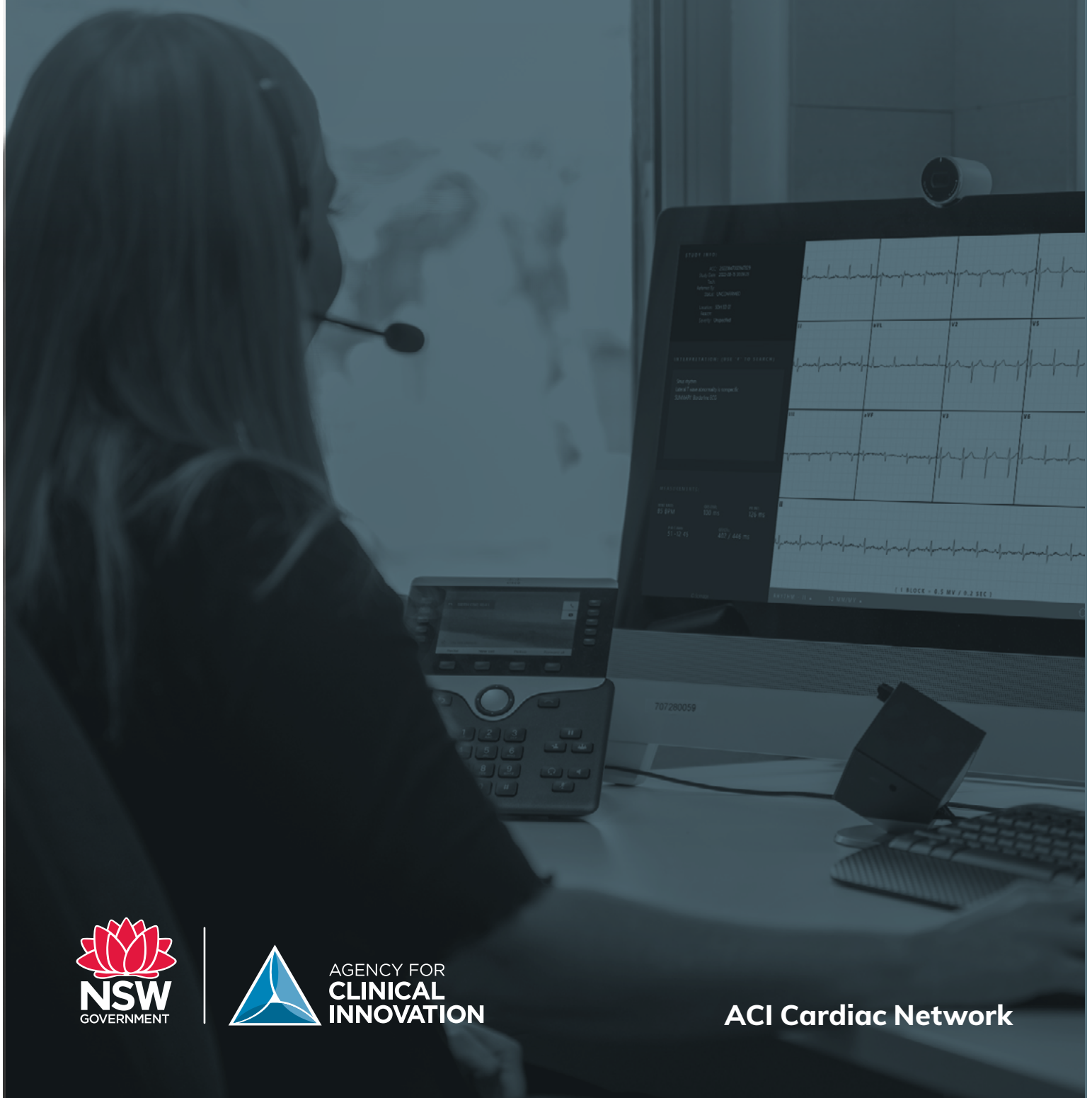


TeleECG model of care

AUGUST 2022



The information in this document is not a substitute for healthcare providers' professional judgement.

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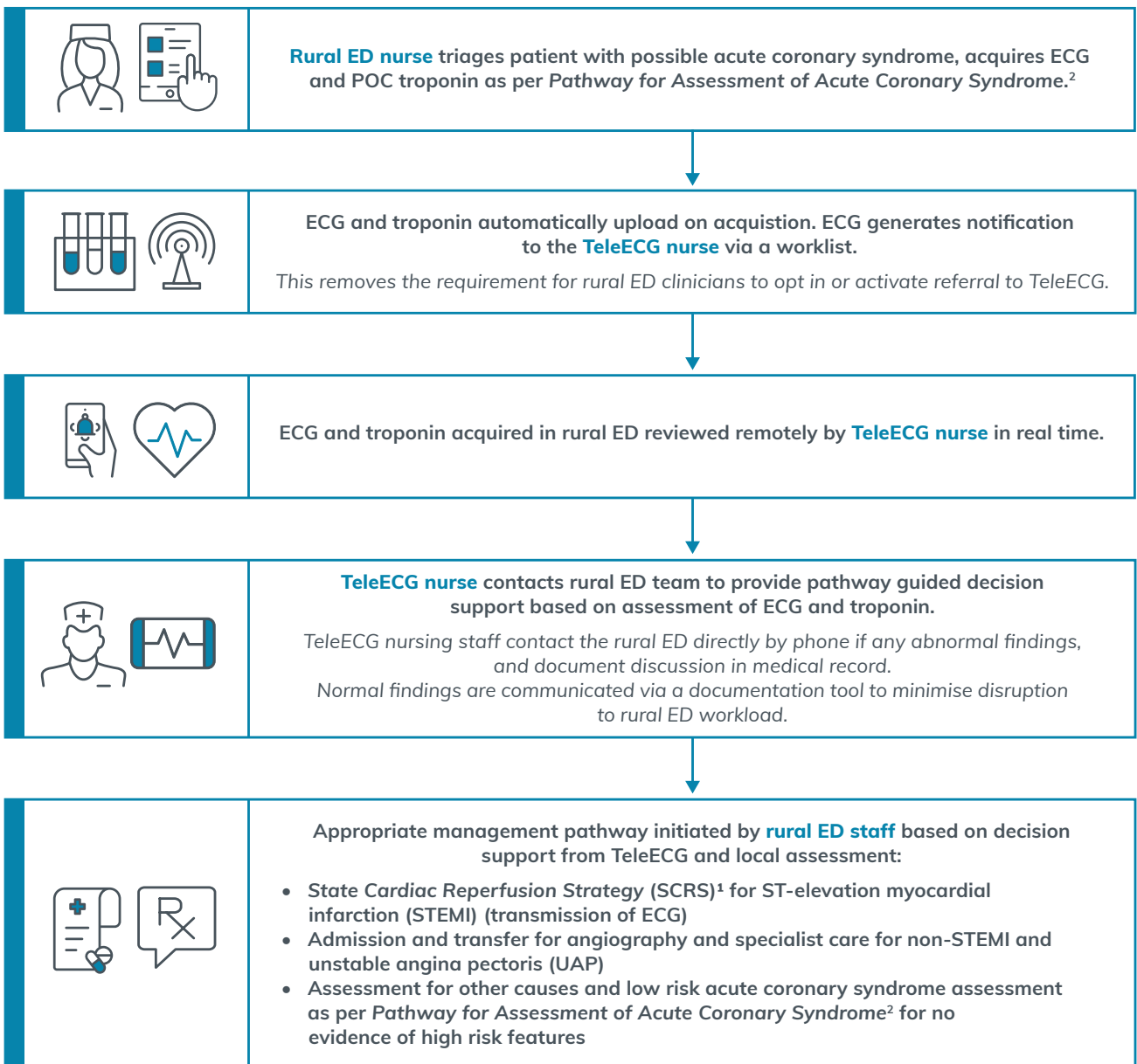
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TeleECG model of care – at a glance

- The teleECG service provides decision support for rural emergency department clinicians in managing patients with possible acute coronary syndrome.
- TeleECG is an evidence-based strategy that supports improved diagnosis and treatment of myocardial infarction in rural NSW.
- Automated download of electrocardiogram (ECG) and troponin provides real time notification and remote review of images to the TeleECG hub.
- TeleECG provides a safety net that complements established pathways (including the [State Cardiac Reperfusion Strategy¹](#)) and comprehensive assessment performed in the rural emergency department (ED).*



*TeleECG does not replace accountabilities of local treating clinicians in the management of patients.

TeleECG model of care

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Summary

Timely identification and management of patients with suspected acute coronary syndrome has a significant impact on clinical outcomes.

The term acute coronary syndrome (ACS) encompasses ST-elevation myocardial infarction (STEMI), non-ST elevation myocardial infarction (non-STEMI) and unstable angina pectoris (UAP).

The NSW TeleECG model of care provides guidance on the implementation of evidence-based decision support for the management of ACS in NSW rural emergency departments (EDs).

The TeleECG model of care encompasses clinical processes and use of technologies that align with the *State Cardiac Reperfusion Strategy*¹, *NSW Virtual Care strategy*³, *NSW Rural Health Plan*⁴ and *Future Health Strategy*⁵.

STEMI is a time-critical, life-threatening, medical emergency. It is essential to rapidly diagnose STEMI and restore blood flow to the heart to reduce the risk of heart failure or death. Prompt recognition and evidence-based management of non-STEMI and UAP reduces the risk of an adverse cardiac event.⁶

People living in regional and rural areas have a high burden of cardiovascular disease. However, access to specialist emergency care in many areas is limited.^{7,8} The NSW TeleECG model of care supports timely management and delivery of evidence-based treatment, close to the patient's home.

The model links specialist nurses with staff in small rural hospitals to support care being provided for patients with suspected ACS. The specialist nurse can help guide the staff from the rural hospital on the appropriate clinical pathway to use for that patient, using a range of telehealth technologies. This complements and supports the existing *State Cardiac Reperfusion Strategy*¹ and *Pathway for Acute Coronary Syndrome Assessment*².

Management of ACS requires effective and streamlined hospital services and rapid access to diagnostics and specialist management.

STEMI is usually caused by a blood clot that blocks a blood vessel in the heart. Timely reperfusion is required either via thrombolytic medication (to dissolve the blood clot) or primary percutaneous coronary intervention. These therapies are only effective in the hours immediately following onset of symptoms. The earlier treatment is provided, the better the outcomes for patients.^{6,9}

Electrocardiogram (ECG) transmission is a technique that uses data networks to send an ECG from the device it is acquired on (defibrillator or ECG machine) as an electronic image, which may be received and viewed from a variety of platforms and applications (including email and centralised repositories).

Significant gains have been made in using ECG transmission platforms for diagnosis of STEMI across NSW as part of the *State Cardiac Reperfusion Strategy*.¹ Despite this, there is evidence that in small rural hospitals, there is a higher incidence of a missed STEMI diagnosis and treatment delays – resulting in failure to provide reperfusion therapy, and increased mortality, length of stay and 30-day readmissions.⁹⁻¹¹

The TeleECG model was subject to a randomised controlled trial (RCT) in Hunter New England Local Health District (HNELHD)¹², as one of the NSW Ministry of Health's Translational Research Grant Scheme projects.

The model of care demonstrated:

- significant improvement in access to specialist nurses
- an increase in identification of STEMI
- initiation of timely treatment
- better clinical outcomes, irrespective of the patient's location.¹²

Importantly, this model of care differs from current pathways which require rural clinicians to opt in, and instead uses technologies to ensure that disruption to clinical workload is minimised.

TeleECG does not replace the existing referral pathways or local clinician accountabilities in rural EDs for assessment and management of suspected ACS patients in a local health district (LHD) (including the *State Cardiac Reperfusion Strategy*¹). It acts as an additional safety net in order to reduce the frequency of missed STEMI and improve overall management of patients with possible ACS.

Introduction

The TeleECG model of care is a specialist nurse-led decision support system. It is for clinicians working in small, rural hospitals that do not have access to expert emergency physicians onsite, to support them in managing all ED presentations with possible ACS.

These facilities are usually managed by general practitioner (GP) visiting medical officers (VMOs), typically with a role delineation of level 1-3.

TeleECG supports assessment of the patient however does not replace the requirement or responsibility of rural clinicians to undertake comprehensive assessment and management of the patient.

The TeleECG model provides:

- automated remote virtual access to ECG and troponin results for a team of clinical nurse consultants (CNCs)
 - support for local teams in the early diagnosis and management of ACS
 - support in the early recognition of other ECG abnormalities, directing care appropriately along local guidelines and referral pathways
 - upskilling and confidence building for nursing staff managing people with ACS in rural areas
- improved access to reperfusion for patients who self-present to small, rural hospitals
 - integration with current cardiac reperfusion strategy pathways and virtual models of care.

TeleECG model of care steps

Below are the TeleECG model of care steps outlining the management of the possible ACS within a rural facility. See [Figure 2](#) for graphical representation.

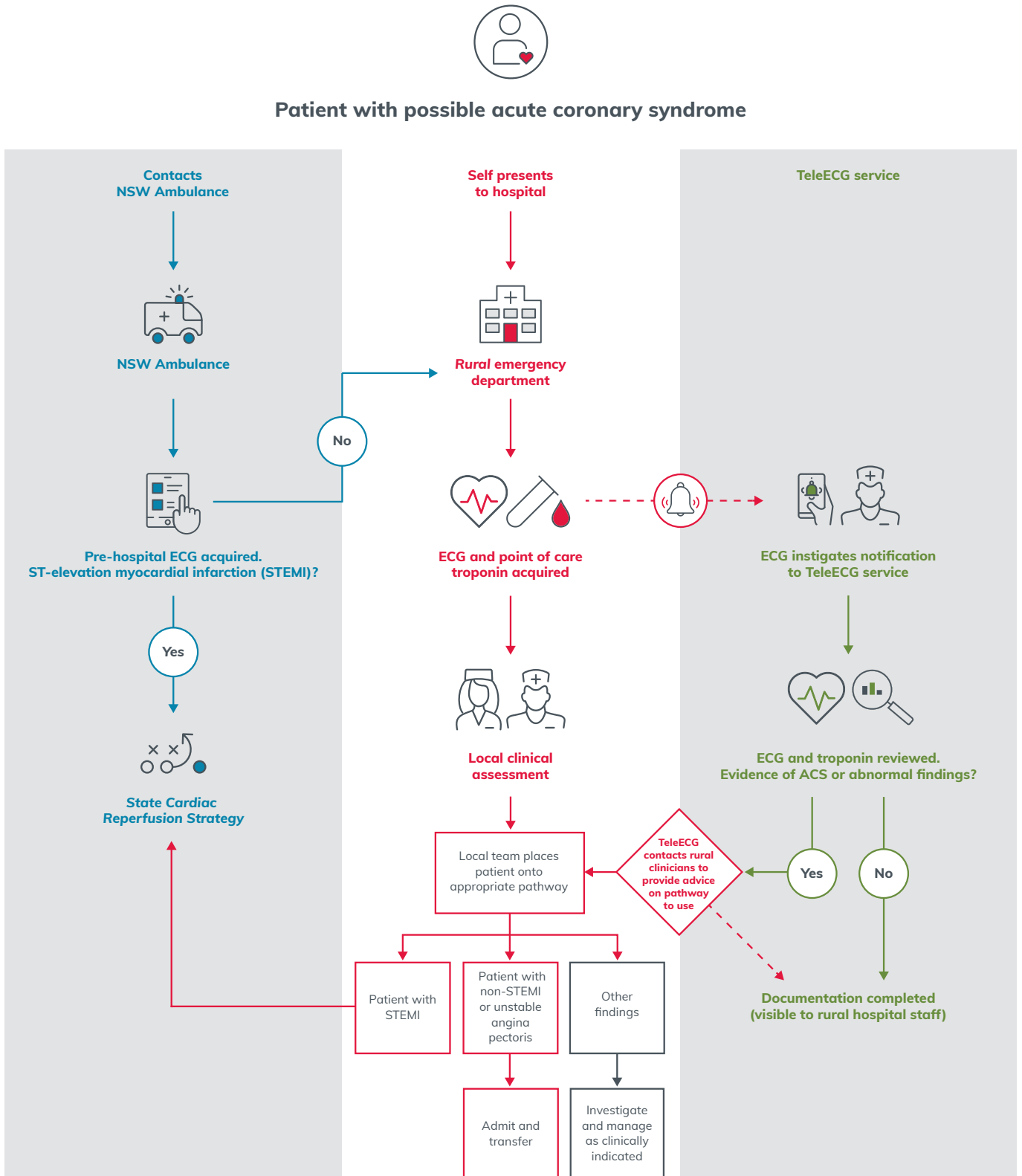
1. The patient presents to a small, rural ED with symptoms of possible ACS (by private transport or ambulance).
2. A triage nurse assesses and selects the appropriate presenting problem code (International Classification of Diseases 10th revision (ICD-10) or systematised nomenclature of medicine (SNOMED) clinical terms), based on the symptoms the patient describes into the local clinical system.
3. An ECG is recorded within 10 minutes of arrival as per the *NSW Pathway for Acute Coronary Syndrome Assessment*² by a nurse at the small rural hospital, (usually concurrently or before the triage category is entered into the information technology (IT) system).
4. The ECG is automatically uploaded on acquisition into the central repository for viewing.
5. The ECG acquired at the small rural hospital instigates a notification to the on duty TeleECG CNCs via a worklist (a development may involve ACS triage via statewide single digital patient record).
6. Bloods are taken at the small rural hospital, including troponin using point of care testing, which download to central repository for the TeleECG CNC to review.
7. The point of care troponin blood results are reviewed by TeleECG CNC in the central repository.
8. Where ECG and troponin are normal, the TeleECG CNC provides confirmation via the documentation tool visible to rural hospital staff.
9. Where ECG and/or troponin are abnormal, the TeleECG CNC contacts the site (or virtual care service where applicable) by a predefined communication channel (phone call or videoconference) to:
 - assist with ECG interpretation
 - provide advice on management where indicated
 - record the actions taken.*
10. If the ECG indicates STEMI, the TeleECG CNC supports referral to the local STEMI reading service. If the ECG and/or presentation is abnormally complex, the TeleECG CNC will support escalation to the local cardiology on-call service.

Future development should aim to incorporate review of relevant clinical information (previous ECGs, triage notes etc.) enabled through the implementation of the statewide single digital patient record.
11. The TeleECG CNC develops an evidence-based treatment plan with the small rural hospital clinicians, or, where relevant, links with the existing virtual care service which incorporates the local LHD pathways.
12. The TeleECG CNC completes the documentation tool regarding; time of contact, ECG and troponin interpretation and advice provided. A copy is transferred to the small rural hospital and incorporated into the patient's electronic medical record.
13. The TeleECG CNC records reperfusion method, reperfusion time and transfer time (that has occurred in the LHD) in the service database.
14. Length of stay, readmission, and mortality are assessed and recorded at 30-day-follow-up by the TeleECG service.

*Any clinician (GP or nurse) working at a rural hospital may initiate a call to the TeleECG service for additional support as required if the patient's condition changes, or additional relevant clinical information is identified.

TeleECG pathway

Figure 2: TeleECG process within the NSW State cardiac reperfusion strategy¹ framework



Objectives

The TeleECG model aims to improve the assessment and management of ACS in rural EDs. It does this by providing an automated decision support service using ECG interpretation and pathology review. Improvement in assessment and management of ACS specifically aims to increase early diagnosis of STEMI and access to primary reperfusion.

Key benefits that are anticipated include:

- early recognition and management of ACS, including STEMI, non-STEMI and UAP
- initiation of evidence-based management for all patients with ACS
- automatic download and electronic storage of ECGs as a critical diagnostic tool
- capability building and transfer of skills for rural clinicians in the management of suspected ACS
- improved access to timely, evidence-based treatment for rural and remote populations
- lower economic and social burdens of cardiovascular disease
- cost effective use of resources
- reduction in mortality, readmissions (associated with reinfarction and heart failure) and length of stay.*

*Anticipated reduction in mortality, readmission (associated with reinfarction and heart failure) and length of stay requires further modelling.

Evidence for TeleECG

The evidence base for reperfusion therapies in the management of STEMI, and risk stratification of non-STEMI and UAP are acknowledged nationally and internationally as best practice, demonstrating reductions in long-term morbidity and improved survival.^{1,4,5,9,10}

The TeleECG model of care builds on the existing approach in NSW for implementing evidence-based management of ACS.

Methods

The current NSW *Pathway for Acute Coronary Syndrome Assessment*² and *State Cardiac Reperfusion Strategy*¹ (involving transmission of ECG and referral to specialist review) provide the framework for implementing this approach in NSW. These documents were developed through expert consensus and systematic review of the literature in 2019 and 2022 respectively.

In conceptualising the TeleECG model of care, incident and patient outcome data were reviewed using local incident and performance data, the *Clinical Excellence Commission Focus Report on Acute Coronary Syndrome Incidents*¹³, National ACS registry data^{10, 14-16} and Australian Institute of Health and Welfare reports¹⁷⁻²⁰.

A literature review was conducted in 2018 of publications from the previous 10 years, to understand the prevalence, impacts and factors associated with missed diagnosis of myocardial infarction. This was undertaken as part of developing the project and intervention design, prior to the Management of Rural Acute Coronary Syndromes (MORACS) RCT, conducted by HNELHD.

The literature review and subsequent intervention design was formally endorsed by the MORACS translational research grant team, which included expert medical, nursing, and clinical research representatives from across NSW LHDs and Hunter Medical Research Institute.

The MORACS RCT (conducted in 2018-2020) compared a nurse-led, centralised ACS diagnostic support service with usual care, with the primary aim of reducing the proportion of missed STEMI in non-specialist-managed rural hospital EDs.¹²

The literature review was repeated in 2020 and 2021 to ensure currency of evidence.

Key findings

The Australia and New Zealand ACS Snapshot Study demonstrated that people living in rural areas with ACS have poorer outcomes than those living in metropolitan areas. Of patients in rural hospital with a confirmed high-risk ACS (non-STEMI and UAP), 58% did not receive evidence-based investigation and treatment. Failure to treat acute STEMI occurred in 36.1% of patients in the study.

The risk of heart failure and mortality is almost double for patients with untreated myocardial infarction.^{10, 11, 21}

Failure to treat acute STEMI (in the absence of contraindications) is predominantly due to failure to interpret the ECG and serum markers, occurring mainly in small rural hospitals without specialists.^{11, 21}

Aboriginal and Torres Strait Islander people have disproportionately higher rates of ACS, and onset occurs at a younger age than in non-Aboriginal and Torres Strait Islander people. In rural settings, Aboriginal and Torres Strait Islander people make up a higher percentage of the population and they

are less likely to receive guideline-based therapy for ACS.²⁰

The MORACS RCT demonstrated that an automated decision support service increased diagnosis of STEMI and initiation of reperfusion therapy. Diagnosis of STEMI was missed in 35% of cases in the usual care group compared to zero for those hospitals provided with ACS decision-making support.¹²

The challenges of providing timely hyperacute care to patients presenting to small hospitals with suspected ACS include:

- varied or limited access to best practice real time assessment, diagnosis and treatment
- transient workforce reducing familiarity with local referral pathways and processes
- requirement of rural clinicians to identify or suspect possible ACS and initiate referral to telehealth or virtual care support via ECG transmission (opt in process)
- less experience in identifying and managing ACS presentations with abnormal ECG patterns, in particular STEMI
- geographical isolation and difficulty reaching hospitals for life-saving treatments.

Rural populations in NSW impacted by acute coronary syndrome

To understand the size of the NSW population who may access this service, data for patients who presented to role delineation level 1, 2 and 3 EDs in the nine rural LHDs, using symptom codes (both ICD-10 and SNOMED) that represent suspected ACS, were examined. These codes are available in [Appendix 1](#).

- Up to 36.1% of rural patients presenting with STEMI do not receive primary reperfusion.^{9, 12}
- A further 58% of patients from rural hospitals with non-STEMI or UAP do not receive evidence-based investigation and treatment.⁹
- Between 2-9% of all suspected ACS presentations to hospital are STEMI, and a further 45-50% are high-risk ACS (non-STEMI or UAP).⁹

Symptoms of breathlessness and epigastric pain were included in the MORACS study to capture atypical presentations, which are common in women, the elderly and patients with diabetes.¹² Atypical presentations are often associated with missed or delayed diagnosis, due to clinicians not considering ACS as a possible diagnosis.

The total number of potential cases at each LHD was compared with the incidence of ACS. This review demonstrated that there are potentially 494-2,216 patients with STEMI and 11,100-12,300 patients with non-STEMI or UAP annually across NSW, who could have their care and outcomes improved by the introduction of the TeleECG service.

Organisational requirements

The TeleECG model is a single, virtual, statewide service that is hosted by one service and managed by a roster of CNCs. These nurses provide remote specialist assessment, diagnosis and treatment planning for patients with a suspected ACS, that aligns with the *NSW Cardiac Reperfusion Strategy*¹, as shown in [Figure 2](#).

The NSW TeleECG model of care includes four main organisational elements:

Host site	The NSW TeleECG host hospital provides the central administrative functions of the service, including rostering and human resources.
Virtual team	A team of CNCs are rostered 24/7 and provide remote clinical advice with the support of an operations manager, data analyst and part-time cardiologist (see Appendix 2 regarding CNC workforce requirements).
Participating sites	<p>All small, rural hospitals engaged with TeleECG will be provided with the technology infrastructure to link to the TeleECG service. This will facilitate early notification of patients presenting with suspected ACS. Standardised statewide pathways, documentation, policies, guidelines and standing orders will support patient assessment. After patients have been triaged and an ECG is acquired, an automated notification is sent to the TeleECG CNC, and the ECG and pathology results are reviewed from a centralised platform.</p> <p>The TeleECG CNC contacts the facility to provide support with specialist assessment, diagnosis and treatment planning for patients with suspected ACS, as required. The platform supports communication across district boundaries. Its data sharing and collaboration functions enable remote viewing of clinical data, real-time review of images and patient assessment.</p>
eHealth	<p>eHealth is responsible for embedding new technologies in care settings to improve outcomes for patients.</p> <p>eHealth works in partnership with the project team to:</p> <ul style="list-style-type: none"> • develop and implement the IT infrastructure to support TeleECG • review and refine processes as the TeleECG model is rolled out and implemented.

Operationalising TeleECG

NSW TeleECG Service

- Recruit project officer, operations manager, CNCs, data analyst and cardiologist roles.
- Implement a rostering system to ensure 24/7 CNC coverage.
- Establish ECG and troponin worklist.
- Provide appropriate IT equipment including high-quality computer screens to enhance diagnostic review for virtual CNCs.
- Implement standardised assessment and documentation tools.
- Establish real-time clinical analytics to support quality improvement.
- Document existing LHD referral pathways in collaboration with participating sites.

Participating sites

- Ensure comprehensive implementation of the *NSW Pathway for Acute Coronary Syndrome Assessment*². This would be evidenced by rural clinicians access, knowledge and utilisation of the pathway.
- Revision of local ACS workflows and referral pathways to include TeleECG.
- Education and training for clinical staff on the TeleECG clinical processes, delivered by implementation and program teams.
- Engage local educators to champion TeleECG and support coordination and ongoing care for people with suspected ACS.

Principles of the TeleECG model of care

The NSW TeleECG model has been informed by the HNELHD MORACS RCT.

Access

Timely initiation of evidence-based care in EDs.

- The TeleECG model provides rapid access to an expert CNC 24/7.
- Automatic notification is provided to the CNCs after an ECG has been acquired in the ED.*
- Early ECG interpretation and review of pathology results are enabled.
- Local protocols are in place at participating TeleECG sites to facilitate two-way communication with the centralised service, through a central point of contact, in case of clinical deterioration and to facilitate early management of suspected ACS.
- An evidence-based treatment plan is documented by the TeleECG CNC, in partnership with the local team, for patients with ACS (as per *NSW Pathway for Acute Coronary Syndrome Assessment*²), including appropriate transfer destination in accordance with local pathways.

Data collection

High quality data and clinical indicators are routinely collected and used to promote patient safety and quality improvement.

- A standardised minimum dataset will be used to measure and evaluate patient and service outcomes.
- Datasets will include process and outcome measures, patient-reported outcome measures, measures of patient and provider experience and adverse events.
- Quantitative metrics will be collected on service activity, volume and clinical consultations.
- Data on patient safety, process, outcome and experience will be reported via local operational meetings for TeleECG, as well as in incident and risk management governance committees, if required.
- Systemic issues will be reported to statewide governance groups for monitoring and management, including the Agency for Clinical Agency (ACI) Executive and Cardiac Network and the Ministry of Health.
- Data on morbidity and mortality will be provided to local teams for review at morbidity and mortality meetings, to support case reviews and discuss adverse events, both at a local and state service level.

*TeleECG may leverage from future roll out of the statewide single digital record utilising triage codes associated with ACS.

Governance and leadership

Local teams are supported to provide high quality care, underpinned by robust governance structures and strong clinical leadership.

- Formal governance arrangements are documented and in place.
- The TeleECG model has local executive sponsorship, oversight and local implementation support.
- The TeleECG model has:
 - a dedicated operations manager to provide organisational, divisional and contractual governance
 - a part-time cardiologist to provide support for post review of complex cases, clinical leadership and strategic service planning
 - a data analyst to collate outcomes and assess service effectiveness to feed into quality assurance processes
 - dedicated IT and telehealth support to provide training, education and business continuity processes for the TeleECG service.
- Clinical and support roles have clearly defined responsibilities that are documented, including scopes of practice and interdependencies with other service providers and facilities.
- Escalation pathways are established to ensure clinical and operational issues are managed in a timely and appropriate manner.
- The TeleECG process is documented including clinical pathways, workflows and feedback mechanisms. Feedback mechanisms include morbidity and mortality review meetings.
- Standardised documentation is used to record:
 - the TeleECG consultation
 - decision-making processes for patients who require transfer or retrieval for escalation of care
 - other interactions between the TeleECG service and the participating sites.

Information technology

Time-critical specialist assessment and care is enabled by IT and TeleECG consultations.

- A notification and communication system is established between rural EDs and TeleECG CNCs.
- A centralised, statewide, unified communications platform is available for centralised storage and retrieval of ECGs and pathology results from hospitals throughout NSW.
- TeleECG participating sites and users have access to high speed, broad area networking, local area networking and wireless networking and a health wide area network and statewide wireless core.
- TeleECG participating sites, users and departments have unified communications capabilities including telephony, file transfer and integration with active directory and Outlook Exchange address book.
- CNCs have personal computers enabled with unified communication capabilities to connect to hospitals using the TeleECG service.
- The TeleECG service and participating hospitals have support agreements in place to cover all aspects of the technology used for patient care including standard procedures in case of technology failure.
- TeleECG CNCs have access to the necessary clinical data at hospitals using the service.
- TeleECG CNCs use standardised assessment and documentation tools.

Protocols and procedures

Standardised protocols and procedures are implemented to support effective patient care.

- Standardised tools are used for the identification, triage and assessment of patients with suspected ACS as per statewide guidelines and protocols.
- A standardised documentation protocol is in place for TeleECG participating sites outlining:
 - responsibilities for documenting consultations in local electronic medical records, including assessment, diagnosis and management plan
 - timelines for documentation in electronic medical record
 - use of the Introduction, Situation, Background, Assessment Recommendation (ISBAR) format to capture the consultation information
 - responsibilities for noting any changes to the patient management plan.
- Standardised statewide protocols are in place for the provision of thrombolysis, including:
 - inclusion and exclusion criteria
 - patient consent
 - storage and replacement of tenecteplase
 - patient monitoring
 - staff roles, responsibilities and accreditation requirements for the administration of tenecteplase (including the *NSW Nurse Administered Thrombolysis Policy Directive*²²).
- Standardised protocols are in place for care post thrombolysis, including observation and monitoring requirements and transfer for percutaneous coronary intervention.
- Protocols are in place to support care of patients with cardiac arrhythmias (non-life threatening and life threatening) and patients who are deteriorating.
- Documented business continuity processes are established.

Workforce education and training

Patients receive high quality ACS care delivered by local teams, supported by virtual specialist CNCs experienced in the delivery of TeleECG.

- Centralised workforce needs are identified (further information provided in [Appendix 2](#)), and roles and responsibilities are defined and documented, ensuring TeleECG supports existing pathways (including *State Cardiac Reperfusion Strategy*¹ for STEMI).
- An education pathway is developed for the TeleECG CNC workforce.
- The TeleECG service operational manager oversees the day-to-day business and operational aspects of the service. This role provides organisational, divisional, contractual and governance support to ensure a high level of service is delivered which meets the expected targets and outcomes.
- Local staff are trained in:
 - the management of ACS
 - the administration of thrombolysis
 - patient monitoring during and after administration
 - the role of the TeleECG service.
- Transfer protocols are in place to facilitate timely percutaneous coronary intervention.

TeleECG phased implementation approach

The model will be implemented using a two phased approach which is detailed in [Table 2](#).

Phase 1

Development of a statewide model and technology requirements

This phase will include the development of a model of care for TeleECG, including an evidence review, guided by the steering committee.

A technology gap analysis will be completed in phase one for each LHD, to assess the current and future requirements for expansion of TeleECG across other LHDs.

The gap analysis will include:

- automated central access to ECGs and pathology results
- two-way communications
- data collection
- documentation tools.

Phase 2

TeleECG service statewide implementation

The second phase will include the establishment of a statewide TeleECG hub to support other rural LHDs with the interpretation of ECGs, pathology review and decision support for the management of ACS. This phase is dependent on approval of the business case.

A risk mitigation plan will be required in the event the business plan is not approved.

The decision to include TeleECG at other sites will be based on a number of criteria, including:

- access to specialist decision-making support within the LHD
- available strategies to support management of ACS
- clinician and executive sponsorship for the service
- current IT infrastructure
- capacity to support the technical installation and troubleshooting aspects of the program, particularly in the early stages.

Strong working relationships between clinical and IT teams is key to the successful implementation of the TeleECG model at other LHDs.

There are nine LHDs with rural or regional hospitals (Far West, Hunter New England, Mid North Coast, Murrumbidgee, Northern NSW, Southern NSW, Nepean Blue Mountains, Illawarra Shoalhaven and Western NSW) that could potentially be included in the service.

Table 2: TeleECG phased implementation

Phase	Service requirements
1. Activities to support TeleECG at other rural LHDs	<ul style="list-style-type: none"> • Proof of concept with another LHD in addition to HNELHD • Identification of potential ACS presentations linked to triage categories • Automatic upload of ECGs from the machine to a central repository • Notification to the centralised team via ECG worklist (including patient ID, location and medical record number (MRN)) • Centralised access of ECGs • Centralised access to pathology results • Development of a documentation tool to support communication between TeleECG and rural EDs • Mapping and documentation of established referral pathways for ACS patients in each LHD • Development of a model of care to standardise care across the state
2. Establish centralised TeleECG service and expand to other LHDs	<ul style="list-style-type: none"> • Identifying a host LHD and detailed clinical governance processes • Establish centralised service with support from central agencies to expand TeleECG to other rural LHDs • Prioritise inclusion based on patient access requirements, staff skill mix, current service availability and technical readiness

Monitoring and evaluation

The monitoring and evaluation plan will include the four dimensions of value:

- Health outcomes that matter to patients
- The experience of receiving care
- The experience of providing care
- The effectiveness and efficiency of care

The information from the plan will be used to inform the model of care and business case for implementation at scale across NSW.

HNELHD already collected data on clinical outcomes from the MORACS RCT and additional variables will be collected as required. An economic appraisal of the MORACS RCT is in progress and additional metrics will be collected to support the efficiency elements of the evaluation. Full details of outcomes, measures and data sources will be specified in the monitoring and evaluation plan.

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Appendix 1: ICD codes used to identify acute coronary syndrome

Code	Description
I20.0	Unstable angina (UAP)
I20.9	Angina pectoris
I20.9	Chest pain, ischaemic (angina)
I20.9	Ischaemic chest pain (angina)
I46.9	Cardiac arrest
R07.4	Chest pain (non-traumatic)
I20.0	Unstable angina (UAP)*
I20.9	Pain in chest, ischaemic (angina)*
I20.9	Angina pectoris (AP)*
I46.9	Cardiac arrest
R07.4	Pain - chest (cardiac origin)
I20.0	Acute coronary syndrome (ACS)
R07.4	Chest pain - atypical
R10.1	Pain - epigastric
R10.4	Pain - abdominal
R06.0	Respiratory - SOB

*Denotes ICD codes merged and no longer individually available in the ICD-10 triage code selection

Appendix 2: Clinical workforce requirements

Delivery of the TeleECG clinical service is provided by a team of clinical nurse consultants (CNCs) (recommended level 2 CNC).

Specialist nurses provide advanced clinical consultancy to support rural nurses and general practitioner visiting medical officers to manage acute coronary syndrome (ACS), guided by the *NSW Pathway for Acute Coronary Syndrome Assessment*². This support is provided to multiple facilities and is delivered via telehealth.

The NSW nurses' and midwives award requirements for a CNC 2 considered relevant to the TeleECG role include:

- five years full time equivalent post registration experience
- at least 3 years full time equivalent experience in the specialty field
- post graduate qualifications relevant to the field appointed to.²³

This degree of specialty field experience and academic preparation is considered appropriate to the scope of the TeleECG CNC role. Suggested selection criteria, domains and functions have been adapted from the Hunter New England Local Health District (HNELHD) TeleECG service and are provided below for further information.

The TeleECG nurse provides advice on acquiring biomarkers and ECG, referral to a higher level of care and commencement of the ST-elevation myocardial infarction (STEMI) or non-STEMI pathways, in accordance with the *NSW Pathway for Acute Coronary Syndrome Assessment*.²

Suggested selection criteria for TeleECG clinical nurse consultant role

(Excerpt from HNELHD TeleECG CNC position description)

1. Demonstrated ability to communicate clinical concepts and information to clinical and non-clinical audiences and provide authoritative advice on clinical issues within field of expertise.
2. Demonstrated advanced analytical and complex problem-solving ability.
3. Demonstrated ability to develop a range of solutions based on specialist expert knowledge.
4. Demonstrated capacity to evaluate current clinical practice within the area of specialty and contribute interventions that mitigate risk and minimise impact on the organisation.
5. Demonstrated highly developed verbal and written communication skills necessary for documenting patient level data and providing clinical service information directly to clinicians and non-clinical staff.
6. Demonstrated skill and experience in interpreting electrocardiogram (ECG).
7. Demonstrated skill and understanding of the State ACS (Chest Pain) Pathway, national guidelines and understanding of the use of troponin in the identification of ACS.
8. Demonstrated experience and knowledge in rural emergency department management of patients with suspected acute coronary syndrome will be highly regarded.

Domains and functions of the TeleECG clinical nurse consultant

Clinical service and consultancy

Provides expert decision support for clinicians (nursing and medical) in target rural emergency departments (without emergency specialists typically role delineation level 1-3 across NSW)

Clinical leadership

Provides leadership in the ongoing review and evaluation of clinical practice that pertains to supporting assessment and management of acute coronary syndrome across rural NSW

Research

Adapts and applies relevant scientific research to clinical practice delivery within the TeleECG service

Education

Contributes to the development and delivery of specialised education for NSW clinicians, consumers and administrative support teams relevant to the service

Clinical services planning and management

Evaluates current practice and identifies opportunities and impacts for service development and/or improvement

Glossary

ACS	Acute coronary syndrome
CNC	Clinical nurse consultant
ECG	Electrocardiogram
ED	Emergency department
GP	General practitioner
ICD	International classification of diseases
ISBAR	Introduction, Situation, Background, Assessment Recommendation
IT	Information technology
LHD	Local health district
MRN	Medical record number
Non-STEMI	non-ST elevation myocardial infarction
Patient	An individual awaiting or under medical care and treatment, may also be referred to client or consumer
STEMI	ST elevation myocardial infarction
UAP	Unstable angina pectoris
VMO	Visiting medical officer

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The ACI's clinical networks, institutes and taskforces are chaired by senior clinicians and consumers who have a keen interest and track record in innovative clinical care.

We also work closely with the Ministry of Health and the four other pillars of NSW Health to pilot, scale and spread solutions to healthcare system-wide challenges. We seek to improve the care and outcomes for patients by re-designing and transforming the NSW public health system.

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