

Optimizing and Standardizing ACS Patient Pathways

Canterbury and the New Zealand Healthcare System

Patients with chest pain (or other symptoms of a heart attack) are one of the most common patient groups presenting to the Emergency Department (ED). Traditionally, 90% of these patients would be admitted to the ED, exposing many patients to unnecessary risk through invasive testing and representing a large burden to the health system. An integrated clinical team at the Canterbury District Health Board (CDHB) recognized that the problem could be solved via use of an Accelerated Diagnostics Pathway (ADP) that enabled the safe early rule out of Acute Myocardial Infarction (AMI). Research partners and collaborations in accordance with the ICARE-ACS initiative led to expansive analytics and outcomes data in this area including application of evidence-based, safe, accelerated diagnostic pathways for rapid discharge of low-risk patients presenting to the ED with suspected Acute Coronary Syndrome (ACS). Identification of 'low-risk' patients using TIMI risk profiles and cardiac biomarkers measured on admission enabled discharge protocols that maximized patient safety while admitting high-risk patients in need of further care. Iterative improvements were observed year over year following adoption of the EDACS risk score and using more sensitive cardiac biomarkers. While maximum discharge rates can be observed with ADP processes leveraging high sensitivity troponin, safe discharge is also possible using point of care. Implementation of these ADP pathways have positively impacted Key Performance Indicators (KPIs) throughout the Canterbury Health System including median length of stay, number of patients transported to central hospitals, cost of prolonged stays and cost of transports, patient satisfaction, and increased clinician confidence.

The success at Christchurch in the Canterbury Health System enabled an initiative with the Ministry of Health (MOH) to implement a country-wide initiative across New Zealand in support of the ADP. The ICARE-ACS team is also involved in global consulting as a direct result of their best practices and successful implementation. Currently, this approach is being extended to remote rural general practices. These integrated clinical care efforts in Canterbury, and across the New Zealand Healthcare System is a valued example of a multi-disciplinary best practice that resulted in measurable benefits across the entire health system.



PATIENT



CLINICIAN



HOSPITAL
ADMINISTRATION



PAYOR



The ICARE-ACS team is a multisite, multidisciplinary research team that is comprised of representatives from emergency medicine, cardiology, general medicine, laboratory medicine, planning and funding, decision support and general practice. Since its conception in 2014, this team has led multiple observational studies and randomised clinical trials which have resulted in >100 publications, have influenced ACS care throughout the New Zealand Healthcare System, and have driven widespread adoption of new chest pain/AMI assessment pathways including recommendations within the 2016 guidelines of the Cardiac Society of Australia and New Zealand (CSANZ).⁷

KEY PARTNERS / STAKEHOLDERS



Martin Than, MD
Senior Medical Officer
Emergency Department
Christchurch Hospital and
University of Otago



Peter George, MBBS, FRCPA
Professor of Pathology
University of Otago and
former Clinical Director,
Canterbury Health
Laboratories



**Sally Aldous, MBChB,
MRCP, FRACP, MD**
Cardiologist
Christchurch Hospital



Gerry Devlin, MD, FRACP, FESC
Cardiologist
Medical Director of the National
Heart Foundation
Associate Professor of Medicine
University of Auckland



Greg Hamilton, PhD
Team Leader
Planning and Funding,
Canterbury District
Health Board

SITUATION ANALYSIS

- Traditional triage for patients with suspected ACS can involve unnecessarily high admission rates (i.e., 90% patients admitted despite only 10–15% with AMI)
- Prolonged ED length of stay increases risk of poor outcomes^{1,5,6}
- Inefficient clinical pathways can result in additional costs due to unnecessary transport and deferred diagnosis; as well as increased burden on the hospital staff
- Implementing evidence-based, accelerated diagnostic pathways for rapid exclusion of AMI in patients with suspected ACS can lead to measurably better healthcare in both rural general practices and hospital emergency departments

APPLICATION OF EVIDENCE-BASED, SAFE ACCELERATED DIAGNOSTIC PATHWAYS

DISCOVERY

An iterative and evidence-based initiative was developed to collect and translate evidence into tested, validated and implemented pragmatic pathways that would incrementally rule-out a greater proportion of low-risk patients without AMI safely. Randomized clinical trials across diagnostic testing strategies including multi-marker point of care testing and single algorithms with contemporary and high sensitivity troponin were used to evaluate risk profiles against major adverse cardiac events (MACE) to assess effectiveness and safety.

Use of high sensitivity troponin assays supported higher discharge rates based on ability to include TIMI-risk score patients ≥ 1 , but even using less sensitive point of care assays; the ADP was proven to be safe and effective.

Testing Strategy	% Patients Discharged	Sensitivity	30-day MACE
Multi-marker POC Strategy with TIMI Risk $\leq 1^2$	9.8%	99.3%	0.7%
Contemporary TnI < 99th%ile and TIMI Risk $\leq 1^3$	19.8%	99.7%	0.25%
High Sensitivity TnI* < 99th%ile and TIMI Risk $\leq 1^4$	40%	99.7%	0.25%

*Not available in the US

HYPOTHESIS

Application of safe and effective ADP clinical care pathways would expedite the investigation of patients with possible heart attacks and enable benefits across the Canterbury Health System.

Best for people, best for system.
Earlier safe discharge, optimization of health resources.

Better, sooner, more convenient health services.
Earlier safe discharge, fewer interventions, minimize overnight stays in hospital with less time spent interacting with health services.

Improved health and equity for all populations.
Locally adapted/chosen pathways embedded consistently with clarity to provide appropriate care for regional rural and metropolitan populations, i.e., tailored pathways for other settings such as Ashburton or Greymouth.

Improved quality, safety, and experience of care.
Proven safe use of troponin testing, proven minimal adverse events, translation of knowledge into clinical practice.

Best value from public health system resources.
Reduced demand for acute services and testing, allowing better allocation of health resources.



APPLICATION OF EVIDENCE-BASED, SAFE ACCELERATED DIAGNOSTIC PATHWAYS

SUCCESS FACTORS

PARTNERS

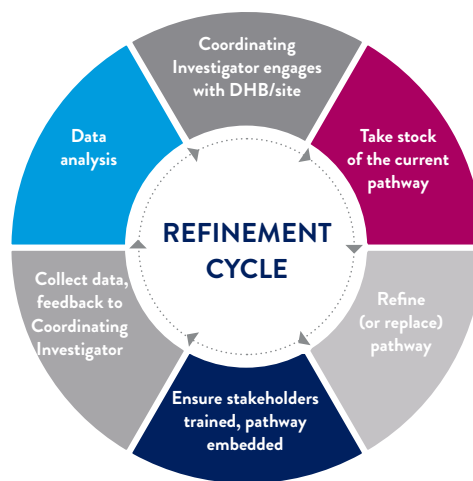
Implementation of new clinical care pathways requires a multidisciplinary team.

Crucial support for the development and implementation of the improved ACS screening pathway was comprised of Emergency Medicine, Cardiology, General Medicine, Nursing, Canterbury Health Laboratories, Planning and Funding, Decision Support and General Practice.

EXECUTION

The movement from experimental trials to sentinel adoption of the ADPs in the Canterbury Health System, including Christchurch Hospital, lead to further implementation across New Zealand and internationally.

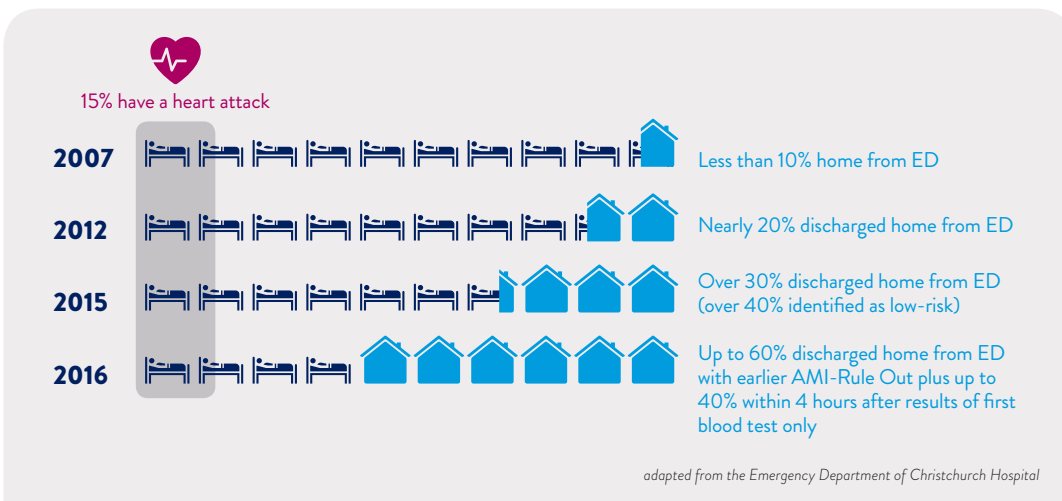
Ensuring a chest pain pathway is appropriate for the population and the environment is a refinement cycle that may be repeated on an ongoing basis as needs change. The key is to ensure it is embedded into clinical practice, known, practiced and measured.







PROOF OF VALUE

The research supporting evidence-based, safe discharge of patients with suspected ACS using an ADP protocol enabled best practice adoption across Australia and New Zealand and led to a national guideline (ICARE-ACS) for EDs to implement comparable programs. Findings have shown a DOUBLING (odds ratio 2.4 [95%CI: 2.3 to 2.6]) for patients being discharged within 6 hours of presentation with suspected ACS and an improved median length of stay for patients without ACS by 2.9 hours [2.4h to 3.4h].

- Accelerated diagnostics pathways for patients suspect with ACS can safely rule out AMI
- Evidence-based EDACS (ED Assessment of Chest pain Score) derived from TIMI-risk assessments and cardiac biomarkers can be implemented nationwide across hospitals and rural clinics
- The highest percent of patients safely ruled-out for AMI leveraged ADPs with high sensitivity troponin
- Cross-departmental collaboration is critical to ensure physician familiarity with the pathway and adherence to newly recommended standardized processes



SPOTLIGHT ON STAKEHOLDER SUCCESS

 <p>PATIENT</p>	<p>INCREASED PATIENT SAFETY</p>	<p>It has been shown that for every hour in the emergency room, risk of adverse events and mortality increases by >3% regardless of the presenting symptom.^{1,5,6} A reduction of mean LOS at Christchurch Hospital from 150 hours to 60 hours drives enhanced patient safety.⁵</p>
	<p>REDUCED PATIENT ANXIETY</p>	<p>“People who come to the emergency department are anxious as many fear that they are having a heart attack. It is really meaningful to be able to say to them much quicker that we don’t think they are.”</p> <p>~Martin Than, MD, Senior Medical Officer, Emergency Department, Christchurch Hospital and University of Otago</p>
 <p>CLINICIAN</p>	<p>CONFIDENT TRIAGE</p>	<ul style="list-style-type: none"> • 100% adherence to Accelerated Diagnostic Protocols (ADP) at Christchurch Hospital • 92% adoption of ADP across New Zealand since 2012 • ADP recommendations now included in 2016 guidelines of the Cardiac Society of Australia and New Zealand (CSANZ)
 <p>HOSPITAL ADMINISTRATION</p>	<p>REDUCED LOS</p>	<p>2.5-fold reduction in overall length of stay for patients without ACS</p>
	<p>REDUCED UNNECESSARY HOSPITAL ADMISSIONS</p>	<p>30% reduction in hospital admissions for patients with suspected ACS between 2014 and 2016 (60% reduction in 2016 vs. 2007)</p>
 <p>PAYOR</p>	<p>LOWER HEALTHCARE COSTS</p>	<ul style="list-style-type: none"> • Reduced costs per year of 9.5 million NZD attributed to the transport savings and LOS improvements across New Zealand following ADP implementation • Reduced Unnecessary Referrals: % of patients admitted to the cardiac ward was reduced 3.5x (70% to 20%)

1. Filippatos George, and Karasi Evridiki. The Effect of Emergency Department Crowding on Patient Outcomes. 2015; 9(6).
2. Than M, Cullen L, Reid CM, et al. A 2-h diagnostic protocol to assess patients with chest pain symptoms in the Asia-Pacific region (ASPECT): a prospective observational validation study. *Lancet* 2011; 377:1077-84.
3. Than M., Cullen L, Aldous S., et al. 2- Hour Accelerated Diagnostic Protocol to Assess Patients With Chest Pain Symptoms Using Contemporary Troponins as the Only Biomarker, *JACC*, 2012; Vol.59, No.23, p. 2091-2098.
4. Cullen L, Mueller C., Parsonage W., et al. Validation of High-Sensitivity Troponin I in a 2-Hour Diagnostic Strategy to Assess 30-Day Outcomes in Emergency Department Patients With Possible Acute Coronary Syndrome, *JACC*, 2013 Vol. 62, No. 14, p.1241-1249.
5. Singer, A. et al. The Association Between Length of Emergency Department Boarding and Mortality. *Acad Emerg Med* 2011; 18(12): 1324-9.
6. Akroyd-Stolarz, S., et al. The association between a prolonged stay in the emergency department and adverse events in older patients admitted to hospital: a retrospective cohort study, *BMJ* 2011; 20:564-569.
7. ICARE-ACS (Improving Care Processes for Patients With Suspected Acute Coronary Syndrome): A Study of Cross-System Implementation of a National Clinical Pathway Martin P. Than, John W. Pickering, et al. on behalf of the ICARE-ACS Implementation Group *Circulation*. 2017; CIRCULATIONAHA.117.031984, originally published November 14, 2017