady decline, from 44% in 2017 to 22% in 2024 (Table 5.4; Figure 5.20). This is associated with an increase in the median door to needle time for patients who had thrombolysis from 40 minutes (IQR: 23–84 minutes) in 2017 to 53 minutes (IQR: 32–89 minutes) in 2024, which is higher than the recommended 30-minute target.

TABLE 5.3: TIMELY REPERFUSION, MEDIAN AND INTERQUARTILE RANGE, BY REPERFUSION TYPE, REFERRAL SOURCE AND SEX, (n=1339)[36]

		Number of patients	Proportion receiving timely reperfusion	Median (h:mm)	IQR 1 (h:mm)	IQR 3 (h:mm)
Male	All timely referfusion	1011	59%			
	Timely primary PCI	927	62%	01:43	01:14	02.16
	Timely primary PCI: directly admitted	613	77%	01:34	01:10	01:59
	Timely primary PCI: self-presented	100	28%	01:23	00:54	02:17
	Timely primary PCI: transferred to a PCI centre	214	33%	02:25	01:50	03:20
	Thrombolysis	84	24%	00:50	00:31	01:21
Female	All timely referfusion	328	55%			
	Timely primary PCI	301	58%	01:47	01:23	02.29
	Timely primary PCI: directly admitted	197	75%	01:40	01:18	02:00
	Timely primary PCI: self-presented	26	38%	01:21	00:41	02:45
	Timely primary PCI: transferred to a PCI centre	78	24%	02:28	02:00	03:33
	Thrombolysis	27	15%	01:00	00:37	02:27
Total	All timely referfusion	1339	58%			
	Timely primary PCI	1228	61%	01:44	01:16	02.18
	Timely primary PCI: directly admitted	810	77%	01:35	01:12	02:00
	Timely primary PCI: self-presented	126	30%	01:23	00:53	02:23
	Timely primary PCI: transferred to a PCI centre	292	30%	02:26	01:53	03:22
	Thrombolysis	111	22%	00:53	00:32	01:29

h:mm - hour(s):minute(s)

[36] Timeliness is presented according to patient pathway: 120 minutes for primary PCI for direct admission by ambulance or transfer from another hospital; 60 minutes for self-presentation to a PCI centre; and 30 minutes for those who received thrombolysis.

TABLE 5.4: PROPORTION OF PATIENTS WHO RECEIVED TIMELY REPERFUSION, BY REPERFUSION TYPE, REFERRAL SOURCE AND YEAR, 2017–2024

	All timely reperfusion	All primary PCI admitted to a PCI centre	Primary PCI directly admitted to a PCI centre	Primary PCI self-presented to a PCI centre	Primary PCI transferred to a PCI centre	Thrombolysis
2017	67% (833/1240)	68%	81%	39%	43%	44%
2018	65% (825/1272)	66%	79%	37%	42%	41%
2019	67% (789/1174)	69%	82%	46%	45%	30%
2020	69% (766/1117)	70%	80%	38%	49%	40%
2021	64% (783/1228)	67%	81%	22%	41%	25%
2022	60% (721/1199)	62%	78%	25%	39%	29%
2023	61% (799/1305)	65%	79%	25%	45%	21%
2024	58% (773/1339)	61%	77%	30%	30%	22%

TABLE 5.5: MEDIAN TIME TO REPERFUSION, BY REPERFUSION TYPE, REFERRAL SOURCE AND YEAR, 2017–2024

	All timely reperfusion	All primary PCI admitted to a PCI centre	Primary PCI directly admitted to a PCI centre	Primary PCI self-presented to a PCI centre	Primary PCI transferred to a PCI centre	Thrombolysis
	minutes (IQR)	minutes (IQR)	minutes (IQR)	minutes (IQR)	minutes (IQR)	minutes (IQR)
2017	96 (67-126)	96 (68-126)	87 (64-114)	79 (30-131)	126 (99-175)	40 (23-84)
2018	94 (66-129)	96 (69-129)	85 (64-116)	79 (34-120)	129 (103-181)	39 (24-64)
2019	93 (67-122)	95 (68-124)	85 (67-112)	68 (32-108)	127 (100-170)	47 (29-89)
2020	92 (67-122)	95 (69-124)	88 (67-114)	75 (32-125)	121 (94-174)	38.5 (21-60)
2021	96 (69-126)	97 (72-127)	90 (68-114)	86 (63-123)	135 (103-185)	55 (31-93)
2022	98 (71-135)	102 (75-138)	90 (70-117)	96 (61-164.5)	138 (106-193)	50 (25-77)
2023	97 (70-129)	100 (74-132)	88 (69-114)	100 (64-147)	129 (103-196)	52 (32-89)
2024	101 (72-136)	104 (76-138)	95 (72-120)	84 (54-144)	146 (113-202)	53 (32-89)

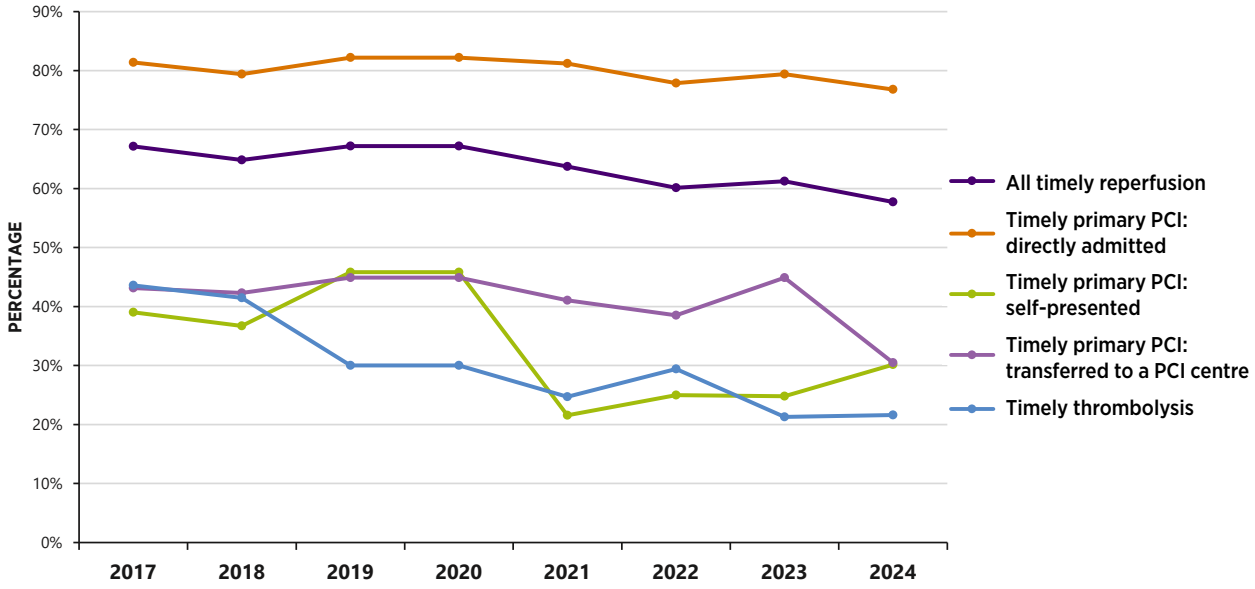


FIGURE 5.20: PROPORTION OF TIMELY REPERFUSION, BY REPERFUSION TYPE, REFERRAL SOURCE AND YEAR, 2017–2024

OPPORTUNITY FOR FURTHER QUALITY IMPROVEMENT

Three modifiable time stamps identified in this chapter highlight clear opportunities for improvement.

The first one of these modifiable time stamps relates to delays in obtaining a prompt ECG. As shown in Figures 5.11 and 5.13, the proportion of patients who received an ECG within 10 minutes in 2024 is suboptimal. Only 35% of patients who self-presented to a PCI centre met this target in 2024, and the rate is even lower, at just 28%, for those who self-presented to a non-PCI-capable hospital.

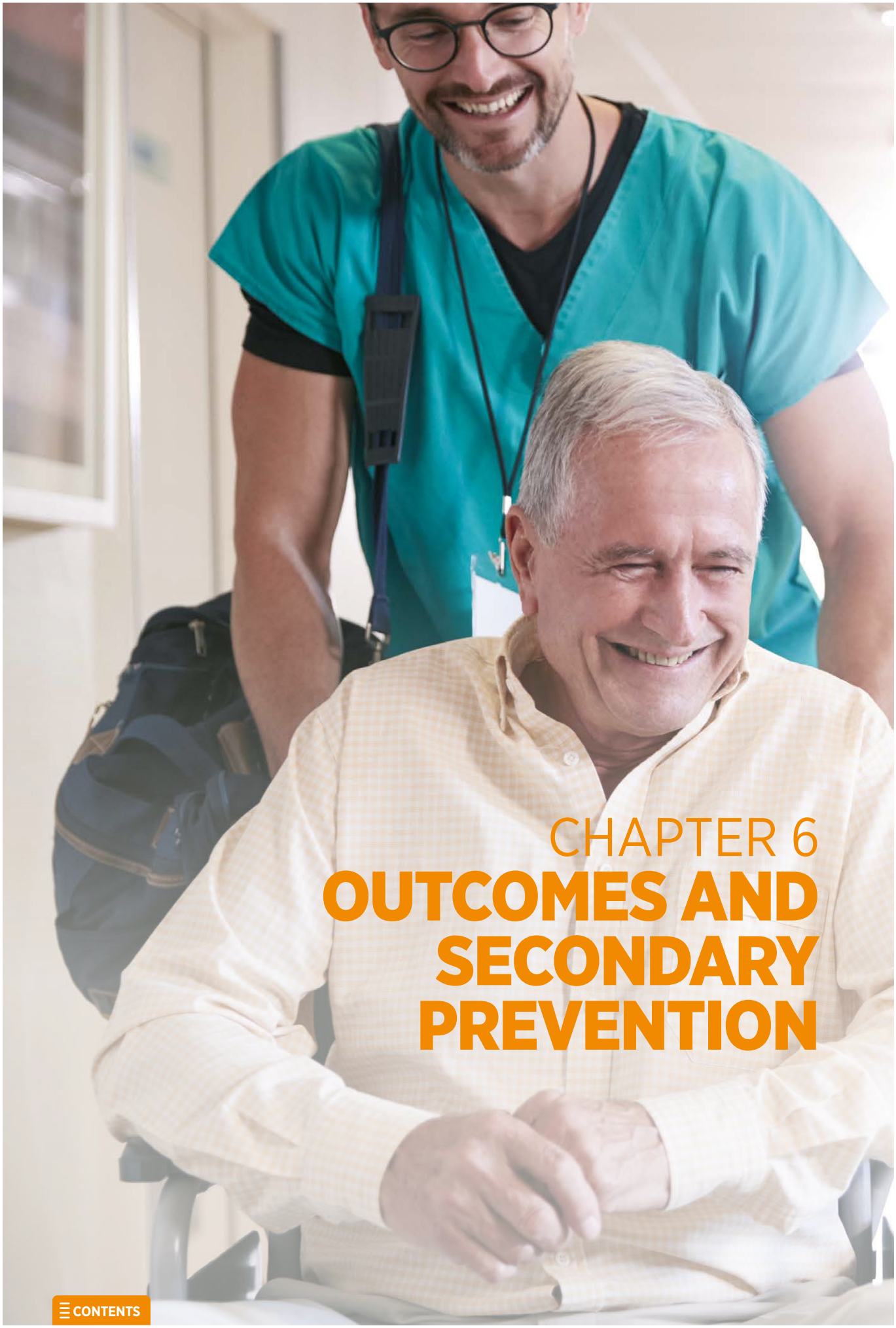
The second time stamp relates to delays in achieving a DIDO time of 30 minutes or less for those who initially present to a non-PCI-capable hospital and are transferred by ambulance to a PCI centre. Figure 5.15 indicates that the 30-minute DIDO target was achieved in only 3% (n=11) of cases in 2024.

With regard to the third time stamp, the recommended DTB target of 30 minutes to achieve timely primary PCI once the patient has arrived at a PCI centre was only achieved for 55% of patients who presented directly to a PCI centre (Figure 5.9) and for 63% of patients who were transferred to a PCI centre (Figure 5.17) in 2024. Longer transfer times allow the catheterisation laboratory (cath lab) team sufficient time to arrive on site prior to the patient's arrival compared with patients who arrive directly to a PCI centre, whereas rapid ambulance transfer, especially in urban areas, may mean that the patient arrives before the clinical team.

All PCI centres and referring hospitals should work together as PCI networks as recommended in the *Acute Coronary Syndromes Programme Model of Care* (HSE, 2012), monitor their results, and implement quality improvement strategies in order to ensure that patients receive optimal care.

KEY FINDINGS FROM CHAPTER 5

- Only 45% of patients who arrived directly by ambulance to a PCI centre called for help within 60 minutes of symptom onset in 2024.
- Primary PCI was performed in 87% of patients who presented directly to a PCI centre, compared with 57% (n=292) of those who initially presented to a non-PCI-capable hospital.
- Seventy-six percent of patients who arrived directly by ambulance to a PCI centre in 2024 met the 90-minute FMCTD target, compared with only 26% of those who were transferred from another hospital.
- The proportion of patients receiving an ECG within 10 minutes of arrival at hospital is suboptimal. Only 35% of patients who self-presented to a PCI centre in 2024 met this target, and the rate is even lower, at just 28%, for those who self-presented to a non-PCI-capable hospital.
- The DIDO time of 30 minutes or less, which is the recommended goal for patients who initially present to a non-PCI-capable hospital, was achieved in only 3% of cases in 2024.
- In 2024, the DTB target of 30 minutes or less that is recommended to achieve timely primary PCI was achieved in 55% of patients who presented directly to a PCI centre and in 63% of patients who were transferred to a PCI centre.
- The proportion of patients who received timely primary PCI has seen a steady decline, from 68% in 2017 to 61% in 2024.
- The proportion of patients who received timely thrombolysis has seen a steady decline, from 44% in 2017 to 22% in 2024.



CHAPTER 6

OUTCOMES AND SECONDARY PREVENTION

CONTENTS

CHAPTER 6: OUTCOMES AND SECONDARY PREVENTION

SCOPE OF CHAPTER 6

This chapter presents the outcomes of care and key treatments aimed at the secondary prevention of further cardiovascular events for patients with a STEMI recorded on Heartbeat in 2024. References to the years 2022 and 2023 refer to the results reported in the *Irish Heart Attack Audit National Report 2022 and 2023* (NOCA, 2024b).

OUTCOMES

LEFT VENTRICULAR FUNCTION OUTCOMES

The majority of patients with a STEMI in 2024 had a non-anterior infarction (n=900, 56%), which is similar to the figures for 2022 (57%) and 2023 (56%). In 2024, anterior infarctions were reported in 44% (n=707) of patients with a STEMI.[37]

Left ventricular function (LVF) was assessed in 89% (n=1440) of cases, which is comparable to the 88% reported in 2023. Of those patients who had an anterior infarction, 90% (n=636) had LVF assessed. Of those patients with a non-anterior infarction, 89% (n=799) had LVF assessed. With regard to those patients who did not have LVF assessed, the majority (79%) were transferred to another hospital for ongoing care and may have had an assessment of LVF performed there prior to discharge; however, this information is not available.

In patients who had a documented assessment of LVF, the vast majority were assessed by echocardiogram (n=1428, 99%) with a small proportion assessed by left ventricular angiography (0.3%; n<5).

Figure 6.1 displays left ventricular function results, by infarct type and timeliness of reperfusion. In total, of those who had timely reperfusion, 37% (n=278) had normal left ventricular function, 26% (n=196) had slightly reduced, 24% (n=175) had moderately reduced, and 12% (n=88) had severely reduced left ventricular function. Of those who did not have timely reperfusion, 29% (n=128) had normal left ventricular function, 31% (n=139) had slightly reduced, one-quarter (n=111, 25%) had moderately reduced, and 13% (n=58) had severely reduced left ventricular function.

[37] Infarction type was unknown in eight cases.

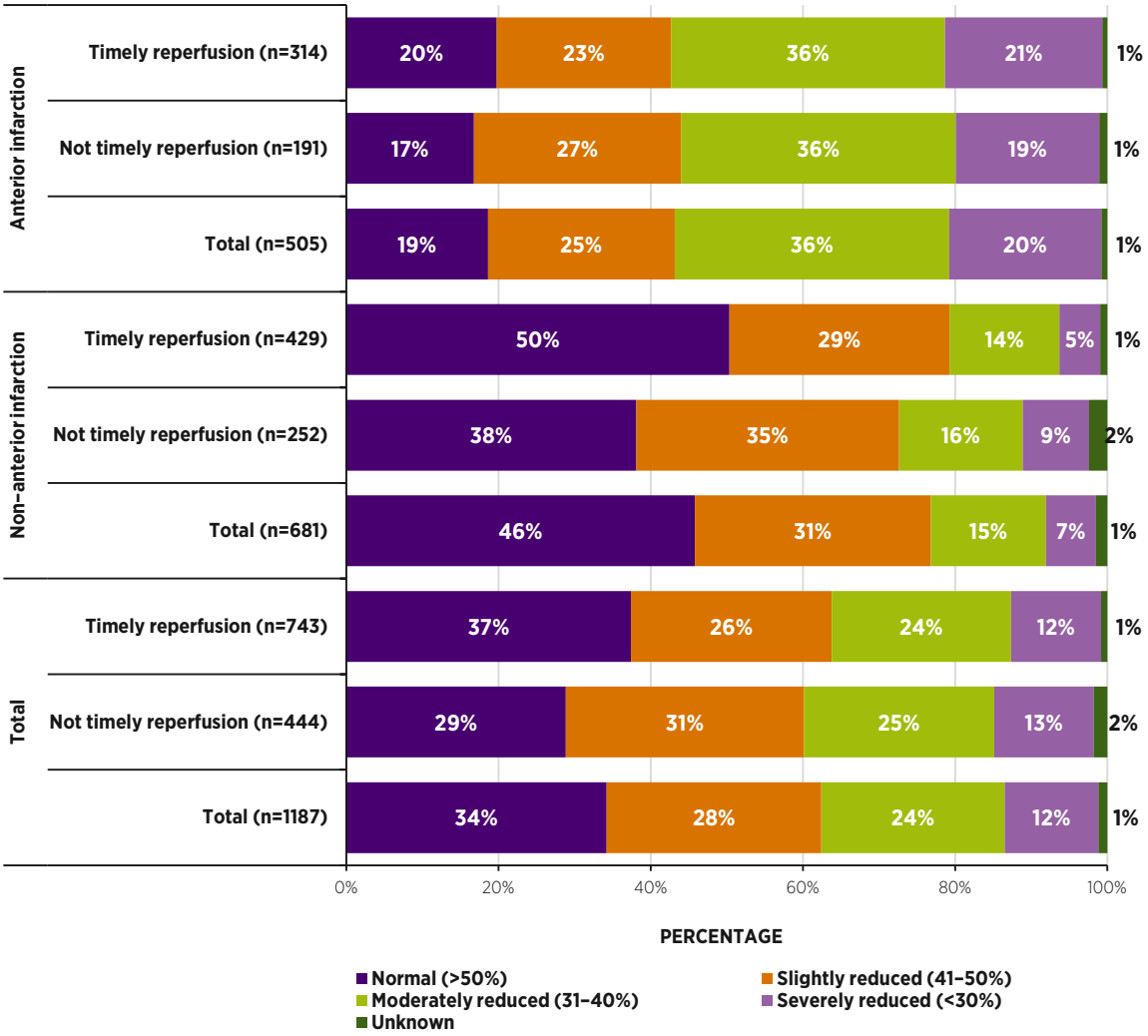


FIGURE 6.1: LEFT VENTRICULAR FUNCTION RESULTS, BY INFARCT TYPE AND TIMELINESS OF REPERFUSION (n=1187)[38,39]

[38] Patients for whom the source of referral was not recorded or for whom it was recorded as 'other', and cases who did not have timeliness of reperfusion recorded, are excluded from Figure 6.1.
[39] Percentages may not add up to 100% due to rounding.

CONGESTIVE HEART FAILURE OUTCOMES

As was the case in 2023 (83%), (n=1322, 82%) the majority of patients with a STEMI in 2024 did not show signs of congestive heart failure in the cath lab. Cardiogenic shock was reported in 10% (n=158) of patients[40] in 2024, a slight increase from 8% in 2023. Figure 6.2 shows congestive heart failure by infarct type.

Among those patients who had cardiogenic shock, the unadjusted in-hospital mortality rate was 46% (n=73) in 2024, which was consistent with the 2023 result (46%).

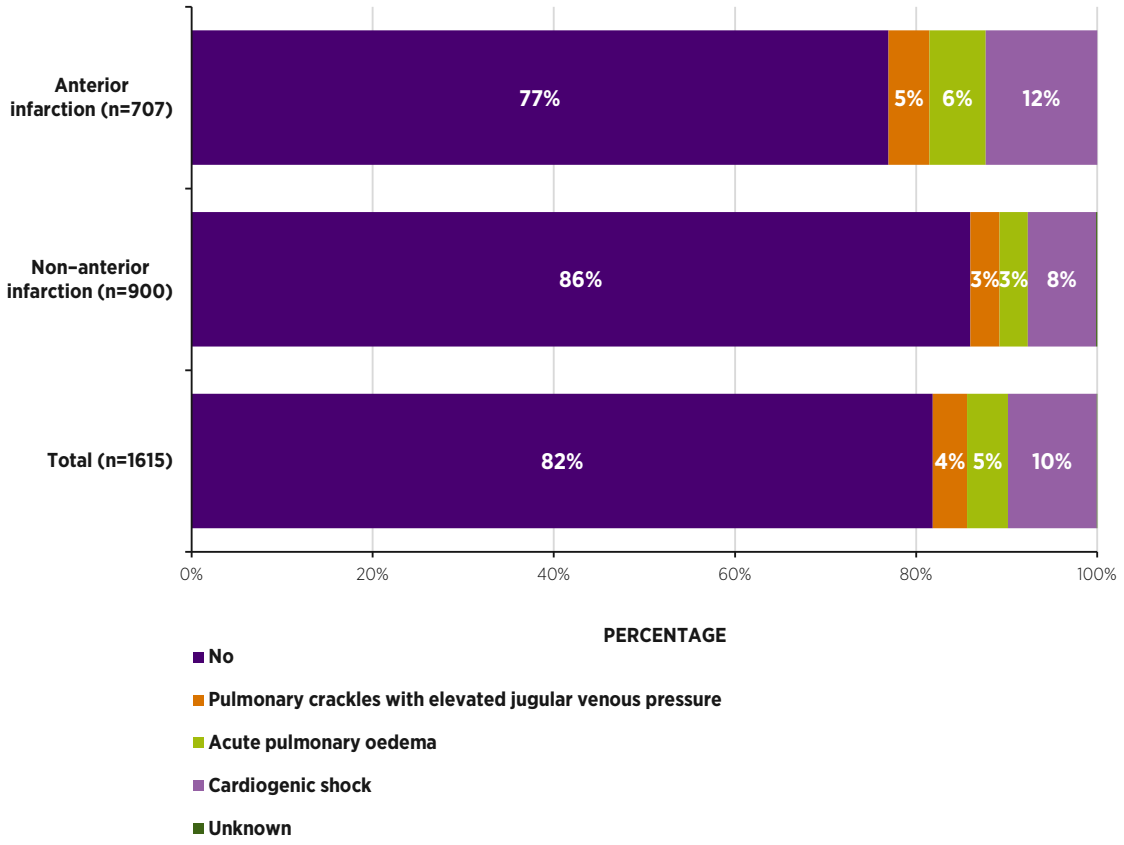


FIGURE 6.2: CONGESTIVE HEART FAILURE, BY INFARCT TYPE (N=1615)[41,42]

[40] Calculated based on the whole population with a STEMI (N=1615).
[41] Cases where infarct type was unknown (n=8) are not presented in Figure 6.2.
[42] Percentages may not add up to 100% due to rounding.

UNADJUSTED IN-HOSPITAL MORTALITY

Data gathered by the IHAA include the survival status of patients on discharge from hospital. This records the survival status of the patient at the point of discharge from hospital, whether the patient is discharged directly from a PCI centre or from another hospital following transfer from a PCI centre to complete their acute STEMI care. Completeness of this data point has gradually increased from 76% in 2021 to 80% in 2022, 96% in 2023, and 99% in 2024. The completeness of 30-day survival status data across hospitals ranged from 98% to 100% in 2024.

In 2024, 6.6% (n=106) of patients with a STEMI died during their stay in hospital, which was similar to the 6.4% (n=98) reported in 2022 and the 6.1% (n=95) reported in 2023.

The unadjusted in-hospital mortality rate was higher in older age groups. In those aged 75 years and over, the mortality rate was 13.0% (n=43) in 2024, compared with 7.1% (n=28) for those aged 65–74 years. The unadjusted mortality rate for those aged 64 years and under was 3.9% (n=35).

Table 6.1 shows the unadjusted in-hospital mortality rate of those who received timely primary PCI versus non-timely primary PCI by sex. In 2024, those who received primary PCI had a 5.3% (n=66) mortality rate, which was similar to the 4.3% (n=49) mortality rate reported in 2023. The unadjusted mortality was higher for female patients (n=24%, 7.8%) than for male patients (n=42, 4.4%).

It is important to note that female patients who died in hospital tended to be older, which may have impacted on the death rate. Nineteen percent (n=77) of women who died in hospital in 2024 were aged 80 years or over, compared with 8% (n=95) in the male cohort.

Timely primary PCI was associated with reduced mortality. In 2024, those who received timely primary PCI had an unadjusted mortality rate of 4.1% (n=32), compared with 7.4% (n=31) for those who did not receive timely primary PCI.

TABLE 6.1 UNADJUSTED MORTALITY RATE FOR PATIENTS WITH A STEMI WHO RECEIVED PRIMARY PCI, AND WHO RECEIVED TIMELY VERSUS NON-TIMELY PRIMARY PCI, BY SEX

Year	Unadjusted in-hospital mortality rate in those who received primary PCI	Unadjusted in-hospital mortality rate in those who received timely primary PCI	Unadjusted in-hospital mortality rate in those who did not receive timely primary PCI
Male	4.4% (n=42)	3.5% (n=22)	5.9% (n=18)
Female	7.8% (n=24)	5.4% (n=10)	11.5% (n=13)
Total	5.3% (n=66)	4.1% (n=32)	7.4% (n=31)

In 2024, the unadjusted in-hospital mortality rate in patients who received thrombolysis as the initial reperfusion strategy was 5.4% (n=6), which represented an increase from 4.6% (n≤5) in 2023. The number of cases was too small to provide meaningful analysis on mortality based on the timeliness of thrombolysis. In 2024, the unadjusted in-hospital mortality rate for those who received no reperfusion therapy was 13.3% (n=10), which was a reduction from 19.2% (n=14) in 2022 and 22.7% (n=22) in 2023.

RISK-ADJUSTED IN-HOSPITAL MORTALITY

The Global Registry of Acute Coronary Events (GRACE) was used as the model to assess the risk of in-hospital mortality in patients with a STEMI. In 2022, additional data points were added to the Heartbeat dataset in order to facilitate the calculation of the GRACE score, and a risk-adjustment model to report on risk-adjusted in-hospital mortality by PCI centre was developed. The IHAA will follow the NOCA procedure for statistical outlier management. This procedure aims to ensure that statistical outliers that are identified through the processes of national clinical audit are appropriately managed and help lead to learning with the potential for the improvement of clinical care. Further information on the development of the risk-adjustment model, together with the list of data points used in the GRACE model, is presented in Chapter 9 of the *Irish Heart Attack Audit National Report 2022 and 2023* (NOCA, 2024b).

IHAA RISK-ADJUSTED IN-HOSPITAL MORTALITY

The data quality of all data points required in order to inform the GRACE model increased from 90% in 2023 to 94% in 2024 nationally. In 2024, data quality at all primary PCI centres in Ireland was 90% or greater. Quarterly reports on any statistical outliers will commence in 2025.

Figure 6.3 presents the survival status (alive or dead) on discharge from hospital among patients with a STEMI in 2024 who were treated in each PCI centre by GRACE risk score of predicted mortality (low, intermediate, or high risk of mortality). As can be appreciated visually, no predicted low-risk GRACE score deaths occurred, with the majority of deaths occurring in patients with a predicted high risk of mortality based on their GRACE score.

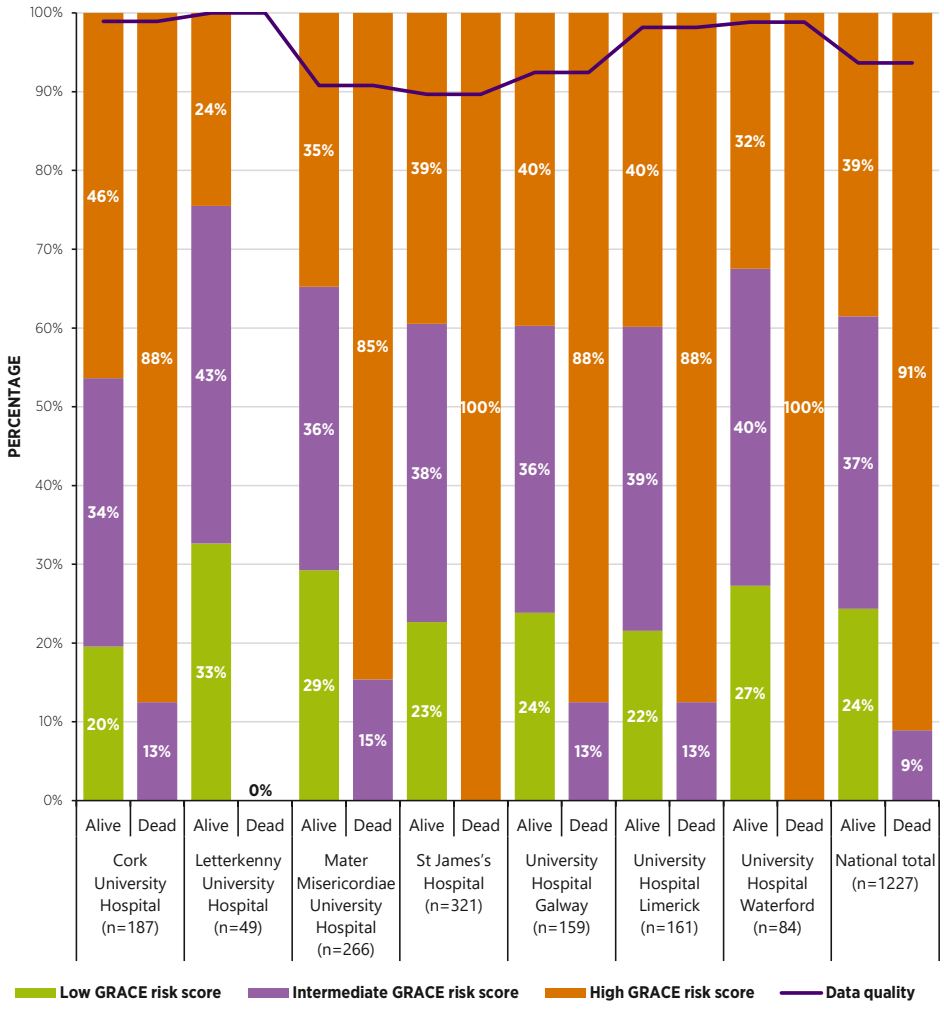


FIGURE 6.3: SURVIVAL AT DISCHARGE BY GLOBAL REGISTRY OF ACUTE CORONARY EVENTS STRATIFICATION AND DATA QUALITY, BY PCI CENTRE (n=1227)

STANDARDISED MORTALITY RATIO FUNNEL PLOT

Standardised mortality ratio (SMR) funnel plots (Figure 6.4) are scatter plots of individual hospitals' SMRs. The upper and lower borders of the funnel are represented by the 99.8% and 95.0% control limits. These borders represent the upper and lower limits of what is referred to as 'expected variation'.

An SMR is expected to appear within the 99.8% control limits 998 times out of 1,000. Statistically, 1 in 500 observations can be expected to appear outside these control limits by chance alone. In other words, if an SMR appears outside these limits, it is very unlikely that this is due to chance. These observations represent variation that is worthy of further review (NOCA, 2023b). The black dotted line in Figure 6.4 represents an SMR of 1. An SMR of 1 means that the number of observed deaths is the same as the expected mortality. The size of each orange circle indicates the number of patients with a STEMI.

Funnel plots make it very easy to identify those observations worthy of further review. A hospital's SMR should only be compared with its own control limits. There is no basis for ranking institutions into 'league tables' (Spiegelhalter, 2005); therefore, it is not valid to compare SMRs between hospitals.

Figure 6.4 presents the SMRs for six PCI centres in a funnel plot for the year 2024. The funnel plot does not perform well with small numbers of expected deaths; therefore, Beaumont Hospital, St Vincent's University Hospital, Tallaght University Hospital and Letterkenny University Hospital were not included in the figure. However, their SMR is available in the frequency tables in Appendix 5.

Figure 6.4 shows that five PCI centres had an SMR within the 99.8% control limits, indicating that their SMRs were within the expected range for 2024. Cork University Hospital had an SMR of 0.45, which was below the lower 99.8% control limit, meaning that the number of observed deaths was lower than the model suggested. No PCI centre had a mortality rate higher than the expected range. The IHAA Governance Committee has agreed that the NOCA outlier management policy will not be implemented until the model is supported with more data.

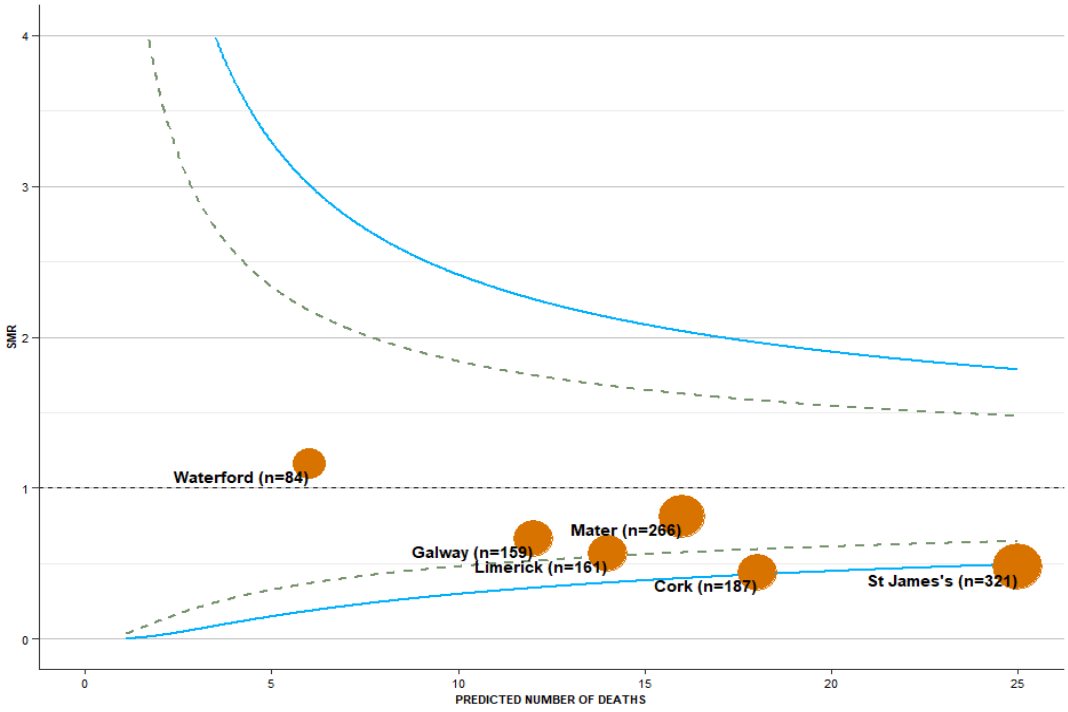


FIGURE 6.4: STANDARDISED IN-HOSPITAL MORTALITY RATIO[43]

It is important to note that the logistic regression model coefficients that are available to be fitted for the GRACE probability of death were estimated in 2014, and therefore may be outdated and no longer appropriate. The logistic regression model coefficients can be developed using IHAA data; however, at the time of writing this report, there was not a sufficient amount of data for this implementation.

[43] Hospitals that had five deaths or fewer (Beaumont Hospital, St Vincent's University Hospital, Tallaght University Hospital and Letterkenny University Hospital) were not included in Figure 6.4.

30-DAY MORTALITY

The European Society of Cardiology (ESC) acute coronary syndromes guideline (Byrne *et al*., 2023) recommends that 30-day risk-adjusted mortality be adopted as an outcome measure for STEMI care. In 2022, the IHAA outlined a strategic aim to adopt this metric. With this aim in mind, the completeness of recording 30-day mortality, with a target of 90% completeness, was established as a KQI. These data are presented in Figure 3.1, with completeness of the 'survival status at 30 days' data point increasing from 56% in 2020 to 72% in 2022, 90% in 2023, and 95% in 2024. In 2024, the data show that the national unadjusted 30-day mortality rate was 7.7%. The crude mortality rate was higher for female patients with a STEMI (11.1%) compared with the male cohort (6.6%).

Figure 6.5 presents the 30-day survival status (alive or dead) on discharge from hospital among patients with a STEMI in 2024 who were treated in each PCI centre by GRACE risk score of predicted mortality (low, intermediate, or high risk of mortality). As can be appreciated visually, no predicted low-risk GRACE score deaths occurred, with all deaths occurring in patients with a predicted high risk of mortality based on their GRACE score.

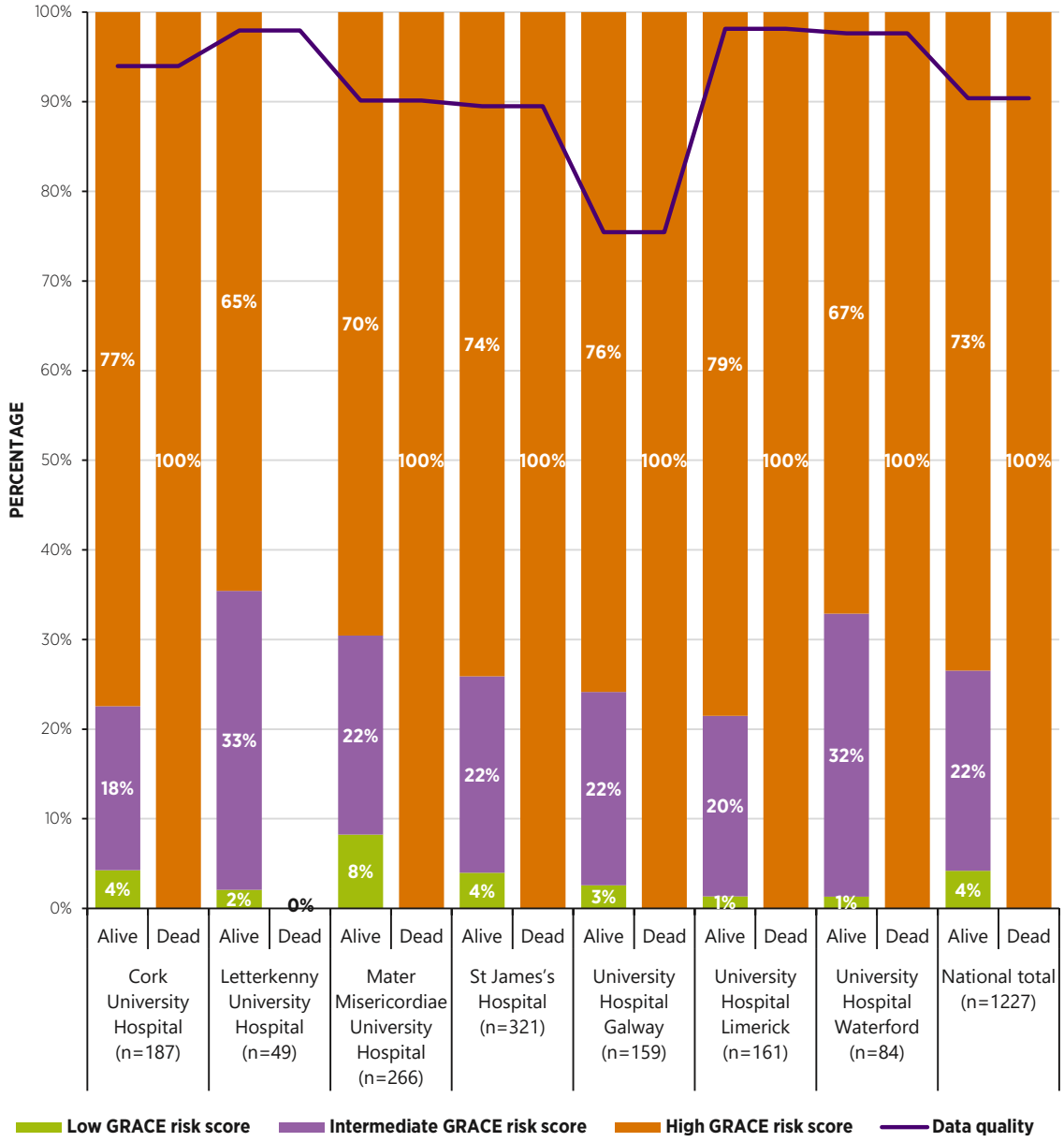


FIGURE 6.5: SURVIVAL STATUS AT 30 DAYS BY GLOBAL REGISTRY OF ACUTE CORONARY EVENTS STRATIFICATION AND DATA QUALITY, BY PCI CENTRE (n=1158)[44]

KQI 8: Percentage completeness of the 'survival status at 30 days' data point recorded in Heartbeat

TARGET: 90% 2024 RESULT: 95%

[44] Those who died while in hospital were categorised as complete. Patients who were not a resident in Ireland were not included in the analysis for Figure 6.5.

BLEEDING AND STROKE COMPLICATIONS

In 2024, 1,362 patients with a STEMI received reperfusion, of which 46 (3%) had a bleed (41 of these received primary PCI and 5 received thrombolysis). The proportion of bleeds remained consistent with that observed in 2023 (3%). Bleeding complications were defined as intracranial haemorrhage, retroperitoneal haemorrhage, or other bleeding event (this last category was subdivided into three categories based on haemoglobin fall: ≥5 grams per decilitre (g/dL); ≥3 g/dL but <5 g/dL; and <3 g/dL). The incidence of bleeding by reperfusion type is presented in Appendix 7.

In 2024, 1.7% (n=23) of patients who had a reperfusion (n=1362) sustained a stroke; 12 (1%) were classified as ischaemic stroke (all 12 received a primary PCI) and 11 (0.8%) as haemorrhagic stroke (7 of these received a primary PCI and 4 received thrombolysis). The incidence of stroke remained consistent with the proportions observed in 2022 (1.6%) and 2023 (1.3%). The incidence of stroke by reperfusion type and hospital is presented in Appendix 7.

LENGTH OF STAY AT A PCI CENTRE

For all patients with a STEMI who were discharged alive from a PCI centre during the reporting period, the median length of stay (LOS) at the PCI centre in 2024 was 3 days (IQR: 1–6 days), which is unchanged from 2023 (median: 3 days; IQR: 1–6 days). For patients who completed their inpatient stay at the PCI centre, the median LOS was 5 days (IQR: 3–8 days), which is consistent with the 4 days (IQR: 3–8 days) reported in 2023. This compares to the relevant key performance indicator (KPI) in the *Acute Coronary Syndromes Programme Model of Care* (HSE, 2012) of a median LOS of 4 days. The LOS varied between PCI centres, ranging from 3 days to 6 days.

For patients who were transferred to another acute hospital for ongoing STEMI care in 2024, the median LOS in the PCI centre was 1 day (IQR: 1–2 days), which is unchanged from 2023 (median: 1 day; IQR: 1–2 days) (Table 6.2).

TABLE 6.2: LENGTH OF HOSPITAL STAY IN THE PCI CENTRE, BY PCI CENTRE (NUMBER OF PATIENTS: 1,521; NUMBER OF DAYS: 8,575)[45]

		Transferred to another hospital for ongoing STEMI care	Completed STEMI care in the PCI centre	Total
Cork University Hospital	Number of patients	40	184	224
	Number of days	146	1414	1560
	Median LOS (days)	1	5	4
	IQR 1 (days)	1	3	3
	IQR 3 (days)	3	7	7
Letterkenny University Hospital	Number of patients	~	*	51
	Number of days	42	335	377
	Median LOS (days)	21	4	5
	IQR 1 (days)	9	4	4
	IQR 3 (days)	33	8	9
Mater Misericordiae University Hospital	Number of patients	215	120	335
	Number of days	276	1012	1288
	Median LOS (days)	1	5	1
	IQR 1 (days)	1	4	1
	IQR 3 (days)	1	8	4
St James's Hospital	Number of patients	241	132	373
	Number of days	640	1566	2206
	Median LOS (days)	1	6	3
	IQR 1 (days)	1	4	1
	IQR 3 (days)	3	12	6
University Hospital Galway	Number of patients	80	138	218
	Number of days	313	1130	1443
	Median LOS (days)	2	5	4
	IQR 1 (days)	1	3	3
	IQR 3 (days)	4	8	7
University Hospital Limerick	Number of patients	38	135	173
	Number of days	182	659	841
	Median LOS (days)	2	3	3
	IQR 1 (days)	1	3	2
	IQR 3 (days)	4	5	5
University Hospital Waterford	Number of patients	41	44	85
	Number of days	185	289	474
	Median LOS (days)	2	4	3
	IQR 1 (days)	1	3	2
	IQR 3 (days)	5	7	7
Non-designated 9–5 PCI centres	Number of patients	8	54	62
	Number of days	95	291	386
	Median LOS (days)	10	4	4
	IQR 1 (days)	6	2	3
	IQR 3 (days)	19	6	7
Total	Number of patients	665	856	1521
	Number of days	1879	6696	8575
	Median LOS (days)	1	5	3
	IQR 1 (days)	1	3	1
	IQR 3 (days)	2	8	6

~ Denotes five cases or fewer.
* Further suppression required in order to prevent disclosure of five cases or fewer.

[45] Only includes patients who were alive on discharge.

DISCHARGE DESTINATION FROM THE PCI CENTRE

41% of patients were transferred from PCI centres to other acute hospitals for ongoing STEMI care.

In 2024, one-half (n=812; 50%) of patients with a STEMI were discharged directly home from a PCI centre; this is consistent with the 48% reported in 2022 and 52% reported in 2023. Forty-one percent (n=665) were transferred to another acute hospital for ongoing STEMI care, which is consistent with the 41% reported in 2023. The 'other' destination category represents discharge to an alternative destination: nursing home, died, and other (n=138, 9%). Figure 6.6 displays the discharge destination by PCI centre and sex.

In 2024, a larger proportion (n=622, 52%) of male patients with a STEMI were discharged directly home from a PCI centre compared with female patients (n=190; 47%). There was variation in discharge destination between PCI centres. Some centres, such as Letterkenny University Hospital, are single entities for primary PCI and hospital care, while the other primary PCI centres serve a network of non-PCI-capable hospitals and therefore repatriate/transfer patients at a higher rate.

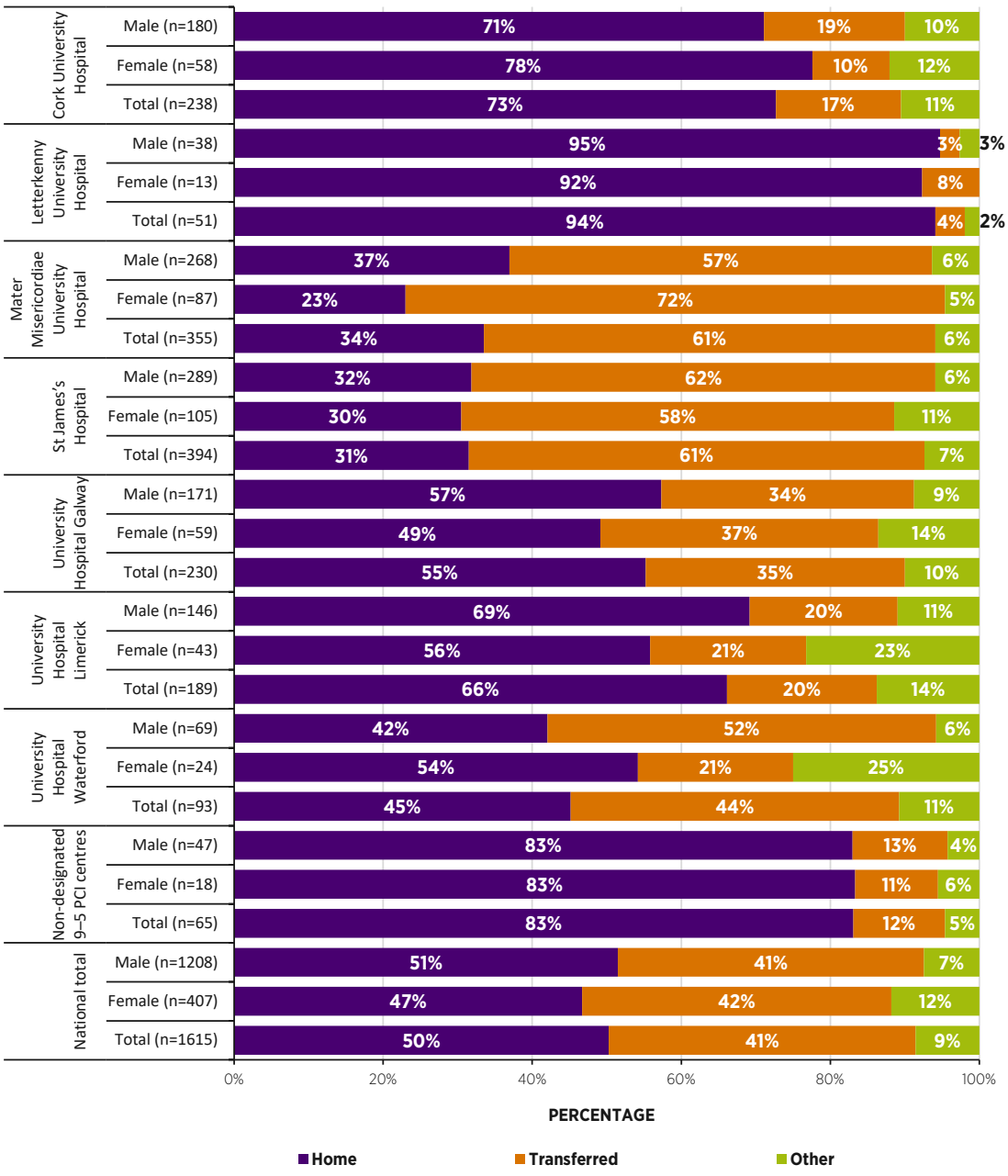


FIGURE 6.6: DISCHARGE DESTINATION FROM PCI CENTRES, BY PCI CENTRE AND SEX (N=1615)[46]

[46] Non-designated 9.00am to 5.00pm weekday PCI centres include Beaumont Hospital, St Vincent's University Hospital and Tallaght University Hospital. Discharge destination data for these hospitals are included in the corresponding frequency table in Appendix 5.

SECONDARY PREVENTION

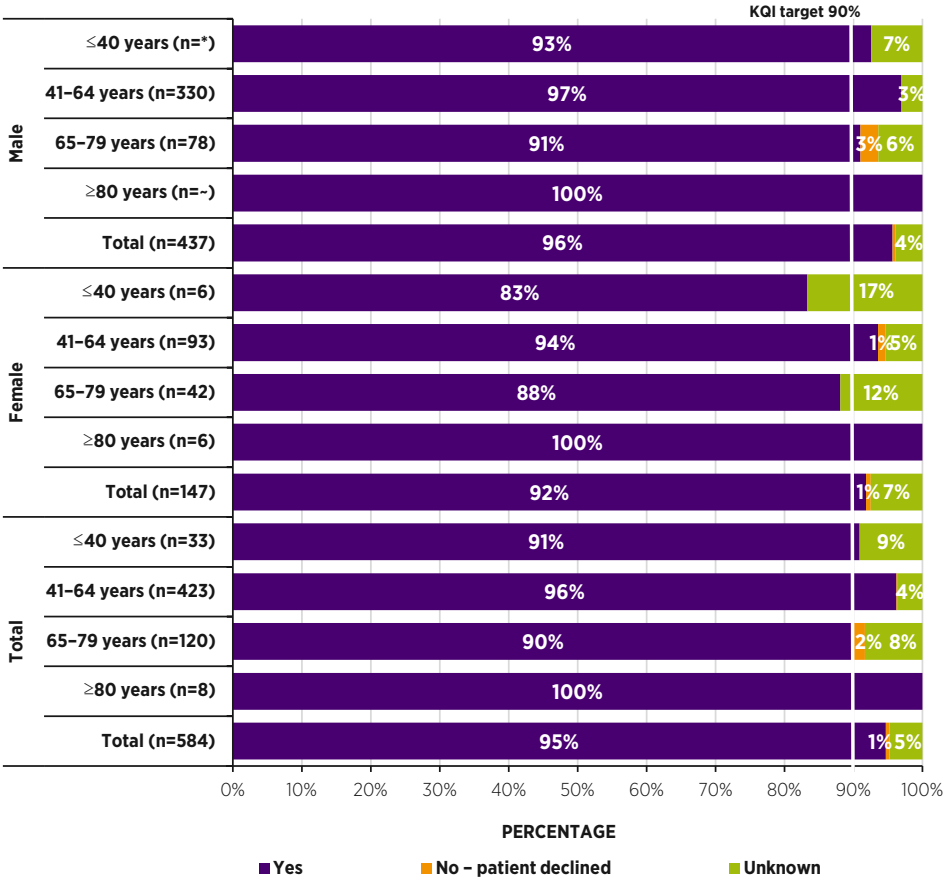
Secondary prevention of further cardiovascular or coronary heart disease events is key to the *Acute Coronary Syndromes Programme Model of Care* (HSE, 2012). The IHAA reports on this under three headings: (1) smoking cessation, (2) secondary prevention medication on discharge and (3) cardiac rehabilitation. Each is reported as a KQI in the IHAA dashboard.

SMOKING CESSATION

As described in Chapter 4, 36% (n=584) of patients with a STEMI in 2024 were classified as current smokers (Figure 4.7). Figure 6.7 displays the proportion of patients with a STEMI who were smokers and who received smoking cessation advice in 2024, by sex and age group. The proportion of patients with a STEMI who were current smokers and were recorded as receiving smoking cessation advice has gradually increased, from 80% in 2022 to 91% in 2023 and 95% (n=553) in 2024, meeting the associated KQI target of 90% (HSE, 2012). Smoking cessation advice was given to male patients (n=418, 96%) at a slightly higher rate compared with female patients (n=135, 92%).

KQI 6: Percentage of patients with a STEMI who actively smoke who were offered smoking cessation advice

TARGET: 90% 2024 RESULT: 95%



~ Denotes five cases or fewer.
* Further suppression required in order to prevent disclosure of five cases or fewer.

FIGURE 6.7: SMOKING CESSATION ADVICE PROVIDED, BY SEX AND AGE GROUP (n=584)[47]

[47] Figure 6.7 includes patients who were reported as current smokers only.

SECONDARY PREVENTION MEDICATION ON DISCHARGE

The proportion of patients with a STEMI who had an appropriate secondary prevention medication discharge bundle recorded increased from 74% in 2021 to 75% in 2022, 86% in 2023, and 91% in 2024, reaching the target of 90% (HSE, 2012) in 2024. Appendix 7 presents these data by PCI centre.

Figure 6.8 shows the proportion of each of the secondary prevention medications prescribed on discharge (excluding cases for which no information was recorded) for each of the medications. In 2024, as in 2022 and 2023, statins (n=1476, 98%) and aspirin (n=1476, 98%) were the most prescribed secondary prevention medications. A second antiplatelet agent was prescribed in 97% (n=1465) of cases, followed by beta-blockers (n=1341, 90%) and angiotensin-converting enzyme inhibitors (ACEIs) or angiotensin II receptor blockers (ARBs) (n=1299, 88%).

KQI 5: Percentage of patients with a STEMI who were discharged with an appropriate secondary prevention medication discharge bundle

TARGET: 90% 2024 RESULT: 91%

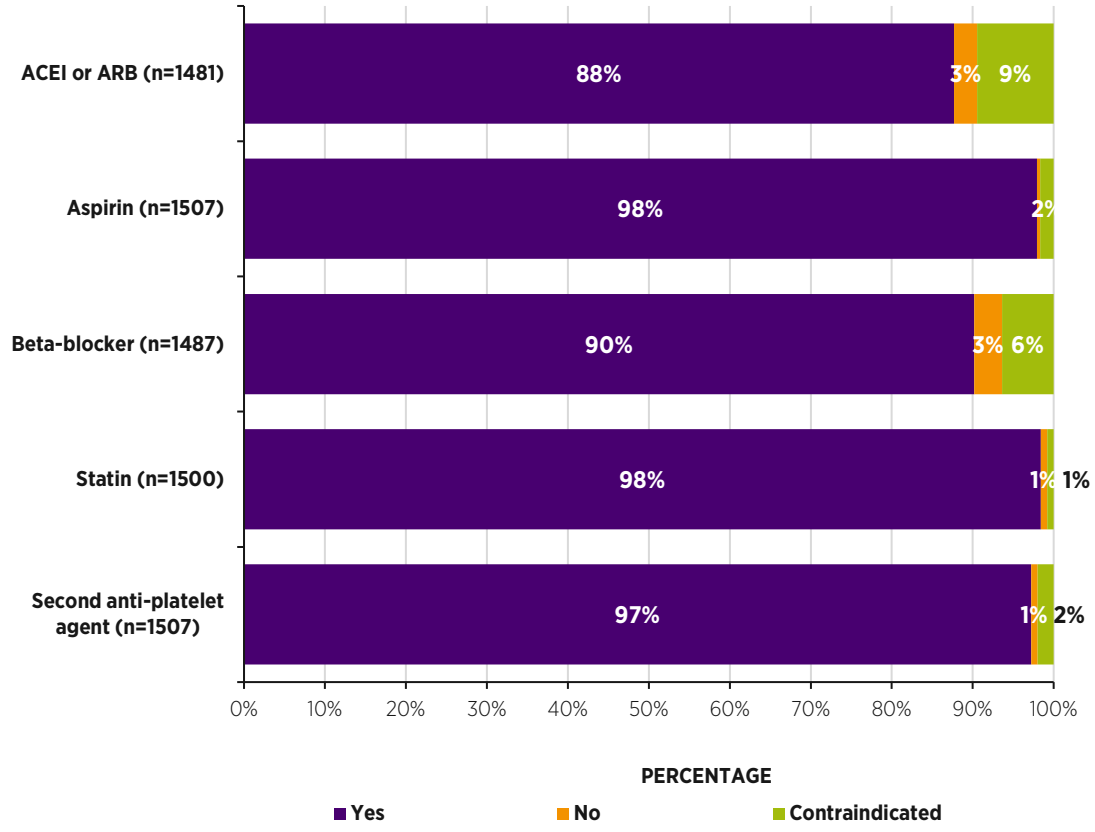


FIGURE 6.8: PROPORTION OF PATIENTS PRESCRIBED SECONDARY PREVENTION MEDICATION ON DISCHARGE[48]

[48] Patients who had no information recorded are excluded from Figure 6.8. Each patient may have been prescribed one or more medications, and may therefore be counted more than once. Figure 6.8 excludes patients who were dead on discharge.

CARDIAC REHABILITATION

Cardiac rehabilitation (CR) is a recognised standard of care for patients with a STEMI, as set out in the current Irish cardiovascular policy, *Changing Cardiovascular Health: National Cardiovascular Health Policy 2010 – 2019* (Department of Health, 2010) and in the ESC guidelines for STEMI management (Ibanez *et al*., 2018). The *Acute Coronary Syndromes Programme Model of Care* (HSE, 2012) target is for 90% of patients with a STEMI to be referred to an early CR programme/ secondary prevention programme on discharge. CR phase 3 consists of an exercise programme and educational classes, typically scheduled over 6–12 weeks.

The proportion of eligible patients with a STEMI who were referred to CR phase 3 has increased from 57% in 2022 to 91% in 2023 and 97% in 2024. The increase can be attributed to better data quality in two of the largest PCI centres (St James's Hospital and the Mater Misericordiae University Hospital). Until 2023, there were ongoing challenges capturing follow-up data in these two PCI centres, which led to a large amount of unknown data. Some additional resourcing by the PCI centres for data collection, new data collection processes, and linkages between referring hospitals have led to improved data completeness in both hospitals since 2023. Figure 6.9 displays the recorded CR phase 3 referral rate by PCI centre.

Monitoring the rate of referral to CR phase 3 has been included in the IHAA dashboard as a KQI, and the national target of 90% was met in 2024 (97%).

KQI 7: Percentage of eligible patients with a STEMI who were referred for cardiac rehabilitation phase 3

TARGET: 90% 2024 RESULT: 97%

Heartbeat contains a data point intended to provide a robust indicator of the delivery of CR phase 3: 'date of first phase 3 CR appointment'. In 2022, the IHAA set out to collect data on the timeliness and delivery of CR phase 3 as a strategic aim. With this aim in mind, the completeness of recording this data point, with a target of 90% completeness, was established as a KQI on the IHAA dashboard. Although the target of 90% has not yet been reached, the completeness of the 'date of first phase 3 CR appointment' data point has gradually improved, from 25% in 2021 to 33% in 2022, 52% in 2023, and 63% in 2024.

KQI 9: Percentage of patients who have a cardiac rehabilitation phase 3 date recorded

TARGET: 90% 2024 RESULT: 63%

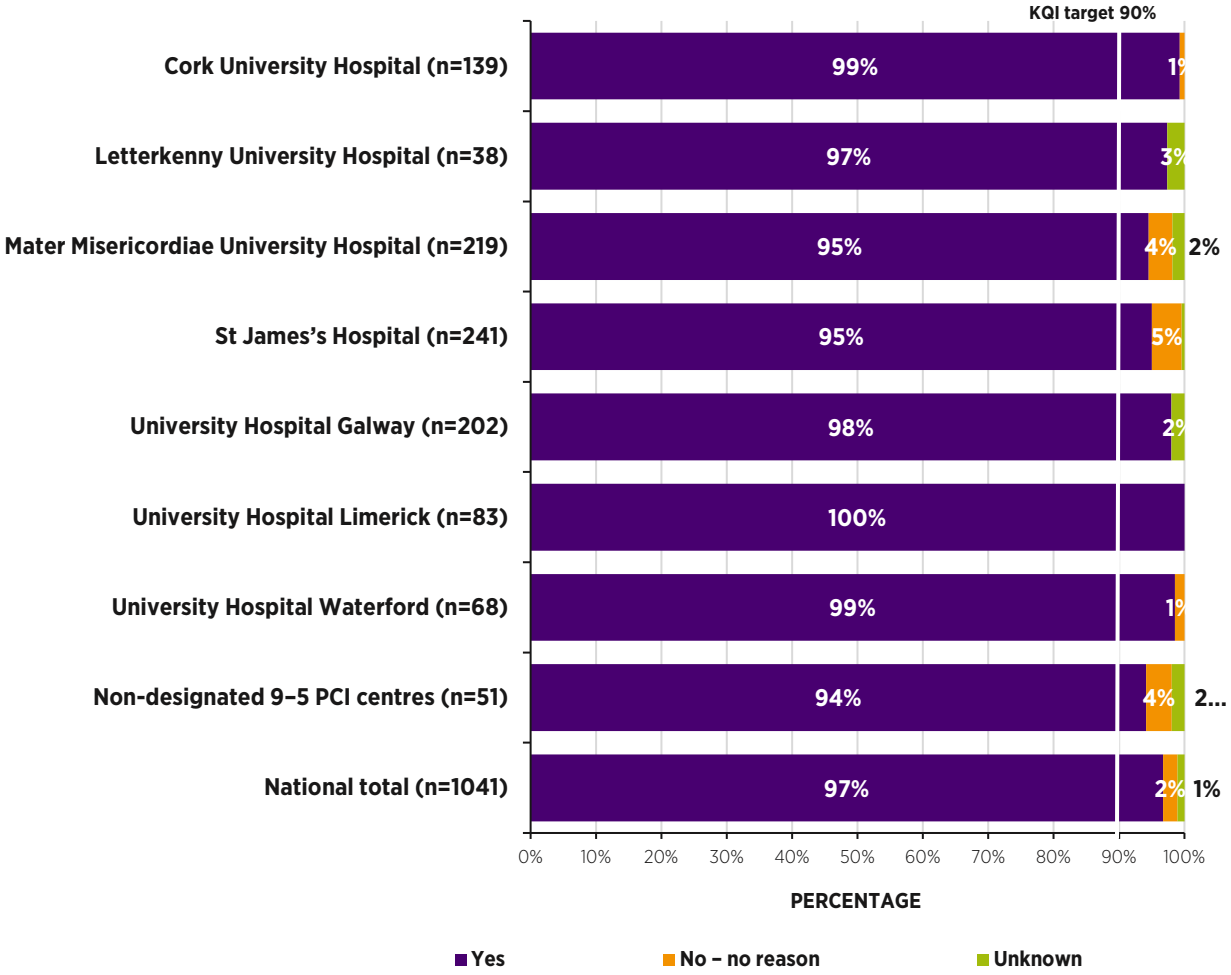


FIGURE 6.9: PROPORTION OF PATIENTS WITH A STEMI REFERRED FOR CARDIAC REHABILITATION PHASE 3, BY PCI CENTRE (n=1041)[49]

KEY FINDINGS FROM CHAPTER 6

- No PCI centre had a mortality rate higher than the expected range in 2024.
- Timely primary PCI is associated with reduced mortality. In 2024, those who received timely primary PCI had an unadjusted mortality rate of 4.1% (n=32), compared with 7.4% (n=31) for those who did not receive timely primary PCI.
- The proportion of patients with a STEMI who were current smokers and were recorded as receiving smoking cessation advice has gradually increased, from 80% in 2022 to 91% in 2023 and 95% (n=553) in 2024, meeting the associated KQI target of 90% (HSE, 2012).
- One-half (n=812, 50%) of patients with a STEMI were discharged directly home from a PCI centre in 2024, similar to the 52% reported in 2023; 41% (n=665) were transferred to another acute hospital for ongoing STEMI care, which is unchanged from 2023.

[49] Non-designated 9.00am to 5.00pm weekday PCI centres include Beaumont Hospital, St Vincent's University Hospital and Tallaght University Hospital. CR phase 3 referral data for these hospitals are included in the corresponding frequency table in Appendix 5. Figure 6.9 excludes patients who declined, those who were unable to participate due to comorbidity, and those who were dead on discharge.

CHAPTER 7
QUALITY IMPROVEMENT

CONTENTS

CHAPTER 7: **QUALITY IMPROVEMENT**

The purpose of this chapter is to highlight and promote quality improvement (QI) initiatives in relation to the IHAA. Clinical audit is one of a range of QI methodologies that can deliver improved processes and outcomes for patients (HSE, 2019). Clinical audit can provide data in order to support QI at all levels, from the local clinical team through to organisational management and national policy-making. The IHAA wishes to ensure that the audit findings support QI at local, national and policy levels.

HOW CAN THE IHAA DRIVE QI?

The findings in this report offer many opportunities for QI initiatives at local, regional and national level. The data quality QI project in Letterkenny University Hospital, presented later in this chapter, demonstrates how a hospital can identify an area for improvement, initiate a QI project and utilise the IHAA dashboard to monitor implementation. Learnings can be shared in order to improve patient care and data quality in all services.

The IHAA data can support national QI collaborations such as the STEMI Care Pathway Quality Improvement Project. Policy decisions, such as rolling out public awareness campaigns in relation to educating people on the symptoms of a heart attack and the importance of calling 112 or 999, could be evaluated using the IHAA data.

THE IHAA DASHBOARD

In 2021, the IHAA Governance Committee agreed nine KQIs. Seven were based on the KPIs published in the *Acute Coronary Syndromes Programme Model of Care* (HSE, 2012), and two data KQIs were agreed in order to support improved collection of follow-up data. The implementation of the IHAA dashboard (Figure 7.1) allows individual hospital teams and hospital management access to timely data with the aim of driving QI locally.

FIGURE 7.1: THE IRISH HEART ATTACK AUDIT DASHBOARD

IHAA KEY QUALITY INDICATOR TRENDS

Almost all KQI results improved in 2024. KQI 1 (Figure 7.2); KQI 5, KQI 6 and KQI 7 (Figure 7.5); and KQI 8 (Figure 7.6) are all now achieving the agreed targets.

KQI 2 (Figure 7.3) decreased from 79% in 2023 to 77% in 2024. KQI 3 fluctuated within the 39–49% range from 2016 to 2023, but in 2024, the proportion decreased to 30% (Figure 7.3).

The two data quality KQIs, KQI 8 and KQI 9 (Figure 7.6), have both increased annually since 2020. In 2024, KQI 8 reached the 90% target, and this improved data quality has allowed the reporting of 30-day mortality (Figure 6.5).

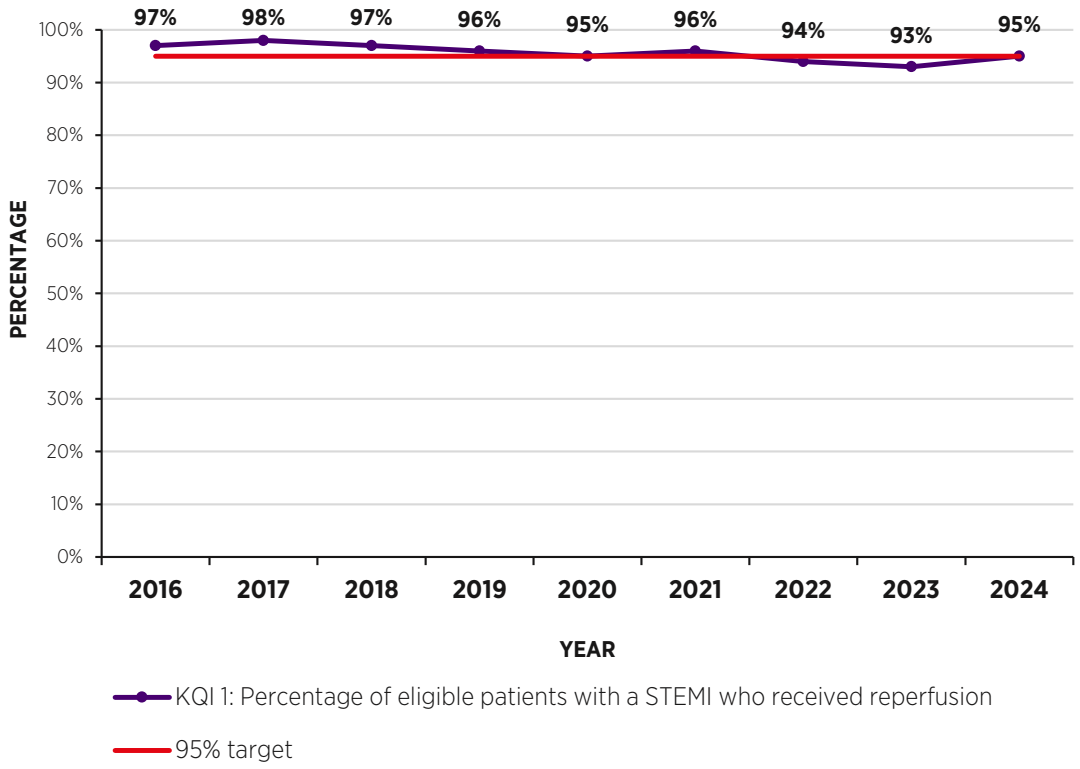


FIGURE 7.2: KEY QUALITY INDICATOR 1: PERCENTAGE OF ELIGIBLE PATIENTS WITH A STEMI WHO RECEIVED REPERFUSION, BY YEAR

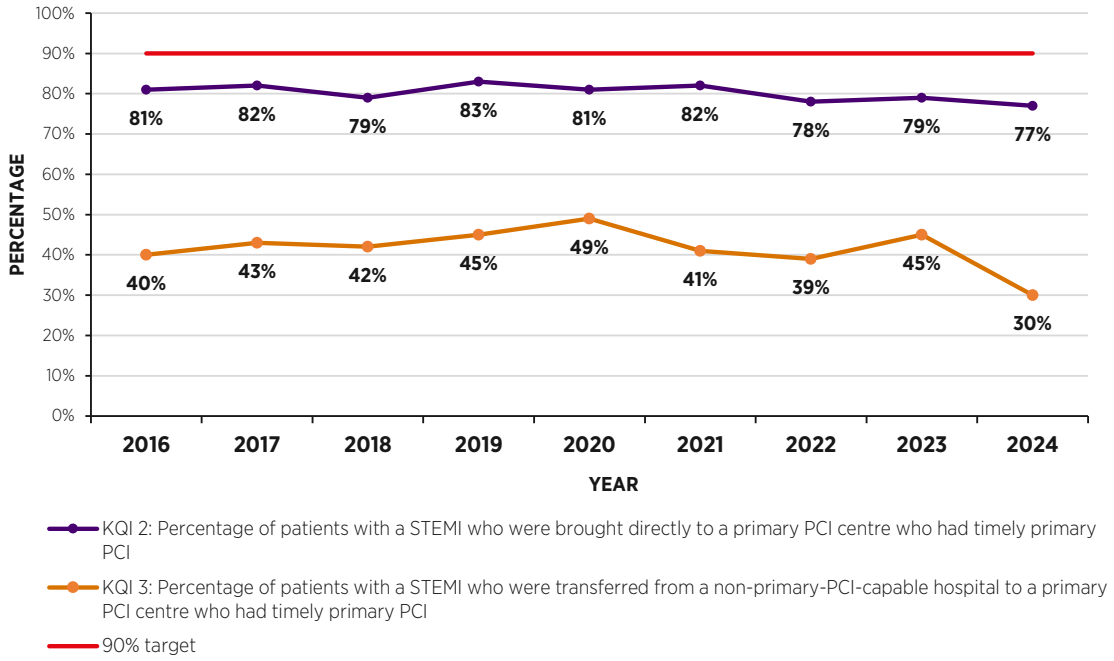


FIGURE 7.3: KEY QUALITY INDICATOR 2: PERCENTAGE OF PATIENTS WITH A STEMI WHO WERE BROUGHT DIRECTLY TO A PRIMARY PCI CENTRE WHO HAD TIMELY PRIMARY PCI, AND KEY QUALITY INDICATOR 3: PERCENTAGE OF PATIENTS WITH A STEMI WHO WERE TRANSFERRED FROM A NON-PRIMARY-PCI-CAPABLE HOSPITAL TO A PRIMARY PCI CENTRE WHO HAD TIMELY PRIMARY PCI, BY YEAR

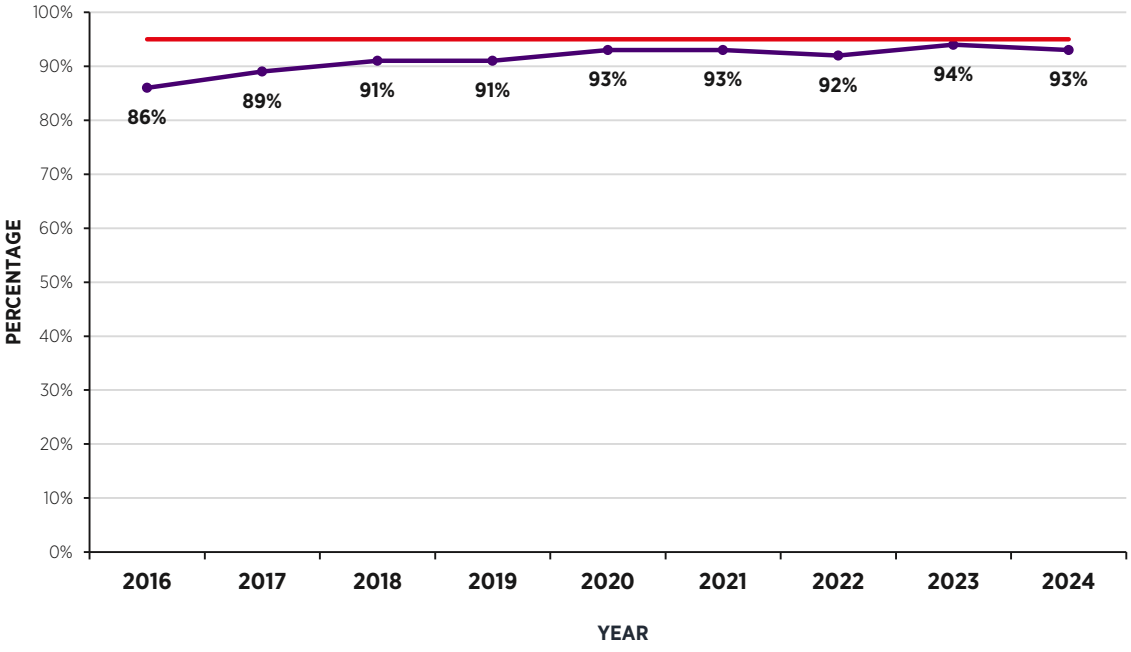


FIGURE 7.4: KEY QUALITY INDICATOR 4: PERCENTAGE OF PATIENTS WITH A STEMI WHO HAD RADIAL ACCESS FOR PRIMARY PCI, BY YEAR

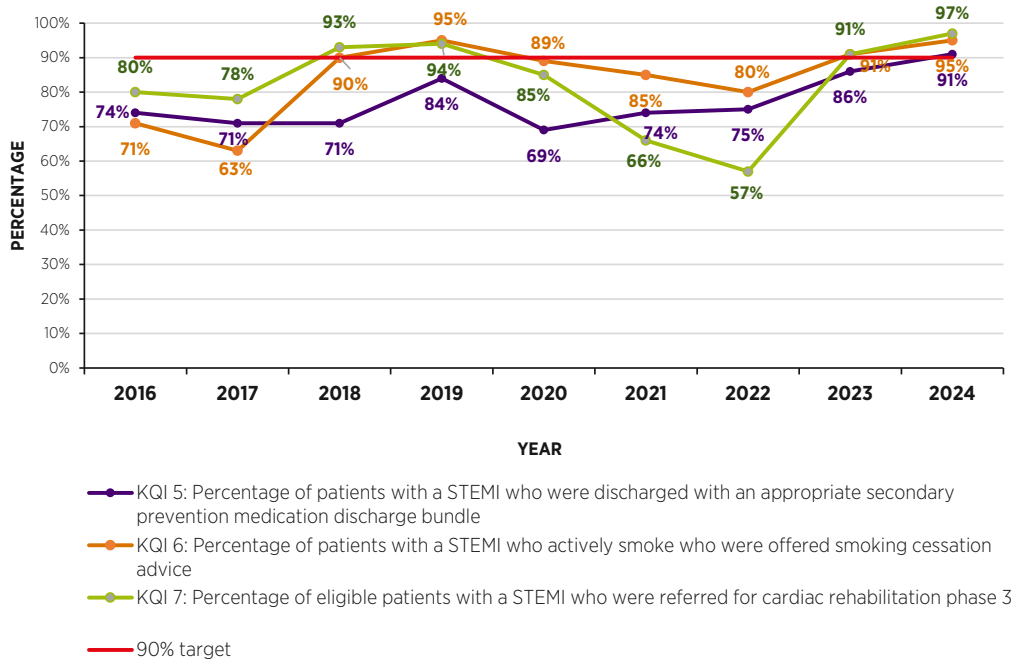


FIGURE 7.5: KEY QUALITY INDICATOR 5: PERCENTAGE OF PATIENTS WITH A STEMI WHO WERE DISCHARGED WITH AN APPROPRIATE SECONDARY PREVENTION MEDICATION DISCHARGE BUNDLE, KEY QUALITY INDICATOR 6: PERCENTAGE OF PATIENTS WITH A STEMI WHO ACTIVELY SMOKE WHO WERE OFFERED SMOKING CESSATION ADVICE, AND KEY QUALITY INDICATOR 7: PERCENTAGE OF ELIGIBLE PATIENTS WITH A STEMI WHO WERE REFERRED FOR CARDIAC REHABILITATION PHASE 3, BY YEAR

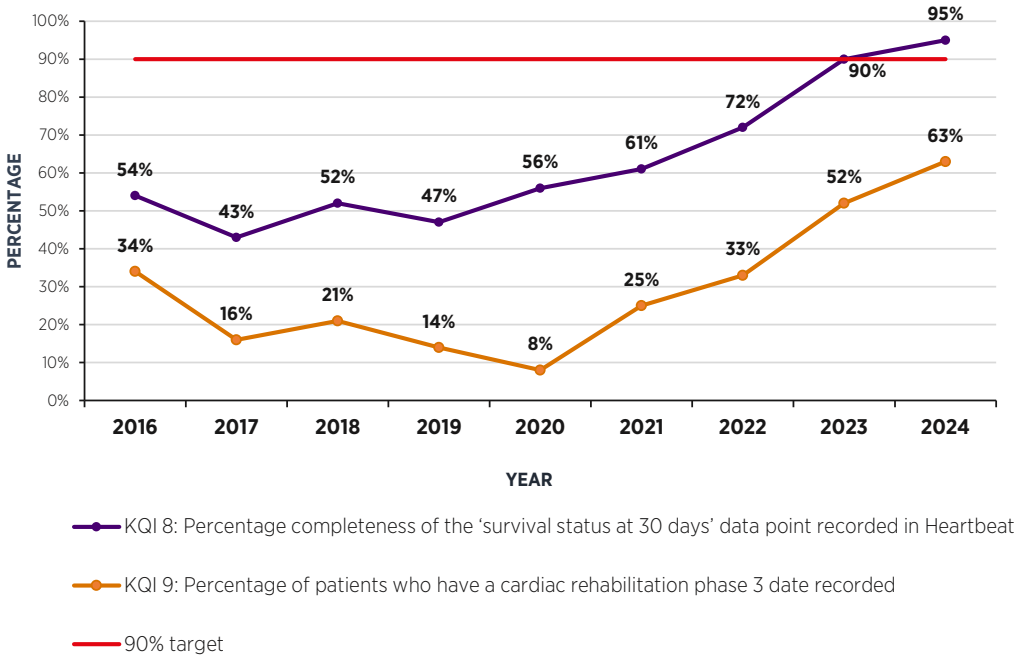


FIGURE 7.6: KEY QUALITY INDICATOR 8: PERCENTAGE COMPLETENESS OF THE 'SURVIVAL STATUS AT 30 DAYS' DATA POINT RECORDED IN HEARTBEAT, AND KEY QUALITY INDICATOR 9: PERCENTAGE OF PATIENTS WHO HAVE A CARDIAC REHABILITATION PHASE 3 DATE RECORDED, BY YEAR

HOW TO DELIVER QI

Clinical audit is a clinically led quality improvement process that seeks to improve patient care and outcomes through systematic review of care against explicit criteria and acting to improve care when standards are not met. The process involves the selection of aspects of the structure, processes and outcomes of care which are then systematically evaluated against explicit criteria. If required, improvements should be implemented at an individual, team or organisation level and then the care re-evaluated to confirm improvements. (Department of Health and Children, 2008, p. 152)

The HSE National Centre for Clinical Audit was established in 2021 in order to implement the recommendations of the *National Review of Clinical Audit* report (HSE, 2019). The HSE National Centre for Clinical Audit provides a national focus for clinical audit in order to ensure that those who are conducting local, regional and national audits have access to best practice information. The National Centre for Clinical Audit provides clinical audit training in order to support clinical teams to develop and run QI projects.

The IHAA recommends that all clinical teams should participate in a QI project and that all learnings can be shared through the National Office of Clinical Audit (NOCA) Quality Improvement Champion Award, in workshops and meetings, and in future IHAA annual reports. The IHAA also recommends that all teams providing care to patients with a STEMI participate in the STEMI Care Pathway Quality Improvement Project and view their own data via the IHAA dashboard in order to identify hospital-specific areas for QI.

THE NATIONAL STEMI QI COLLABORATIVE

The National STEMI QI collaborative was set up in order to review the early management of patients with a STEMI. The collaborative was created in response to a recommendation from NOCA based on the IHAA, which highlighted a number of areas where KPIs of optimal management were not met.

The National Heart Programme has focused on areas highlighted by the IHAA, in addition to some other areas where improvement is possible.

Reducing 'door in door out' times in emergency rooms for patients with a STEMI

1. Two hospitals – Connolly Hospital and the Mater Misericordiae University Hospital – have initiated a pilot project for a new pathway to reduce 'door in door out' (DIDO) times by reducing times to electrocardiogram (ECG) in their emergency departments (EDs). Both hospitals have appointed designated individuals (a healthcare assistant in Connolly Hospital and an unregistered nurse trained abroad in the Mater Misericordiae University Hospital) to look for patients in the waiting room pre-triage (and in some cases pre-registration) who have chest pain or look critically unwell for immediate performance of an ECG. Both were trained in how to perform and interpret an ECG.

2. Both hospitals have begun an audit of these pathways. Connolly Hospital has completed its initial audit, which included all patients who underwent ECG (including non-urgent patients) (see Figure 7.7) and showed an average time to ECG of 27 minutes, with 34% of patients receiving an ECG within 10 minutes of triage and 9% of patients receiving their ECG pre-triage. Only two patients had myocardial infarctions. Interestingly, the one patient with a STEMI had their ECG pre-triage, and the one patient with a non-ST elevation myocardial infarction (NSTEMI) had their ECG 9 minutes post-triage.

3. There are plans to roll out this pilot project to other centres, targeting those with the poorest DIDO times. This will require the development of a new model of care for patients presenting to EDs with chest pain and onsite visits to each ED in the country. This project would benefit from a part-time project lead.

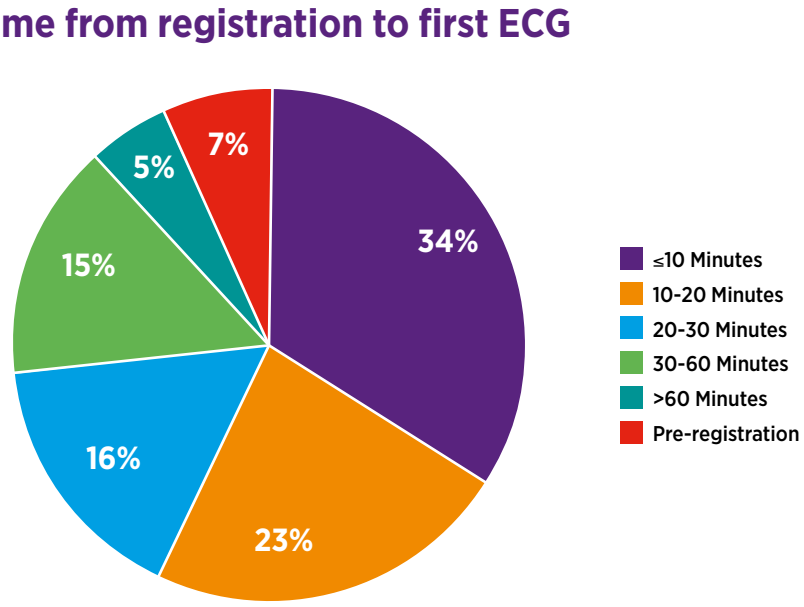


FIGURE 7.7: CONNOLLY HOSPITAL AUDIT RESULTS

Reducing time to patients calling for help for chest pain

1. The current 45% of patients who call for an ambulance within 1 hour of onset of chest pain is too low. The IHAA recommendation for a public information campaign to reduce the time from symptom onset to patients calling for help is well-intended but is challenging to deliver at present because of a lack of ambulances. The current deficit in available ambulances (estimated at 30 nationally) means that patients with ongoing confirmed STEMIs awaiting transfer from a non-PCI ED to a catheterisation laboratory (cath lab) in a PCI centre are waiting excessively long times for transfer.

2. It is not possible to prioritise patients with undifferentiated chest pain over those who are actually having a STEMI. While the National Heart Programme strongly supports the concept of a public information campaign, this cannot be commenced until there is an increase in the number of ambulances on the road.

Ambulance arrival times to patients having a STEMI

No data are currently available on the time between calling for help and ambulance arrival times for patients having a STEMI. The National STEMI QI collaborative will write to the National Ambulance Service (NAS) requesting these data by county for all patients who call complaining of chest pain and attempt to focus on those patients who were subsequently diagnosed with a STEMI. These data should ideally be included in the NOCA IHAA.

Reducing delays in EDs calling for an ambulance transfer via protocol 37

1. Parallel activation of the ambulance service for patient transfer to a PCI centre while waiting for the PCI centre to accept the case is possible when the level of confidence in the diagnosis of a STEMI and the appropriateness of transfer is high. Some PCI centres may require that only an ED consultant rather than a registrar can make this call.

2. Instant transfer of ECGs from non-PCI-capable EDs to primary PCI centres should be possible by making the same ZOLL ECG transmission system that the ambulances use available in the EDs. Further work is required on the need for and feasibility of rolling out such an ECG transmission system to all EDs.

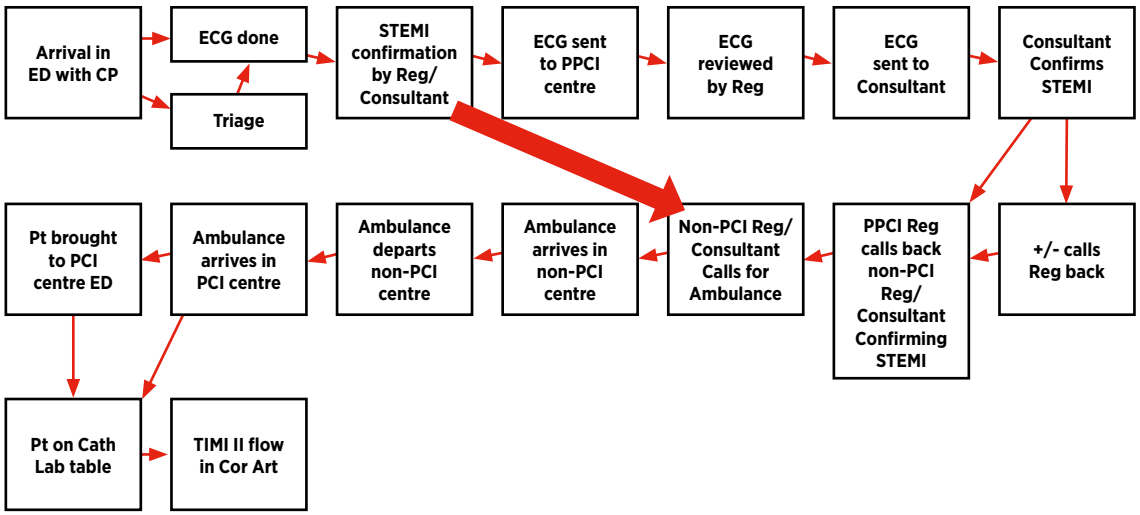


FIGURE 7.8: PARALLEL ACTIVATION OF THE AMBULANCE SERVICE WHILE WAITING FOR CONFIRMATION OF PATIENT ACCEPTANCE BY PRIMARY PCI CENTRE

Opening of University Hospital Waterford as a 24/7 primary PCI centre

The increase in University Hospital Waterford's primary PCI cover from 8.00am to 8.00pm, 7 days a week to 24 hours a day, 7 days a week will significantly reduce transfer times for patients from Wexford and East Waterford for primary PCI in University Hospital Waterford compared with transfer to Cork University Hospital or St James's Hospital.

ED-based thrombolysis

1. It is accepted that patients in certain hospitals (e.g. Sligo University Hospital) will not reach a PCI centre within 90 minutes of a diagnostic ECG because of distance. The other longest drive times to a primary PCI centre were from Wexford General Hospital and University Hospital Waterford (both of which should now be managed more efficiently with 24/7 primary PCI in University Hospital Waterford) and Cavan General Hospital, where the decision has been made to treat patients there with intravenous heparin and transfer them rather than treat them with thrombolysis for the time being, with continuous monitoring of the situation. Figure 7.9 indicates the Google Map drive times between non-PCI-capable hospitals and primary PCI centres, with the percentage of patients with a STEMI making the journey in the target time of less than 90 minutes shown in parentheses. Hospitals with 0% success in achieving the 90 minutes target are shown in red and should be the initial focus of DIDO time reduction strategies and thrombolysis protocols.

2. Centres that consistently miss a 90-minute transfer time to the PCI centre or that have an anticipated wait time for an ambulance of more than 20 minutes should proceed immediately and without delay to thrombolysis for patients with a STEMI.

3. ED-based thrombolysis needs to be supported by an education programme, educational material and/or a poster for each ED.

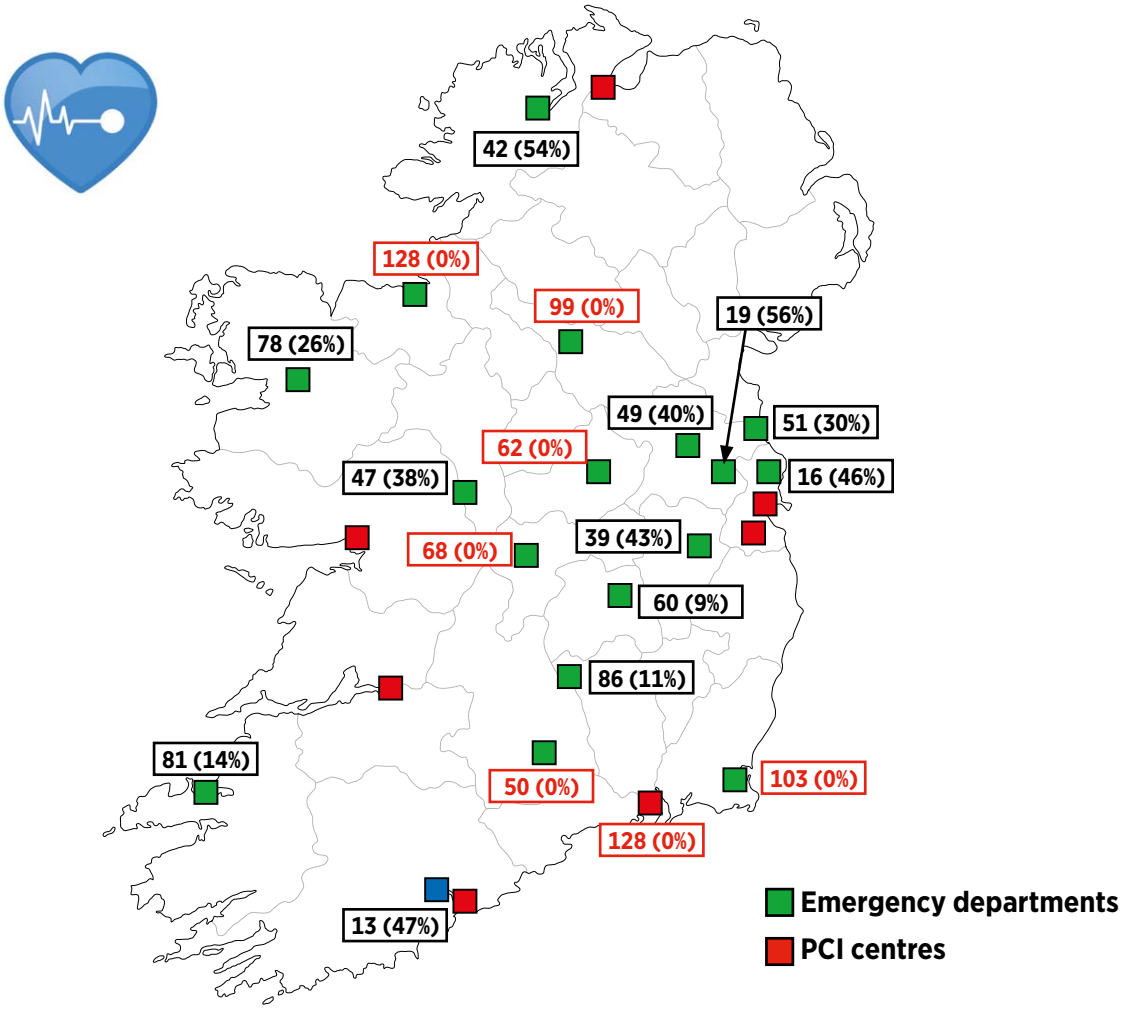


FIGURE 7.9: GOOGLE MAP DRIVE TIMES BETWEEN NON-PCI-CAPABLE HOSPITALS AND PRIMARY PCI CENTRES IN MINUTES, WITH THE PERCENTAGE OF PATIENTS WITH A STEMI MAKING THE JOURNEY IN THE TARGET TIME OF LESS THAN 90 MINUTES SHOWN IN PARENTHESES.

DATA QUALITY IMPROVEMENT PROJECT:
LETTERKENNY UNIVERSITY HOSPITAL

Driving improvements in access to cardiac rehabilitation phase 3 for patients with a STEMI: A practical initiative at Letterkenny University Hospital

BACKGROUND

The NOCA IHAA reports quarterly on nine KQIs. The Clinical Nurse Specialist in Chest Pain (CNS-CP) in Letterkenny University Hospital (LUH) identified KQI 9 as an area for QI in LUH. KQI 9 is the proportion of patients with a STEMI who have the date of commencement of cardiac rehabilitation (CR) phase 3 recorded. The national target is 90%, and in 2023, this was reported as 17% in LUH.

Recognising the importance of CR phase 3 in secondary prevention and long-term patient outcomes, the CNS-CP commenced a QI initiative to improve the proportion of patients who attended CR phase 3.

AIM

The aim of the initiative was to increase the proportion of patients with a STEMI attending CR phase 3 from 17% to over 70% by:

- identifying key challenges affecting patient attendance
- identifying key challenges affecting data collection
- implementing a structured, multidisciplinary follow-up pathway
- using IHAA results to monitor progress and evaluate the effectiveness of interventions.

FIGURE 7.10: CARDIOLOGY JOURNAL CLUB MEETING IN LETTERKENNY UNIVERSITY HOSPITAL:
From left to right: Martina McDaid, cardiac rehabilitation clinical nurse specialist; Dr Manuel Ramos, consultant cardiologist; Karen McCafferty, heart failure clinical nurse specialist – integrated care; Catarina Doddy, heart failure clinical nurse specialist; Sreeji Kurup, chest pain clinical nurse specialist; Marcella Sweeney, cardiac rehabilitation coordinator – community; Aideen McFadden, cardiac rehabilitation staff nurse; Dr Santhosh David, senior consultant cardiologist; Cathy Farrell, heart failure advanced nurse practitioner; Marie Collins, heart failure clinical nurse specialist – integrated care; Dr Janourine Ossman, cardiology team intern; sitting at the front from left to right: Rosie O'Donnell, cardiac rehabilitation physiotherapist; Dr Michelle Bird, cardiology team registrar.

CHALLENGES IDENTIFIED

Several challenges were identified during this project, including difficulties in tracking patients referred to community CR phase 3 services, the lack of a centralised dataset for monitoring CR phase 3 attendance, and delays in obtaining feedback on patients' progress.

ADDITIONAL CHALLENGES INCLUDED:

- lack of real-time data access to track CR phase 3 attendance
- patients not referred in error or delayed referrals on the referral system, especially during staff leave
- limited awareness among clinical teams about hospital-specific NOCA IHAA results.

THE FOLLOWING INTERVENTIONS WERE IMPLEMENTED:

1. Audit feedback to clinical teams:

- Presented NOCA IHAA results at the Cardiology Journal Club (Figure 7.10).
- Raised awareness among consultants, non-consultant hospital doctors and CR coordinators regarding the hospital's low recorded CR phase 3 rates.

2. Enhanced patient identification:

- Developed a monthly list of patients with a STEMI for circulation to rehabilitation teams, ensuring visibility of new discharges.

3. Access to ProWellness database:

- Secured access to the ProWellness system, allowing the CNS-CP to directly verify which patients had attended CR phase 3.
- Facilitated proactive follow-ups for patients who were awaiting CR or delayed for other reasons.

4. Follow-up mechanism for CR phase 3:

- Developed a process for the CNS-CP to follow up on patients whose rehabilitation status was unclear, especially during staff absences.

5. Developed and maintained an Excel tracking sheet, creating a checklist to monitor CR phase 3 status for all patients with a STEMI discharged from LUH.

6. Enhanced multidisciplinary monthly communication:

- Established regular monthly reviews with CR teams (Figure 7.11) to discuss patient progress and resolve referral issues.

FIGURE 7.11: CARDIAC REHABILITATION TEAM:

From left to right: Sreeji Kurup, chest pain clinical nurse specialist; Catarina Doddy, heart failure clinical nurse specialist; Martina McDaid, cardiac rehabilitation clinical nurse specialist; Rosie O' Donnell, cardiac rehabilitation physiotherapist; Dr Manuel Ramos, consultant cardiologist; Aideen McFadden, cardiac rehabilitation staff nurse; Marcella Sweeney, cardiac rehabilitation coordinator – community.

RESULTS

Overall, the percentage of patients who had a CR phase 3 date recorded improved from 17% in 2023 to 73% in 2024. The trend indicates sustained and progressive improvement, demonstrating the effectiveness of enhanced communication, increased data visibility and proactive tracking.

KQI 9	KQI 9	KQI 9	KQI 9	KQI 9
17% N:6 D:35	60% N:6 D:10	68% N:15 D:22	68% N:21 D:31	73% N:27 D:37
Proportion of patients who have cardiac rehabilitation phase 3 date recorded *Target: 90%*	**Proportion of patients who have cardiac rehabilitation phase 3 date recorded** *Target: 90%*	**Proportion of patients who have cardiac rehabilitation phase 3 date recorded** *Target: 90%*	**Proportion of patients who have cardiac rehabilitation phase 3 date recorded** *Target: 90%*	**Proportion of patients who have cardiac rehabilitation phase 3 date recorded** *Target: 90%*
2023	2023 (Q1)	2023 (Q1 & Q2)	2023 (Q1, Q2 & Q3)	2024

IMPACT OF THE QI PROJECT:

- LUH achieved substantial improvement in CR phase 3 uptake, which will improve secondary prevention efforts for patients with a STEMI.
- LUH developed a sustainable workflow, ensuring that no patients with a STEMI are overlooked in the CR phase 3 referral process.
- LUH strengthened collaboration between hospital and community teams, resulting in shared ownership of audit outcomes.

CONCLUSION

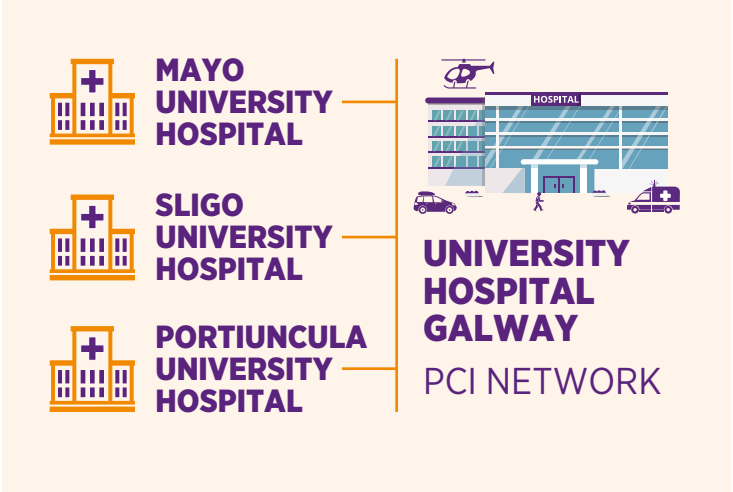
This QI initiative demonstrates how NOCA IHAA data, when translated into actionable multidisciplinary team strategies, can drive significant improvements in patient care pathways. By bridging the gap between audit data and patient care, LUH achieved a nearly four-fold improvement – from 17% in 2023 to 73% in 2024 – in CR phase 3 attendance for all patients with a STEMI.

QUALITY IMPROVEMENT PROJECT:
UNIVERSITY HOSPITAL GALWAY

University Hospital Galway PCI Network Multidisciplinary Review Meetings

University Hospital Galway is a designated primary PCI centre, delivering PCI services to a network of referring hospitals across the west of Ireland. Given the extensive geographical area within its catchment area, effective monitoring of both clinical processes and patient outcomes is essential.

The University Hospital Galway PCI centre holds regular review meetings via Zoom in order to enhance communication between hospitals, educate teams on quality metrics and identify areas for improvement.



All relevant staff within the HSE West and North West health region are invited to join our STEMI Review Meeting via Zoom, including:

- **ED medical and nursing staff representatives**
- **chest pain service representatives**
- **CR representatives**
- **representatives from the NAS**
- **coronary care/cath lab staff.**

MEETING AGENDA

- **Demographics of cases**
- **Referral source**
- **Timeliness of STEMI care**
- **IHAA KQIs**
- **Key findings in IHAA national reports**
- **Case discussions and questions**
- **STEMI form utilisation**

Code STEMI Improved Care for Acute Myocardial Infarction

Saolta Grúpa Ollscoile Cúram Sláinte University Health Care Group

Patient Name: _____
Hospital No: _____
Date of Birth: _____
Address: _____

Referring Hospital: _____ **MEDICAL Consultant:** _____

Time of onset of pain: Date: _____ Time: _____

1st medical contact: Date _____ Time _____ (GP, Ambulance)

Arrival at hospital: Date: _____ Time: _____ (Door-in time)

First diagnostic ECG: Time: _____
It is critical that the correct patient name, date & time is documented on diagnostic ECG.
Please send a copy of diagnostic ECG with the patient.

Time left hospital for PCI centre: Time: _____ (Door-out time)

Thrombolysis time (if administered): Time: _____
Thrombolysis to be administered if transfer to UHG is not possible within 90 mins of diagnostic ECG.
Thrombolysis, when indicated, should be given within 30 mins of door-in time.
C/I to thrombolysis: _____

IV Cannula site: Left ante-cubital fossa preferred **Known allergies:** _____
Avoid lower arm if possible to facilitate possible radial access for PCI.

Next of Kin: _____ **Contact no:** _____
Please confirm that next of kin is aware of patient transfer to Galway. Yes ☐

Medications Administered

Medication Name	Dose	Time
Aspirin (administer if not already administered pre-hospital)		
Anti-platelet agent: Specify		
Others:		

Relevant regular medications:
B-blockers ☐ Warfarin ☐ DOACs ☐ Anti-platelets ☐

Please attach copy of diagnostic ECG Yes ☐

University Hospital Galway Only
Time arrival at Cath Lab: _____
UHG consent ☐ Weight _____ Kg
Patient registered on PAS ☐ UHG identity band ☐
Procedure: Primary PCI ☐ Rescue PCI ☐ Angio only ☐
Reperfusion time: _____

To upload this form, go here.
CCU UHG ☎ 091-544260 ✉ ccu_uchg@hse.ie Please ensure that all data is complete

CHAPTER 8
AUDIT UPDATE

CONTENTS

CHAPTER 8: **AUDIT UPDATE**

The purpose of this chapter is to present an update on previous IHAA national report recommendations, highlight how IHAA data are utilised by other services, and present information on other IHAA activities and projects undertaken by the IHAA in collaboration with other stakeholders, including:

- the EuroHeart Registry Project: the NOCA IHAA impact study report
- reporting of diabetes cases in the IHAA data.

UPDATE ON PREVIOUS IHAA NATIONAL REPORT RECOMMENDATIONS

Table 8.1 displays an update on the recommendations from previous IHAA national reports (NOCA, 2024b; 2023a; 2022).

TABLE 8.1: UPDATE ON PREVIOUS IRISH HEART ATTACK AUDIT NATIONAL REPORT RECOMMENDATIONS

RECOMMENDATION	STATUS	UPDATE
Implement a national STEMI transfer form for use when transferring patients from a non-PCI hospital to a PCI centre.	On hold	**The IHAA has established links with the Emergency Medicine Programme, which is designing an emergency inter-hospital transfer document that includes all data necessary in order to expedite patient treatment and facilitate effective audit. The document is awaiting piloting in a Dublin hospital and the IHAA is awaiting further information on this pilot.**
Improve the data quality of the follow-up dataset within the Heartbeat portal.	Ongoing	**Two KQIs on follow-up data variables are reported on a quarterly basis via the NOCA IHAA dashboard:** **1. KQI 8: Percentage completeness of the 'survival status at 30 days' data point recorded in Heartbeat:** This has increased from 72% in 2022 to 95% in 2024. As a result of this improvement, this variable has been used to report on survival status at 30 days using the Global Registry of Acute Coronary Events (GRACE) stratification (Figure 6.5). **2. KQI 9: Percentage of patients who have a cardiac rehabilitation phase 3 date recorded:** This has also improved, from 33% in 2022 to 63% in 2024 (Figure 3.1). A QI initiative is presented in Chapter 7, and learnings from this project could be replicated in other PCI centres in order to increase the proportion of CR phase 3 dates recorded. Once there is good completeness of this variable in all PCI centres, the IHAA can begin to report on the time it takes for patients to access phase 3 CR.
Introduce a KPI that measures the DIDO time with the aim of achieving the ESC's guideline target of 30 minutes or less.	Ongoing	**The DIDO time by non-PCI centre is now reported annually (Figure 5.15).** **The National Heart Programme has identified this metric as a key area for targeted improvement and is piloting a QI project in two hospitals (Chapter 7).**
Improve timeliness of reperfusion for patients with a STEMI presenting to non-PCI centres.	Ongoing	**This is an ongoing recommendation and focus of the National STEMI Care Pathway Quality Improvement Project.**

Develop a public awareness campaign to encourage people with heart attack symptoms to call 112 or 999 immediately for emergency help in order to facilitate pre-hospital ECG diagnosis of a STEMI.	On hold	**A temporary hold has been placed on the public information campaign after IHAA data showed that the worst transfer times for patients who require primary PCI were not for patients coming directly by ambulance to the PCI centres but for patients being transferred from non-PCI-capable hospital EDs. Further work is required in order to assess the impact of a public awareness campaign on the NAS, and this has been developed further in Recommendation 1 (Chapter 9).**
Improve public awareness of the adverse impact of smoking on heart attack risk.	Ongoing	**The IHAA continues to report on the adverse impact of smoking. IHAA data can be used to support further research or national campaigns in order to continue to reduce the proportion of the population who smoke.**
There should be a national and regional focus on QI in the STEMI care pathway. All percutaneous coronary intervention (PCI) centres, non-PCI-capable hospitals, and ambulance services should participate in the STEMI care pathway quality improvement project.	Ongoing	**The National Heart Programme and the NAS, in collaboration with the HSE National Quality and Patient Safety Directorate, the National Centre for Clinical Audit, and the Royal College of Physicians of Ireland, have embarked on a QI project focusing on the STEMI care pathway, which is known as the STEMI Care Pathway Quality Improvement Project.** **The National Heart Programme has focused on a number of areas highlighted by the IHAA in addition to some other areas where improvement is possible. See Chapter 7 for further information.**
The Irish Heart Attack Audit should complete a survey of PCI networks.	In progress	**The IHAA has discussed this recommendation with the National Heart Programme. Governance structures for the National Heart Programme nationally and regionally are currently under review as part of the implementation of the National Review of Specialist Cardiac Services. The new governance structures will include oversight of primary PCI services and access to CR both nationally and regionally.**
The Irish Heart Attack Audit should report on patients who self-present in all hospitals as a separate cohort and align the timeliness targets with the 2023 European Society of Cardiology guideline.	Complete	**Reporting separately on patients who self-present to a PCI centre has been included in the reporting for 2024.**

VALUE OF AUDIT

It takes many years to embed the capture of high-quality data into practice. All hospitals that provide a primary PCI service are now participating in the IHAA. The increasing visibility of the quality of STEMI care in hospitals in Ireland through the publication of the IHAA annual reports has led to increased participation and improved data quality.

In December 2024, NOCA launched the *Irish Heart Attack Audit National Report 2022 and 2023* (NOCA, 2024b) online. The report's launch, via a webinar on 10 December 2024, received solid coverage across both mainstream media and health-focused outlets, with the following key themes highlighted: delayed symptom recognition, the importance of ambulance access for timely care, increased CR rates, persistent smoking risks, and calls for awareness campaigns. The Irish Independent offered the broadest audience exposure, while the Irish Heart Foundation's media output and the Health Manager Journal provided deeper, domain-specific analysis.

The IHAA dashboard is available at each PCI centre and is refreshed quarterly. This can help support PCI centres to identify areas for improvement and to monitor the impact of QI projects.

The IHAA data inform the national acute coronary syndrome (ACS) KPIs, which in turn inform the HSE's annual National Service Plan. In addition, the IHAA informs the European Society of Cardiology (ESC) Atlas of Cardiology project through the Irish Cardiac Society.

The IHAA now has 8 years of validated data that can be utilised for secondary analysis for research and/or service evaluation. A research project investigating gender-based disparities among Irish patients with a STEMI is currently under way. The IHAA encourages the use of secondary analysis of validated data for service evaluation or research purposes.

The recommendations within the IHAA and the follow-up on previous recommendations will, if implemented, lead to improved outcomes for patients by increasing heart attack awareness in the population; improve the timeliness of reperfusion therapies; support the reporting of risk-adjusted outcomes; and provide information to support the roll-out of QI initiatives.

AUDIT ACTIVITY

EUROHEART REGISTRY PROJECT: THE NOCA IRISH HEART ATTACK AUDIT IMPACT STUDY REPORT

EuroHeart Registry Project

EuroHeart is an ESC initiative based on a collaboration between a number of national registries in association with national cardiac societies. It aims to improve cardiovascular care by fostering international collaboration and supporting high-quality data collection across healthcare systems. The project has developed and published data standards for major cardiovascular diseases and outcomes, such as ACS, PCI, valve disease (including transcatheter aortic valve implantation (TAVI)), heart failure (including cardiac resynchronisation treatment), and atrial fibrillation and associated interventions (EuroHeart, 2024). EuroHeart aims to foster a culture of learning and improvement at a national and international level, a framework for registry-based randomised controlled trials (R-RCTs) and cost-effective safety surveillance of new drugs and devices. EuroHeart publishes an annual report on its website describing the data landscape in participating countries.

In 2023, the cardiac community in Ireland, via the Irish Cardiac Society, agreed to commence work on a project to implement EuroHeart in Ireland, starting with the ACS PCI data standards. The overall aims of the project were outlined in the *Irish Heart Attack Audit National Report 2022 and 2023* (NOCA, 2024b) and can be summarised as:

- pilot testing of data collection and submission (phase 1)
- completing an IHAA impact study
- achieving national data coverage
- expanding the dataset.

The NOCA Irish Heart Attack Audit impact study

As of 2025, the IHAA sources its data via the Hospital In-Patient Enquiry (HIPE) system. HIPE is the principal source of national data on discharges from acute hospitals in Ireland. It collects demographic, clinical and administrative data on discharges from and deaths in acute public hospitals nationally. Additional STEMI-specific data are submitted from each hospital via the Heartbeat portal within the HIPE system. The HIPE data and Heartbeat data are merged to form the final Heartbeat dataset used by the IHAA. EuroHeart offers the IHAA an alternative data source. In 2024, NOCA commissioned the IHAA impact study, which aims to understand the full consequences of potentially moving to use the EuroHeart data collection platform as the data source for the IHAA.

The objectives of the study are as follows:

- Carry out a comprehensive impact study to assess replacing the Heartbeat dataset with the EuroHeart dataset for national STEMI and non-ST elevation myocardial infarction (NSTEMI) data collection.

- Prepare an in-depth report that covers viability, advantages, challenges and recommendations. The report should take into account data quality, operational efficiency, user satisfaction and cost implications.

Methodology

Dataset alignment

The Heartbeat and EuroHeart datasets were aligned in order to assess the differences between the datasets and identify any gaps. This involved a number of iterative rounds. Items with a direct match were quickly identified. Items that did not have a direct match were reviewed clinically in order to assess whether the EuroHeart option would meet the needs of the IHAA. Following this initial review, a clinical expert group was convened to agree recommendations to be made to the IHAA Governance Committee where significant changes may be required to the IHAA variables in order to align with EuroHeart. A Delphi-style questionnaire was administered in order to achieve consensus around the acceptability of these recommendations.

A workshop was held with the EuroHeart Data Science team in order to assess the collection of items that are not currently captured in the EuroHeart dataset. The EuroHeart Data Science team gave several suggestions in terms of how the additional Heartbeat items would fit into the EuroHeart data flow and informed the IHAA impact study project team of newly developed outcome variables that had been added to the dataset and that were not yet available publicly.

The Healthcare Pricing Office was also consulted in order to assess how the HIPE variables that will be retained in EuroHeart would be managed.

Impact assessment

In order to achieve the second objective, the data collections were characterised side by side in terms of their methodologies and systematically evaluated from data management, reporting, technical, and information governance perspectives.

Findings

Dataset alignment

The high-level Heartbeat and EuroHeart alignment is presented in Table 8.2. There are 121 variables in total in Heartbeat, which are made up of 82 Heartbeat variables and 39 variables from HIPE.

The alignment exercise identified 38 variables that can be captured as mandatory level 1 variables and 7 variables that can be captured using the standardised definitions for optional (level 2) items in EuroHeart. The 7 variables that are optional in EH will need to be made mandatory in order to meet the IHAA requirements.

Some Heartbeat items will require minor (n=14) or significant (n=11) changes in order to fully align with EuroHeart. Examples of minor changes include: changing the wording from 'previous' to 'prior' for a number of variables; the collection of an IHAA variable through two variables in EuroHeart instead of one in order to meet the needs of the IHAA; and the exclusion of 'asthma' from the data element 'previous chronic lung disease', as it will now be collected as 'prior COPD' in EuroHeart. The items requiring significant changes are presented in Table 8.3 along with the EuroHeart option. Provided that the information can be collected, the resulting impact should be positive in terms of data quality.

A number of variables from the HIPE dataset (n=28) have not been used for reporting thus far. The IHAA Governance Committee agreed that these items do not need to be included in EuroHeart for the purpose of the IHAA. These variables are collected for administrative purposes and so do not result in any savings in terms of the burden of data collection. An additional three variables were identified as no longer being of value due to practical difficulties with collecting the information retrospectively.

Forty-five items will need to be captured as level 3 variables. These requirements will need to be specified for EuroHeart. This is a complex piece of audit development work that is distinct from the IHAA impact study, and it will require adequate NOCA resourcing in order to ensure that the IHAA requirements are laid out according to the existing EuroHeart data flow and to take into account the appropriate data validation rules relative to EuroHeart. EuroHeart will need to manage the way in which the IHAA requirements are captured and translated to a technical specification. Data capture of many of these variables is dependent on the availability of the Individual Health Identifier in order to record the complex patient flow for people with a heart attack in Ireland's healthcare system.

End user testing should include NOCA as a key stakeholder. A communication strategy will need to be developed in order to manage changes with stakeholders as the project develops.

Additional data points and response options that are relevant for the IHAA can be captured within the existing EuroHeart data flow. A process for submitting change requests will be developed, together with a log. Clinical leadership will prioritise change requests.

TABLE 8.2: IRISH HEART ATTACK AUDIT ITEMS MATCHED TO EUROHEART LEVELS

IHAA items with a suitable level 1 match in EuroHeart (n=38)	IHAA items with a suitable level 2 match in EuroHeart (n=7)	IHAA items that will need to be specified as a level 3 item for EuroHeart (n=45)	IHAA items that do not need to be included in EuroHeart (n=31)
Patient hospital number encrypted*	Previous peripheral vascular disease† (two level 2 options needed to fulfil IHAA requirements)	Principal diagnosis*	Day case indicator*
Sex*	Aspirin pre-admission/ admission‡	Name of hospital (primary PCI centre)*	Marital status*
Residence*	Other antiplatelet pre-admission/admission‡	Admission date (primary PCI centre)*	Specialty*
Age*	Call for help date	Discharge date (primary PCI centre)*	Discharge status*
Admission type*	Call for help time	Discharge code (following primary PCI centre)*	Admission ward*
Previous MI†	Troponin elevation	Transfer hospital to*	Discharge ward*
Previous cerebrovascular disease†	Bleeding (following any intervention)‡ (both level 1 and level 2 options needed to fulfil IHAA requirements)	Length of stay (primary PCI centre)*	Source of admission*
Previous chronic renal failure‡		Discharge diagnosis – other	Private days*
Previous chronic lung disease†		Previous angina†	Public days*
Previous PCI†		Previous hypercholesterolaemia†	Semi-private days*
Previous CABG (coronary artery bypass graft)†		Source of referral (to primary PCI hospital)	Number of days in an intensive care unit environment*
Previous other heart surgery†		Source of referral – other hospital	Transfer hospital from*
Diabetes mellitus‡		Method of admission ambulance	Waiting list indicator*
Smoking status†		Method of admissions ambulance other	Mode of emergency admission*
Previous hypertension†		Referral source – other	Admission weight*
BMI†		Date left first hospital	Day ward indicator*
Symptom onset date		Time left first hospital	Diagnosis-related group*
Symptom onset time		Helicopter transport	Major diagnostic category*
First positive ECG date		First positive ECG location	Medical card indicator*
First positive ECG time		First positive ECG location – other	Name of health insurer*
Arrival at first hospital date		Arrival at primary PCI centre hospital – date	Hospital acquired diagnosis 2–30*
Arrival at first hospital time		Arrival at primary PCI centre hospital – time	Diagnosis 2–30*
Reperfusion therapy date		Patient status on admission	Procedure 1–20*
Reperfusion therapy time		Patient status on admission – other	Procedure 2 to procedure 20*
Was angiogram performed? †		Contraindication to reperfusion therapy reason	Procedure date 1*
Outcome of angiogram/PCI‡		Contraindication to reperfusion therapy reason – other	Procedure date 2 to procedure date 20*
Percutaneous arterial access‡		Reperfusion therapy type	STEMI form
Late reperfusion therapy (thrombolysis or primary PCI)		Angiogram performed as part of?	Late reperfusion therapy reason (if reperfusion therapy outside targets)
LVF assessment		Primary coronary vessel	Late reperfusion therapy reason – other
LVF assessment method‡		Infarct type	
What is the ejection fraction?		Non-culprit lesion	
Heart rate on arrival to cath lab		Stroke during hospital stay	
Systolic blood pressure on arrival at the cath lab		Discharge diagnosis	
Serum creatinine value		Hospital of discharge	
Congestive heart failure		Survival status on discharge home	
Survival status at 30 days post-MI		Aspirin on discharge	
Cause of death		Other antiplatelet therapy on discharge	
Bleeding (following any intervention)‡		Beta-blocker on discharge	
		Statin on discharge	
		ACEI or ARB on discharge	
		Smoking cessation counselling (for smokers)	
		Referral to cardiac rehabilitation (CR) phase 3	
		Hospital for cardiac rehabilitation (CR)	
		Date of first phase 3 CR appointment	
		Comment	

* HIPE variable
† IHAA variable requires minor amendment to align with EuroHeart
‡ IHAA variable requires significant amendment to align with EuroHeart

TABLE 8.3: SUMMARY OF SIGNIFICANT CHANGES TO THE IRISH HEART ATTACK AUDIT DATASET

IHAA option	IHAA response	EuroHeart option	EuroHeart response	Impact for IHAA
Patient hospital number encrypted	Numeric	Patient identification number	Enter the patient's national identification number or the registry generated unique identification number.	Inclusion of the IHI as the patients national ID number would facilitate following of complex patient flow and capacity for data linkage provided it is available for use following the pilot.
Residence	Numeric	Postal code	Enter the postal code for the patient's current residence	Eircode is required for collection of the IHI and will be available in the future.
Admission Type	Elective Elective Readmission Emergency Emergency Readmission Maternity Newborn.	Admission type	Urgent, Emergency, Salvage, and Unknown.	EuroHeart options more specific to cardiac care
Previous Chronic Renal Failure	No, Yes, Unknown	Moderate or severe chronic kidney disease	No, Yes, Unknown	Improved, more appropriate data definition.
Diabetes	Not DM DM (diet control) DM (oral meds) DM (insulin)/ Unknown	Diabetes mellitus	No DM type 1 DM type 2 DM of other unspecified type Unknown	More appropriate terminology with potential for improved data quality.
Aspirin at pre-admission	Yes No Contraindicated Unknown	Aspirin at pre-encounter	No Yes Unknown	Improved face validity of what is intended to be measured.
Other antiplatelet pre-admission / admission	Yes No Contraindicated unknown	P2Y12 Inhibitors at pre-encounter	No Clopidogrel Prasugrel Ticagrelor Other Unknown	Improved face validity of what is intended to be measured. Potential opportunity to capture dual therapy.
Percutaneous Arterial Access	Femoral Brachial Radial.	Percutaneous Arterial Access	Right radial artery Left radial artery Right femoral artery Left femoral artery Right ulnar artery Left ulnar artery Other Unknown	No significant impact. Important that radial and ulnar are combined for reporting for UL access.
LVF Assessment method	Angiogram Echocardiogram Other.	LVF Assessment method	Not performed Echocardiography Other method Unknown	No significant impact. 98% of all LVFs are by echo. No requirement to capture angiogram separately.

TABLE 8.3: SUMMARY OF SIGNIFICANT CHANGES TO THE IRISH HEART ATTACK AUDIT DATASET

IHAA option	IHAA response	EuroHeart option	EuroHeart response	Impact for IHAA
Outcome of angiogram/PCI	Successful PCI Unsuccessful PCI (incomplete) Unsuccessful PCI (patient deceased) PCI not required CABG Other Unknown	Outcome of angiogram/PCI	Lesion success: Y / N, Peri-procedural events: No Procedure-related myocardial infarction Vascular access complication Side branch occlusion Coronary perforation Coronary dissection persisting at end of procedure Brady-arrhythmia requiring pacing Arrhythmia requiring DC cardioversion Cardiogenic shock Cardiac tamponade Acute surgical intervention from cath lab Stroke or transient ischaemic attack (TIA) Death Other Unknown ONLY IF: PCI attempted = Yes CONNECT TO: Segment attempted	More granular response options
Bleeding (following any intervention)	None Intracranial bleed Retroperitoneal haemorrhage Any bleed with Hb fall >5g Any bleed with Hb fall> 3g and < 5g Any bleed with Hb fall <3g Unknown	In hospital events, major bleeding (item 54) In hospital events, major bleeding according to BARC criteria (item 188)	No Fatal bleeding Intracranial haemorrhage Bleeding requiring surgery Bleeding requiring transfusion Other major bleeding Unknown BARC score (0,1,2,3a,3b,3c, 4, 5a, 5b, unknown)	Governance Committee decision made to move to BARC criteria previously. EH will facilitate data capture of same. 'Retroperitoneal' will no longer be captured but no impact as most PCI now UL access only.

Impact assessment

The full impact assessment on data quality, reporting and roles cannot be completed until phase 1 is complete. The following sections describe what is known thus far in relation to governance, data collection, data quality, reporting, information technology (IT) and information governance.

Governance

An independent governance board will be established for the governance of EuroHeart in Ireland, of which NOCA will be a member and will be required to attend quarterly meetings. It has been agreed that NOCA will remain independent with its own governance committee for the IHAA.

Furthermore, in line with reporting requirements for the HSE's new service developments in 2025, the EuroHeart programme will be required to report on progress and deliverables to the National Heart Programme Implementation Oversight Group. This group is currently being convened with membership consisting of senior HSE and Department of Health officials.

Data collection

It is expected that EuroHeart will have a different data collection model than the IHAA. The EuroHeart Registry IT platform has been developed to support standardised data collection. ACS data will be collected by registration officers currently employed in each hospital in the HSE South West health region. Funding has been made available for additional data quality roles in other regions. PCI data are expected to be collected at the point of care, with extraction from usual care procedural reports produced by consultant cardiologists. NOCA cannot assess the full impact of EuroHeart on IHAA audit coordinator roles until after phase 1. As the HSE South West model for how the hospitals work together differs from those of other regions, a second phase for proof of concept should be implemented in another health region that reflects the complex patient flow between hospitals for patients who experience the spectrum of ACS, NSTEMI and STEMI prior to any further implementation.

Data quality

The EuroHeart implementation group has engaged with Systematized Nomenclature of Medicine Clinical Terms (SNOMED CT) and the HSE Data Specification Management Programme in order to ensure that international data standards will be met. It has also engaged with the team implementing the Individual Health Identifier in order to ensure that data linkage will be possible in the future.

A data quality process statement (with agreed end-to-end processes for validation of the full dataset, including IHAA items, coverage and completeness, and training plan), in addition to a post-phase 1 data quality assessment, is required in order to fully assess the impact of implementing EuroHeart on IHAA data quality.

Reporting

Due to significant changes to the dataset and the source of information, there will be a requirement for the IHAA to specify and recode all of its analyses for the provision of dashboard analytics and the national report.

Customising EuroHeart reporting visualisations to include IHAA key quality indicators is out of scope of implementing the EuroHeart digital platform thus, IHAA reporting needs to be managed through data exports/application programming interfaces.

IT and information governance

Data linkage has been made available in the most recent EuroHeart update (May 2025). While data linkage is out of scope for phase 1, linkage provides the opportunity to obtain some of the items required for the IHAA directly from hospital patient administration systems and HIPE once the Individual Health Identifier is operational.

Private hospitals will access the EuroHeart platform through the Citrix portal. The IT build is expected to take 4–6 months.

NOCA and EuroHeart will need to agree the information governance framework and a process for managing data access requests.

Figure 8.1 summarises the known impacts of EuroHeart on NOCA and the IHAA.

IMPACTS OF EUROHEART ON NOCA

Prior to the completion of phase 1:

- NOCA will retain its own independent IHAA Governance Committee and be a member of the EuroHeart Governance Board.
- The IHAA dataset requirements will be provided to the EuroHeart IT development team.
- The information governance framework will be agreed between EuroHeart and NOCA.
- NOCA will be included in end user testing of the IT tool.
- Specification and recoding of NOCA analytics will be required for the NOCA dashboard and NOCA reporting.

This work will have a significant impact on NOCA resources.

If EuroHeart is successfully implemented:

- The IHAA will have a new data source through EuroHeart, delivered through the EuroHeart IT platform. The impact of EuroHeart on data quality and IHAA audit coordinator roles is not yet known.
- The IHAA will need to update its data dictionary to reflect the dataset changes associated with the adoption of EuroHeart data items.
- NOCA will need to develop a business case for the funding of an audit of NSTEMIs.
- A communications strategy will need to be developed in order to ensure that relevant stakeholders are informed of any changes.
- There will be no changes to the IHAA data collection model until after phase 1.

FIGURE 8.1: SUMMARY OF THE IMPACT OF EUROHEART ON THE NATIONAL OFFICE OF CLINICAL AUDIT AND THE IRISH HEART ATTACK AUDIT

The following are required from EuroHeart in order to complete the impact assessment following phase 1:

- gathering of dataset, reporting and IT requirements by the EuroHeart IT development team
- illustration of data flow
- completion of the data quality process statement, including how training will be delivered, in order to ensure the quality and interpretation of IHAA data
- agreement on the information governance framework
- provision of an extract of IHAA items from phase 1 for NOCA to develop a reporting specification and assess that the process works as intended
- provision of a report of phase 1, including:
  - data quality report
  - key findings
  - evaluation, including user satisfaction
  - learnings for the future

Conclusion

EuroHeart brings a number of opportunities for the IHAA in terms of improvements to the dataset and potential opportunities for international benchmarking through participation in the EuroHeart initiative and the audit of NSTEMI care in Ireland. It will have a significant impact on NOCA resources in specifying IHAA requirements for EuroHeart; analytical recoding for reports and the IHAA dashboard; updating the IHAA data dictionary; and developing a communication strategy to manage the proposed changes.

The full impact on data quality, hospital roles, information governance and IT cannot be assessed until after the first phase of data collection in the HSE South West health region.

In order for EuroHeart work to progress from a NOCA perspective, EuroHeart should provide a suitable resource to NOCA to ensure that the IHAA's needs will be met in the EuroHeart solution, and to complete the impact assessment and support the management of the IHAA in order to meet the key deliverables (Table 8.4).

TABLE 8.4: RECOMMENDATION ARISING FROM THE IRISH HEART ATTACK AUDIT IMPACT STUDY

RECOMMENDATION
The EuroHeart implementation project team should provide a suitable resource to NOCA via a secondment in order to: • deliver the IHAA dataset, reporting and technical requirements in the deployment of EuroHeart • understand the operational processes and outputs of the IHAA in order to maintain data quality and reporting standards • deliver the completed the IHAA impact report • support day-to-day management of the NOCA IHAA as necessary in order to meet the key deliverables. This role should commence for 1.5 days per week initially for 3 months, then increase to 2 days per week until the pilot report is completed, following which it should be reviewed to support national implementation and inclusion of NSTEMI audit in NOCA under the governance of the IHAA.
RATIONALE FOR THIS RECOMMENDATION
The IHAA impact study highlighted the significant impact on NOCA resources of adopting EuroHeart as a data source.
EVIDENCE BASE FOR IMPLEMENTATION
Forty-five IHAA items will need to be captured as level 3 variables, and 7 items can be captured as level 2 variables but need to be mandatory for the IHAA. These requirements will need to be specified for EuroHeart. The specification will require the inclusion of user help text and data validation rules in the EuroHeart dataset. Specification and recoding of NOCA analyses will be required for the NOCA dashboard and NOCA reports.
WHO BENEFITS FROM THE RECOMMENDATION?
EuroHeart's mission is to improve cardiovascular care by monitoring high-quality harmonised patient data at hospital admission and over time. It aims to include a number of diseases across the cardiovascular spectrum over time. Thus, it serves to benefit patients and population health. EuroHeart brings several opportunities for the IHAA in terms of improvements to the dataset and potential opportunities for international benchmarking through participation in the EuroHeart initiative and the audit of NSTEMI care in Ireland. The project team delivering EuroHeart in Ireland is learning from NOCA's well-established expertise in developing and delivering national audits and registries.
RECOMMENDED ACTIONS FOR IMPROVEMENT/CHANGE/IMPLEMENTATION
• Develop a project initiation document for gathering the IHAA requirements in EuroHeart. • Form a project group and agree responsibilities for the gathering of IHAA requirements. • Collaborate closely with the IHAA audit manager and relevant stakeholders in order to specify the IHAA dataset, technical and reporting requirements to be incorporated into EuroHeart. • Agree the statement of work for the EuroHeart IT provider. • Coordinate design meetings and user stories (if required) with the EuroHeart IT provider. • Develop an IHAA testing plan and coordinate and participate in user testing of the IHAA requirements. • Work closely with the NOCA IHAA data analyst to specify the IHAA reporting specification using EuroHeart as the data source. • Develop a communications strategy with the IHAA audit manager in order to manage communications with stakeholders (including public and patient interest representatives) as the project progresses. • Engage with stakeholders – including the IHAA, the National Heart Programme, and public and patient interest representatives – in relation to the inclusion of the audit of NSTEMI care and identifying potentially suitable data items for inclusion in the audit of NSTEMI care. • Support and learn from the IHAA in order to progress the integration of IHAA requirements into EuroHeart; for example, assess IHAA coverage for periodic reporting and support periodic dashboard reporting. • Follow NOCA policies, procedures and guidelines for audit development and the business-as-usual management of the IHAA. • Following the EuroHeart pilot, the role assigned to NOCA from the EuroHeart implementation team should be reviewed for national roll-out and the inclusion of NSTEMI audit. This may involve reviewing processes of care prone to variation that are measurable and amenable to improvement; guideline and data availability; and priorities for national clinical audit.
ACTION OWNER/LEAD
EuroHeart Manager
RECOMMENDED PRIORITISATION OF THESE ACTIONS
This work should commence as soon as possible in order to ensure that the IHAA requirements are met in the build of the EuroHeart IT solution.
EXPLICIT STATEMENT ON RESOURCE DEPENDENCY
The deliverable is dependent on the EuroHeart resource being appointed to NOCA.

UPDATE ON THE REPORTING OF DIABETES IN THE IHAA

Diabetes mellitus is a well-established risk factor for cardiovascular disease. Compared with individuals without diabetes, both those with type 1 or type 2 diabetes have a considerably higher risk of cardiovascular morbidity and mortality, and are disproportionately affected by cardiovascular disease (Martín-Timón *et al*., 2014).

The *Irish Heart Attack Audit National Report 2022 and 2023* (NOCA, 2024b) presented findings on an analysis comparing the coding of diabetes on Heartbeat and HIPE. It found the following:

- Heartbeat captured more cases of type 2 diabetes than HIPE did.
- Heartbeat may be underestimating the rate of type 2 diabetes, as it does not differentiate those on insulin by diabetic type.
- HIPE coding relies on the documentation of diabetes in the healthcare record.

The project indicated three options to improve the reporting of diabetes:

1. Increase the education and training provided to audit coordinators and continue to report using the current Heartbeat diabetes information.
2. Use the HIPE diabetic code to report on diabetes.
3. Revise the Heartbeat dataset to change from identifying cases of diabetes by treatment type to recording the diabetic type.

The IHAA audit coordinators considered various options regarding the recording of diabetes in relation to the Heartbeat dataset. It was confirmed that diabetes data are collected as part of the follow-up data and submitted to Heartbeat. It was agreed that the HIPE episode from the PCI centre may not contain a record of diabetes, especially in cases where it is a new diagnosis made at a referring hospital. As such, there may be inconsistencies between HIPE data and Heartbeat records.

In order to improve data accuracy and consistency, the audit coordinators agreed that the IHAA should update the recording of diabetes within the Heartbeat dataset to specify the type of diabetes (e.g. type 1, type 2). This change will ensure more precise reporting and analysis moving forward.

The options were also reviewed by colleagues in HIPE, which noted that diabetes can only be coded if it is documented in the medical record at the hospital where the episode of care occurs – namely, the PCI centre. It was acknowledged that many cases are treated as day cases in the cath lab, and in such instances, coding is often based solely on the cath lab summary sheet, which may not include all relevant clinical details. As a result, it was agreed that reporting diabetes based solely on HIPE data may not provide the most accurate picture.

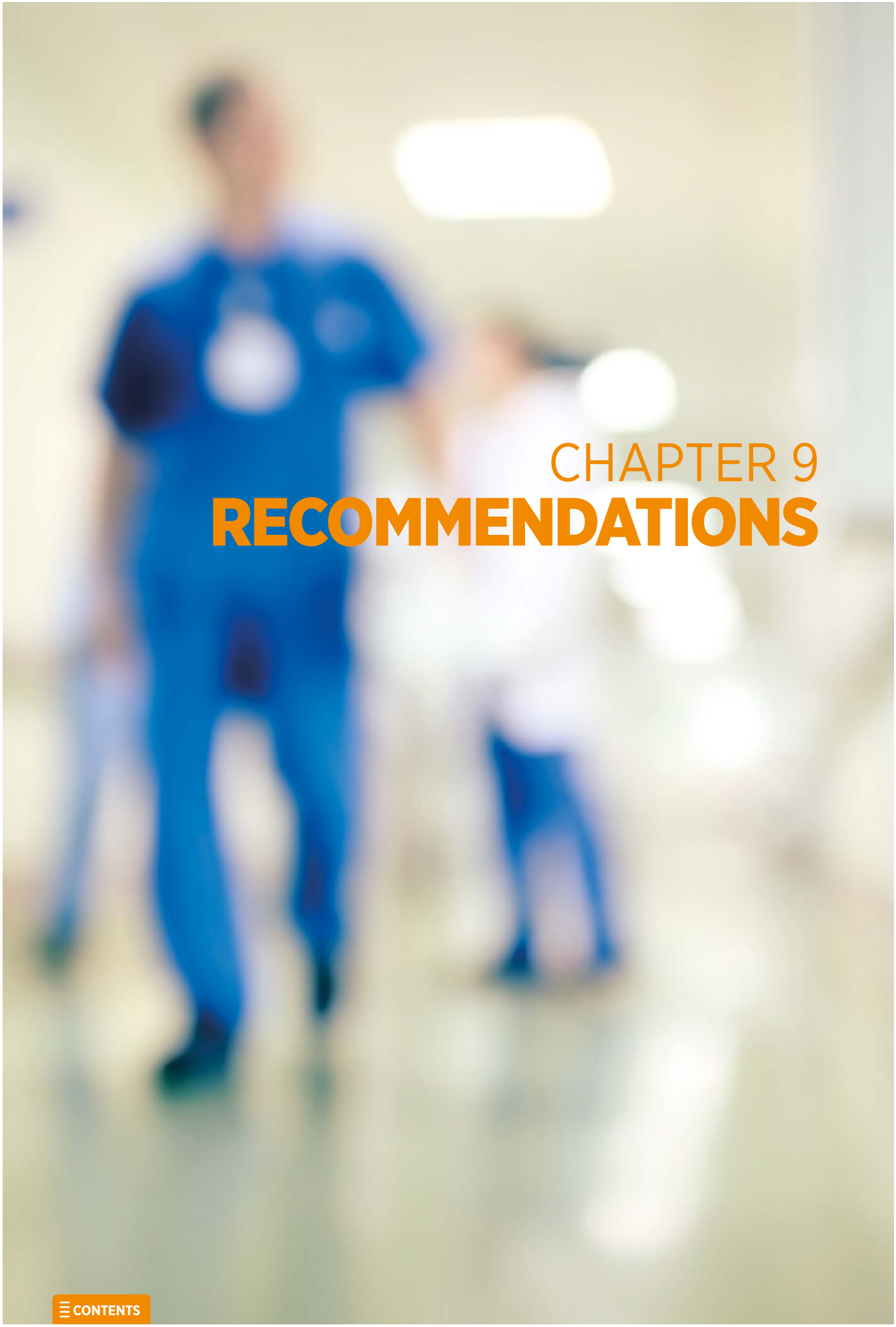
The coding of diabetes in the EuroHeart dataset was also considered. In EuroHeart, diabetes status is documented according to the specific type of diabetes the patient has.

Taking into account all of the above, the findings were presented to the IHAA Governance Committee and it was agreed that the Heartbeat dataset would be amended to record diabetes by diabetic type. This change will commence in January 2026.

AUDIT DEVELOPMENT PLAN

The audit development plan for 2026 includes:

- Amend the Heartbeat dataset to collect information on diabetes by diabetic type.
- Add the door to balloon (DTB) time to the IHAA dashboard.
- Continue to refine the risk-adjusted mortality modelling over time in conjunction with the National Audit of Hospital Mortality.
- Complete the IHAA impact study in order to assess the viability and advantages of, and the potential challenges associated with, collecting a dataset for the IHAA via the EuroHeart Registry for the national collection of both STEMI and NSTEMI cases.



CHAPTER 9
RECOMMENDATIONS

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CHAPTER 9: **RECOMMENDATIONS**

RECOMMENDATION 1

Improve the rate of primary PCI for all patients with a STEMI.

Rationale
Timely primary PCI is recognised internationally as the preferred treatment for STEMI (Byrne *et al*., 2023). Where primary PCI cannot be delivered within a clinically acceptable time frame, thrombolysis is recommended, with early transfer to a PCI centre for angiography (HSE, 2012). The proportion of patients with a STEMI who received primary PCI decreased from 86% in 2017 to 77% in 2024, and the proportion of patients who received thrombolysis increased from 3% in 2017 to 7% in 2024. There is variation between PCI centres in the rate of thrombolysis that is not related to distance to a PCI centre, which may suggest evolving practices among referring hospitals. The findings in this report indicate two main reasons for patients not receiving primary PCI. Firstly, how a patient accesses care initially may influence the type of reperfusion therapy they receive. In 2024, 24% (n=388) of patients with a STEMI did not call an ambulance for help and self-presented to a non-PCI-capable hospital. Primary PCI was performed in 57% (n=292) of patients who initially presented to a non-PCI-capable hospital compared with 87% (n=936) of patients who presented directly to a PCI centre. Patient delay in seeking medical attention is another contributing factor to the decline in the rate of primary PCI. There was an increase in the proportion of patients who were contraindicated for reperfusion therapy due to late presentation. This proportion rose from 7% in 2020 to 11% (n=176) in 2024. The most common contraindication, accounting for 86% (n=152) of these cases, was late presentation, defined as calling for help or arriving at the hospital more than 12 hours after symptom onset. Of those who did call an ambulance, only 45% (n=402) called within 60 minutes of symptom onset in 2024, a decrease from 49% in 2023. These findings suggest that an increasing proportion of patients are delaying seeking medical attention.

What actions should be taken?	Who is responsible for implementation?	When should this be implemented?
• These findings underscore the need for a targeted public awareness campaign to educate the public on recognising heart attack symptoms and the importance of seeking immediate care at an appropriate hospital. A public awareness campaign is expected to result in increased call volumes to the National Ambulance Service (NAS), potentially placing additional pressure on existing resources. The NAS, in conjunction with the National Heart Programme, should be supported to prepare a detailed gap analysis to assess the service impact of a public awareness campaign and to identify the resources required – both capital resources (ambulance units) and human resources (call centre operatives and frontline paramedic crews) – in order to meet this demand.	• NAS • National Heart Programme	As soon as possible

Evidence that the action will be effective

- Studies show that increasing public awareness of the signs and symptoms of heart attack is associated with quicker pre-hospital decision-making (Bray *et al*., 2015) and with a reduction in the number of out-of-hospital cardiac arrests (Nehme *et al*., 2017). A warning sign campaign was in place in Australia from 2009 to 2013, and an impact analysis of this campaign indicated that there was no increase in the proportion of ambulance presentations or in earlier hospital presentations among patients with a STEMI during the campaign. However, there was an increase in the proportion of patients who presented to hospital for whom English was their first language and for those without a prior cardiac history but who had cardiovascular risk factors, suggesting that the campaign impacted preferentially on certain strata in the community (Redwood *et al*., 2022). In Ireland, following the first stroke public awareness campaign, it was found that awareness can wane when campaigns end (Hickey *et al*., 2018), emphasising the need for regular, recurrent campaigns.

Who will benefit from the recommendation?

- All patients with symptoms of a heart attack will benefit from early detection of a STEMI and direct transfer to a PCI centre, as they will be more likely to receive timely reperfusion, with a positive impact on both individual prognosis and overall healthcare costs.

RECOMMENDATION 2

Improve the timeliness of reperfusion for all patients with a STEMI.

Rationale

In 2024, only 58% (n=773) of patients with a STEMI received timely reperfusion (either primary PCI or thrombolysis), continuing a downward trend since 2017, when 67% of patients received timely treatment.

The proportion of patients who received timely primary PCI has seen a steady decline, from 68% in 2017 to 61% in 2024, and the proportion of patients who received timely thrombolysis has also seen a steady decline, from 44% in 2017 to 22% in 2024.

None of the key time intervals in the patient pathway to timely reperfusion met the recommended target of more than 90% of patients in 2024, both for those who presented directly to a PCI centre and even less so for those who presented initially to a non-PCI-capable hospital:

- The proportion of patients receiving an electrocardiogram (ECG) within 10 minutes of arrival at hospital is suboptimal. Only 35% of patients with a STEMI who self-presented to a PCI centre met this target in 2024, and the rate was even lower, at just 28%, for those who self-presented to a non-PCI-capable hospital.
- The 'door in door out' (DIDO) time of 30 minutes – the recommended goal for patients who initially present to a non-PCI-capable hospital and are then transferred by ambulance to a PCI centre – was achieved in only 3% of cases in 2024.
- Seventy-seven percent of patients who presented directly to a PCI centre met the 90-minute target from first medical contact to arrival at the PCI centre in 2024, compared with only 26% of those who were transferred from another hospital.

What actions should be taken?	Who is responsible for implementation?	When should this be implemented?
• All PCI centres must establish and maintain effective governance structures with referring hospitals in their PCI networks in order to ensure coordinated and high-quality care delivery. • NOCA data should be actively utilised in order to identify areas requiring improvement, and quality improvement (QI) initiatives should be developed and implemented in order to enhance timeliness across all key time intervals in the STEMI care pathway. • All hospitals are expected to actively participate in the STEMI Care Pathway Quality Improvement Project that was launched in 2023. This project is led by the National Heart Programme and the NAS, in collaboration with the HSE National Quality and Patient Safety Directorate and the Royal College of Physicians of Ireland.	• Regional executive officers • Regional clinical leads in cardiology • Clinical leads in PCI centres • Cardiology and emergency department (ED) leads in non-PCI-capable hospitals	As soon as possible

Evidence that the action will be effective

- Timely primary PCI is recognised internationally as the preferred treatment for STEMI (Byrne *et al.*, 2023). Where primary PCI cannot be delivered within a clinically acceptable time frame, thrombolysis is recommended, with early transfer to a PCI centre for angiography (HSE, 2012).

Who will benefit from the recommendation?

- Patients with a STEMI will benefit from the establishment of PCI networks that work towards identifying areas for improvement and implementing and monitoring the effect of change. Healthcare teams involved in the care of patients with a STEMI will benefit through increased collaboration with colleagues.

RECOMMENDATION 3

All PCI centres should implement targeted quality improvement initiatives to increase the proportion of patients with a STEMI who arrive at a PCI centre by ambulance who achieve the recommended 'door to balloon' time of 30 minutes or less.

Rationale

In order to meet the target of 120 minutes or less for timely primary PCI, the time between arrival at the PCI centre (door) and the time of reperfusion (balloon/wire cross) should be within 30 minutes. This is referred to as the DTB time.

In 2024, of patients who were transferred to a PCI centre, 63% (n=184) achieved the target DTB time of 30 minutes or less, which represented a decline from 67% in 2023. There was variation between PCI centres in achieving a DTB time of 30 minutes or less, ranging from 80% (n=66) in the Mater Misericordiae University Hospital to 42% (n=13) in University Hospital Waterford. The median DTB time for those who were transferred to a PCI centre in 2024 was 26 minutes (interquartile range (IQR): 18–38 minutes).

Among patients with a STEMI who arrived directly by ambulance to a PCI centre, 55% (n=449) achieved a DTB time of 30 minutes or less in 2024. There was variation between PCI centres in achieving a DTB time of 30 minutes or less among these patients, ranging from 70% (n=135) in the Mater Misericordiae University Hospital to 35% (n=44) in Cork University Hospital. None of the non-designated 9.00am to 5.00pm weekday PCI centres achieved a DTB time of 30 minutes or less in 2024. The median DTB time for patients admitted directly to a PCI centre[50] in 2024 was 29 minutes (IQR: 19–46 minutes).

What actions should be taken?	Who is responsible for implementation?	When should this be implemented?
• NOCA should add the DTB time to the IHAA dashboard as a key quality indicator. • All PCI centres should systematically review their clinical data and operational processes related to the DTB time (the interval between patient arrival at the PCI centre and the time of reperfusion). • Particular attention should be given to identifying delays within the DTB time interval. • Each PCI centre should develop and implement targeted QI initiatives based on their findings, aiming to reduce time to reperfusion.	• NOCA • Clinical leads in PCI centres	2026

Evidence that the action will be effective

- Every minute of delay in the treatment of patients with a STEMI affects 1-year mortality. The risk of 1-year mortality is increased by 7.5% for each 30-minute delay (De Luca *et al*., 2004).

Who will benefit from the recommendation?

- All patients with a STEMI will benefit from timely primary PCI, with a positive impact on both individual prognosis and overall healthcare costs.

[50] The DTB results for those who were admitted directly to a PCI centre in 2024 are not directly comparable to previous reports, as in prior years the directly admitted cohort also included self-presenting patients.

RECOMMENDATION 4

All PCI centres should implement targeted quality improvement initiatives to increase the proportion of patients with a STEMI who self-present to a PCI centre who achieve the recommended 'first medical contact to balloon' time of 60 minutes or less.

Rationale		
In 2024, 30% (n=38) of patients with a STEMI who self-presented to a PCI centre had timely primary PCI (within 60 minutes). The median first medical contact to balloon (FMCTB) time for this cohort in 2024 was 84 minutes (IQR: 54–144 minutes). Reducing the time to ECG is a key opportunity to improve the speed of reperfusion delivery in this group of patients. In 2024, 149 patients with a STEMI self-presented to a PCI centre and had the first positive ECG in the ED. Of those, 35% (n=52) had their first positive ECG within 10 minutes of arrival. The median time to first positive ECG for this cohort was 15 minutes (IQR: 8–30 minutes).		
What actions should be taken?	**Who is responsible for implementation?**	**When should this be implemented?**
All primary PCI centres should: • systematically review clinical data and operational processes related to patients who self-present to the PCI centre • identify specific causes of delay or inefficiency in care delivery from the time of first medical contact to balloon/wire cross • develop and implement targeted QI initiatives based on the findings, aiming to reduce time to reperfusion.	Clinical leads in PCI centres	As soon as possible
Evidence that the action will be effective		
• Timely primary PCI is considered to have been achieved for patients who self-present to a PCI centre when the time between the arrival at the PCI centre (first medical contact) and balloon/wire cross is 60 minutes or less (Byrne *et al*., 2023).		
Who will benefit from the recommendation?		
• All patients with a STEMI will benefit from continuous improvement of the STEMI care pathway, ensuring timely, equitable and effective treatment for all patients, including those who self-present.		

LEARNINGS AND CONSIDERATIONS

SMOKING AND HEART ATTACK

As in previous IHAA reports (NOCA, 2024b; 2023a), the findings regarding the impact of smoking remain clear. In 2024, 36% (n=584) of patients presenting with a STEMI were current smokers, a rate substantially higher than the national population average of 17% (Department of Health, 2024). Smoking is associated with an earlier onset of STEMI: on average, smokers present with a STEMI 11 years earlier than individuals who have never smoked. Among female smokers, this gap is even more pronounced, with women who are current smokers experiencing a STEMI approximately 13 years earlier than their non-smoking counterparts. Of those who were reported as current smokers in 2024 (n=584), 95% (n=553) received smoking cessation advice, which is an increase from 86% in 2023.

These findings reinforce the well-established link between smoking and premature cardiovascular events, highlighting the importance of national initiatives such as the HSE Making Every Contact Count programme and the HSE QUIT plan.

AMBULANCE RESPONSE TIMES

The IHAA dataset captures the 'call for help' time, which for those who call an ambulance is the time they called 112/999. These data are used in order to assess the time between symptom onset and the call for help. At present, the ambulance response time is not recorded in the IHAA dataset, and given that the patient pathway to timely reperfusion encompasses pre-hospital transport times, we would like to explore how to develop linkages with ambulance service records. Preliminary discussions have taken place with a research team in the Royal College of Surgeons in Ireland, which has developed a process to link audit data with ambulance data, and it is hoped that this project will be extended to include cases of heart attack.

CHAPTER 10
CONCLUSION

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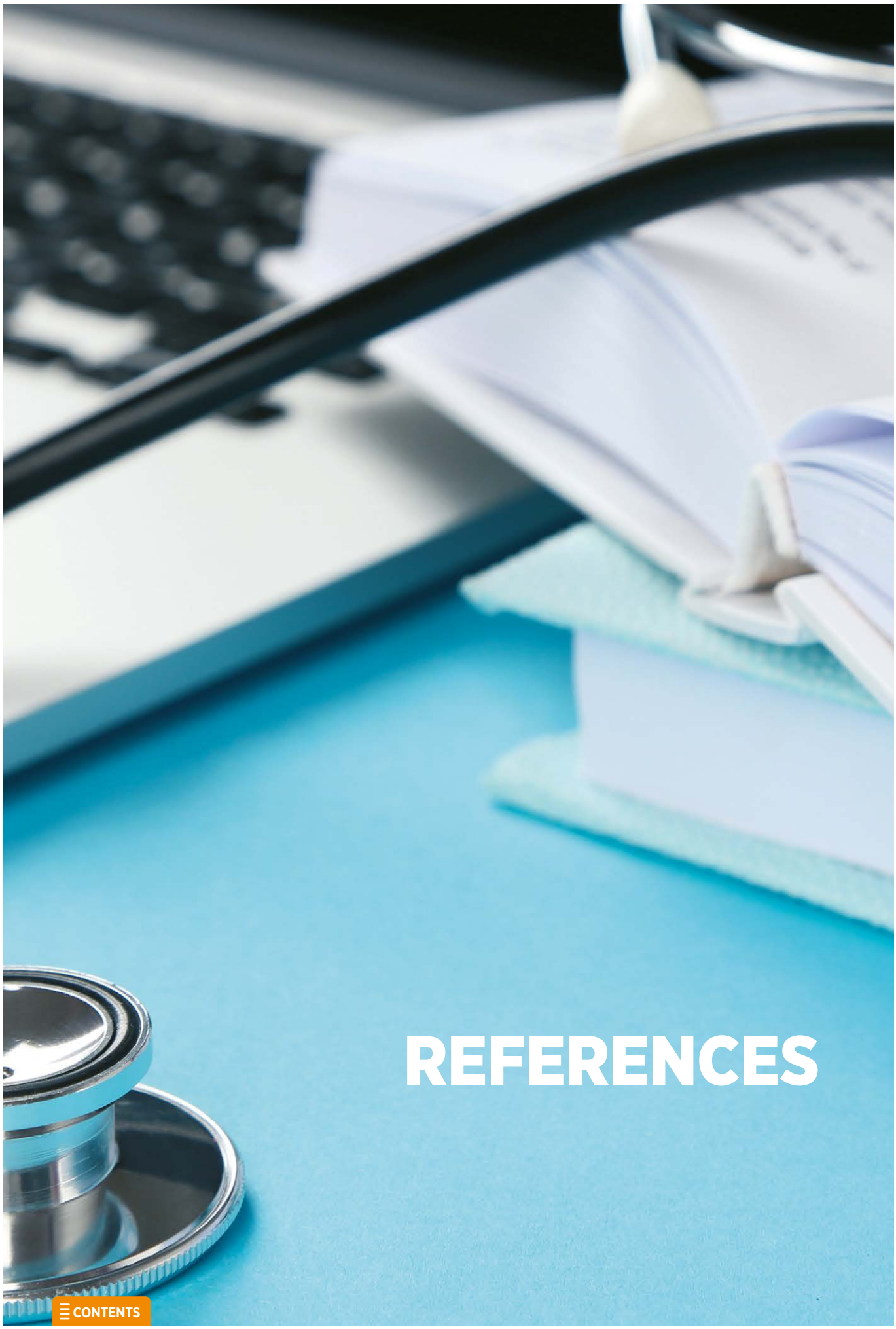
CHAPTER 10: **CONCLUSION**

This report presents an evaluation of performance for 2024 in the management of STEMI in the Republic of Ireland. While outcomes remain within expected mortality ranges, both in our risk-adjusted modelling and compared with international registries, several concerning trends have emerged.

This report highlights systemic delays and declining performance across multiple stages of the STEMI care pathway. Declining primary PCI rates, inadequate ECG timeliness, prolonged DIDO times, reduced ED bypass, and poor adherence to thrombolysis standards (where timely transfer cannot be achieved) collectively compromise reperfusion outcomes. Simultaneously, the persistent burden of modifiable risk factors, particularly smoking in younger patients, highlights the need for continued health promotion and education at population level.

In order to address these challenges, our recommendations highlight system-level improvements in PCI networks, aimed at ensuring rapid and equitable reperfusion through better coordination, audit-driven QI, and reinforcement of standards, and intensified national efforts in prevention and chronic disease management, particularly targeting smoking cessation and cardiovascular risk reduction. Together, these measures can restore momentum in improvement of STEMI care, reduce variation, and ultimately improve survival and long-term outcomes for patients across Ireland. This report also presents some national and local QI projects that, if adopted in all PCI centres, could also drive system-wide change.

We would like to thank everyone who contributed to this report. In particular, we are grateful to Paula Connor for generously sharing her story. Her experience serves as a powerful reminder of the importance of our work and that our ultimate goal is to save lives and ensure that every patient has the best possible outcome.



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Irish National Heart Attack Audit National Report 2024
Dublin: National Office of Clinical Audit.

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