

Health Innovation Fund

Evaluation of Round 1 Project

Outcome Evaluation Report – February 2016

Accelerated Chest Pain Risk Evaluation (ACRE)

Health Innovation Fund – Outcome Evaluation Report February 2016

Published by the State of Queensland (Queensland Health), February 2016

For more information contact:

Healthcare Improvement Unit, Department of Health, GPO Box 48, Brisbane QLD 4001, email HIU@health.qld.gov.au, phone (07) 3328 9148.

Disclaimer:

The content presented in this publication is distributed by the Queensland Government as an information source only. The State of Queensland makes no statements, representations or warranties about the accuracy, completeness or reliability of any information contained in this publication. The State of Queensland disclaims all responsibility and all liability (including without limitation for liability in negligence) for all expenses, losses, damages and costs you might incur as a result of the information being inaccurate or incomplete in any way, and for any reason reliance was placed on such information.

Contents

Contents.....	2
Executive Summary	3
1. Overview.....	7
2. Methodology	9
3. Outcome Evaluation Findings	17
3.1 Effectiveness	17
3.2 Efficiency	62
3.3 Equity	65
3.4 Appropriateness & Acceptability	67
3.5 Sustainability	69
4. Summary.....	72

Executive Summary

Context

In response to increasing demand and patient expectations, continuous improvements and innovative service delivery models must be embraced and evaluated within all health services. The Queensland Department of Health (DoH) has established the Health Innovation Fund (HIF) to support improvement in service delivery and patient care by providing grants for innovative solutions with the potential for state-wide application.

This funding saw the implementation of seven unique projects over a 3-year period; each project addresses one of four priority areas:

- Chronic Disease Management
- Access to Health Services for Rural and Remote Queenslanders
- Expansion of Acute Hospital Substitution Models
- Reducing Waiting Time for EDs, Outpatient and/or Elective Surgery.

The goal of the Accelerated Chest pain Risk Evaluation (ACRE) Project is to increase the efficiency of the assessment of patients with chest pain presenting to Queensland DoH Emergency Departments (EDs) through implementing an Accelerated Diagnostic Protocol (ADP), which:

- Streamlines risk stratification of patients
- Improves resource utilisation
- Maintains or improves clinical safety.

Evaluation Overview

Deloitte was engaged to conduct an evaluation of the HIF Projects. The evaluation consists of three types of evaluation – process, impact and outcome. Deloitte worked with the Project Team to establish an evaluation framework which included a Program Logic, evaluation questions, key indicators and implementation plan in alignment with the timeframe of the Project. To date, a Process Evaluation Report, Impact Evaluation Report and an Outcome Evaluation Report 2015 have been completed. This Report is the final Outcome Evaluation Report for the ACRE Project and builds on the results discussed in the Outcome Evaluation Report 2015.

Key Findings

The 2016 Outcome Evaluation of ACRE revealed that the ACRE Project has continued to progress and achieve the Project's objectives to a significant extent. A summary of the key findings include:

- **Effectiveness:** 77.2% of the targeted 22 sites across Queensland have implemented ADP, indicating a strong and successful uptake of the program. Local contextual factors were primarily cited by those sites who have decided not to proceed with implementation.
- **Effectiveness:** National Emergency Access Target (NEAT) compliance increased by 8.2% in ACRE participating hospitals, including a notable 18.6% NEAT performance improvement at Townsville Hospital. A statistically significant reduction in admission rates across all sites of 10.7% was also experienced.
- **Efficiency:** Across the 17 sites that implemented ACRE, the median total Length of Stay (LOS) for all cardiac chest pain presentations decreased from 20.4 hours to 14.3 hours, a decrease of 29.9%.¹ This saving in LOS applied to the cardiac chest pain cohort

¹ Pre- and post-implementation data for total LOS was available reported as a median by month, by facility. Without unit-level data, the ability to calculate the aggregate median LOS across all sites for the pre- and

represented a saving of \$2,980,709 over the project duration of 20 months. This resulted in a return on investment (ROI) of **365.8%**.

- **Sustainability:** No substantial barriers to the ACRE model beyond the HIF funded period were identified, indicating the ACRE Project is sustainable.

The Key Outcome Evaluation findings of this Report are further discussed in Table 1.

post-implementation period was limited. Aggregates were calculated using a weighted mean of medians method; variance and statistical significance was not able to be determined, which is a limitation and ideally continued data monitoring should occur to ensure the savings can be attributed to ACRE.

Table 1: ACRE Key Outcome Findings

Domain	Major Findings
Effectiveness	<ul style="list-style-type: none"> • 77.2% of the targeted 22 sites across Queensland have implemented ADP, representing a strong and successful uptake of the program. Local contextual factors were primarily cited by those sites who decided not to proceed with implementation. • NEAT compliance increased by a statistically significant 8.2% in ACRE participating hospitals, including a notable 18.6% NEAT performance improvement at Townsville Hospital. • A statistically significant reduction in admission rates for all cardiac chest pain patients was experienced across all targeted facilities. Admission rates fell from 66.9% to 56.2%, this is a significant achievement of the ACRE pathway with evident cost savings and patient flow benefits for targeted facilities. • Total hospital LOS for cardiac chest pain patients was reduced for most sites implementing the ACRE pathway. • The strong clinical leadership approach adopted by the ACRE Project Team was often cited as a critical success factor to the Project and a highly valued element by Stakeholders.
Efficiency	<ul style="list-style-type: none"> • The wide spread implementation of the ACRE pathway indicates the Project is already transferable and scalable. However, key learnings from this model that could be transferred to other areas or expansion projects include: <ul style="list-style-type: none"> – Importance and benefit of interdepartmental collaboration – Ensuring flexibility and adaptability to local site contexts – Strong clinical leadership is critical to ensuring the pathway is adopted and adhered to. • Across the 17 sites that implemented ACRE, the mean total LOS for all cardiac chest pain presentations decreased from 20.4 hours to 14.3 hours, a decrease of 29.9%.² This saving in LOS applied to the cardiac chest pain cohort represented a saving of \$2,980,709 over the project duration of 20 months. This resulted in a ROI of 365.8%. Put simply, approximately \$4 is saved for every \$1 spent on the ACRE Project.
Equity	<ul style="list-style-type: none"> • Limited barriers to access were identified for culturally and linguistically diverse groups, indigenous groups, and people living with a disability. Given the implementation in primarily metro and regional hospitals, some barriers for rural and remote populations were identified. It should be noted that due to the inability to access laboratory troponin testing, implementation of the ACRE pathway

² Pre- and post-implementation data for total LOS was available reported as a median by month, by facility. Without unit-level data, the ability to calculate the aggregate median LOS across all sites for the pre- and post-implementation period was limited. Aggregates were calculated using a weighted mean of medians method; variance and statistical significance was not able to be determined, which is a limitation and ideally continued data monitoring should occur to ensure the savings can be attributed to ACRE.

Domain	Major Findings
	<p>could not occur in rural hospitals.</p> <ul style="list-style-type: none"> Overall, the ACRE Project is well aligned to patient need.
Appropriateness & Acceptability	<ul style="list-style-type: none"> A high degree of support for the ACRE Project was expressed by Stakeholders with 79.6% of respondents rating their support a 7, 8, 9 or 10 out of 10 (1 completely unsupportive, 10 completely supportive). Stakeholders were also highly satisfied with the support and materials provided, education delivered and generally the ACRE Project overall. The ACRE Project Team reported a number of strategies utilised to enhance acceptability, these focused on obtaining equal involvement of Emergency and Cardiology clinicians, direct contact with local senior clinicians by ACRE Clinical Leads facilitates increased adoption, and scheduling education sessions with wider staff to address any concerns or misinformation.
Sustainability	<ul style="list-style-type: none"> All Project Team members felt the ACRE Project was to a 'Great Extent' sustainable beyond the HIF funded period, with no substantial barriers to continuing the Project identified. Nonetheless, some concern was raised regarding the impact of clinician staff turnover and the potential for knowledge regarding the pathway to be lost. The growing and robust evidence base supporting the effectiveness of the pathway was cited as a key factor improving the sustainability of the Project. Evidence of broader skill development within the ACRE Project Team was demonstrated, with all team members reporting their project management skills had improved to a 'Great Extent'. This level of skill development will have a positive impact on the sustainability of ACRE. Skill development is also evident amongst Stakeholders surveyed, with 69.5% of respondents either 'Agreeing' or 'Strongly Agreeing' the ACRE Project had built their skills and knowledge about the accelerated process for the assessment of patients with possible cardiac chest pain.

1. Overview

Aim of the Project

The goal of the ACRE Project is to increase the efficiency of the assessment of patients with chest pain presenting to Queensland DoH EDs through implementing an Accelerated Diagnostic Protocol (ADP), which:

- Streamlines risk stratification of patients
- Improves resource utilisation
- Maintains or improves clinical safety.

Additionally, the ADP aims to increase the likelihood for Queensland DoH EDs to achieve the National Emergency Access Target (NEAT). The NEAT mandates that, by 2015, 90.0% of ED patients are to be either discharged or admitted to hospital within four hours of presentation to an ED. The ADP is expected to quickly and safely identify approximately 20.0% of patients presenting to ED with chest pain who are at low risk of a heart attack and eligible for early discharge. Decreased ED wait times have a flow on impact of increasing resource allocation efficiency of EDs by identifying chest pain patients suitable for discharge and outpatient follow-up (after clinical evaluation and blood tests over a period of two hours from presentation).

Expected increased efficiency levels and decreased wait times aim to enable EDs to achieve the NEAT. The objectives provide focus and direction to the achievement of this goal. The following key objectives were developed in consultation with the ACRE Project Team:

- Introduce the clinical redesign project based on the results of the ADAPT trial and to encourage Stakeholders within ED and Cardiology/Medicine to apply the recommendations of the trial and the Nambour Hospital pilot.
- Engage with Stakeholders in order to assist with planning, education and support as required.
- Collect data from Emergency Department Information Systems (EDIS) in order to document outcome measures as indicators of improvement, such as LOS and NEAT performance.
- Reduce inpatient admission rates for ADP patients admitted with chest pain by comparing it with pre-implementation data, from EDIS and Patient Administration System (PAS).
- Transfer diagnostic investigations for ADP patients from an inpatient to an ambulatory setting where feasible.
- Engage relevant policy making organisations to amend State and National guidelines for assessment of patients presenting to ED with chest pain by including the ADP.

In addition to the objectives of the Project, the ACRE Project contributes towards the Health Innovation Fund (HIF) Priority Area: Reducing Waiting Time for EDs, Outpatient and/or Elective Surgery. The objective of this priority area is to facilitate the development and test programs/models which result in improved access in ED, outpatients and elective surgery in a cost effective manner, in 3 years or less.

Background

The ACRE Project was developed as a means to accelerate the translation of research findings into practice and thereby make rapid improvements in the assessment of patients presenting to hospital EDs with chest pain.

Each year in Australia an estimated 500,000 patients present to EDs with undifferentiated chest pain, representing the most common single presentation in adult males and the second most common in adult females. While the majority (up to 85%) of these patients are eventually diagnosed with non-cardiac causes, under the current guidelines their assessment utilises extensive resources and requires extended ED stays (>6-8 hours), or admission for diagnostic testing.

Evidence has emerged which validates alternative risk stratification processes (using ADPs) that allow shorter assessment for certain patients and therefore reduced ED LOS and better adherence to the NEAT.³

In 2012 the ACRE Project was established to commence implementation of a recently derived ADP into clinical practice at a single site (Nambour General Hospital) as a pilot study. Seven months of data were collected which demonstrated approximately 15% of chest pain presentations (20% of 'possible cardiac chest pain' presentations) were able to be assessed using the ADP. This resulted in dramatic reductions in ED LOS in this group, which equated to 121,743 minutes over 6 months, or 0.46 of a staffed and equipped treatment space in the ED.⁴

On the basis of the findings of the pilot study, as well as subsequent analysis which showed these results were maintained, the ACRE Project was funded to roll out the protocol across Queensland.

³ Than M, Cullen L, Aldous S, Parsonage WA, Reid CM, Greenslade J, et al. 2-Hour Accelerated Diagnostic Protocol to Assess Patients with Chest Pain symptoms Using contemporary Troponins as the Only Biomarker: The ADAPT Trial. *J Am Coll Cardiol.* 2012; 59(23): 2091-8. Epub 2012/05/15.

⁴ George T, Ashover S, Cullen L, Larsen P, Gibson J, Bilesky J, et al. Introduction of an accelerated diagnostic protocol in the assessment of emergency department patients with possible acute coronary syndrome: The Nambour Short Low-Intermediate Chest pain project. *Emergency Medicine Australasia.* 2013; 25: 340-344.

2. Methodology

Using the Report of Government Services (ROGS) Performance Indicator Framework as a foundation, the evaluation domains have been defined below:

- **Effectiveness:** Refers to how well the outputs of a service achieve the stated objectives of that service.
- **Efficiency:** Relates service outputs to inputs (technical efficiency) or service outcomes to inputs (cost effectiveness).
- **Equity:** Measures the gap between service delivery outputs or outcomes for special needs groups and the general population. Equity of access relates to all Australians having adequate access to services, where the term adequate may mean different rates of access for different groups in the community.
- **Appropriateness & Acceptability:** The service is appropriate if it meets a client's needs. Appropriateness indicators seek to measure how well services meet client needs and also identify the extent of any underservicing or over servicing.
- **Sustainability:** Involves gauging the capacity of the program to sustain workforce and infrastructure, to innovate and respond to emerging needs.

Outcome Evaluation Questions, Performance Indicators and Data Sources

Performance indicators were identified in order to address each of the outcome evaluation questions; these are outlined in the Table below. In some cases multiple performance indicators were selected to provide a range of perspectives and data sources, enabling triangulation and validation of the evaluation findings.

There are a number of indicators unable to be reported on at this time due to delays in access and other data linkage activities. It is anticipated that these indicators will be included in subsequent reports.

Table 2: ACRE outcome performance indicators

Outcome evaluation domains	Outcome evaluation questions	Performance indicators	Data source
Effectiveness	<ul style="list-style-type: none"> How effectively has the ACRE Project delivered on its intended objectives? 		
	<ul style="list-style-type: none"> Has the clinical redesign project been introduced on the basis of the ADAPT trial? Have Stakeholders been encouraged within ED and cardiology/medicine to apply the recommendations of the trial and Nambour pilot? 	<ul style="list-style-type: none"> Number and proportion of target facilities who implemented the ADP 	ACRE Project Records
	<ul style="list-style-type: none"> Has guidance, documentation and funding been provided across 90% of target hospital sites to assist in implementation of the ADP within 2 years? 	<ul style="list-style-type: none"> Proportion of hospital sites with access to guidance documentation which assists with the implementation of the ADP 	Stakeholder Outcome Semi Structured Interviews (SSI)
	<ul style="list-style-type: none"> Has EDIS data been used to quantify ED and hospital LOS for patients across 90% of target hospitals on a new accelerated pathway within 2 years? 	<ul style="list-style-type: none"> Number and proportion of patients presenting to target EDs treated for chest pain through the ADP, by facility 	EDIS
	<ul style="list-style-type: none"> Has there been a demonstrated improvement in NEAT compliance across target hospital EDs for patients presenting with acute chest pain? 	<ul style="list-style-type: none"> Quarterly NEAT performance across target hospitals for patients presenting to hospital EDs on the ADP pathway, compared to baseline and measured overtime, by facility 	EDIS
	<ul style="list-style-type: none"> Has there been a reduction in: i) the overall hospital Average LOS (ALOS) for 	<ul style="list-style-type: none"> Pre- and Post-ADP Implementation Comparison - 	EDIS

Outcome evaluation domains	Outcome evaluation questions	Performance indicators	Data source
	<p>patients presenting with acute chest pain across 90% of target hospital EDs; and ii) an improvement in NEAT compliance, within 2 years?</p>	<p>NEAT performance for patients presenting to hospital EDs with possible chest pain (ICD Code I20.0) pre- and post-implementation of ADP by facility</p> <ul style="list-style-type: none"> • Comparison of median ED LOS and Admitted LOS between ADP patients and non-ADP patients with possible chest pain (ICD Code I20.0) patients, by facility (NEST) 	
	<ul style="list-style-type: none"> • Has there been a transfer of inpatient Exercise Stress Tests (ESTs) for ADP patients to an ambulatory setting across 90% of target hospitals within 2 years? 	<ul style="list-style-type: none"> • No. and proportion of exercise stress tests undertaken as an outpatient for possible chest pain patients, measured overtime in three specific sites (only metropolitan sites) • No. and proportion of patients on ADP re-admitted for chest pain within 28 days, by facility 	<p>Site-specific data</p> <p>Site-specific data</p>
	<ul style="list-style-type: none"> • What has been the level of engagement from relevant policy making organisations to change the state and national guidelines for assessment of patients presenting to EDs with acute chest pain to include the design of the ADP around which the ACRE Project is designed? 	<ul style="list-style-type: none"> • Communication with relevant policy making organisations 	<p>Project Team Outcome Survey</p> <p>Process Evaluation Tool</p>
	<ul style="list-style-type: none"> • Has the ACRE Project improved awareness and knowledge of the ADP amongst Stakeholders, including HHS Chief Executives (CEs) and clinicians 	<ul style="list-style-type: none"> • Reported awareness of ACRE Projects by region 	<p>Stakeholder Outcome SSI</p>
	<ul style="list-style-type: none"> • What have been the motivating factors and barriers to implementing the ADP? 	<ul style="list-style-type: none"> • Reported motivating factors and barriers to 	<p>Stakeholder Outcome SSI</p> <p>Project Team</p>

Outcome evaluation domains	Outcome evaluation questions	Performance indicators	Data source
	<ul style="list-style-type: none"> What has been the cultural, social-environmental and design factors attributable to the increase in effectiveness of the ACRE Project? How satisfied were clinicians with the ACRE Project? What aspects of the ACRE Project have been successful and/or most valued by Stakeholders? 	<ul style="list-style-type: none"> implementing the ADP by Project Team members, HHSs, EDs, and clinicians Reported cultural, social-environmental and design factors which increased the effectiveness of the ADP, by ACRE Project Team members Clinical leads in EDs/ medical officers/ specialists satisfaction with ADP Reported aspects of the ACRE Project most valued by Stakeholders 	<ul style="list-style-type: none"> Outcome Survey Project Team Outcome Survey Stakeholder Outcome SSI Stakeholder Outcome SSI
Efficiency	<ul style="list-style-type: none"> Did the ACRE Project result in a return on investment? Did the Project result in cost savings? Has there been an improvement in resource utilisation? Is the ACRE Project transferable to other sites? Is it scalable? Are there any specific critical success factors which need to be considered? 	<ul style="list-style-type: none"> Return on investment of the ACRE Project upon completion Reduction in ED LOS X ED per hour cost (\$) X no. patients (measured by facility) Reported transferability and scalability of the ACRE Project to other sites by the Project Team members Reported intention/barriers to continue with the ACRE Project by the Project Team members Reported critical success factors by ACRE Project Team members, clinical leads, DOH QLD, clinicians, HHSs 	<ul style="list-style-type: none"> Various Sources EDIS Project Team Outcome Survey Stakeholder Outcome SSI

Outcome evaluation domains	Outcome evaluation questions	Performance indicators	Data source
Equity	<ul style="list-style-type: none"> Did disadvantaged groups have appropriate access to the ACRE Project or were there barriers? 	<ul style="list-style-type: none"> Reported barriers to access by Project Team members and ED staff No. and proportion of patients presenting to Target EDs treated for chest pain through the ADP, by facility, by remoteness (according to Rural, Remote and Metropolitan Areas (RRMA) Classification) 	<p>Project Team & Stakeholder Outcome Survey</p> <p>EDIS</p>
	<ul style="list-style-type: none"> Did disadvantaged groups achieve the same outcomes? 	<ul style="list-style-type: none"> Quarterly NEAT performance across DoH for patients presenting to hospital EDs on the ADP pathway measured overtime, by facility 	<p>EDIS</p>
Appropriateness & Acceptability	<ul style="list-style-type: none"> Is the ACRE Project accepted by Stakeholders? How was the ACRE Project received? 	<ul style="list-style-type: none"> No. and proportion of Target EDs who chose not to implement the ADP or had an alternative process implemented. Record reason for not implementing Reported views on the level of support for the Project by Stakeholders 	<p>Project Records</p> <p>Stakeholder Outcome SSI</p>
	<ul style="list-style-type: none"> What strategies and interventions are the ACRE Project Team members using at each site to increase acceptability? What is the rationale for using these? 	<ul style="list-style-type: none"> Reported strategies/interventions and approach to increase acceptability by Project Team members 	<p>Project Team Outcome Survey</p>
Sustainability	<ul style="list-style-type: none"> How sustainable is the ACRE Project? What can be done to enhance its sustainability? 	<ul style="list-style-type: none"> Reported views on sustainability of the ACRE Project Reported strategies to improve sustainability 	<p>Project Team Outcome Survey</p>
	<ul style="list-style-type: none"> Has the ACRE Project successfully built the skills 	<ul style="list-style-type: none"> Reported knowledge and 	<p>Project Team Outcome</p>

Outcome evaluation domains	Outcome evaluation questions	Performance indicators	Data source
	and knowledge of key personnel to support sustainability?	skills of Project Team members to implement/continue the ACRE Project <ul style="list-style-type: none"> • Change in score for Sustainability Capability • No. clinicians attending briefing sessions with ACRE Project Team (Project Team to establish register) 	Survey HIF Capability Assessment Tool
	<ul style="list-style-type: none"> • How could the ACRE Project be embedded in the target EDs as 'business as usual'? 	<ul style="list-style-type: none"> • Reported feedback on how the Project could be embedded in EDs by Project Team members and across target hospital EDs 	Project Team Outcome Survey Stakeholder Outcome SSI

Program Logic

A Program Logic was used to establish the key short term and medium to long term outcomes for the ACRE Program. Program Logic maps are used to depict the anticipated cause-and-effect relationships between inputs, activities, outputs, and outcomes, and to provide a platform for an evaluation framework which documents the achievements of the HIF Program. The Program Logic model for the ACRE Program is illustrated in Figure 1.

Figure 1: ACRE Program Logic

Reducing waiting times for ED, outpatient and / or elective surgery services		To develop and test programs/ models which result in improving access in these settings in a cost effective manner. To determine if these models could be implemented across the DoH QLD EDs				
Goal		Increase the efficiency of treatment for chest pain patients presenting to DoH QLD EDs, through implementing an Accelerated Diagnostic Protocol (ADP) which improves risk stratification of patients, improves resource utilisation and maintains or improves clinical safety				
Accelerated chest-pain risk evaluation (ACRE)	Inputs	Process	Outputs	Impacts	Outcomes	
				Year 1	Year 2	Year 3
ACRE's Objectives <ul style="list-style-type: none"> The intention of the ACRE project is that it will be implemented in 90% of the hospitals within DoH QLD over 2 years. It targets a cohort of 20% of patients presenting with possible cardiac chest pain who meet the criteria for ADP. The departments involved would be Emergency, Cardiology, Medicine and Cardiac Investigations Units. Introduce the clinical redesign project on the basis of the ADAPT trial and to encourage stakeholders within ED and cardiology/medicine to apply the recommendations of the trial and Nambour pilot Engage with stakeholders in order to assist with planning, education and support as required Collect data from EDIS in order to document outcome measures as indicators of improvement, such as LOS and NEAT To reduce inpatient admission rates for ADP patients admitted with chest pain by comparing it with pre implementation data, from EDIS and PAS To transfer EST for ADP patients from an inpatient to an ambulatory setting where feasible Engage relevant policy making organisations to amend State and National guidelines for assessment of patients presenting to ED with chest pain by including the ADP. 	HUMAN RESOURCES <ul style="list-style-type: none"> Back-fill clinical leads in ED and Cardiology (Year 1 0.25 FTE, Year 2 0.125 FTE) Back-fill of medical officer (14 x 0.25 FTE) Project officers (2.5 FTE) Technology <ul style="list-style-type: none"> Computers and printers Consumables Financial resources \$999,000	PLANNING FOR STATE-WIDE IMPLEMENTATION <ul style="list-style-type: none"> Engagement of and liaison with State-wide Clinical Networks to support changes to the DoH QLD's Chest Pain Pathway guidelines Engagement of and liaison with the Cardiac Society of Australia and CSANZ and the National Heart Foundation to implement changes to the guidelines for the management of acute coronary syndromes Executive engagement LOCAL LEVEL IMPLEMENTATION <ul style="list-style-type: none"> Identify and appoint key leads/ champions in each HHS Patient awareness kit developed Amend data entry fields in EDIS Develop toolkit for ADP sites Engage and build relationship with ED & Cardiology Project teams redesign local ED and patient flow diagrams and patient pathways to incorporate the ADP in the assessment of patients presenting with chest pain. Education and support is provided to local staff to implement changes in patient management Local hospitals will be engaged to support process changes Patient Processes Patients present to ED with chest pain Attending clinicians undertake accelerated diagnostic assessment <ul style="list-style-type: none"> Low risk patients <ul style="list-style-type: none"> Discharged home Low risk patients return to outpatient clinic for tests High risk patients <ul style="list-style-type: none"> Standard care provided 	Percentage uptake of the ADP in the form of the clinical redesign project, by HHS, to a point where it is part of the guideline for assessment of patients Outcome measure analysis (LOS and NEAT compliance) categorized as per HHS Patient information documents. Intermediate risk patients receive evidence based treatments according to standard of care Communication pathways with GPs established, to receive notification letter and patient information Quarterly Newsletter distributed	Increased awareness of the ACRE projects (by region)	Improved National Emergency Access Target (NEAT) compliance and median LOS from current 8 hours.	Improved work capacity at ED (beds & staff)
				Increased patient awareness of care pathway	Reduction in median hospital LOS for ADP patients from current state of 24.5 hours.	Hospital readmission rates remain at or below current rates for chest pain patients
Increased GP knowledge of patient care pathway	Reduction in inpatient investigations up to 20% of patients with possible cardiac chest pain presentations for inpatient investigations.	Improved timeliness of services				
Increased collaboration between ED & Cardiology	Assumption of a significant drop in transfer rates of ADP – low risk patients with possible chest pain from rural services to tertiary hospitals. This measurement will be made against current rate of transfer.	Equal or improved patient health outcomes for chest pain patients				
	Assumption of improved patient experience as a result of findings from the Nambour.	Positive patient experience				
		Incorporation of ADP into the state-wide chest pain pathway				
		High risk cardiac patients care pathway improves due to the management of low risk patients in ambulatory care				
External Influences						
Availability of other services	Policies/Processes	Other Programs	Socio-demographic factors	Location Factors		
<ul style="list-style-type: none"> There will be a transfer of supply from inpatient to outpatient exercise stress tests 	<ul style="list-style-type: none"> Changes to QAS's procedures in responding to chest pain patients 	<ul style="list-style-type: none"> Other programs currently implemented with impact or focus on patients with chest pain or a heart condition 	<ul style="list-style-type: none"> Socio-demographic factors which impact on pre-determinants for heart conditions, i.e. obesity levels or prevalence of chronic disease 	<ul style="list-style-type: none"> Access to and availability of health services in rural and remote areas Willingness of staff in each location to participate and comply with the protocol 		

Data Collection Tools

Project Team Outcome Survey

An online survey was distributed to the ACRE Project Team members, requesting detail on key aspects of their Projects' delivery and outcomes observed.

Four of the six Project Team members responded to this Survey, representing a response rate of 66.6%.

ACRE Stakeholder Outcome Survey

An online survey was distributed to the key Stakeholders, as identified by the ACRE Project Team. This survey requested details on Stakeholders' views on the effectiveness of the Project, its barriers or enablers to delivery, outcomes observed and views on the scalability and transferability of the Project.

68 Stakeholders responded to this survey, representing a response rate of 28.5%. It should be noted that this survey was distributed to a variety of stakeholders from both administration and clinical roles, subsequently their knowledge of the ACRE Project did vary.

Other Data Sources

The ACRE Project Team collected data from EDIS in sites that had implemented the ADP about patients presenting with possible cardiac chest pain managed on and off the pathway.

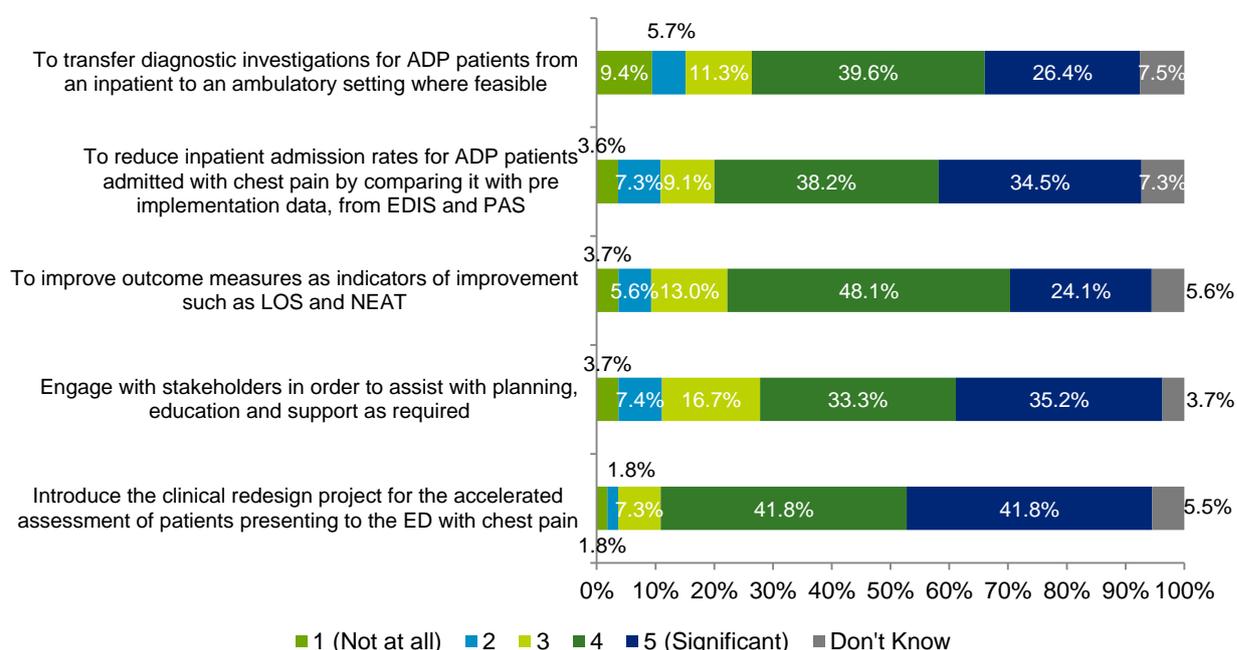
3. Outcome Evaluation Findings

3.1 Effectiveness

3.1.1 How effectively has the ACRE Project delivered on its intended objectives?

From the perspective of Stakeholders, the ACRE Project is delivering strongly on their intended objectives. For all five objectives, between 24.1% and 41.8% of respondents felt they were being achieved to a ‘Significant Extent’. This is illustrated in Chart 1.

Chart 1: Stakeholders views on the achievement of ACRE objectives



Source: Stakeholder Outcome Survey

n= 55

Whilst Stakeholders generally believed ACRE’s objectives were being achieved, suggestions to enhance the achievement of the Project’s objectives were provided. These include:

- Education:** Provide additional education on the importance of adhering to the pathway. There is a perception that it has become a process for all chest pain patients regardless of risk. To counter this, biannual education sessions were suggested. It is evident that the nurses whom received multiple in-services have greater familiarity with the pathway.
- Clinical Engagement:** Further engagement and liaison between ED and Cardiology Departments in-sites to reduce tension caused by pathway non-compliance. Overall wider consultation within sites would assist.
- Rural Expansion:** Further investigation into the possibility of expanding to rural sites would be beneficial.
- Ongoing Education:** Turnover of Registered Medical Officers (RMO) results in loss of knowledge and skills to adhere to the pathway. This results in inappropriate use of the

ACRE pathway by junior doctors. Increased education of junior doctors would assist in addressing this issue.

- **Project Management:** Build stronger ACRE teams at sites and maintain membership to ensure ongoing improvements can be made.

3.1.2 Has the clinical redesign project been introduced on the basis of the ADAPT trial? Have Stakeholders been encouraged within ED and cardiology/medicine to apply the recommendations of the trial and Nambour pilot?

Twenty two target sites across Queensland were identified for implementation of the ADP. Major sites not targeted were the Royal Brisbane and Women's Hospital, as it is the site of ongoing ADP research, Nambour Hospital, as it was the pilot site, the Mater Hospital, as there are issues with the public–private interface reporting, and the Lady Cilento Children's Hospital, as the ADP is specific to patients aged over 18 years.

As at October 2015, ADP had been implemented at the following sites:

- Seventeen sites had implemented the ADP
 - Logan Hospital (October 2013)
 - Redcliffe Hospital (March 2014)
 - Queen Elizabeth II Jubilee (QEII) Hospital (May 2014)
 - Ipswich Hospital (June 2014)
 - Gold Coast Hospital (July 2014)
 - Toowoomba Hospital (July 2014)
 - Townsville Hospital (August 2014)
 - Gladstone Hospital (August 2014)
 - Caboolture Hospital (November 2014)
 - Rockhampton Hospital (April 2015)
 - Robina Hospital (May 2015)
 - The Prince Charles Hospital (May 2015)
 - Mackay Hospital (May 2015)
 - Hervey Bay Hospital (July 2015)
 - Caloundra Hospital (July 2015)
 - Redlands Hospital (Sept 2015)
 - Cairns Hospital (Sept 2015)
- Two sites were in varying stages of pre-implementation planning:
 - Mt Isa Hospital (completed supporting documentation, in the process of determining a potential start date within the next 2 months)
 - Bundaberg Hospital (estimated implementation date of June 2016)
- Two sites had decided against implementing the ACRE Project:
 - Gympie Hospital (due to limited pathology laboratory hours)
 - The Princess Alexandra Hospital (local Stakeholder decision)
- One site was not targeted, due to no pathology laboratory services
 - Maryborough Hospital.

ACRE has achieved 77.2% of their targeted 22 sites across Queensland, this represents strong and successful uptake of the ADP. The ACRE Project Team have reported that on completion

of the Project in approximately 5 months, 86.4% of the targeted sites will have implemented the ADP.

Whilst a small number of hospitals did not proceed with implementation, local contextual factors were primarily cited as reasons not to proceed with implementation. The key tertiary hospital which decided not to proceed with implementation was the Princess Alexander Hospital (PAH). Further investigation into the reasons why implementation did not proceed was undertaken to enhance the Project learnings and obtain additional contextual information. The results of the SSIs conducted with PAH representatives are provided below. It should be noted the points described below reflect the opinions and perspectives of those interviewed. No additional analysis or evidence was sought to verify these statements.

- ED and Cardiology leaders conducted analysis and undertook consultation to determine whether progression with the ACRE pathway would occur. After considerable deliberation the decision not to proceed was made, citing the following key points:
 - The PAH is undergoing substantial change with the introduction of the Digital Hospital and numerous innovation projects underway. This ‘change fatigued’ environment was not considered optimal for introduction of the ACRE pathway. Furthermore, the clinical staff resources required to support the implementation were simply not available.
 - The tertiary nature of the PAH means the cardiac presentations are predominantly high acuity and complex in nature, hence not suitable for the ACRE pathway. Analysis was conducted revealing a small proportion of PAH presentations would be eligible for ACRE. Given this small proportion, priority was allocated to implementing strategies to improve the quality and patient flow of higher acuity patients.
 - The PAH does not commonly implement clinical pathways given the seniority of their medical workforce, this would likely result in low uptake of the pathway.
 - PAH leadership team prioritises interventions which have a deliberate outcome measure. The ACRE Project has not yet collected or published data on the longer term outcomes of patients and those which may have had a subsequent cardiac event.⁵
- Medical leaders involved in the decision were comfortable with the research base supporting the pathway.
- The PAH representatives were very satisfied with the level of engagement and support provided by the ACRE Project Team through the decision making process.
- The PAH recognised the ACRE pathway had been useful in bolstering the confidence of junior doctors in treating chest pain and contributed to effective engagement between ED and Cardiology.

⁵ The ACRE Project Team acknowledged the ACRE Project is based on previously published, widely cited research and undertook a pilot phase to test the pathway. Patient outcomes were followed up during this pilot phase.

Outcome Report 2015 Highlights

As at July 2015, 15 sites had undergone implementation of the ADP representing 68.2% of the targeted hospitals. At this stage Cairns had decided not to proceed with implementation, however since the Outcome Evaluation Report 2015 Cairns through strong engagement from the ACRE Project Team has proceeded in implementing the ADP.

3.1.3 Has there been a demonstrated improvement in NEAT compliance across target hospital EDs for patients presenting with acute chest pain?

In 2011 the NEAT was introduced in response to growing demand for ED services. The intent of this time based, stretch target for ED care was to drive process improvement and address patient safety concerns related to access block.⁶ Since the introduction of NEAT, a multitude of strategies and processes have been implemented in Queensland acute care facilities to improve timeliness of care and patient flow through the ED. This is important contextual information to consider when interpreting the results and impact of the ACRE pathway.

At an aggregate level the implementation of the ADP pathway has had a statistically significant impact on the NEAT compliance for cardiac chest pain patients across all 17 sites. When compared to the Pre-ACRE NEAT compliance an increase of 8.2% can be demonstrated. A select number of hospitals have achieved an increase in NEAT compliance for cardiac chest pain patients well beyond this, with Townsville improving their NEAT performance by 18.6% and Rockhampton Hospital improving by 17.7%. Table 3 notes the change in NEAT compliance across all sites for cardiac chest pain patients, an individual breakdown of the changes across the individual sites is included in Table 4. Graphical representation of NEAT compliance and the total hospital median LOS pre- and post-ACRE follow these tables. The admission rates for each hospital have also been included given the statistically significant decline in admission rate experienced across the sites (see Table 5 and Table 6). This illustrates that the improved NEAT compliance has not come at the expense of increased admissions. This is a considerable benefit of the ACRE Project given the impact avoided admissions has on the broader capacity of the hospital. Furthermore, the change in total hospital LOS for cardiac chest pain patients, pre-and-post ACRE has been calculated in Table 7. The decline in total hospital LOS demonstrated for most sites further indicates the positive impact ACRE has had on the patient flow within targeted sites.

It should be noted that whilst NEAT performance and median total hospital LOS have been compared across the ACRE Project's duration, there are a multitude of confounding factors which impact these indicators on a monthly basis, for example seasonal variability. This should be considered when interpreting the results of the analysis conducted by site.

⁶ Queensland Government. 2014. Queensland Clinical Senate 27-28 March 2014 Meeting Report and Recommendations. Accessed 9th of February 2016. <https://www.health.qld.gov.au/qldclinicalsenate/docs/fin-rep-mar2014.pdf>

Table 3: NEAT compliance pre- and post-ACRE for all sites for cardiac chest pain patients

	Pre-ACRE	Post-ACRE	Difference	95% CI (%)	p-value
	NEAT compliance %(n)				
All sites	55.4% (33179)	63.6% (38053)	8.20%	8.9% - 7.5%	< 0.001

Source: ACRE Process Evaluation Tool (reported from EDIS)

Table 4: NEAT compliance pre-and post-ACRE for cardiac chest pain patients, by individual site

Site	Pre-ACRE	Post-ACRE	Difference	95% CI (%)	p-value
	NEAT compliance %(n)				
Logan	37.4% (2265)	46.7% (4425)	9.3%	11.8% - 6.8%	< 0.001
Redcliffe	48.8% (2119)	49.3% (3510)	0.5%	3.2% - -2.2%	0.40000
QEII	63.3% (1566)	68.2% (3548)	4.9%	7.7% - 2.1%	< 0.001
Ipswich	65.7% (1928)	76.1% (2548)	10.5%	13.1% - 7.8%	< 0.001
Gold Coast	73.2% (3396)	81.3% (5605)	8.1%	9.8% - 6.3%	< 0.001
Toowoomba	66.7% (1614)	73.7% (2529)	6.9%	9.8% - 4.1%	< 0.001
Townsville	43.1% (2422)	61.7% (3913)	18.6%	21.1% - 16.1%	< 0.001
Gladstone	73.8% (665)	78.1% (785)	4.3%	8.7% - -0.1%	0.02912
Caboolture	58.1% (2112)	67.5% (2791)	9.3%	12% - 6.6%	< 0.001
Rockhampton	51.6% (1943)	69.3% (1251)	17.7%	21.2% - 14.2%	< 0.001
TPCH	40.4% (4176)	36.4% (2544)	-4.0%	-1.6% - -6.4%	0.00052
Robina	88.3% (2083)	89.3% (1260)	1.0%	3.2% - -1.2%	0.18851
Mackay	31.0% (1190)	45.0% (764)	14.0%	18.4% - 9.6%	< 0.001
*Hervey Bay	40% (1078)	44.1% (641)	4.2%	9% - -0.6%	0.04495
*Caloundra	77.8% (1127)	83.2% (680)	5.4%	9.2%-1.6%	0.00270
*Redland	45.1% (1438)	50.0% (644)	4.9%	9.5%-0.2%	0.01980

Site	Pre-ACRE	Post-ACRE	Difference	95% CI (%)	p-value
	NEAT compliance %(n)				
*Cairns	52.0% (2057)	48.6% (615)	-3.4%	1.1%--7.9%	0.0708

Source: ACRE Process Evaluation Tool (reported from EDIS)

* These sites undertook ACRE implementation at a later date, therefore have 6 or less months of NEAT data. This smaller sample size has an impact on the statistical analysis conducted and therefore direct comparisons should not be drawn with the remaining sites.

Table 5: Admission rate all cardiac chest pain, pre- and post-ACRE, by individual site

	Pre-ACRE	Post-ACRE	Difference	95% CI (%)	p-value
	Admission rate all cardiac chest pain %(n)				
All sites	66.9% (33179)	56.2% (38053)	-10.7%	-10.0% – -11.4%	< 0.001

Source: ACRE Process Evaluation Tool (reported from EDIS)

Table 6: Admission rate all cardiac chest pain, pre- and post-ACRE, by individual site

Site	Pre-ACRE	Post-ACRE	Difference	95% CI (%)	p-value
	Admission rate all cardiac chest pain %(n)				
Logan	52.9% (2265)	43.7% (4425)	-9.2%	-6.7% – -11.8%	< 0.001
Redcliffe	89.5% (2119)	72.8% (3510)	-16.7%	-14.5% – -18.9%	< 0.001
QEII	38.8% (1566)	32.8% (3548)	-6.0%	-3.2% – -8.8%	< 0.001
Ipswich	73.6% (1928)	36.6% (2548)	-37.0%	-34.0% – -39.9%	< 0.001
Gold Coast	92.5% (3396)	82.6% (5605)	-9.9%	-8.4% – -11.4%	< 0.001
Toowoomba	73.7% (1614)	56.6% (2529)	-17.1%	-14.1% – -20.1%	< 0.001
Townsville	65.3% (2422)	55.9% (3913)	-9.4%	-6.9% – -11.9%	< 0.001
Gladstone	84.7% (665)	75.0% (785)	-9.7%	-5.5% – -13.8%	< 0.001
Caboolture	41.3% (2112)	35.7% (2791)	-5.6%	-2.9% – -8.4%	0.001
Rockhampton	47.3% (1943)	28.9% (1251)	-18.5%	-15.0% – -22.0%	< 0.001
TPCH	78.3% (4176)	71.5% (2544)	-6.8%	-4.7% – -8.9%	< 0.001
Robina	91.0% (2083)	80.3% (1260)	-10.7%	-8.3% – -13.0%	< 0.001

Site	Pre-ACRE	Post-ACRE	Difference	95% CI (%)	p-value
	Admission rate all cardiac chest pain %(n)				
Mackay	78.9% (1190)	58.6% (764)	-20.3%	-16.1% – -24.4%	< 0.001
Hervey Bay*	55.1% (1078)	41.0% (641)	-14.1%	-9.2% – -19.0%	< 0.001
Caloundra*	55.2% (1127)	45.6% (680)	-9.6%	-4.8% – -14.4%	0.001
Redland*	42.8% (1438)	46.6% (644)	3.7%	8.4% – -0.9%	0.0559
Cairns*	42.3% (2057)	75.3% (615)	33.0%	28.5% – 37.5%	< 0.001

Source: ACRE Process Evaluation Tool (reported from EDIS)

*These sites undertook ACRE implementation at a later date, therefore have 6 or less months of post-implementation data. This smaller sample size has an impact on the statistical analysis conducted and therefore direct comparisons should not be drawn with the remaining sites.

Table 7: Total LOS for all cardiac chest pain, pre- and post-ACRE, by individual site

Site	Pre-ACRE	Post-ACRE	Difference (minutes)
	Mean total LOS all cardiac chest pain* (minutes) (n)		
Logan	1008.4 (2265)	666.0 (3275)	-342.4
Redcliffe	1281.8 (2119)	1183.2 (2735)	-98.6
QEII	716.7 (1566)	522.9 (690)	-193.8
Ipswich	1974.2 (1928)	713.7 (1744)	-1260.5
Gold Coast	1262.4 (3396)	1100.5 (4382)	-161.9
Toowoomba	1090.2 (1614)	628.9 (1948)	-461.3
Townsville	1631.2 (2422)	851.8 (3107)	-779.4
Gladstone	894.6 (665)	702.4 (558)	-192.2
Caboolture	684.9 (2112)	443.2 (1960)	-241.7
Rockhampton	874.9 (1943)	610.5 (527)	-264.4
TPCH	1337.7 (4176)	1406.6 (1101)	68.9
Robina	1034.3 (2083)	939.6 (550)	-94.7

Site	Pre-ACRE	Post-ACRE	Difference (minutes)
	Mean total LOS all cardiac chest pain* (minutes) (n)		
Mackay	1997.7 (1190)	1268.6 (330)	-729.1
Hervey Bay**	1458.6 (1078)	1286.9 (206)	-171.7
Caloundra**	1576.1 (1127)	820.2 (238)	-755.9
Redland**	637.5 (1438)	NA [#]	-
Cairns**	NA [#]	NA [#]	-

Source: ACRE Process Evaluation Tool (reported from EDIS)

* Pre- and post-implementation data for total LOS was available reports as a median by month, by facility. Without unit-level data, the ability to calculate the aggregate median LOS across all sites for the pre- and post-implementation period was limited. Aggregates were calculated using a weighted mean of medians method; variance and statistical significance was not able to be determined.

** These sites undertook ACRE implementation at a later date, therefore have 6 or less months of post-implementation data. This smaller sample size has an impact on the statistical analysis conducted and therefore direct comparisons should not be drawn with the remaining sites.

Linked total LOS data not available

Site- Specific Data

Logan Hospital

The average NEAT performance for the 12-month pre-implementation period for patients presenting with possible cardiac chest pain at Logan Hospital was 37.4%. Following implementation of the ADP NEAT performance for all cardiac chest pain patients increased to 46.7%.

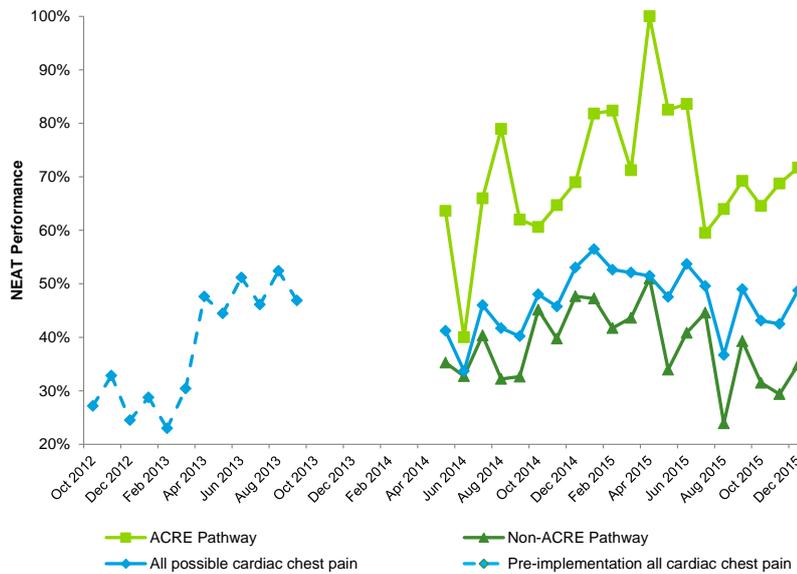
Over the reporting period, the average number of possible cardiac chest pain presentations per month was 221; 26.4% of patients presenting with possible cardiac chest pain from May 2014 to October 2015 were managed on the ADP. After a below-average start in June 2014, NEAT performance of patients managed on the ADP has increased steadily to 72.0% in December 2015. Peaks in NEAT performance were reported in August 2014 (78.9%) and April 2015 (100.0%).

Since October 2014 the NEAT performance of ADP patients has continued to exceed pre-implementation performance. Overall NEAT compliance has improved by 9.3% since the implementation of ACRE to 46.7%; this percentage of improvement is of statistical significance.

Median total hospital LOS for ADP patients has reflected this trend and remained below pre-implementation LOS for the reporting period.

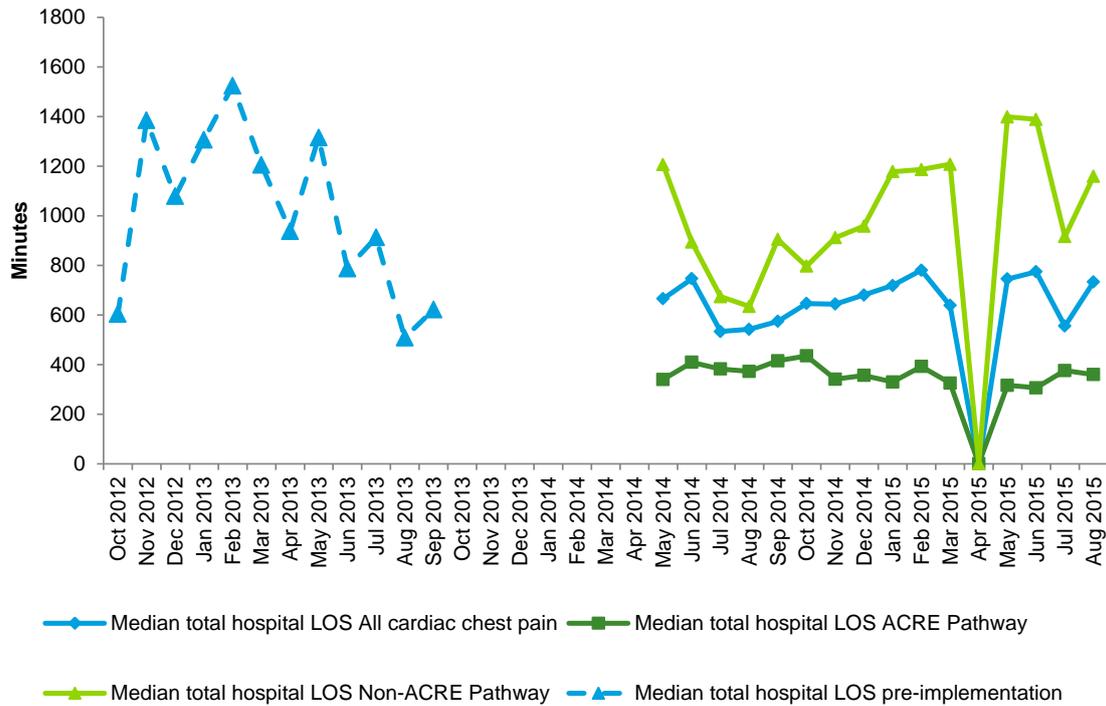
The ACRE pathway had a statistically significant impact on reducing admissions for all cardiac chest pain patients, with the admission rate declining by 9.2%, from 52.9% to 43.7%.

Chart 2: Logan Hospital NEAT pre- and post-implementation performance for cardiac chest pain patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Chart 3: Logan Hospital median total hospital length of stay for ACRE pathway vs non-ACRE pathway patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Note: April 2015 state-wide data excludes Logan - Issue with project box & project data not collected

Redcliffe

The average NEAT performance for the 12-month pre-implementation period for patients presenting with possible cardiac chest pain at Redcliffe Hospital was 48.8%. Following implementation of the ADP NEAT performance for all cardiac chest pain patients rose by 0.5% to 49.3%.

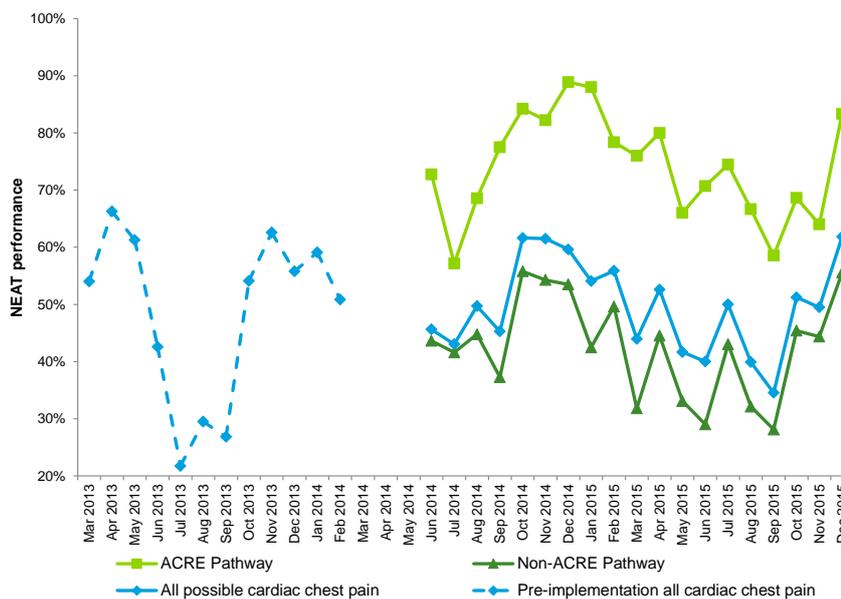
Over the reporting period, the average number of possible cardiac chest pain presentations per month was 185; 21.9% of patients presenting with possible cardiac chest pain over the data collection period were managed on the ADP. NEAT performance of ADP patients has remained above pre-implementation NEAT performance for the duration of the reporting period. Drops in performance in July 2014 (57.1%) and September 2015 (58.5%), were followed by peaks in December 2014 (88.9%) and December 2015 (83.3%).

Overall, NEAT performance for all patients presenting with possible cardiac chest pain was higher than the pre-implementation average; increasing by 0.5%. Performance was highest in December 2014 and 2015 suggesting a seasonal influence.

The reduced total hospital LOS for ACRE patients appears to have made an impact on the broader chest pain cohort with their median LOS remaining below non-ACRE patients.

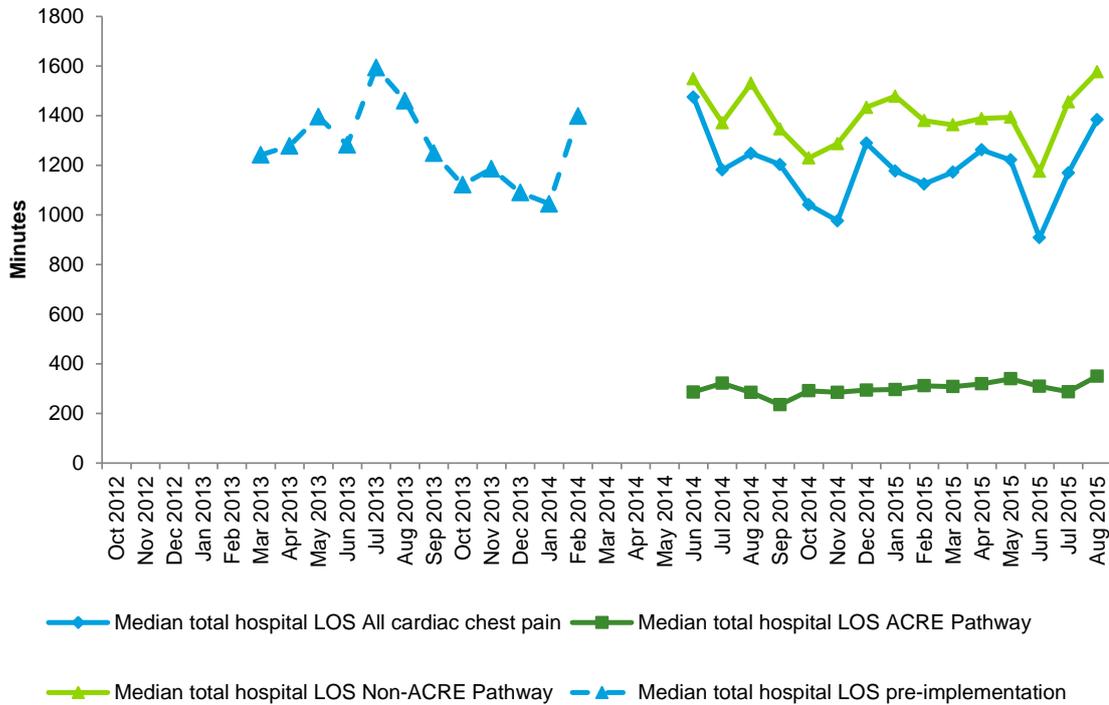
A substantial and statistically significant decline in the admission rate for all cardiac chest pain patients was experienced at Redcliffe Hospital. The admission rate declined by 16.7%, from 89.5% to 72.8%.

Chart 4: Redcliffe Hospital NEAT pre- and post-implementation performance for cardiac chest pain patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Chart 5: Redcliffe Hospital median total hospital length of stay for ACRE pathway vs Non-ACRE pathway patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

QEII Jubilee Hospital

The NEAT performance for the 12-month pre-implementation period for patients presenting with possible cardiac chest pain at QEII Jubilee Hospital was 63.3%. Over the reporting period, this increased by 4.9% to a NEAT performance of 68.2% for all possible cardiac chest pain patients.

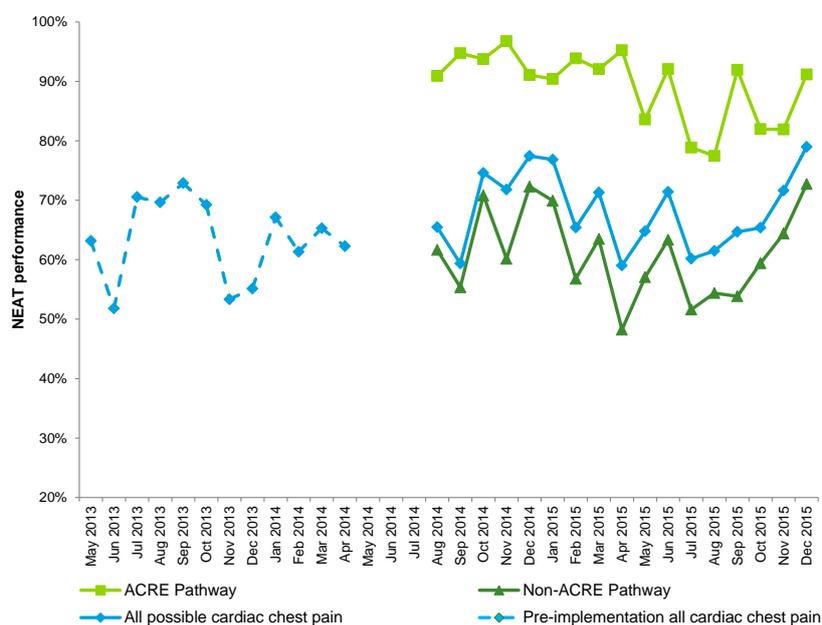
Post implementation, the average number of possible cardiac chest pain presentations per month was 209 (excluding June 2014 and July 2014 data); 27.2% of recorded patients presenting with possible cardiac chest pain in August 2014 to December 2015 were managed on the ADP.

NEAT performance between August 2014 and April 2015 for patients managed on the ADP did not fall below 90.0%. Between May 2015 and December 2015, NEAT performance of patients managed on ADP fluctuated between 77.5% and 92.1%; thus a high NEAT performance was sustained for a majority of the reporting period, and appeared to be unaffected by seasonal influences.

These high NEAT scores are a positive sign that suitable patients are being identified and the pathway facilitated timely risk assessment and discharge as appropriate. Furthermore, Chart 7 shows that those patients on the ACRE pathway have a shorter total hospital LOS than patients who are not on the pathway; this suggests that the ACRE pathway is contributing to efficiencies.

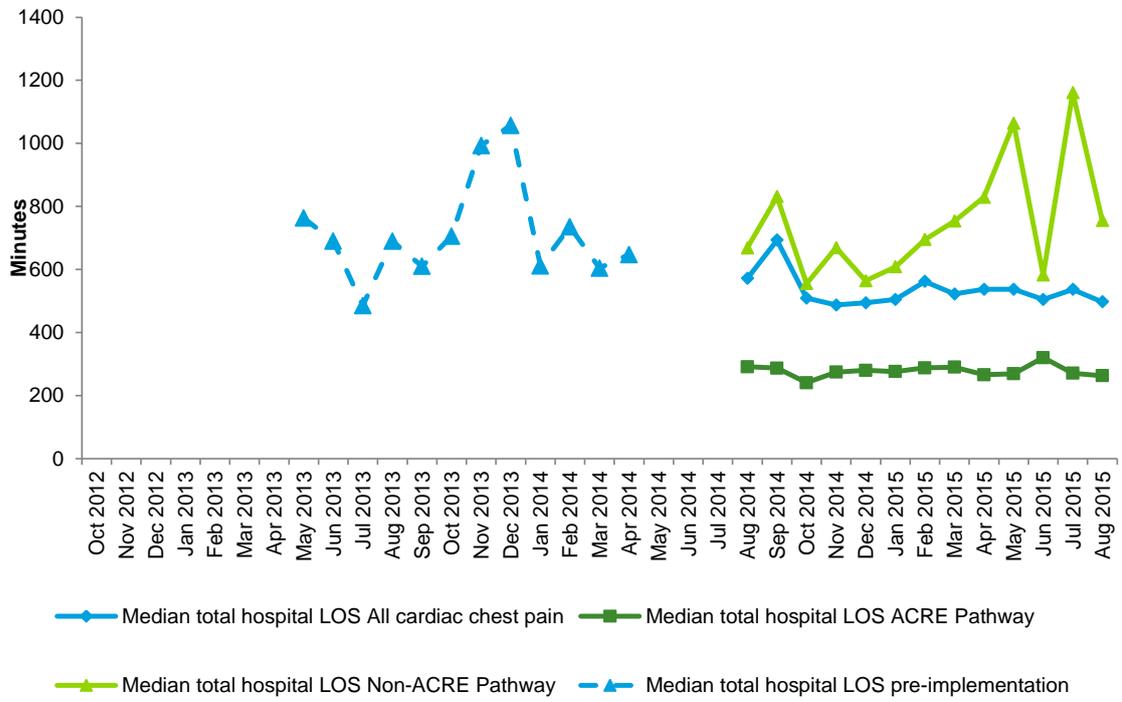
Admission rates declined by 6.0%, from 38.8% to 32.8%, these results were considered statistically significant.

Chart 6: QEII Jubilee Hospital NEAT pre- and post-implementation performance for cardiac chest pain patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Chart 7: QEII Jubilee Hospital median total hospital length of stay for ACRE pathway vs Non-ACRE pathway patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Ipswich

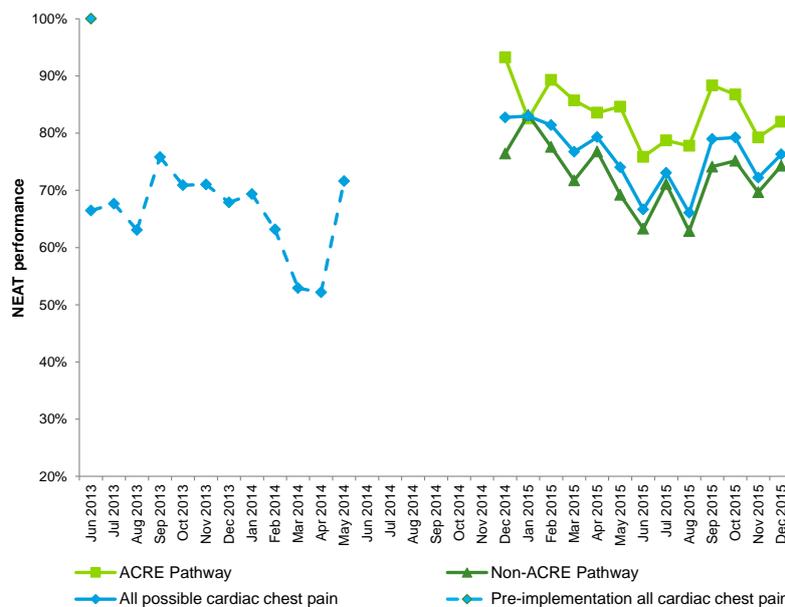
The NEAT performance for the 12-month pre-implementation period for patients presenting with possible cardiac chest pain at Ipswich Hospital was 65.7%. Over the reporting period, NEAT performance for all possible cardiac chest pain patients increased by 10.5% to 76.1% compliance.

Over the reporting period, the average number of possible cardiac chest pain presentations per month was 196; 32.1% were treated on the ADP pathway. The peak NEAT performance for ADP patients during this time was 93.2% in December 2014. Following this peak, NEAT performance dropped in January 2015 to be level with patients not managed by ADP (82.5%). For the remainder of the reporting period, the performance of patients being managed on ADP remained higher than those not managed on ADP, indicating the ADP had a positive impact on Ipswich's NEAT performance.

As expected, Chart 9 demonstrates that total hospital LOS for patients on the ADP is shorter compared to those patients not on the ADP.

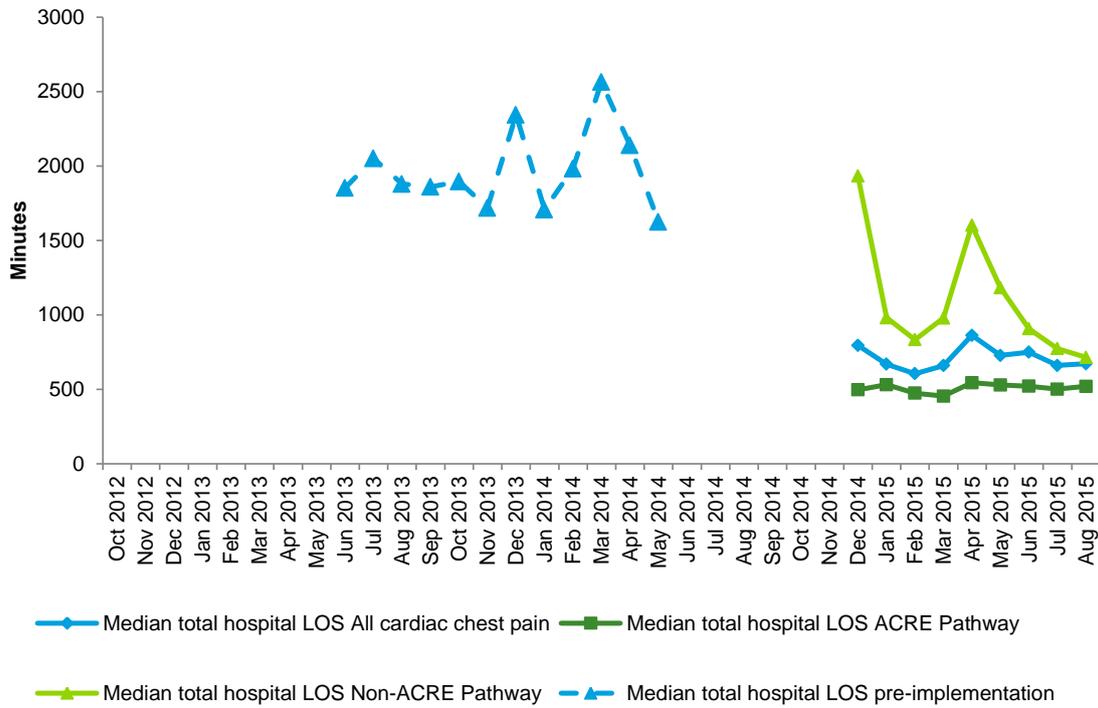
A substantial decline in admission rates was observed, with the post-implementation admission rate declining by 37.0%, from 73.6% to 36.6%.

Chart 8: Ipswich Hospital NEAT pre- and post-implementation performance for cardiac chest pain patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Chart 9: Ipswich Hospital median total hospital length of stay for ACRE pathway vs non-ACRE pathway patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Gold Coast

The NEAT performance for the 12-month pre-implementation period for patients presenting with possible cardiac chest pain at Gold Coast Hospital was 73.2%. Post implementation of ACRE, NEAT performance for all possible cardiac chest pain patients rose by 8.1% to 81.3%.

Over the reporting period, the average number of possible cardiac chest pain presentations per month was 311; 13.4% of recorded patients presenting with possible cardiac chest pain in June 2014 to December 2015 were managed on the ADP. Despite a review of the ADP process in February 2015, NEAT performance for ADP patients for five out of the remainder ten months was comparatively poor. NEAT performance for ADP patients was lower than (three months) or matched with (two months) patients not managed on the ADP, as well as the full patient cohort of possible cardiac chest pain.

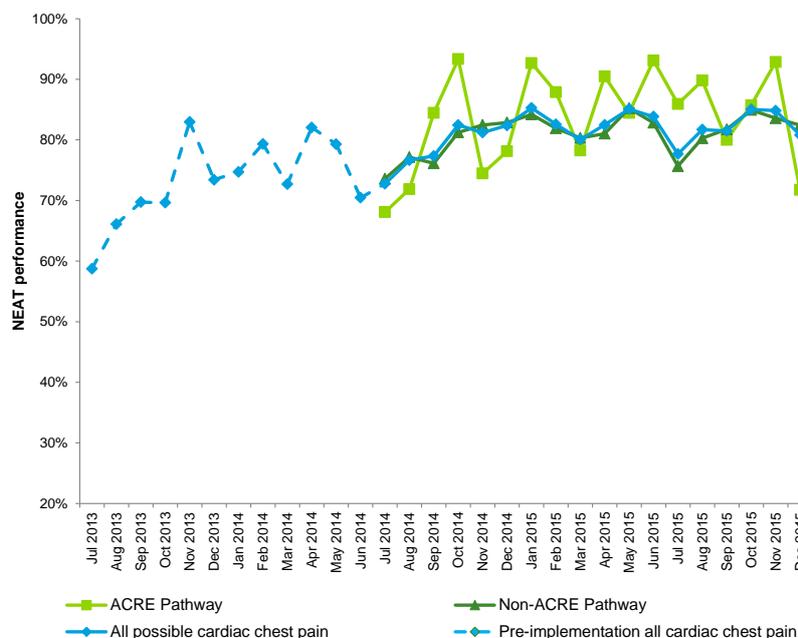
The ADP appears to be having minimal impact on the overall NEAT performance of chest pain presentations, with all chest pain and non-ADP NEAT data points varying on average by 1% across the entire reporting period. Potential reasons for this observed minimal impact include inconsistency in the application of the ADP pathway, particularly if considerable staff turnover has been experienced.

A slight decreasing trend is noted in the median total hospital LOS for patients on the ADP pathway.

The comparatively higher NEAT performance of patients not managed on the ADP in some months, coupled with the lower uptake rate suggests that not all appropriate low-risk patients are being managed via the ADP, and perhaps the benefits for overall NEAT performance are not being realised. Such a result indicates that more effort needs to be directed into ensuring adoption of the ACRE process continues and is suited to the context of the hospital.

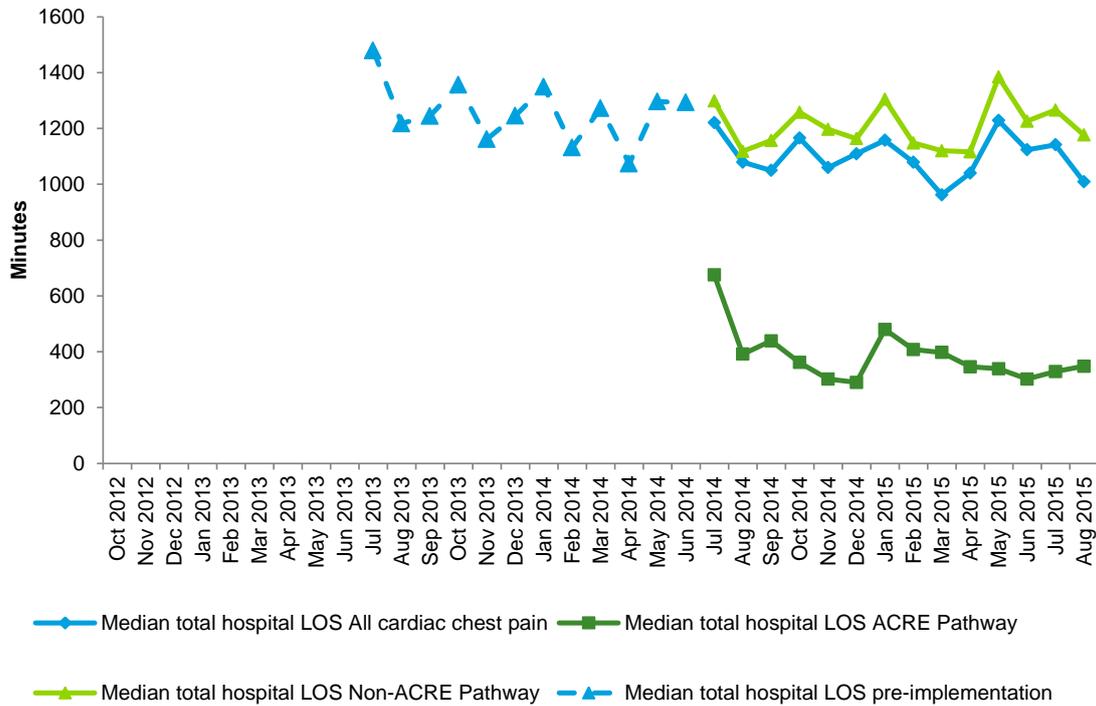
Admission rates for all chest pain patients declined by 9.9%, from 92.5% to 82.6%. These results were considered statistically significant.

Chart 10: Gold Coast Hospital NEAT pre- and post-implementation performance for cardiac chest pain patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Chart 11: Gold Coast Hospital median total hospital length of stay for ACRE pathway vs non-ACRE pathway patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Toowoomba

The average NEAT performance for the 12-month pre-implementation period for patients presenting with possible cardiac chest pain at Toowoomba Hospital was 66.7%. Upon the implementation of ADP, this improved by 6.9% to 73.7% post-implementation for all cardiac chest pain patients.

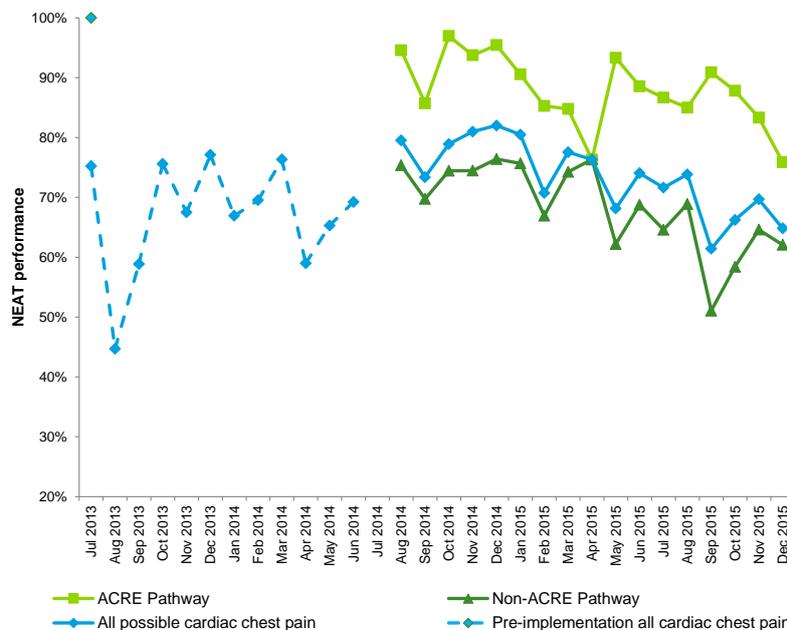
Over the reporting period, the average number of possible cardiac chest pain presentations per month was 149; 26.2% of recorded patients presenting with possible cardiac chest pain in August 2014 to December 2015 were managed on the ADP. The NEAT performance of patients managed on the ADP pathway fluctuated throughout the reporting period. The highest range of performance for ADP was between 94.6% and 97.0%, whereas the lowest range was 75.8% in December 2015.

NEAT performance of all chest pain presentations, and those not managed on ADP were very similar to patients managed on the ADP pathway for the beginning of the reporting period. However, following a matched NEAT performance for all three categories in April 2015 (approximately 76.3%), a greater gap emerged that saw patients managed on ADP remain above pre-implementation performance, and patients not managed on ADP fall below. This drop was enough to cause all chest pain presentations NEAT performance to drop to pre-implementation performance. The median total hospital LOS for ADP patients has consistently remained below both non-ADP patients and all chest pain patients. November 2014 to April 2015 saw a steady increase in the total hospital LOS for patients not managed on the ADP.

Overall, uptake of the ADP was variable month to month, but overall quite good and appears sufficient for the NEAT performance of ADP patients to have an impact on the overall NEAT performance for chest pain presentations for the beginning of the reporting period. This influence appeared to be weaker towards the end of 2015.

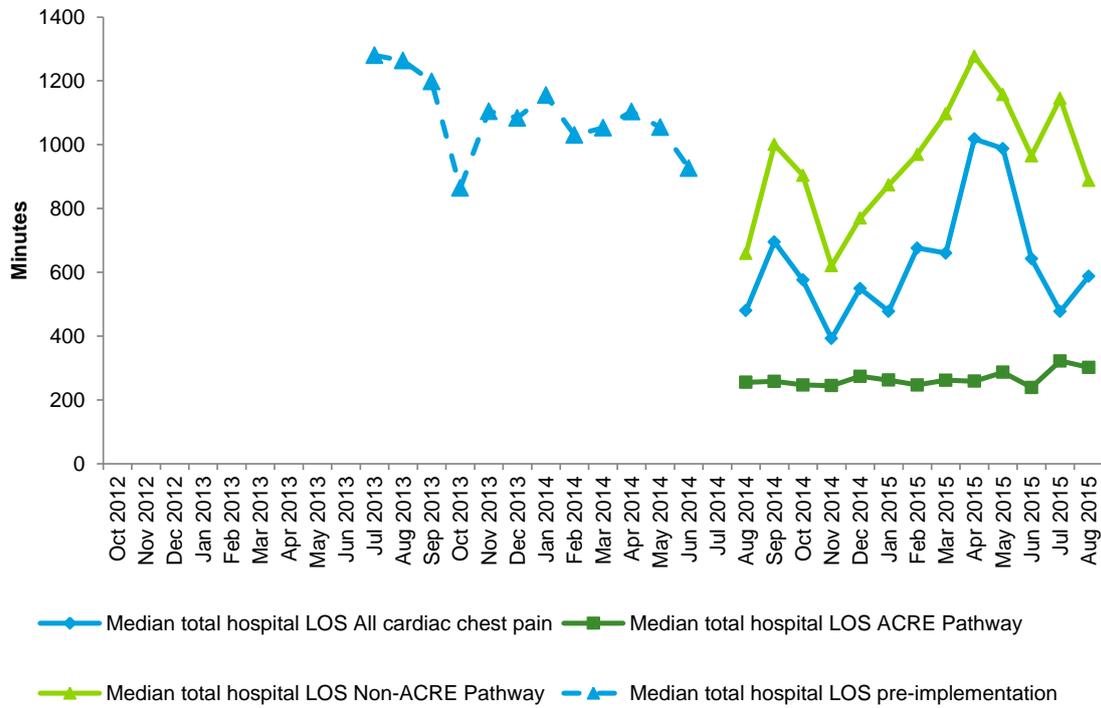
A substantial decline in admission rates across all cardiac chest pain patients was observed, with rates declining 17.1%, from 73.7% to 56.6%.

Chart 12: Toowoomba Hospital NEAT pre- and post-implementation performance for cardiac chest pain patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Chart 13: Toowoomba Hospital median total hospital length of stay for ACRE pathway vs Non-ACRE pathway patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Townsville

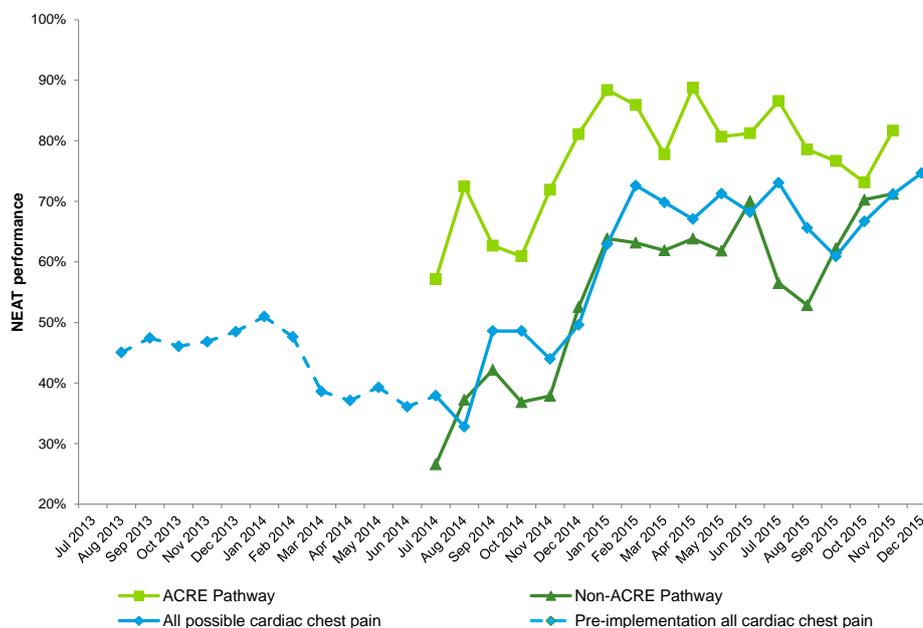
The average NEAT performance for the 12-month pre-implementation period for patients presenting with possible cardiac chest pain at Townsville Hospital was 43.1%. This improved by 18.6% to 61.7% post-implementation for all possible cardiac chest pain patients. This is the greatest improvement of all hospitals that implemented the ACRE pathway.

Over the reporting period, the average number of possible cardiac chest pain presentations per month was 332; 31.0% of recorded patients presenting with possible cardiac chest pain in August 2014 to December 2015 were managed on the ADP. Patients managed on the ADP had a higher NEAT performance compared to those not on the ADP, and all possible cardiac chest pain patients each month. NEAT performance for ADP patients at the beginning of the reporting period was similar to the pre-implementation average, with a peak in NEAT performance of 71.9% in December 2014 being sufficient to bring the NEAT performance of chest pain presentations above the pre-implementation average for the first time over the reporting period. Following this peak, NEAT performance of patients managed on ADP remained stable between 88.7% in May 2015 and 73.1% in November 2015; once again this was sufficient to keep the NEAT performance of all chest pain presentations above pre-implementation performance.

Overall, ACRE appeared to have a positive influence on Townsville Hospital patients presenting with cardiac chest pain. This positive influence is also reflected in median total hospital LOS of patients (Chart 15). Total hospital LOS for ADP pathway patients continued to shorten throughout the reporting period, despite considerable fluctuation experienced by all chest pain and non-ADP patients.

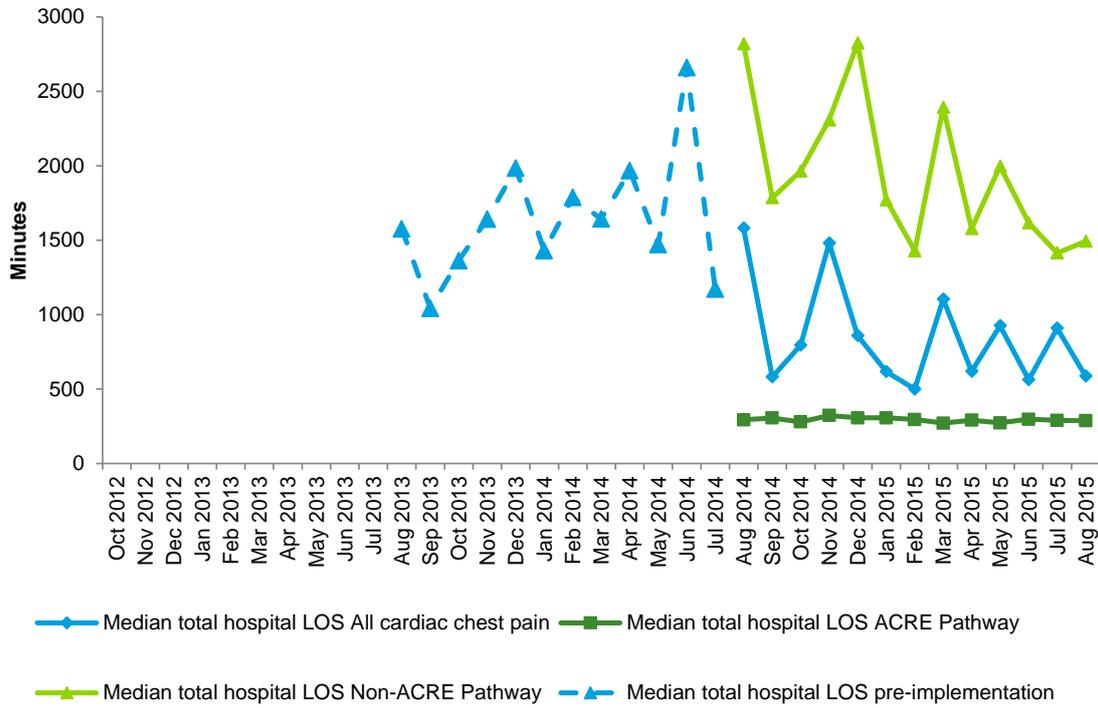
Townsville Hospital also experienced a significant decline in the admission rate for all cardiac chest pain patients. Post-ACRE implementation, admission rates declined by 9.4%, from 65.3% to 55.9%.

Chart 14: Townsville Hospital NEAT pre- and post-implementation performance for cardiac chest pain patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Chart 15: Townsville Hospital median total hospital length of stay for ACRE pathway vs Non-ACRE pathway patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Gladstone

The average NEAT performance for the 12-month pre-implementation period for patients presenting with possible cardiac chest pain at Gladstone Hospital was 73.8%; this is one of the highest NEAT performances for pre-implementation. Over the reporting period, this improved by 4.3% to 78.1% for patients with possible cardiac chest pain.

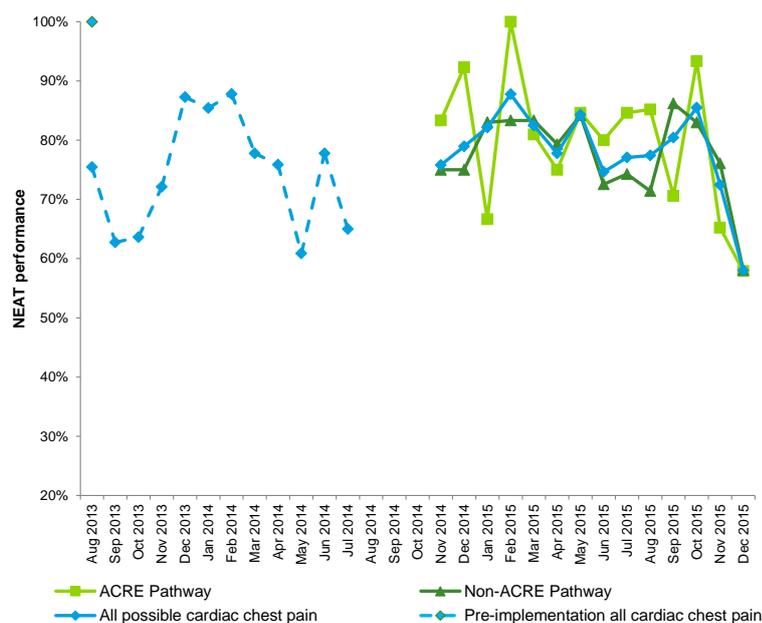
Over the reporting period, the average number of possible cardiac chest pain presentations per month was 56; the lowest of all of the sites, and the number and proportion of these patients being managed on the ADP was 27.9%. NEAT performance of patients managed on ADP varied from month to month, both rising above and dropping below pre-implementation NEAT performance. The final month of reporting saw NEAT performance for ADP patients drop below pre-implementation performance. This sporadic performance seemed to have little influence on the NEAT performance of all cardiac chest pain which matched or remained below pre-implementation NEAT performance for the duration of the ACRE Project. Whilst the proportion of patients on the pathway was reasonably high, this only constituted an average of 16 patients on the ADP pathway per month. This smaller cohort of ADP patients may be contributing to this variability in NEAT performance.

It must be noted that Gladstone Hospital has a high proportion of locum staff which would negatively impact on the compliance and uptake of the ADP. This may be contributing to the variability in Gladstone Hospital's results.

The total hospital LOS for patients managed on the ADP was predominantly shorter than all cardiac chest pain, and patients not managed on ADP. The only exception being the LOS in January 2015 was considerably higher than patients not managed on the ADP and all cardiac chest pain patients. Given this is in the initial stages of implementation, it is possible this anomaly may be due to adoption or non-compliance issues with the pathway.

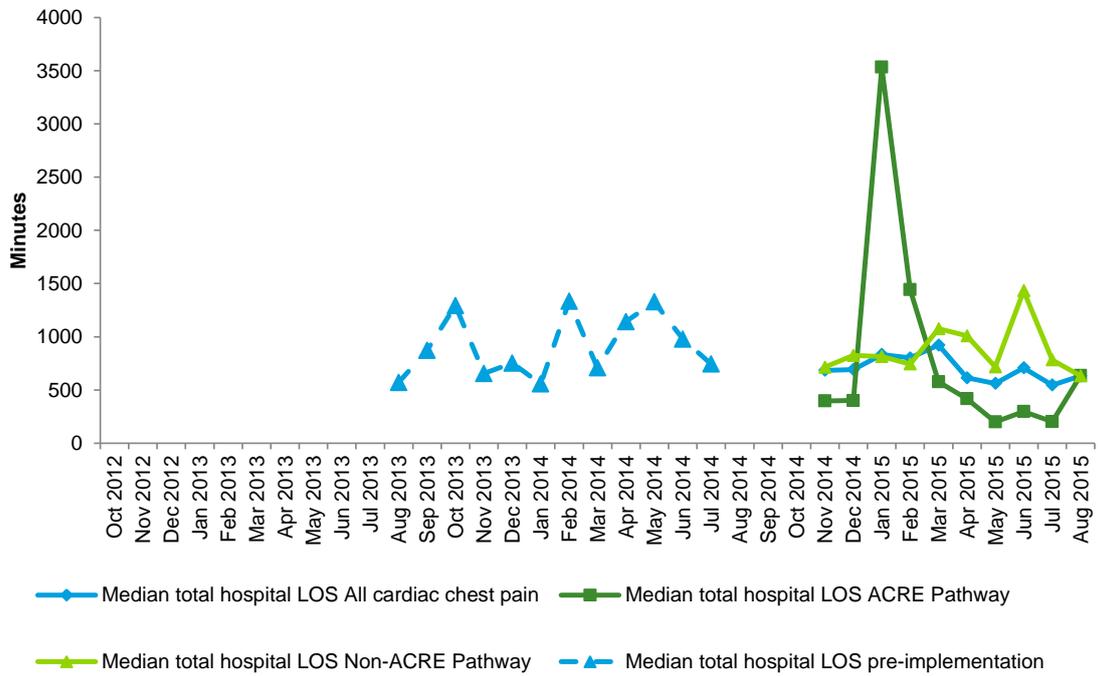
Gladstone Hospital also experienced a substantial decline in the admission rate for all cardiac chest pain patients, with rates declining by 9.7%, from 84.7% to 75.0%, post-implementation of ACRE.

Chart 16: Gladstone Hospital NEAT pre- and post-implementation performance for cardiac chest pain patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Chart 17: Gladstone Hospital median total hospital length of stay for ACRE pathway vs Non-ACRE pathway patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Caboolture

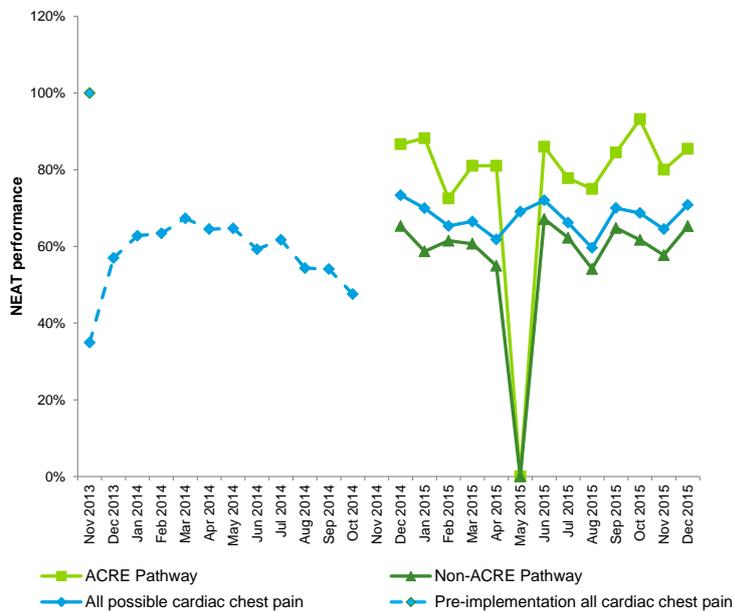
The average NEAT performance for the 12-month pre-implementation period for patients presenting with possible cardiac chest pain at Caboolture Hospital was 58.1%. Over the reporting period, this improved by 9.3% to 67.5% for all patients with cardiac chest pain.

Over the reporting period, the average number of possible cardiac chest pain presentations per month was 215. The proportion of these patients being managed on the ADP was 26.4%.

Overall, NEAT performance of all patients presenting with cardiac chest pain, remained above the pre-implementation NEAT performance. Over the reporting period, the performance of patients not managed on ADP mirrored the performance of patients managed on ADP, but at a lower percentage. This suggests that other strategies within the ED may have been impacting patient flow through the ED.

Caboolture Hospital also experienced some decline in the admission rate for all cardiac chest pain patients, with post-ACRE implementation admission rates declining by 5.6%, from 41.3% to 35.7%.

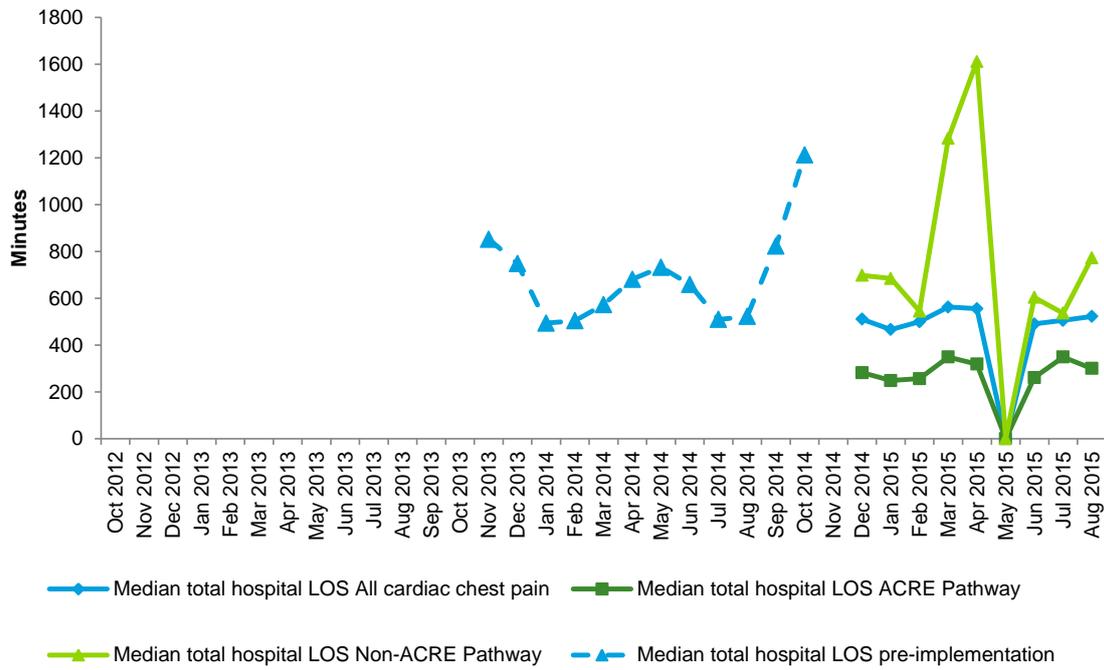
Chart 18: Caboolture Hospital NEAT pre- and post-implementation performance for cardiac chest pain patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Note: Issues with the data collection box were experienced in May 2015

Chart 19: Caboolture Hospital median total hospital length of stay for ACRE pathway vs Non-ACRE pathway patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Rockhampton

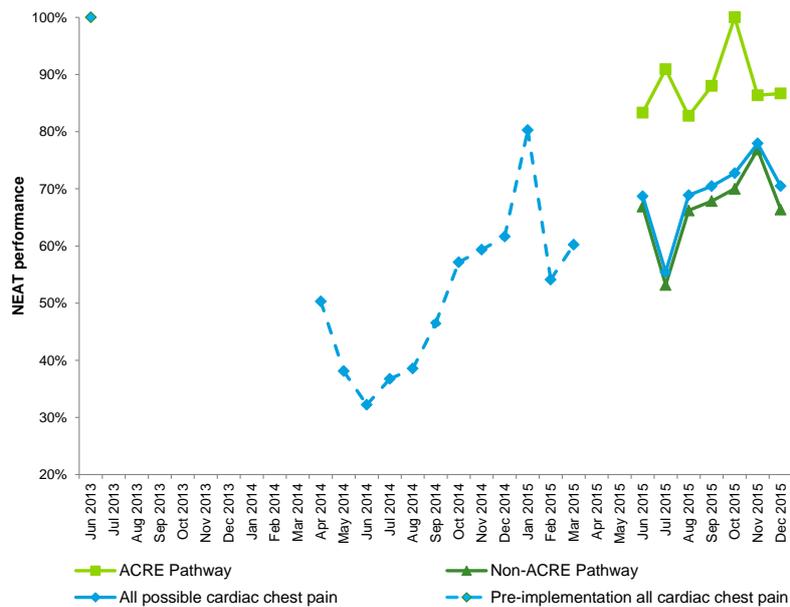
The average NEAT performance for the 12-month pre-implementation period for patients presenting with possible cardiac chest pain at Rockhampton Hospital was 51.6%. Over the reporting period, this improved by 17.7% to 69.3% for all cardiac chest pain patients.

Over the reporting period, the average number of possible cardiac chest pain presentations per month was 179. On average, 12.2% of these presentations went on to be managed on the ADP each month.

Overall, for the 7 month reporting period, NEAT performance of patients managed on the ADP was above that of the pre-implementation performance, with a peak of 100.0% in October 2015 and a low of 82.8% in August 2015 (see Chart 20). In comparison, the performance of patients not managed on the ADP did not improve from the pre-implementation phase. However, total hospital LOS for both patients showed improvement (see Chart 21). Further month to month analysis will provide indication of whether this trend in total hospital LOS is sustainable.

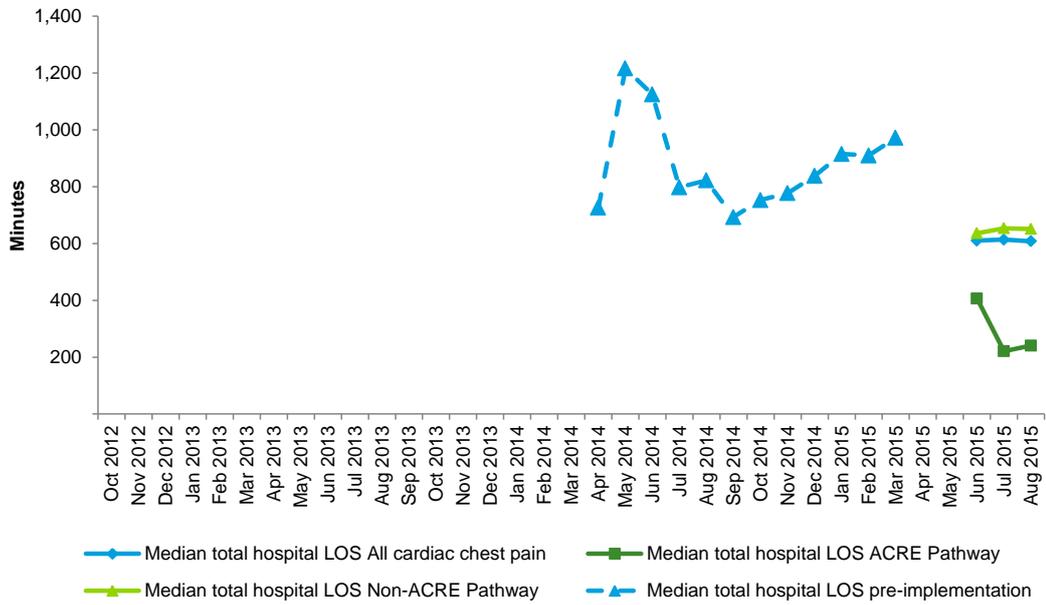
Rockhampton Hospital also experienced a substantial decline in the admission rate for all cardiac chest pain patients, with post-ACRE implementation rates declining by 18.5%, from 47.3% to 28.9%.

Chart 20: Rockhampton Hospital NEAT pre- and post-implementation performance for cardiac chest pain patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Chart 21: Rockhampton Hospital median total hospital length of stay for ACRE pathway vs Non-ACRE pathway patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

TPCH

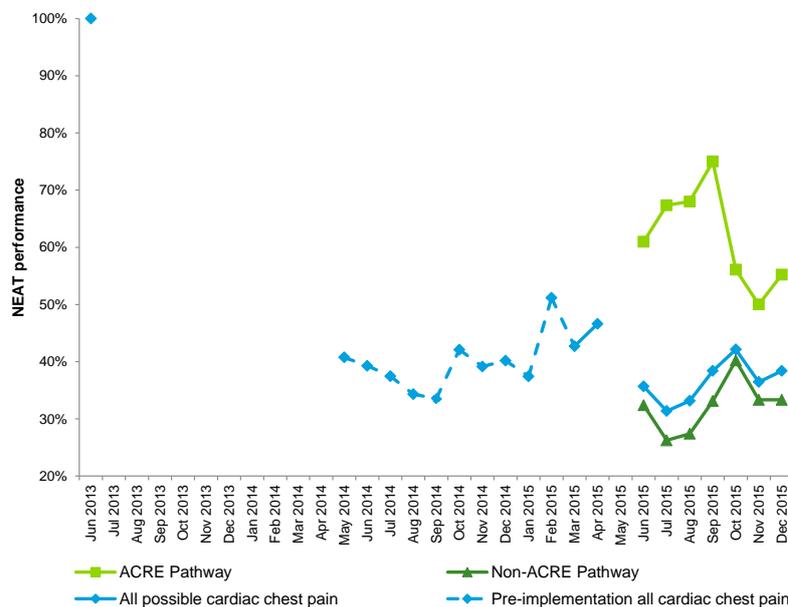
The average NEAT performance for the 12-month pre-implementation period for patients presenting with possible cardiac chest pain at TPCH Hospital was 40.4%. Over the reporting period, whilst peaks of above pre-implementation NEAT compliance were experienced, overall this did not improve, decreasing by 4.0% to 36.4% for all patients with cardiac chest pain.

Over the reporting period, the average number of possible cardiac chest pain presentations per month was 363; 14.4% of these presentations went on to be managed on the ADP each month.

Overall, for the seven month reporting period, NEAT performance of patients managed on the ADP was above that of the pre-implementation performance, for six months of the reporting period, peaking in September 2015 at 75.0%. In November 2015, a drop to 50.0% was enough to bring down the average NEAT performance of patients managed on ADP to reflect pre-implementation performance (see Chart 22). In comparison, the performance of patients not managed on the ADP did not improve from the pre-implementation phase. Decreases in NEAT performance for all patients with cardiac chest pain (31.4%) and patients not managed on the ADP (26.2%), is reflected in peaks in total hospital LOS (see Chart 23). Further investigation into adoption and compliance with the pathway should occur to determine the root cause of the declining NEAT performance.

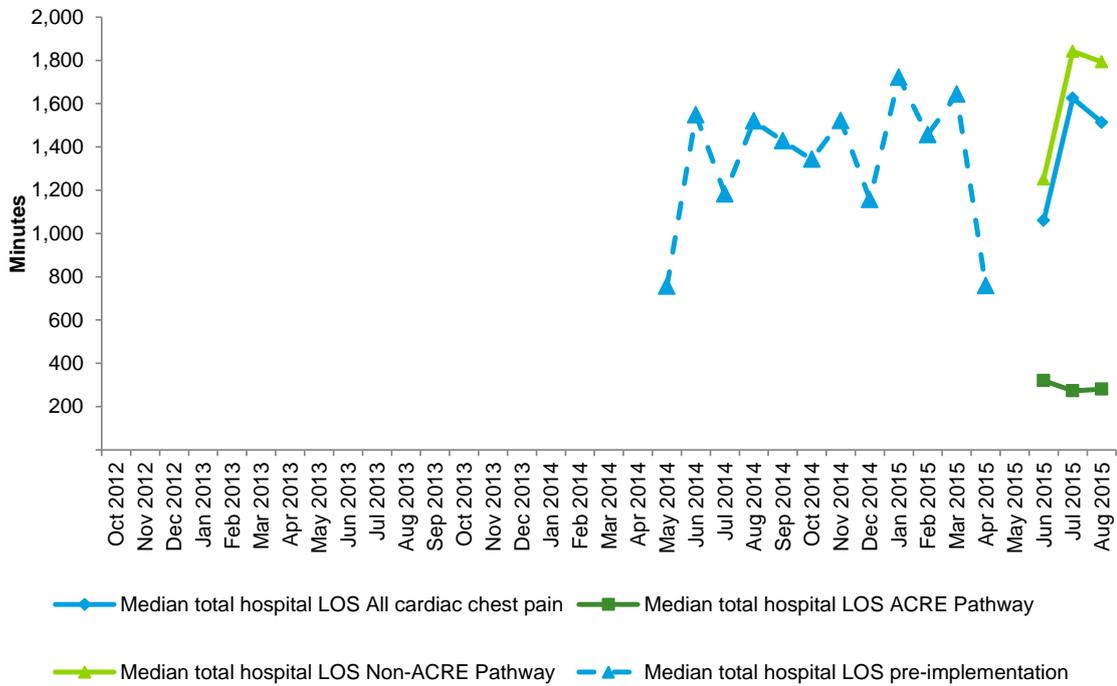
TPCH also observed some decline in the admission rate for cardiac chest pain patients, with post-ACRE implementation rates declining by 6.8%, from 78.3% to 71.5%.

Chart 22: TPCH NEAT pre-and post-implementation performance for cardiac chest pain patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Chart 23:TPCH Hospital median total hospital length of stay for ACRE pathway vs Non-ACRE pathway patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Robina

The average NEAT performance for the 12-month pre-implementation period for patients presenting with possible cardiac chest pain at Robina Hospital was 88.3%, the highest of all hospitals implementing the ACRE pathway. Due to this high start point, a high NEAT performance for all patients with cardiac chest pain was sustained over the reporting period improving by 1% to 89.0%.

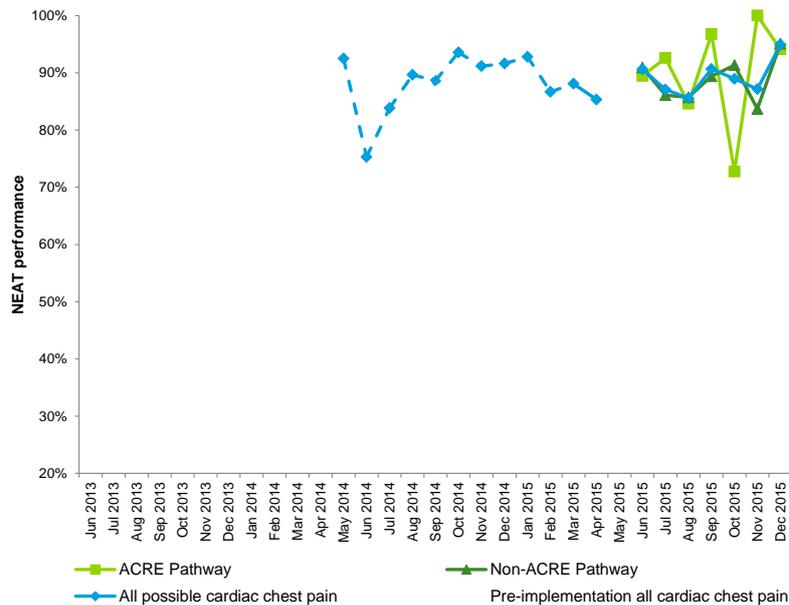
Over the reporting period, the average number of possible cardiac chest pain presentations per month was 180; 17.1% of these presentations went on to be managed on the ADP each month.

Overall, NEAT performance remained higher or level with pre-implementation performance for patients managed on ADP; this is with the exception of October 2015 where performance dropped to 72.7%. Such a drop has impacted the overall improvement in NEAT performance over the reporting period.

Like NEAT performance, Chart 25 shows that total hospital LOS has remained relatively stable. Further data will be required to make any certain conclusions regarding the decreasing total hospital LOS.

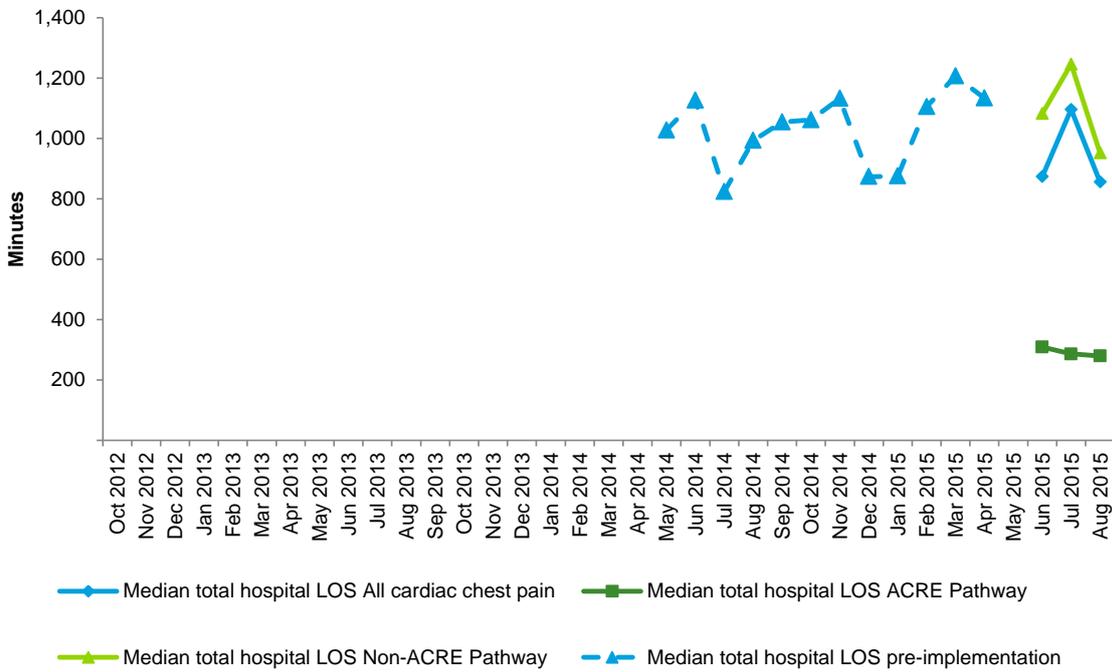
Robina also experienced a decline in the admission rates for all cardiac chest pain patients with post-ACRE implementation rates decreasing by 10.7%, from 91.0% to 80.3%.

Chart 24: Robina Hospital NEAT pre- and post-implementation performance for cardiac chest pain patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Chart 25: Robina Hospital median total hospital length of stay for ACRE pathway vs Non-ACRE pathway patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Mackay

The average NEAT performance for the 12-month pre-implementation period for patients presenting with possible cardiac chest pain at Mackay Hospital was 31.0%. NEAT performance improved by 14.0% to 45.0% over the reporting period for all patients with cardiac chest pain.

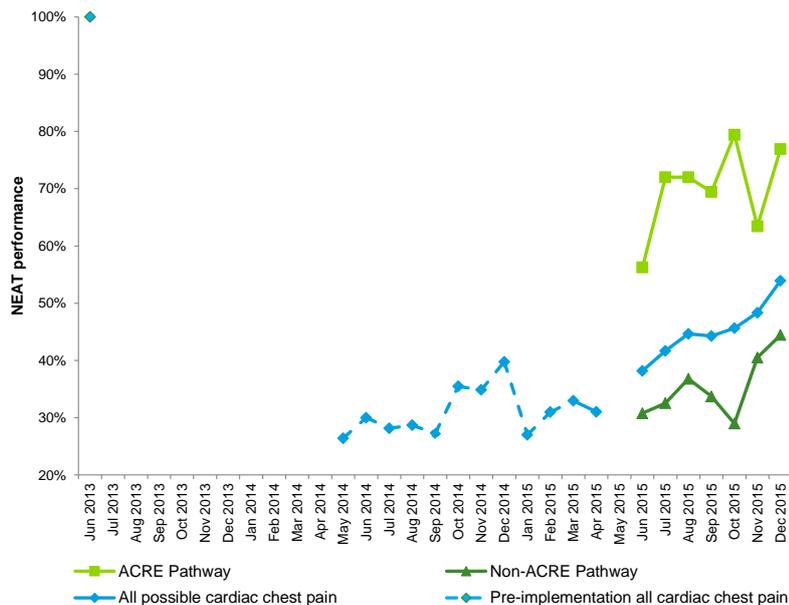
Over the reporting period, the average number of possible cardiac chest pain presentations per month was 109. On average, 28.7% of these presentations went on to be managed on the ADP each month.

Overall, NEAT performance for patients on ADP remained well above pre-implementation NEAT performance. Peak performance was in October 2015 at 79.4% (see Chart 26). The NEAT performance of all patients presenting with cardiac chest pain was brought down by the low NEAT performance of patients not on the ADP. Performance of non-ADP patients was lowest in October 2015 at 29.0%, however gradually grew to be 44.4% by December 2015.

Total hospital LOS for all patients presenting with cardiac chest pain was marginally shorter than pre-implementation LOS (see Chart 27). Total hospital LOS for patients on the ACRE pathway was significantly shorter than pre-implementation phase.

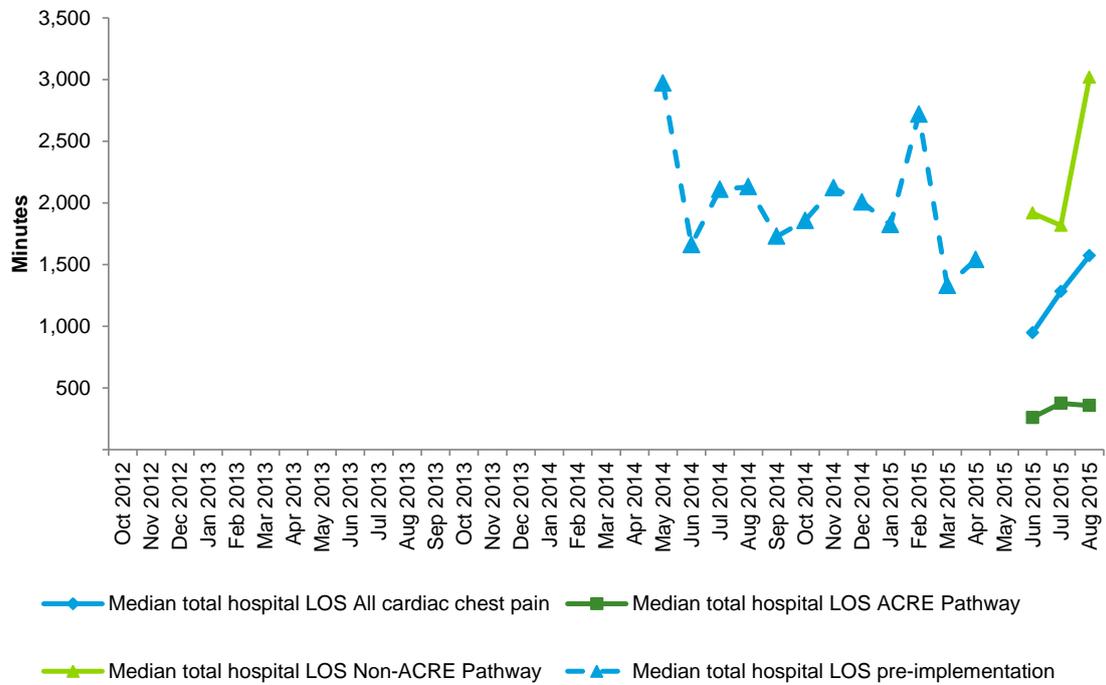
Mackay Hospital experienced a substantial decline in the admission rates for all cardiac chest pain patients. Post-ACRE implementation, admission rates declined by 20.3%, from 78.9% to 58.6%.

Chart 26: Mackay Hospital NEAT pre- and post-implementation performance for cardiac chest pain patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Chart 27: Mackay Hospital median total hospital length of stay for ACRE pathway vs Non-ACRE pathway patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Hervey Bay

The average NEAT performance for the 12-month pre-implementation period for patients presenting with possible cardiac chest pain at Hervey Bay Hospital was 40.0%. NEAT performance improved by 4.2% to 44.1% over the reporting period for all patients with cardiac chest pain.

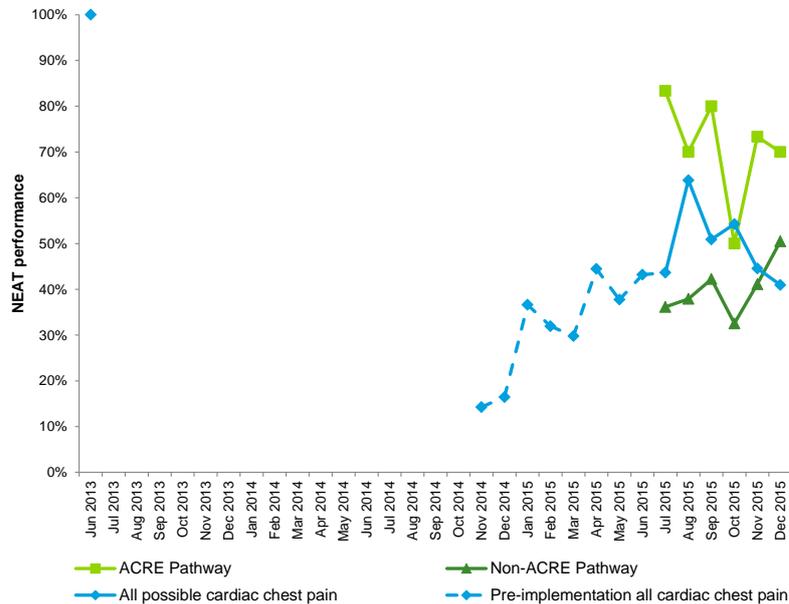
Over the reporting period, the average number of possible cardiac chest pain presentations per month was 107. On average, 12.6% of these presentations went on to be managed on the ADP each month.

NEAT performance for patients managed on the ADP improved in comparison to the pre-implementation phase (see Chart 28). Performance for these patients dropped to be below pre-implementation phase in October (50.0%). However the NEAT performance of non-ADP patients also dropped in this month, suggesting contextual factors within the Hervey Bay ED may have influenced results.

For the two months where patient total hospital LOS was measured, results suggest that total hospital LOS for all patients presenting with cardiac chest pain was shortening (see Chart 29). However, further time series analysis will need to occur to determine whether these changes are sustained.

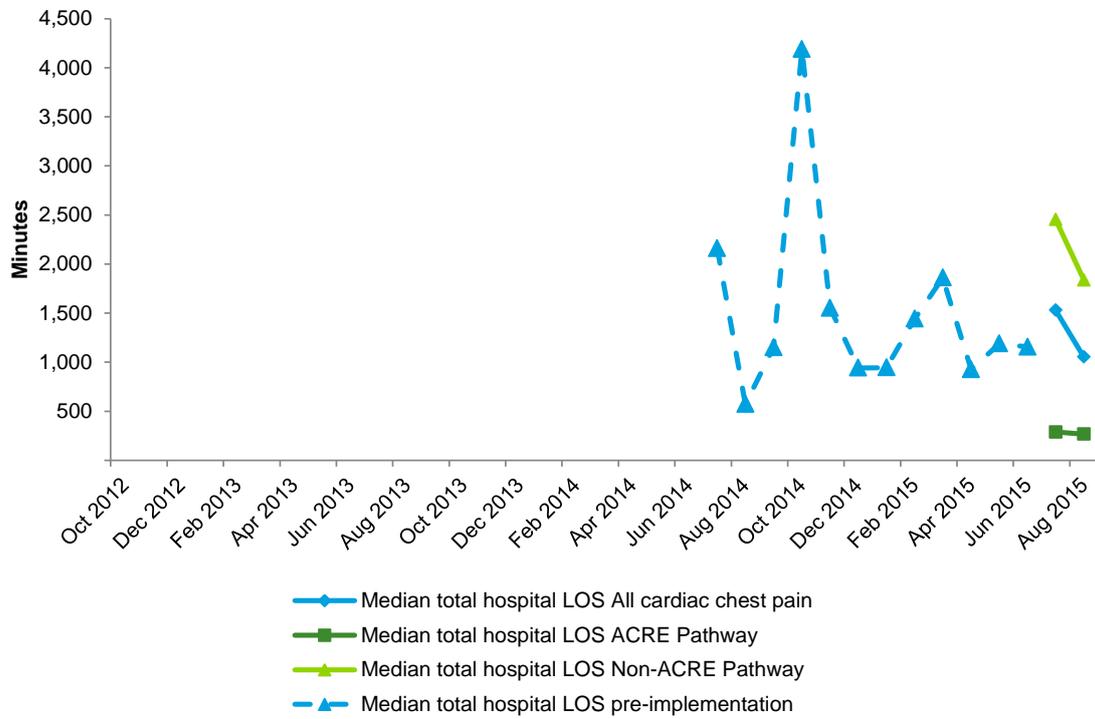
Hervey Bay Hospital also experienced a decline in the admission rate for all cardiac chest pain patients. After ACRE implementation, the admission rate declined by 14.1%, from 55.1% to 41.0%.

Chart 28: Hervey Bay Hospital NEAT pre- and post-implementation performance for cardiac chest pain patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Chart 29: Hervey Bay Hospital median total hospital length of stay for ACRE pathway vs Non-ACRE pathway patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Caloundra Hospital

The average NEAT performance for the 12-month pre-implementation period for patients presenting with possible cardiac chest pain at Caloundra Hospital was 77.8%. NEAT performance improved by 5.4% to 83.2% for all patients with cardiac chest pain over the reporting period.

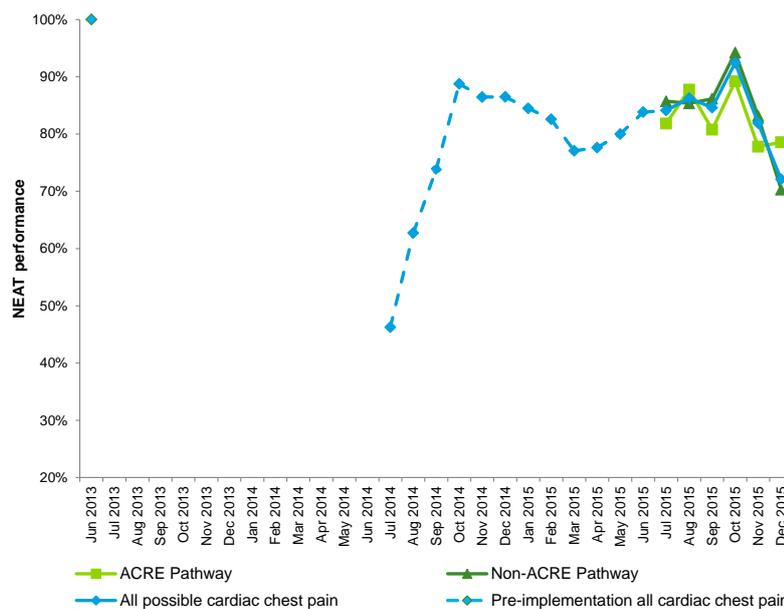
Over the reporting period, the average number of possible cardiac chest pain presentations per month was 113; 31.0% of these presentations went on to be managed on the ADP each month.

Since implementation of the ADP Pathway in July 2015, the NEAT performance of ADP patients has not exceeded non-ADP patients or the broader chest pain cohort. Given Caloundra remains in its initial months of implementation, issues with the adoption and compliance with the pathway may be negatively impacting the NEAT performance.

The impact on median total hospital LOS cannot be conclusively determined due to the small timeframe of available data. Nonetheless, for the two months of available data, it appears the median LOS for ADP patients is decreasing.

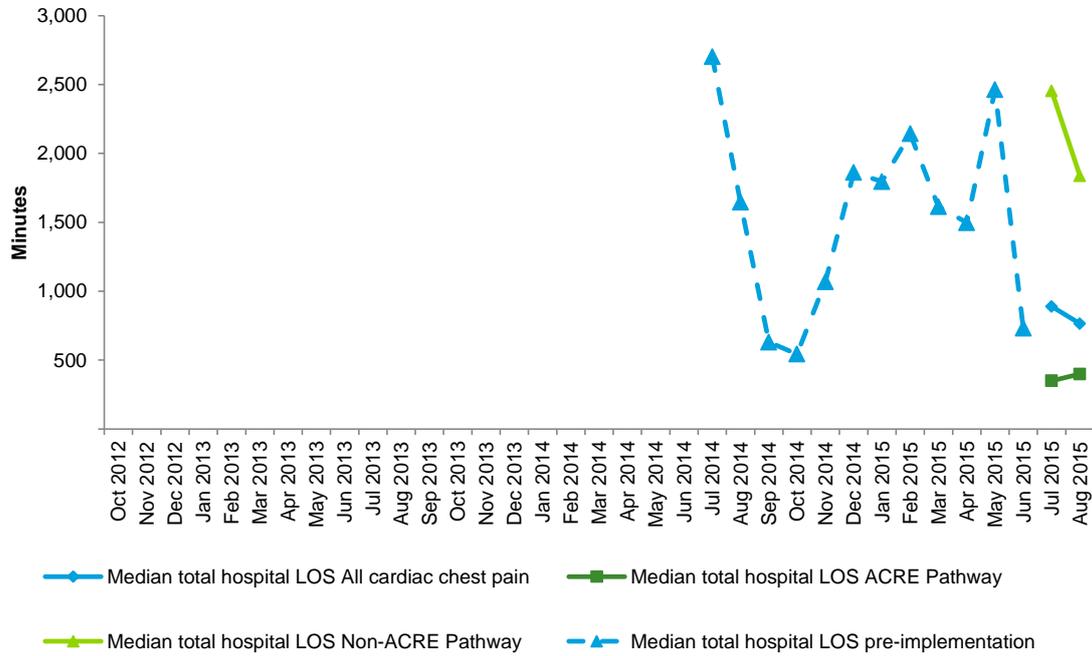
Caloundra Hospital experienced a decline in admission rates for all cardiac chest pain patients. After ACRE implementation, the admission rate declined by 9.6%, from 55.2% to 45.6%.

Chart 30: Caloundra Hospital NEAT pre- and post-implementation performance for cardiac chest pain patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Chart 31: Caloundra Hospital median total hospital length of stay for ACRE pathway vs Non-ACRE pathway patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Redland Hospital

The average NEAT performance for the 12-month pre-implementation period for patients presenting with possible cardiac chest pain at Redland Hospital was 45.1%. NEAT performance improved by 4.9% to 50.0% for all patients with cardiac chest pain over the reporting period.

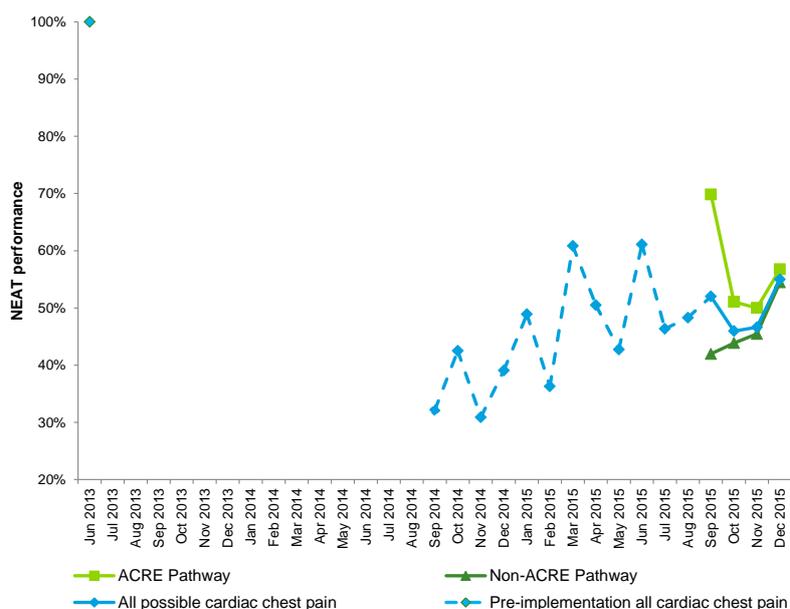
Over the reporting period, the average number of possible cardiac chest pain presentations per month was 161; 28.7% of these presentations went on to be managed on the ADP each month.

NEAT performance for patients on the ADP pathway commenced at a high of 69.8% in September 2015, decreasing to 56.8% in December 2015. Whilst a declining trend is noted, NEAT performance has remained above the pre-implementation average, the NEAT compliance levels of non-ADP patients and the broader chest pain cohort. Given the substantial decline occurred in the second and third months of implementation, it is likely that issues with adoption and compliance with the ADP pathway negatively impacted NEAT performance.

Median total hospital LOS was not available for Redland Hospital.

Redland Hospital experienced an increase in the admission rate for all cardiac chest pain patients, however this was not considered statistically significant. Nonetheless, it did increase by 3.7%, from 42.8% to 46.6%.

Chart 32: Redland Hospital NEAT pre- and post-implementation performance for cardiac chest pain patients



Source: ACRE Process Evaluation Tool (reported from EDIS)

Cairns Hospital

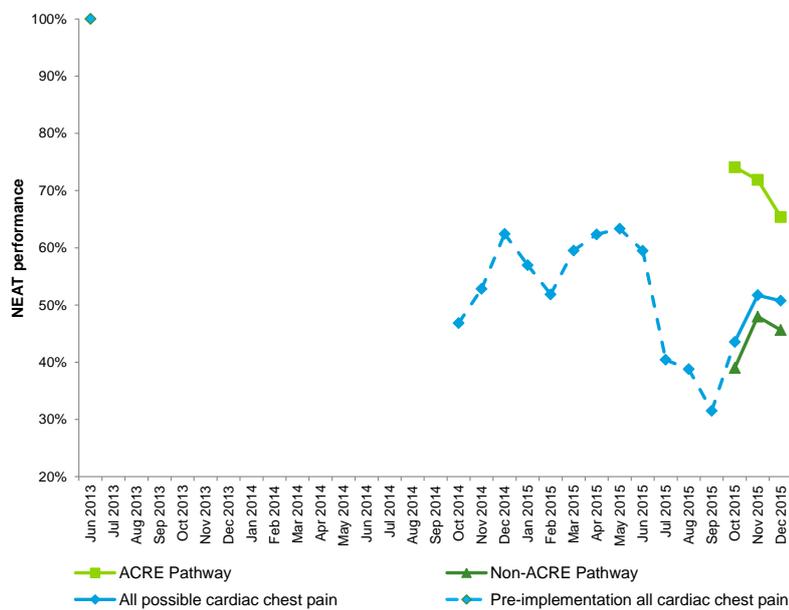
The average NEAT performance for the 12-month pre-implementation period for patients presenting with possible cardiac chest pain at Cairns Hospital was 52.0%. NEAT performance declined by 3.4% to 48.6% for all patients with cardiac chest pain over the reporting period.

Over the reporting period, the average number of possible cardiac chest pain presentations per month was 205; 18.0% of these presentations went on to be managed on the ADP each month.

NEAT performance of patients on the ADP pathway is considerably higher than both the pre-implementation. Median total hospital LOS data was not available for Cairns.

Cairns also experienced an increase in the admission rate for all cardiac chest pain patients. Post-ACRE implementation, admission rates rose by 33.0%, from 42.3% to 75.3%. Whilst this was considered statistically significant, the sample size of the Cairns data is considerably smaller, relative to other sites (due to the later implementation date).

Chart 33: Cairns Hospital NEAT pre- and post-implementation performance for cardiac chest pain patients

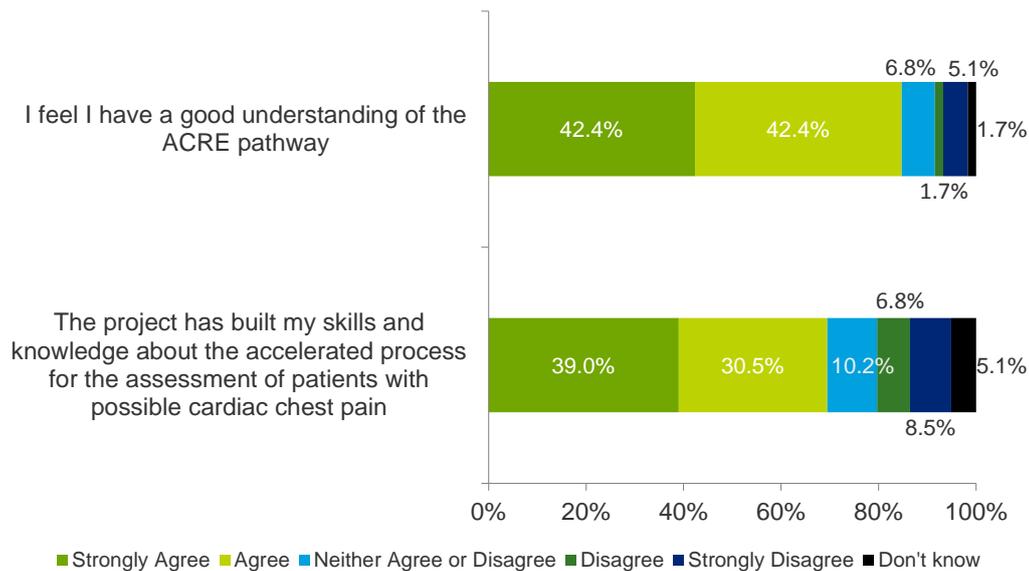


Source: ACRE Process Evaluation Tool (reported from EDIS)

3.1.4 Has the ACRE Project improved awareness and knowledge of the ADP amongst Stakeholders, including HHS CEs and clinicians?

69.5% of survey respondents either 'Agreed' or 'Strongly Agreed' that the ACRE Project had built their skills and knowledge regarding the accelerated process for the assessment of patients with possible cardiac chest pain. Furthermore, 84.8% of survey respondents either 'Agreed' or 'Strongly Agreed' that they had a good understanding of the ACRE pathway. These results are illustrated in Chart 34.

Chart 34: Stakeholder Understanding and Skills Built through the ACRE Project



Source: Stakeholder Outcome Survey

n=59

3.1.5 What have been the motivating factors and barriers to implementing the ADP?

The Project Team identified a number of factors which assisted in achieving successful outcomes, these included:

- The strong evidence base supporting the effectiveness of the ACRE Pathway.
- The expertise of the clinical leads across both Emergency and Cardiology Departments assisted with gaining comprehensive Stakeholder buy-in.
- The momentum built by the broad implementation assisted in increasing awareness and acceptance of the pathway.
- The flexible nature of the pathway enabled it to be adapted locally which promoted ownership and accountability.
- Direct communication with local Stakeholders established a strong network and valuable relationships.

The Project Team also cited a number of barriers to continuing the Project which must be considered, these include:

- A decrease in the skills and education of staff due to turnover in staff.
- A risk that if local project champions move on, the impact of the ACRE pathway will be reduced.

Barriers cited by key Stakeholders include:

- Reduced education sessions if funding to sustain dedicated Project staff is not provided.
- Loss of understanding of the ACRE pathway by ED, RMO and Registrars as rotation occurs. This is a systematic issue within the HHSs which requires strong leadership from senior clinicians.
- Cultural resistance to the pathway.
- Inability to demonstrate patient outcomes over and above reduced ED length of stay.
- Regional areas have difficulty providing appropriately skilled clinicians to complete the stress tests and outpatient appointments with a Cardiologist.
- Smaller sites struggle with access to clinical measurement clinic appointments for exercise stress tests or outpatient appointments with a Cardiologist.
- Site specific suggestion – utilisation with indigenous groups would be required for further uptake to occur in rural and regional areas.

3.1.6 What has been the cultural, social-environmental and design factors attributable to the increase in effectiveness of the ACRE Project?

Contextual factors cited by the Project Team and Stakeholders that have improved effectiveness included:

- Dedicated and committed local clinicians enhance the adoption and continued application of the pathway considerably.
- A stable workforce with minimal turnover contributes to the successful adoption of the pathway.
- Highlighting the ability to improve NEAT performance via the use of the pathway enhances adoption.
- Cross collaboration between the ED and inpatient teams positively impacts on the effectiveness of the pathway.

3.1.7 What aspects of the ACRE Project have been successful and/or most valued by Stakeholders?

Project Team members felt the following elements of the ACRE Project were most valuable:

- The assistance and support provided by the Project Team to implement all aspects of the Project.
- The feedback provided by the Project Team, through monthly reports, newsletters and the annual forum.
- The ability to review site specific data and using this information to provide each site with tailor feedback and support.
- The high quality and evidence informed nature of the pathway.
- The level of clinical lead engagement with each site.

Stakeholder reported aspects most valued about the ACRE Project, included:

- The reduced time that low risk patients are required to spend in the ED
- The collaboration and networks built between Stakeholders
- The support materials provided to implement the pathway and the strong evidence supporting the effectiveness of the pathway
- The feedback provided through the monthly reporting cycles
- The flexibility to adapt the pathway to the local context of each facility. A one-size fits all approach was not taken
- The simplicity of the pathway
- The support provided to negotiate between ED and Cardiology in a mutually acceptable way regarding the management of chest pain patients
- The administrative support and centralised collection and analysis of data
- The expert advisors working with and helping local staff
- The ability to streamline the incorporation of research into clinical practice without extensive delays.

A number of Stakeholders expressed their views on ACRE's most valuable aspects. Whilst the points described above note the major themes, Figure 2 provides a graphic summary of the respondents' thoughts on ACRE's most valuable elements.

3.2 Efficiency

3.2.1 Did the ACRE Project result in a return on investment?

The costs accounted for in calculating the ROI were in the categories of labour and non-labour expenses. Labour expenses included health practitioners, managerial and clerical. Human resources were used for tasks including project management, data collection and research, and clinician engagement; total labour expenditure over the project duration was \$613,119. Non-labour expenses included supplies and services expenses, communication expenses, and travel expenses; total non-labour expenditure over the project duration was \$26,813. Total labour and non-labour expenditure over the project duration was \$639,932; this was \$384,987 below the allocated funding of \$1,024,919, with excess funding approved for roll-over to continue project management and data collection.

The original business case defined the benefits of the model as a reduction in ED LOS for patients who are managed on the ADP. The value of this benefit was quantified by applying the difference in LOS to the patient cohort on the pathway. Without being able to isolate the low-risk patient cohort pre-implementation LOS to compare with their post-implementation LOS, ED LOS savings were calculated based on the whole chest pain patient cohort, and applied to the whole cohort. In addition to ED LOS savings, there were also admitted LOS savings observed across the chest pain patient cohort; savings in admitted LOS were only applied to the proportion of patients who were admitted (56.2%).

Across the 17 sites that implemented ACRE, the pre-implementation mean total LOS for all cardiac chest pain presentations was 20.4 hours.⁷ Over the project duration to end of December 2015, there were over 38,000 cardiac chest pain presentations at hospitals that had implemented ACRE, 23.2% of whom were managed on the ADP. The post-implementation mean total LOS for all cardiac chest pain presentations was 14.3 hours.⁸ This saving comprised 0.3 hours ED LOS saving and 5.8 hours admitted LOS saving. The cost of ED time was quantified as \$98 per hour, and admitted time was quantified as \$32.46 per hour.⁹ A discount rate was applied to the value of the benefits based on when they were realised. In addition, an additional discount was applied from the initial ROI model to account for diminishing benefit. This resulted in a saving of \$765,173 attributable to ED LOS savings, and \$2,215,536 attributable to admitted LOS savings, totalling \$2,980,709 over the 20 months and 17 sites. This resulted in an ROI of 365.8%. Put simply, approximately \$4 is saved for every \$1 spent on the ACRE Project.

In addition to LOS savings, a significant reduction in admission rate of 10.7% was observed across the cardiac chest pain patient cohort (see Table 5). This amounted to 4,071 avoided admissions in the post-implementation period. The value of this benefit has not been quantified, as it was not part of the original ROI model, however this should be taken into account when considering the broader benefits of this intervention in terms of patient flow and released capacity.

⁷ Pre- and post-implementation data for total LOS was available reports as a median by month, by facility. Without unit-level data, the ability to calculate the aggregate median LOS across all sites for the pre- and post-implementation period was limited. Aggregates were calculated using a weighted mean of medians method; variance and statistical significance was not able to be determined, which is a limitation and ideally continued data monitoring should occur to ensure the savings can be attributed to ACRE.

⁸ Ibid

⁹ Cullen L, Greenslade J, Merollini K, Graves N, Hammett C, Hawkins T, et al. *Cost and outcomes of assessing patients with chest pain in an Australian emergency department*. Med J Aust 2015;202(8):427–33.

The nature of this Project was scaling a clinical pathway that is able to operate in existing service models and does not require ongoing operational costs; therefore, benefits in LOS savings are likely to continue and be sustained beyond the duration of the project costs.

3.2.2 Did the Project result in cost savings? Has there been an improvement in resource utilisation?

Cost savings were calculated by site, driven by the change in ED LOS pre- and post-implementation, and the volume of presentations since implementation. As per Section 3.2.1, these calculations were based on the whole cardiac chest pain cohort, as ED LOS pre-implementation data for the low-risk chest pain cohort could not be isolated. Note that these cost savings are a component of the total LOS cost savings outlined in Section 3.2.1.

Table 8 shows the pre- and post-implementation ED LOS for cardiac chest pain, by site. Fifteen of the 17 sites demonstrated a decrease in ED LOS, which is consistent with findings in NEAT improvement, shown in Table 4, with the majority of sites having a statistically significant improvement in NEAT compliance. Two sites, Gladstone and TPCH, had an increase in ED LOS of 0.15 hours (9 minutes) and 0.27 hours (16 minutes), respectively. Decreases in ED LOS ranged from 0.08 hours (5 minutes) to 0.9 hours (54 minutes). These changes resulted in potential time and cost savings in the ED of varying values, dependent on effect size and number of cardiac chest pain presentations. The more efficient management of low-risk chest pain presentations has the potential to improve resource utilisation by reallocating these savings towards the management of higher-risk patients.

Table 8: ED LOS cost savings pre- and post-ACRE, by individual site¹²

Site	Pre-ACRE Mean ED LOS* (hours)	Post-ACRE	Difference (hours)*	Number of patients	Cost saving
Logan	4.96	4.33	0.63	4425	\$ 96,590.18
Redcliffe	4.25	4.14	0.11	3510	\$ 13,406.25
QEII	3.42	3.27	0.15	964	\$ 4,997.13
Ipswich	3.73	3.31	0.42	2548	\$ 37,192.40
Gold Coast	3.21	3.03	0.18	5605	\$ 34,046.83
Toowoomba	3.57	3.15	0.42	2529	\$ 36,675.42
Townsville	4.85	3.95	0.90	3913	\$ 121,777.54
Gladstone	3.15	3.30	-0.15	785	\$ (3,972.76)
Caboolture	3.54	3.07	0.47	2791	\$ 45,132.52

¹² LOS savings cannot be fully attributed to one particular strategy or intervention given the multitude of confounding factors which impact LOS.

Site	Pre-ACRE	Post-ACRE	Difference (hours)*	Number of patients	Cost saving
	Mean ED LOS* (hours)				
Rockhampton	4.31	3.33	0.99	1251	\$ 42,613.39
TPCH	4.57	4.84	-0.27	2544	\$ (23,583.04)
Robina	2.70	2.62	0.08	1260	\$ 3,515.71
Mackay	5.11	4.39	0.72	764	\$ 18,925.29
Hervey Bay	5.13	4.69	0.44	641	\$ 9,683.85
Caloundra	2.71	2.51	0.19	680	\$ 4,572.54
Redland	4.45	3.96	0.49	644	\$ 10,837.01
Cairns	4.25	4.15	0.09	615	\$ 1,966.13

* Pre- and post-implementation data for LOS was available as a median by month, by facility. Without unit-level data, the ability to calculate the aggregate median LOS across all sites for the pre- and post-implementation period was limited. Aggregates were calculated using a weighted mean of medians method; variance and statistical significance was not able to be determined, which is a limitation and ideally continued data monitoring should occur to ensure the savings can be attributed to ACRE.

Source: ACRE Process Evaluation Tool (reported from EDIS)

3.2.3 Is the ACRE Project transferable to other sites? Is it scalable? Are there any specific critical success factors which need to be considered?

The wide spread implementation of the ACRE pathway across Queensland indicates that this Project is already transferable and scalable. However, key learnings from this model which could be transferred to other areas of care provision were identified. These included:

- The importance and benefit of interdepartmental collaboration
- Ensuring the protocol, pathway or intervention is flexible and adaptable to local site contexts
- Development and communication of the strong evidence supporting the effectiveness of the pathway
- Strong clinical leadership is critical to ensuring the pathway is adopted and adhered to.

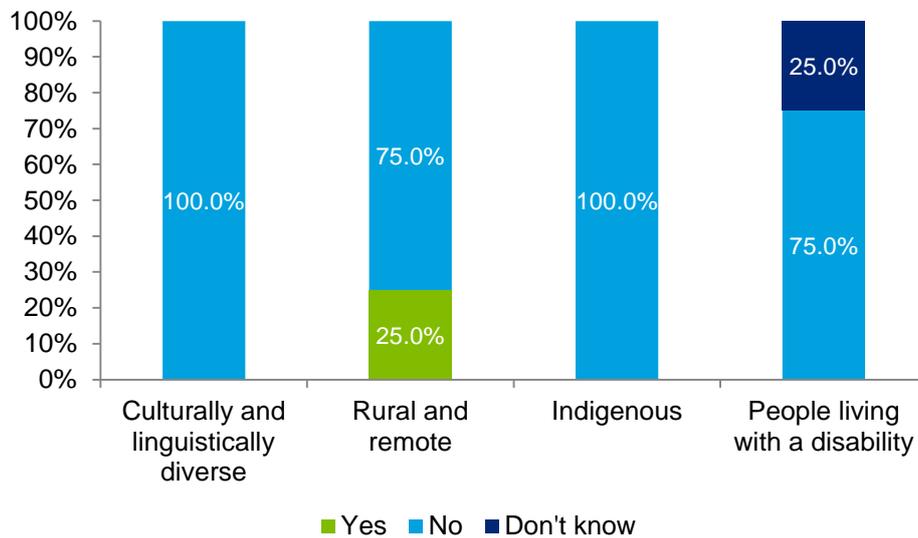
3.3 Equity

3.3.1 Did disadvantaged groups have appropriate access to the ACRE Project or were there barriers?

All Project Team members and Stakeholders believed access to the ACRE model was aligned with the clinical need.

Project Team members and Stakeholders were asked to cite any barriers to accessing the ACRE model of care for disadvantaged groups, specifically culturally and linguistically diverse, indigenous, disabled and rural and remote. Barriers were identified by the Project Team members for rural and remote populations. This is illustrated in Chart 31. Likely due to the implementation occurring in mainly metro and regional hospitals, barriers were cited only for rural and remote populations. It should be noted that due to the inability to access laboratory troponin testing, implementation of the ACRE pathway could not occur in rural hospitals.

Chart 31: Project Team member views on barriers to accessing the service / model

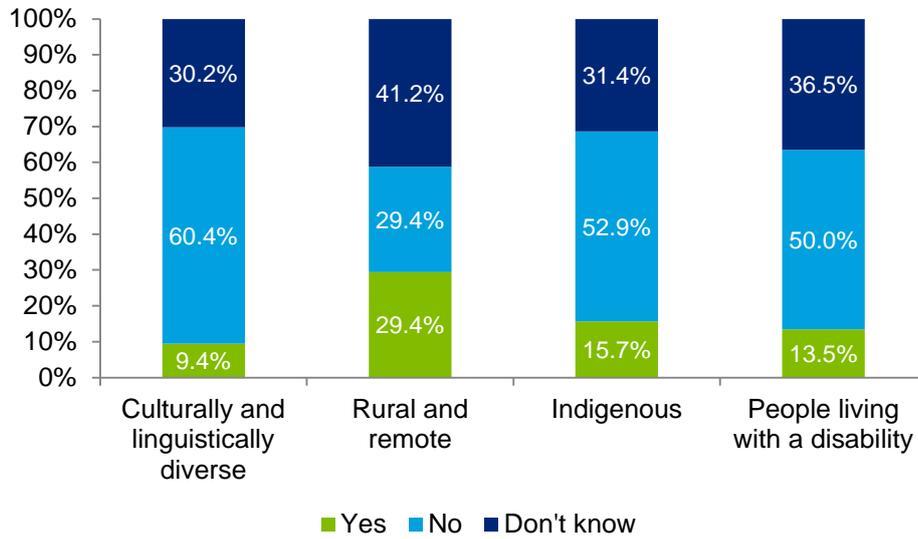


Source: Project Team member Outcome Survey

n = 4 (this small sample size should be considered when interpreting the results above)

From the Stakeholders perspective a minority of the respondents did identify barriers for culturally and linguistically diverse populations, rural and remote populations, indigenous populations and people living with a disability. These results are illustrated in Chart 32.

Chart 32: Stakeholders perspective on barriers to accessing the ACRE Pathway



Source: Stakeholder Outcome Survey

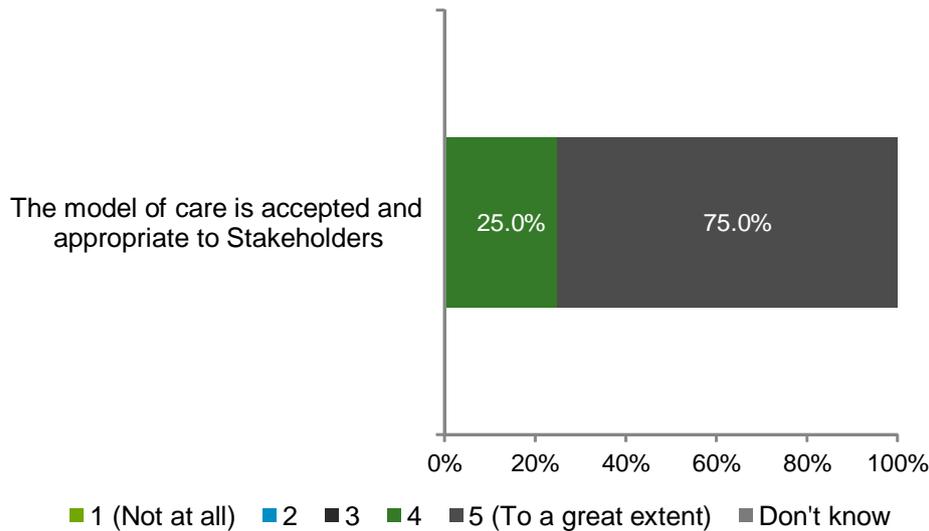
n=53

3.4 Appropriateness & Acceptability

3.4.1 Is the ACRE Project accepted by Stakeholders? How was the ACRE Project received?

Project Team members reported high levels of acceptability by Stakeholders this is illustrated in Chart 33 below.

Chart 33: Project Team views on the acceptability and appropriateness to Stakeholders

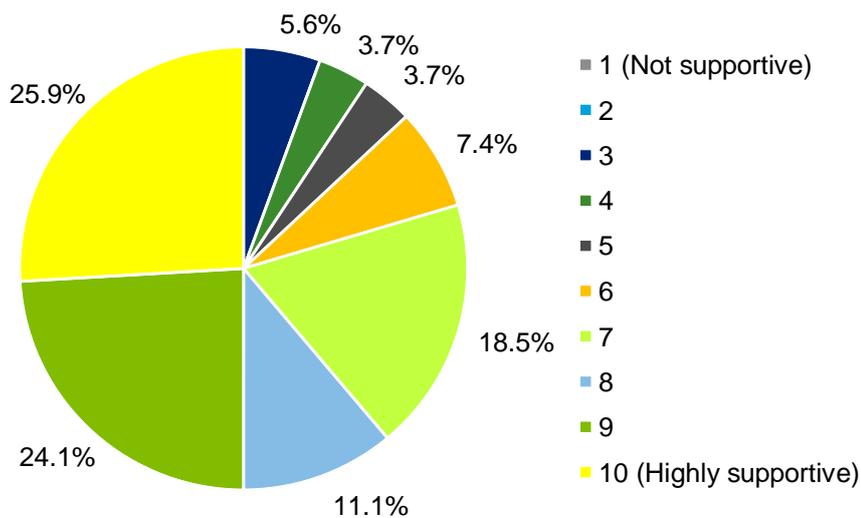


Source: Project Team Outcome Survey

n=4 (this small sample size should be considered when interpreting the results above)

Survey respondents indicated a strong level of support for the ACRE Project, with 79.6% of those surveyed rating their support as a 7, 8, 9 or 10 out of 10. These positive results are illustrated in Chart 34.

Chart 34: Stakeholders level of support for the ACRE Project

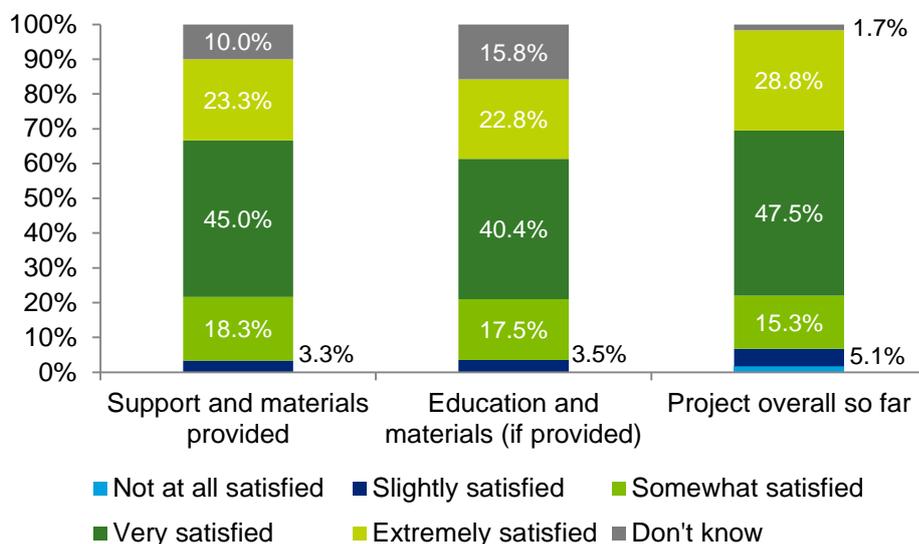


Source: Stakeholder Outcome Survey

n = 54

Furthermore, 76.3% of Stakeholders surveyed were either 'Very' or 'Extremely Satisfied' with the ACRE Project overall. A high degree of satisfaction was also demonstrated for individual components of the Project, including support and education materials provided. These results are highlighted in Chart 35.

Chart 35: Stakeholders satisfaction with the ACRE Project



Source: Stakeholder Outcome Survey

n = 60

3.4.2 What strategies and interventions are the ACRE Project Team members using at each site to increase acceptability? What is the rationale for using these?

Project Team and Stakeholders reported the tailored approach to different sites based on local resources to improve acceptability and optimise uptake:

- Localised version of pathways to fit in with local processes and capabilities.
- Obtaining involvement from both Emergency and Cardiology given the pathway has implications for both specialties.
- Direct contact with local senior clinicians by ACRE Clinical Leads facilitates increased adoption and assists with change management at each site.
- Education sessions held with wider staff to address any concerns or misinformation.

Outcome Report 2015 Highlights

High levels of acceptability from Stakeholders were reported in the 2015 Outcome Evaluation Report. This was primarily due to the sound clinical research supporting the pathway and the feedback provided to sites on their uptake and performance. The 2016 results demonstrate the pathway continues to mature with Stakeholders valuing the flexible approach of the ACRE implementation team.

3.5 Sustainability

3.5.1 How sustainable is the ACRE Project? What can be done to enhance its sustainability?

All Project Team members surveyed agreed that the ACRE Project is to a 'Great Extent' sustainable beyond the HIF. No substantial barriers to continuing the Project were identified. However, education levels may drop if local project champions move on or reduce their focus on the pathway. The strategies that have been used to enhance the sustainability of the pathway include:

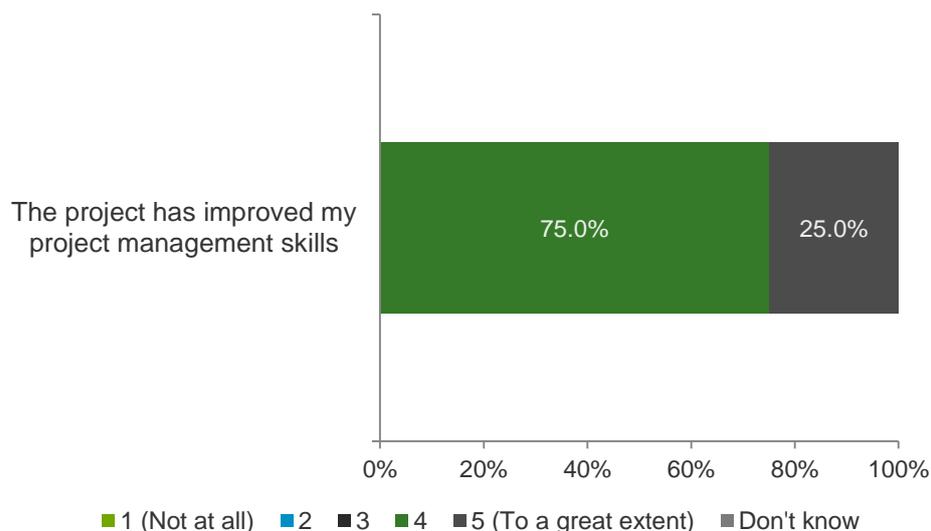
- Maintained flexibility in allowing sites to adopt to current practice.
- Focused on local ownership to drive continued uptake and adherence to the pathway.
- Conducting ongoing research into further acceleration of processes to enable continued benefits to be achieved.
- Dedication to widespread implementation has contributed towards achieving a large, ongoing impact.

Growing the evidence base for the pathway is also integral to enhancing the sustainability of the Project. The Project Team did indicate that the ACRE Project will be informing the development of a translational research paper in the future.

3.5.2 Has the ACRE Project successfully built the skills and knowledge of key personnel to support sustainability?

Sustainability of a project is largely dependent on the capability and skills transfer that occurs for key personnel. The ACRE Project Team have reported that involvement in the broader HIF Program and through delivery of the ACRE Project their project management skills to 'Some Extent' have improved (Chart 36).

Chart 36: ACRE Project Team's reported improvement in Project Management Skills



Source: Project Team Outcome Survey

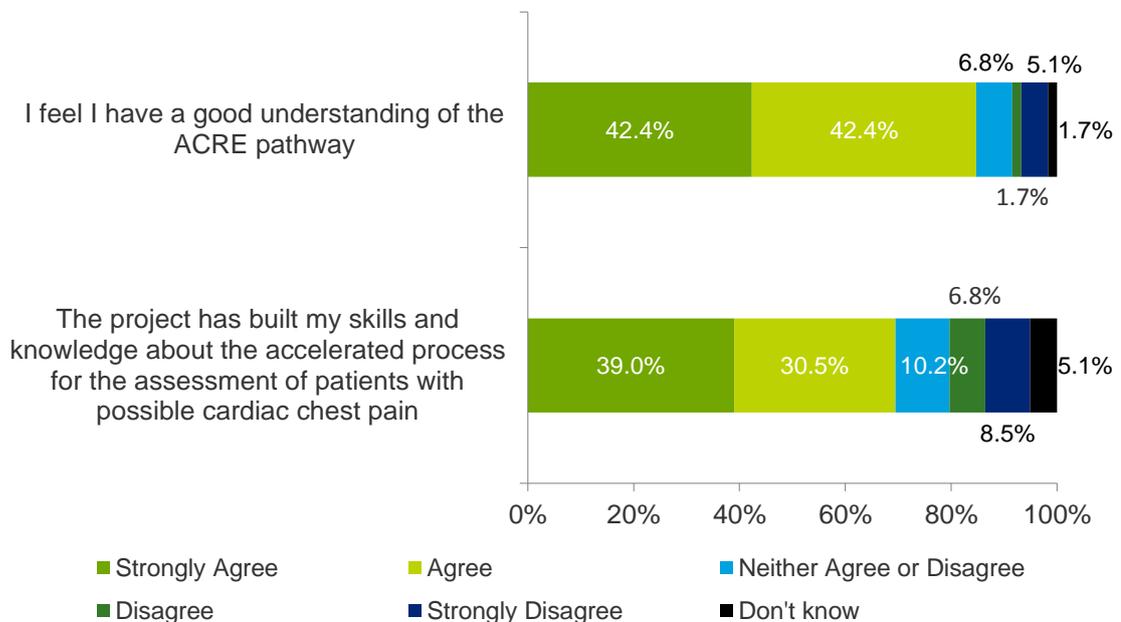
n = 4

From the perspective of Stakeholders positive results were demonstrated for skills and knowledge that ACRE has built amongst the staff and clinicians whom implemented the pathway. 69.5% of respondents either 'Agreed' or 'Strongly Agreed' the ACRE Project had built their skills and knowledge about the accelerated process for the assessment of patients with possible cardiac chest pain. Furthermore, 84.8% of respondents 'Agreed' or 'Strongly Agreed' they had a good understanding of the ACRE Project. This provides an encouraging view that staff and clinicians will be able to continue with the application and utilisation of the ACRE Pathway. However, as noted in Section 3.1.5 concerns were raised regarding the negative impact of medical staff turnover, particularly the 5 week rotation of Medical Registrars on the retention of skills and knowledge required for the ACRE pathway. Stakeholders did describe reasons that had contributed to their responses on how their understanding had been built, these include:

- Attending conference presentations, involvement in the (Australian Commission on Safety and Quality in Health Care (ACSQHC) ACS Clinical Care Standards (CCS) and involvement with the early planning of the Project at the local level all contributed to my understanding.
- The high level of support provided by project leads, including information provided, openness to questions and onsite visits contributed greatly to understanding the pathway.
- Involvement of an enthusiastic and motivated ACRE champion who provided extensive education.
- The clear guidelines and risk stratification process were simple and easy to implement.

Chart 37 illustrates Stakeholder's views on the skills and knowledge built by the ACRE Project.

Chart 37: Stakeholders views on the skills and knowledge built by the ACRE Project



Source: Stakeholder Outcome Survey

n=59

3.5.3 How could the ACRE Project be embedded in the target EDs as 'business as usual'?

Project Team members cited critical success factors to embedding the model of care as 'business as usual', including:

- Pathway had the flexibility to be integrated into the current practices of each individual site
- Pathways could be merged and integrated with state-wide cardiac pathways
- Identified local individual to take ownership
- Ongoing support from central agencies including the Health Information Unit
- Continued access to lab-based troponin testing
- Built momentum amongst sites by providing continual feedback enhanced the familiarity and adoption of the pathway
- Focused on minimising the disruption to local practice.

Stakeholders also provided comment on the critical success factors required for embedding the ACRE Project as 'business as usual' practice, these included:

- The widespread implementation across all HHS has generated a high degree of awareness for the Project, this will assist with continued uptake and implementation
- Identifying a Clinical Lead within both the ED and Cardiology Departments and ensuring buy-in from both departments is critical
- The simplistic nature and strong evidence base for the pathway
- Ongoing education campaign to ensure knowledge and skills are retained
- Consider decreasing the emphasis on stress testing for very low risk patients, given the access issues experienced for these tests
- Identifying local champions at each site to drive the Project
- Compliance with Queensland Health Cardiac Pathway recommendation
- Consider establishing mandatory ongoing in service training of providers
- Implement an annual or scheduled review of the ACRE Pathway
- Improving access to Clinical Measurement and OPD Services
- Strong executive level support for the implementation of the Project.

4. Summary

Table 9 below summarise the key findings from the evaluation by domain.

Table 9: ACRE key outcome findings

Domain	Major Findings
Effectiveness	<ul style="list-style-type: none"> • 77.2% of the targeted 22 sites across Queensland have implemented ADP, representing a strong and successful uptake of the program. Local contextual factors were primarily cited by those sites who decided not to proceed with implementation. • NEAT compliance increased by a statistically significant 8.2% in ACRE participating hospitals, including a notable 18.6% NEAT performance improvement at Townsville Hospital. • A statistically significant reduction in admission rates for all cardiac chest pain patients was experienced across all targeted facilities. Admission rates fell from 66.9% to 56.2%, this is a significant achievement of the ACRE pathway with evident cost savings and patient flow benefits for targeted facilities. • Total hospital LOS for cardiac chest pain patients was reduced for most sites implementing the ACRE pathway. • The strong clinical leadership approach adopted by the ACRE Project Team was often cited as a critical success factor to the Project and a highly valued element by Stakeholders.
Efficiency	<ul style="list-style-type: none"> • The wide spread implementation of the ACRE pathway indicates the Project is already transferable and scalable. However, key learnings from this model that could be transferred to other areas or expansion projects include: <ul style="list-style-type: none"> - Importance and benefit of interdepartmental collaboration - Ensuring flexibility and adaptability to local site contexts - Strong clinical leadership is critical to ensuring the pathway is adopted and adhered to. • Across the 17 sites that implemented ACRE, the mean total LOS for all cardiac chest pain presentations decreased from 20.4 hours to 14.3 hours, a decrease of 29.9%.¹⁵ This saving in LOS applied to the cardiac chest pain cohort represented a saving of \$2,980,709 over the project duration of 20 months. This resulted in a ROI of 365.8%. Put simply, approximately \$4 is saved for every \$1 spent on the ACRE Project.

¹⁵ Pre- and post-implementation data for total LOS was available reported as a median by month, by facility. Without unit-level data, the ability to calculate the aggregate median LOS across all sites for the pre- and post-implementation period was limited. Aggregates were calculated using a weighted mean of medians method; variance and statistical significance was not able to be determined, which is a limitation and ideally continued data monitoring should occur to ensure the savings can be attributed to ACRE.

Domain	Major Findings
Equity	<ul style="list-style-type: none"> • Limited barriers to access were identified for culturally and linguistically diverse groups, indigenous groups, and people living with a disability. Given the implementation in primarily metro and regional hospitals, some barriers for rural and remote populations were identified. It should be noted that due to the inability to access laboratory troponin testing, implementation of the ACRE pathway could not occur in rural hospitals. • Overall, the ACRE Project is well aligned to patient need.
Appropriateness & Acceptability	<ul style="list-style-type: none"> • A high degree of support for the ACRE Project was expressed by Stakeholders with 79.6% of respondents rating their support a 7, 8, 9 or 10 out of 10 (1 completely unsupportive, 10 completely supportive). • Stakeholders were also highly satisfied with the support and materials provided, education delivered and generally the ACRE Project overall. • The ACRE Project Team reported a number of strategies utilised to enhance acceptability, these focused on obtaining equal involvement of Emergency and Cardiology clinicians, direct contact with local senior clinicians by ACRE Clinical Leads facilitates increased adoption, and scheduling education sessions with wider staff to address any concerns or misinformation.
Sustainability	<ul style="list-style-type: none"> • All Project Team members felt the ACRE Project was to a 'Great Extent' sustainable beyond the HIF funded period, with no substantial barriers to continuing the Project identified. Nonetheless, some concern was raised regarding the impact of clinician staff turnover and the potential for knowledge regarding the pathway to be lost. • The growing and robust evidence base supporting the effectiveness of the pathway was cited as a key factor improving the sustainability of the Project. • Evidence of broader skill development within the ACRE Project Team was demonstrated, with all team members reporting their project management skills had improved to a 'Great Extent'. This level of skill development will have a positive impact on the sustainability of ACRE. • Skill development is also evident amongst Stakeholders surveyed, with 69.5% of respondents either 'Agreeing' or 'Strongly Agreeing' the ACRE Project had built their skills and knowledge about the accelerated process for the assessment of patients with possible cardiac chest pain.

